Development trend of the construction market in Russian regions

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Abstract. Construction in Russia is a dynamically developing type of economic activity. This is facilitated by various programs that support construction at both the municipal and federal levels. In the paper the method of economic-statistical analysis application of the construction market of the Orenburg region is formed, which will allow identifying patterns and factors influencing the development of the construction market of the Orenburg region, studying trends in the volume and structure of the construction market in order to identify promising directions of the construction market development in the region. As a result of applying methods of economic and statistical analysis (structure, dynamics and forecasting and factor analysis), structural and dynamic changes in the regional construction market are identified, trends in the dynamics of construction volume and factors affecting the growth rate (decline) of the construction market in the region are determined.

1. Introduction

Construction in Russia is a dynamically developing type of economic activity. Throughout the history of Russia, uneven construction volumes have been observed over time. In the 20th century, the maximum input of habitation is considered to be the period of 60-80s, when the country’s leadership introduced the so-called standard building. The 1990s can be described as destructive in all areas of the economy, including construction. The pace of residential real estate construction declined sharply during this period. With the beginning of the new century, a new era in construction began, and new tools for implementing construction projects appeared, such as the Federal law on mortgages and shared construction. In the Orenburg region over the past two decades, the construction market has undergone significant changes, which has increased the volume of construction work, commissioning of housing. This is facilitated by various programs that support construction at both the municipal and federal levels. The development of construction improves the quality of life of the population, as the need for housing is the basis of their life for most people.

These points determine the relevance of the research topic, as well as determine its aim and objectives.

The aim of the research is to provide a comprehensive economic and statistical analysis of changes in the construction market in the Orenburg region.

Within the framework of the selected research, the following tasks were set and solved in connection with the aim:

- the theoretical foundations of construction research were studied;
- the analysis of the current state of construction in the Orenburg region was carried out;
The analysis of housing commissioning in the Orenburg region was carried out;
the analysis of the dynamics of housing prices in the primary market of the Orenburg region was done;
forecast of housing input volumes using the trend equation, multiple regression equation, regression equation, and trend equation was done;
the factors that have the greatest impact on the development of the construction market were identified.

The subject of the research is the construction market of the Orenburg region.
The object of research is the Orenburg region.
The choice of the research period (2001-2018) is justified by the presence of crisis phenomena in the economy during this period, including those related to the introduction of US and European sanctions.

2. Materials and methods
In the process of studying the current state of the construction market of the Orenburg region, the authors used such methods of economic and statistical research as tabular, graphical, analysis of structural changes, analysis of dynamics series, methods of forecasting using trend models and factor analysis.

The authors suggest the following scheme of economic and statistical research of the state of the external debt of the Russian Federation (Fig. 1).

Figure 1. Scheme of economic and statistical research of the state and prospective development of the construction market of the Orenburg region [5].

As a result of using the proposed scheme of economic and statistical research of the state and prospective development of the construction market, it is possible to obtain comprehensive assessment
of the dynamics and structure of construction in the region, forecast indicators and evaluate the prospects for development.

3. Results
To analyze the state of the construction market in the Orenburg region, it is important to consider its development dynamics (Fig. 2). The growth rate in 2007 compared to 2006 was 20.5%, this was largely due to the development of mortgage lending. However, under the influence of the global financial crisis in 2008, the Russian economy entered a recession, which could not but affect construction. [3] The volume of construction work in 2009 compared to 2008 reduced by almost a third. The recovery of construction rates occurred only by 2011, when it was possible to reach the level of 2008. In the future, there is an increase in the volume of construction work. Even the negative economic events of 2015-2016 did not have a critical impact on construction. In 2016, the volume of construction work amounted to 49750.8 million rubles, and in 2018 it reached more than 66 billion rubles. Let us analyze the construction trends for 2005-2018. [6]

Figure 2. The volume of work performed by the type of economic activity “Construction” in the Orenburg region, million rubles.

The steady economic development of Russia since the beginning of the 2000s has been reflected primarily in housing construction. Over the past fourteen years, every year there has been an increase in the area of residential buildings in the region (Fig. 3). The fundamental factor in this situation is mortgage lending. The long-term nature of mortgage loans has had a positive impact on the effective demand of the population. [7] But since 2008 in Russia, as in the whole world, there was a financial and economic crisis, which negatively affected the commissioning of residential buildings and housing construction in general, as well as the solvency of the population.

Figure 3. Dynamics of commissioning of residential buildings in the Orenburg region in 2005-2018.

In 2009, housing commissioning decreased in comparison with 2008 by 35.8 thousand m², and in 2010 by 189.3 thousand m². But in 2011, due to state support, there was an increase in the commissioning of housing by 156.7 thousand m². State programs to provide housing for the population began to be developed. These include, in particular, programs to relocate residents of the region from dilapidated and emergency housing, providing housing for socially vulnerable categories of citizens, such as orphans and the disabled, eliminating queues for housing among military personnel, etc. And, starting from 2014, there was a sharp jump in the commissioning of residential
buildings in the Orenburg region compared to 2013 by 361 thousand m$^2$, and in 2015 it increased by another 37.2 thousand m$^2$. In 2015, the maximum value of housing commissioning was reached, which was 1190.1 thousand sq. m.

However, at the end of 2015, the country was again subjected to crisis phenomena, this time related to economic sanctions imposed against the Russian Federation, as well as the destabilization of the national currency and oil exchange rates. This negatively affected both the population’s ability to pay and the region’s ability to implement social programs. Thus, the introduction of housing in 2017 compared to 2015 decreased by almost 300 thousand sq. m. And only in 2018, there was a new trend to increase the volume of housing construction.

One of the factors that influenced the increase in demand for housing was the development of mortgage lending. As a result, there was an increase in the effective demand of the population. The main part of commissioning of residential buildings is due to own and borrowed funds in urban areas.

The important indicator of the economic state of the region is the market value of housing. Housing affordability is one of the key needs of the population, and has a great impact on the social security of citizens. Here there are data on the cost of housing in the primary and secondary real estate market for 2007-2018.

During the study period, fluctuations in the housing market prices are similar to changes in the pace of construction. If the average difference in the cost of sq. m. is about 8%, in some years (2014-2015), the gap reached 17-18%. In the future, there is a gradual smoothing of the difference and in 2017 the cost of housing in the primary and secondary markets is almost the same. In 2018, the housing market has again seen an increase in the cost of housing. At the same time, prices in the primary and secondary housing markets are comparable. So, the cost of 1 sq. m. in the new building on average was 39138 rubles, in the secondary market 39875 rubles.

Due to the introduction of Federal law 214-FZ into legislative proceedings, the situation is changing significantly. In 2018, the main part of construction projects in the Orenburg region was built on the basis of the groundwork made in the period preceding the entry into force of the new law.

In the period from 2007 to 2018, there is an increase in the cost of primary housing in the Orenburg region. In comparison with 2007, in all subsequent years, the cost of housing increased from 18.4% to 43.58%. In 2018 compared to 2008 the price of primary residential real estate in the Orenburg region increased by 11,142.4 rubles or 39.8%. The maximum increase in the price of 1 sq. m. falls on 2014 and is 43.58% in relation to 2007. [18] (Fig. 4).

![Figure 4: Average cost in the primary and secondary housing market in the Orenburg region, rubles/sq. m.](image)

The largest increase in the cost of housing occurred in 2008 compared to 2007 by 28.06%. Also in 2012, the cost of primary residential real estate increased by 10.66% compared to 2011. In other periods, the changes are less expressed. The cost of housing has been declