



HOUSING CONSTRUCTION: PROBLEMS AND PROSPECTS (AS EXEMPLIFIED BY RUSSIA)

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ABSTRACT

Objective: The purpose of the present article is to assess the potential of housing construction in Russia and develop managerial solutions for its development. **Methods:** Authors carried out an analysis of the housing construction condition in Russia during runtime from 2000 to 2019 to assess the development potential of the housing sector in the country. The resulting equation was used to predict the commissioning of residential buildings for the future until 2022. **Results:** The socio-economic transformations, taking place in the Russian Federation, have radically changed the approaches to solving the housing problem, the economic and organizational foundations of housing, and communal services. Many years of efforts to create legal and economic conditions for the transition to market methods of regulation, as well as the political will of the country's leadership, have yielded certain results. **Conclusion:** Of great importance for the development of the construction, as well as and housing and the communal complex was adopting and improving the legislative and regulatory framework, as well as the launching the National Project "Affordable and comfortable housing for Russian citizens". Nevertheless, at present, several problems related to the features of the reform period in this socially significant sector are becoming more and more evident. Problems in the development of the housing sector reinforce infrastructure constraints and pose a threat of slowing down social development and the formation of a common economic space. As the result of the analysis of the existing trends in housing construction in Russia, the main opportunities for the development of the country's housing sector were determined.

Keywords: Housing construction; Actual cost of construction; Residential buildings. Project financing; Escrow accounts; Projection.



CONSTRUÇÃO DE HABITAÇÕES: PROBLEMAS E PERSPECTIVAS (COMO EXEMPLIFICADO PELA RÚSSIA)

RESUMO

Objetivo: O objetivo do presente artigo é avaliar o potencial da construção de moradias na Rússia e desenvolver soluções gerenciais para o seu desenvolvimento. **Métodos:** Os autores realizaram uma análise da condição de construção de moradias na Rússia durante o período de execução de 2000 a 2019 para avaliar o potencial de desenvolvimento do setor habitacional no país. A equação resultante foi usada para prever o comissionamento de edifícios residenciais para o futuro até 2022. **Resultados:** As transformações socioeconômicas ocorridas na Federação Russa mudaram radicalmente as abordagens para resolver o problema habitacional, os fundamentos econômicos e organizacionais da habitação e serviços comunitários. Muitos anos de esforços para criar condições jurídicas e econômicas para a transição para os métodos de regulação do mercado, bem como a vontade política da liderança do país, deram alguns resultados. **Conclusão:** De grande importância para o desenvolvimento da construção, bem como da habitação e do complexo comunal foi a adoção e melhoria do quadro legislativo e regulamentar, bem como o lançamento do Projeto Nacional "Habitação acessível e confortável para os cidadãos russos". No entanto, atualmente, vários problemas relacionados às características do período de reforma neste setor socialmente significativo estão se tornando cada vez mais evidentes. Problemas no desenvolvimento do setor habitacional reforçam os constrangimentos de infraestrutura e ameaçam desacelerar o desenvolvimento social e a formação de um espaço econômico comum. Como resultado da análise das tendências existentes na construção de moradias na Rússia, foram determinadas as principais oportunidades para o desenvolvimento do setor habitacional do país.

Palavras-chave: Construção habitacional; Custo real de construção; Prédios residenciais; Financiamento do projeto: Escrow accounts; Projeção. Project financing: Escrow accounts; Projection.

1. INTRODUCTION

The housing sector is one of the largest and most complex elements of the economy, which in current conditions of scientific and technological progress, the spread of resource-saving technologies, designed to increase housing availability and comfort, requires new more flexible forms of management, susceptible to innovation. The complexity of housing sector management is related not only to several specific features of housing as a good but also to the fact that the interests of the population, government, and business directly influence its development. Therefore, a clear understanding of the control object and the relationships between the controls becomes important here. Thus, the achievement of sustainable development of the housing sector is due to the implementation of innovative forms of management, which



are based on an integrated approach that provides for forming new approaches to the interaction of economic entities in the development of innovative infrastructure on mutually beneficial partnerships between the main participants in the production process and homeowners.

Housing construction is a complex interconnected structure that includes a set of mechanisms for the redistribution of housing stock facilities and housing services created by them, based on a combination of the interests of all its participants and the competition for effective land use (Clapham, 2008). Housing services relate to the sphere of the current functioning of the housing stock and are determined by the set that each residential unit of the housing stock can produce. The operation of the housing stock is not only a source of satisfaction of human needs for housing but also a source of income for its owners. Ultimately, for the population and economic entities, operating in the housing market, the housing stock is valuable not just as such, but as an object that generates income (Franklin & Clapham, 1997; Kemp, 1995).

The residential real estate market is localized since its facilities are immovable and linked to the land. All plots of land within localities are differentiated. Housing is a durable commodity, which requires long-term care and maintenance. The degree of depreciation of housing stock depends on the quality of its maintenance. The owner of the housing can control the duration and degree of deterioration of the housing, spending money on its upkeep, restoration, and maintenance. Noted features directly affect the processes that occur in the housing sector, thus, determining the housing demand pattern (Panitz & Gluckler, 2020; Hartman & Levi, 1973).

The demand for housing construction projects shows how much housing buyers want to buy, that is, it depends on their number and individual specifics of demand, which are determined by the monetary capabilities, such as cost of housing and other goods and services, as well as by income and personal preferences. The demand for housing is directly proportional to the level of income and inversely proportional to prices, being elastic in the short term (Peterman, 2008).

The amount of housing that a buyer can purchase on the market at the current price level is a supply that limits the demand function. Some factors affect the housing supply. These include the level of gross investment in construction, as well as maintenance, and the rate of depreciation of the housing stock. Gross investments can be divided into new construction, reconstruction, and repair of already existing housing



stock. Net investment is the difference between gross investment in housing and the rate of its loss: disposal or depreciation. Every year, only a small amount of new housing enters the housing market, and therefore old housing remains the basis of the housing stock. A larger number of citizens live in old housing, and because of this, changes in prices for housing stock facilities change the supply of housing only in the long term (Van Wyk, 2006).

The formation of housing supply is mainly related to the quality of existing housing and its facilities (available housing stock and its condition) and the capital market (the level of capitalization in real estate), which determines the prices of housing and its production. At the same time, the housing supply is formed based on the needs of the population for housing and the level of income, received from the operation of real estate by its owners. The population's need for housing is primarily determined by the level of income accumulation, general economic and demographic conditions. The construction sector itself is part of the housing sector and is subject to the internal links of the system (Jung-in Kim, Eun-Young Jee, 2019).

An external factor affecting the behavior of the system may be the return level of investment. With an increase in the profitability of investments in other economic sectors, income from the housing stock becomes less attractive for investors, and vice versa. The behavior of investors is influenced by changes in the state tax policy regarding real estate and risks from investments in housing. The decrease in the interest rate on long-term loans contributes to the expansion of demand for housing as an ownership facility, and vice versa, an increase in this rate leads to a narrowing of demand for housing stock and a drop in construction volumes. An increase in demand for housing as a facility leads to an increase in housing prices, an increase in the construction volume and housing stock (Polcin, Mahoney, Mericle, 2020).

Another external factor, influencing the housing sector condition is the change in the housing construction conditions. Limited availability and high rates on long-term construction loans lead to an increase in construction costs and a decrease in its volume when the profit margin falls. Tightening local zoning rules for construction increases construction costs and reduces the profitability of projects. The construction volume is also influenced by factors of land use, as well as restrictions and price increases for land plots for the construction of residential facilities. Eventually, reducing



the construction volume leads to a decrease in the supply of housing which is manifested in an increase in housing prices (Walker, 2018).

2. METHODS

As part of the present work, at the first stage, an analysis of the housing construction condition in Russia was carried out during runtime from 2000 to 2019 to assess the development potential of the housing sector in the country. The analysis involved the following indicators:

- commissioning of residential buildings in the Russian Federation;
- the number of apartments built in the Russian Federation and their average size;
- the commissioned total area of residential buildings in the Russian Federation by number of stories;
- the average actual cost of construction per square meter of the total area of residential premises in commissioned residential buildings in the Russian Federation (average prices in the primary housing market, average prices in the secondary housing market).

In the second stage, a correlation and regression analysis was conducted, which allowed identifying the main factors affecting the development of housing construction. The main indicator, characterizing the development level and pace of the real estate market is commissioning of the total area of housings, which is why this figure was chosen as a dependent variable Y. Important parameters are also those that were selected as explanatory variables:

X1 – the amount of work, performed by the type of economic activity indicated as "construction", bln rubles;

X2 – investments in fixed assets for the development of the production base of organizations engaged in construction, bln rubles;

X3 – the number of apartments built, thousand pcs.;

X4 – the average size of the built apartments, sq. m. of the total area;

X5 – average prices on the primary housing market in the Russian Federation, rubles/sq. m.;

X6 – the number of private property construction organizations operating in the Russian Federation, pcs.



At the final stage, the resulting equation was used to predict the commissioning of residential buildings for the future until 2022. The most suitable for this purpose are formalized prediction methods, such as in particular, extrapolation methods. In this case, the least-squares method was chosen. The working formula of the least-squares method is as follows:

$Y_{(t+1)} = a \cdot x + b$, where $t+1$ is the prediction period, a and b are the coefficients, x is the time symbol.

$$a = \frac{\sum (Y_f \cdot X) - (\sum X \cdot \sum Y_f)/n}{\sum X^2 - (\sum X)^2/n}$$

$$b = \frac{\sum Y_f}{n} - \frac{a \cdot \sum X}{n},$$

where Y_f is the actual value of the dynamics series, n is the number of the time series levels.

3. RESULTS

The dynamics of the indicator reflecting the commissioning of residential buildings in Russia over the past two decades have been multidirectional. The volumes of housing being commissioned grew dynamically (2000-2008), then fell (2008-2010), then rose again (2010-2015). The decrease in housing commissioning in 2018 compared to the same period of previous years was largely laid down in 2014-2015 and was associated with a reduction in the number of new projects, launched during the crisis. A decade after starting the reforms, the volume of housing construction has sharply decreased. Thus, in 2011, the volume of housing construction amounted to 62.3 mln sq. m., in 2012 – 65.7 mln sq. m., in 2013 – 70.5 mln sq. m., and only in 2015, the volume of housing construction has reached a historical maximum equal to 85.3 mln sq. m. More interesting is the situation that developed in this sector later. According to the data, the growth dynamics of previous years in subsequent years has not been preserved, but on the contrary, began to deteriorate.

However, in 2019, the housing commissioning rate amounted to 80.3 mln sq. m., which is 5.7% more than that in 2018. At first glance, it may seem that the state of housing construction in the country has improved again. However, it should be bear in mind that this indicator takes into account both the commissioning of multi-housing



units (MDU) and the commissioning of houses built, by the population at the expense of their own or borrowed funds, i.e., private housing construction (PDC). It is worth noting that the state does not influence the volume of individual housing construction since the planned indicators, laid down in the national project for the housing construction development do not take into account the volume of PDC.

Structural changes in the housing market occurred not only in terms of different building rates of MDU and PDC but also in terms of changes in the commissioning of apartments with different numbers of rooms (Fig. 1).

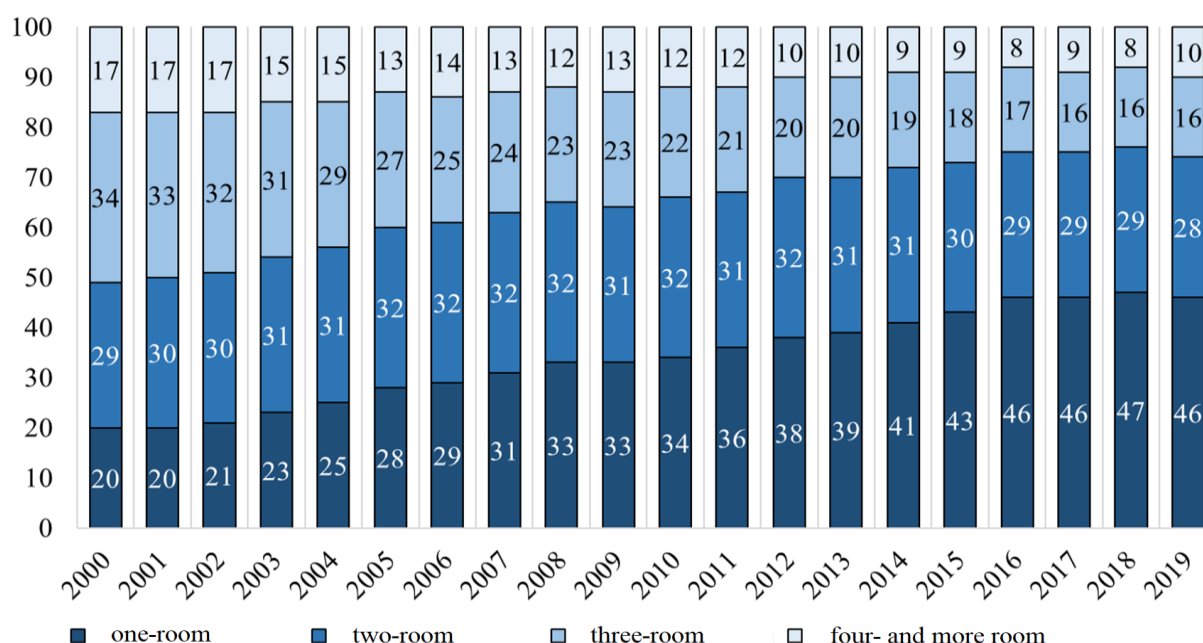


Figure 1. The number of apartments by type, commissioned in the Russian Federation (as a percentage of total commissioning) Source: Compiled by the authors

The change in this structure was a direct reflection of the change in demand of the population, which shifted towards cheaper housing. Such dynamics resulted from the crisis that began in mid-2014, which led to a drop in real incomes of the population, that against the background of an increase in the interest rate on housing loans, contributed to the decision of a certain part of citizens to refuse to purchase a multi-room apartment in favor of one-room housing. Over the past 19 years, the number of one-room apartments in the structure of commissioned apartments has increased by more than twice, reducing the number of three-room, four-room, or multi-room apartments. The number of two-room apartments under construction remains almost unchanged. This trend has affected the average size of apartments. Thus, from 2009

to 2016, there was a steady decrease in the average size of apartments from 85.3 to 68.7 sq. m. From 2016 to 2019, the average apartment area tends to increase, amounting to 73.2 sq. m in 2019, which was a consequence of the increase in the floor space of single-room apartments.

The average actual construction cost per square meter of the total area of premises in the commissioned residential buildings in the Russian Federation over the past two decades significantly increased (Fig. 2).

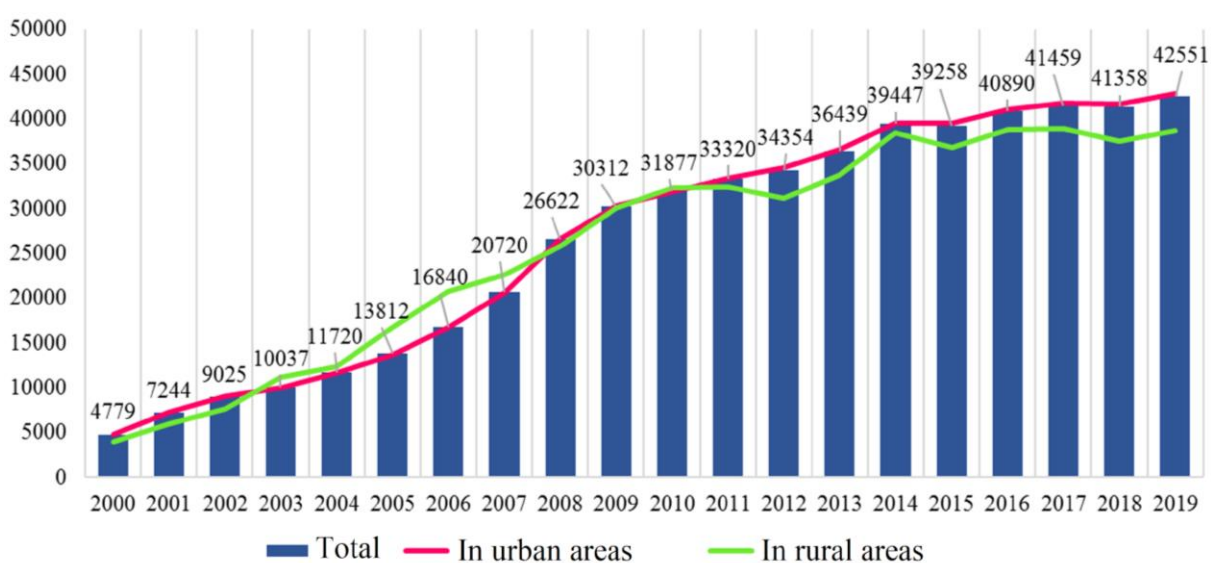


Figure 2. The average actual construction cost per square meter of the total area of premises in the commissioned residential buildings in the Russian Federation (rubles) Source: Compiled by the authors

Having data on the construction cost and prices in the primary market, it is possible to calculate the estimated margin per square meter of housing (Fig. 3).

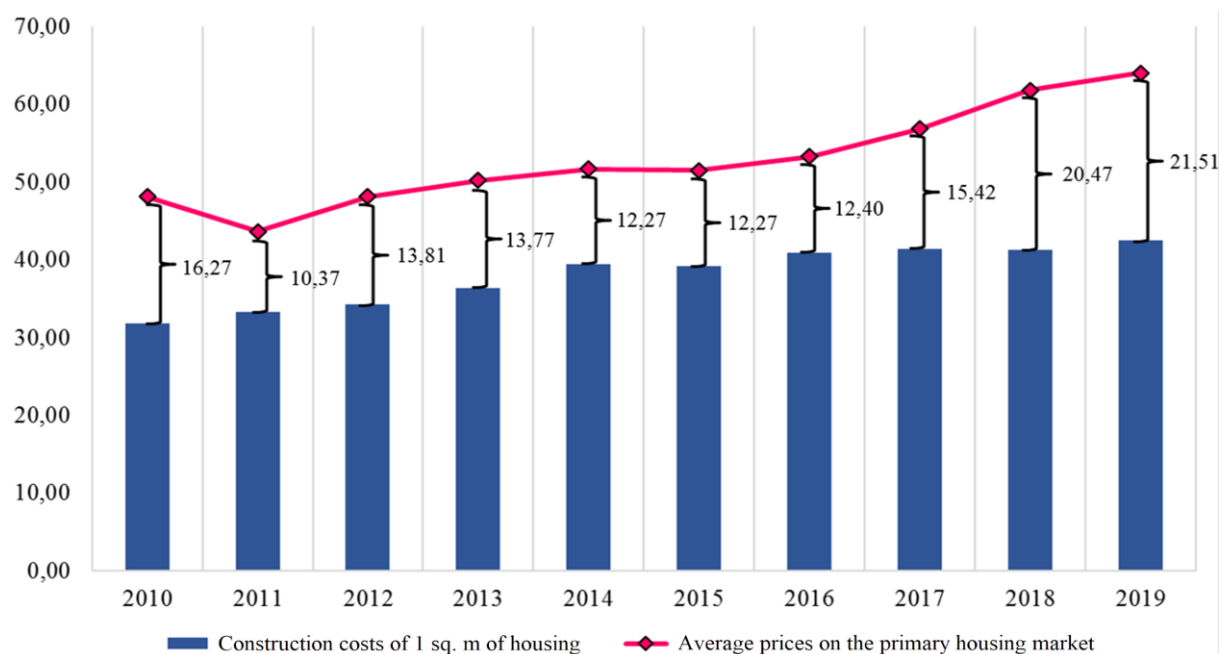


Figure 3. The estimated margin per square meter of housing in Russia (thousand rubles). Source: Compiled by the authors.

Thus, the margin increases every year. While for five years, from 2012 to 2017, the margin practically did not change or the changes were less than one thousand rubles, then over the last three years, from 2017 to 2019, the total margin was more than 9 thousand rubles, reaching 21.51 thousand rubles.

One of the main stages of our methodology was conducting a correlation and regression analysis to identify factors affecting the development of housing construction in Russia. The analysis was carried out based on data retrieved from the Federal State Statistics Service for 2009-2018. The results of the correlation analysis are presented in Table 1.

Table 1. Correlation analysis

	Y	X1	X2	X3	X4	X5	X6
Y	1						
X1	0,7844047	1					
X2	0,3305376	0,5174262	1				
X3	0,9818165	0,8685791	0,3471083	1			
X4	-0,8542973	-0,955748	-0,447784	0,934174	1		
X5	0,6072997	0,8652951	0,1797494	0,6859141	-0,754309	1	
X6	0,7141088	0,9455105	0,370615	0,8248909	-0,946591	0,843119	1

Based on the correlation analysis, it can be seen that all indicators are related to the dependent variable. Most parameters manifest a very strong or significant relationship with the indicator reflecting the commissioning of housing (X1, X3, X4, and X6), indicators X2 and X5 show a strong relationship. It is also seen that there is an inverse relationship between the dependent variable Y and the indicator X4, while the relationship with other parameters is direct. It is also worth noting that there is multicollinearity between all the indicators, and therefore, only one indicator will remain in the model – X3, since it has the greatest influence on the dependent variable Y (0.98 > 0.78; 0.33; 0.85; 0.61; 0.71).

Thus, when building a regression model, the indicator X3, corresponding to the number of built apartments (thousand units) was selected. The resulting regression equation is as follows:

$$y = 0.0511x + 22.706$$

We obtained a paired regression model. The next step is to check the quality of the resulting model. To do this, we analyzed regression statistics (Table 2).

Table 2. Regression statistics

Multiple R	0,981816505
R-square	0,963963649
Normalized R-square	0,959459105
Standard error	2,042027012
Observations	10

Good model quality is confirmed by the Normalized R-square indicator which is the determination coefficient, adjusted to the sample size since it is 0.96, which practically does not differ from the R-square indicator.

Based on subsequent calculations, it can be concluded that the equation of the form $y=0.0511x+22.706$ has a high degree of reliability and is suitable for predicting the indicator reflecting commissioning of residential buildings depending on the number of apartments built in the Russian Federation. However, the results obtained contain a false correlation due to the presence of a linear trend in each of the series. There are several methods to eliminate the trend. Let's use one of them, which is called the "Time Factor Inclusion Method".

Employing this method, the regression equation will be written as:

$$Y_t = b_0 + b_1 X_t + b_2 t$$

Thus, we got a model with two explicative variables. Using the least-squares method, we obtained the following equation:

$$Y_t = 14.28 + 0.07 X_t - 1.06 t, R^2 = 0.991$$

As a result of subsequent transformations, we obtained an equation of the form

$$y = 0.0511x + 22.706$$

which has a high degree of reliability, and is suitable for predicting the indicator reflecting commissioning of residential buildings depending on the number of apartments built in Russia, which can be used to predict indicators characterizing the development of the industry.

At the second stage of the analysis, we built a prediction for the commissioning of residential buildings in Russia until 2022. To begin with, we calculated the predicted values for the indicator characterizing the commissioning of residential buildings in Russia in general (Table 3).

Table 3. Calculation of predicted values for the indicator "Commissioning of residential buildings" in Russia

Years	Commissioning of houses, mln sq. m	Time symbol	$Y_f \cdot X$	X^2	Y_p	Calculation of the average relative error $\frac{ Y_f - Y_p }{Y_f} \cdot 100$
2010	58,4	1	58,4	1	63,66	9,01
2011	62,2	2	124,4	4	65,96	6,05
2012	65,7	3	197,1	9	68,27	3,90
2013	70,5	4	282	16	70,57	0,10
2014	84,2	5	421	25	72,87	13,46
2015	85,3	6	511,8	36	75,17	11,87
2016	80,2	7	561,4	49	77,47	3,40
2017	78,5	8	628	64	79,77	1,62
2018	75,1	9	675,9	81	82,02	9,29
2019	80,1	10	801	100	84,38	5,34
Total	740,2	55	4261	385	740,2	64,0475498
Predicted values						
2020	86,68	11				
2021	88,98	12				
2022	91,28	13				

The average relative error of the predicted values is:

$$\epsilon = 64.0475498/10 = 6.40\%$$

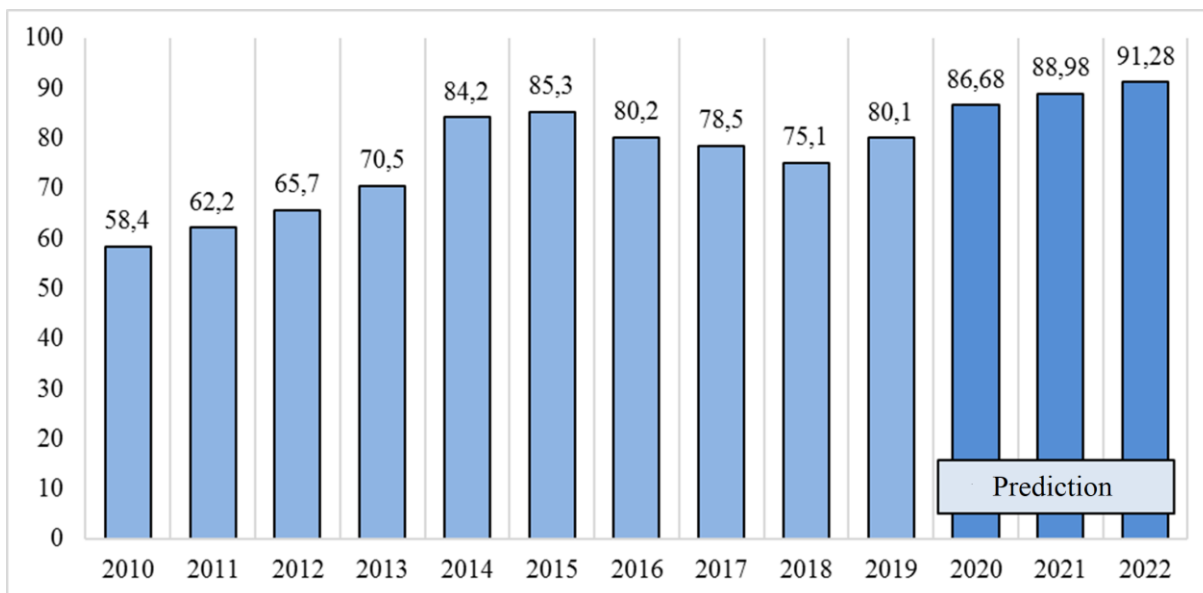


Figure 4. Predicted values of residential buildings commissioning in the Russian Federation (mln sq. m.) Source: Compiled by the authors

The average relative error is within the range $\epsilon < 10\%$; therefore, the accuracy of the predicted values of commissioning of residential buildings is quite high. Considering the prediction, the schedule of commissioning of residential buildings in Russia looks as follows (Fig. 4).

4. DISCUSSION

Currently, the housing construction industry is being reformed. The first part of the industry reform was related to changes in the legislative framework, which began to take effect on July 1, 2018. They were mainly aimed at strengthening the requirements for developers, increasing bank control over them, and also providing for the voluntary possibility of switching to escrow accounts. The actual consequence of this stage was a record number of construction permits received by developers in the first half of 2018. Market participants tried to stock up on land plots as much as possible, on which construction could be carried out according to the old and understandable rules. This policy allowed maintaining the volume of ongoing construction at a fairly high level in recent years.

The second part of the industry reform was launched at the beginning of 2019. From July 1, 2019, all projects that have not reached the required percentage of construction readiness and percentage of sales, as well as new projects must be implemented through the project financing mechanism with the involvement of banks. However, before introducing the project financing mechanism, many developers had no experience working with banks. The banks also found themselves in a complicated situation, because it was required to radically strengthen competencies in construction in less than six months, as well as to develop and offer a new product to the construction market. As a result, the housing construction market tolerates the reform quite painfully.

A year later, only about a third of the construction sites were realized through project financing. This means that in a situation of lagging replacement of equity participation agreements with project financing, the reduction in construction volumes may become even more significant. In addition to the fact that developers overcome the natural difficulties caused by the reform, they are more cautious about launching new projects due to declining demand. Housing sales occur unevenly throughout the year and have a clear trend to increase the volume of transactions from quarter to quarter.

However, since the third quarter of 2019, when the mandatory transition to project financing was implemented into practice, the volume of registered co-investment agreements (CIA) has been decreasing every quarter compared to the same period last year. In the third quarter of 2019, the volume of registered CIAs decreased by 16% compared to the third quarter of 2018. In the fourth quarter of 2019, the volume of registered CIAs decreased by 53% compared to the fourth quarter of 2018, and in the first quarter of 2020, the decrease in the volume of CIAs was 26% compared to the first quarter of 2019, and 7% compared to the first quarter of 2018. Many developers at the end of the first quarter of 2020 noted an increased protective demand for apartments, associated with the depreciation of the ruble. Even the declining mortgage rate and the growth in the volume of mortgage loans, which traditionally serve as a key driver of housing sales, could not support demand.

5. CONCLUSION

An analysis of the practice in the application of main most typical housing financing schemes allows concluding that they contribute to solving the housing problem in



Russia, and are a necessary stage in the development of a civilized housing loan market since they create conditions for transforming transitional models into classical ones.

From the analysis of foreign experience in financial support of housing construction, it is known that the effective functioning of the housing finance and lending system is possible only if observing the balance of benefits and risks of all entities, involved in this process (construction organizations, the population, banks, insurance companies, and the state). There is also no doubt that when establishing a housing finance system in Russia, it is necessary to be guided by the general initial provisions of building a modern housing finance system, widely tested in world practice. However, today's Russian reality does not yet provide an opportunity to take full advantage of the world experience due to the absence of the most important element – accommodating the balance of interests of all market participants.

As a result, many indicators, necessary for the effective development of the housing market and housing lending in Russia are not comparable. These are balances of interbank rates and the cost of a loan for the purchase and construction of housing, household income, construction costs and the cost of real estate, loan rates, and construction profitability, general housing stock, a saturation of the market by housing and credit services.

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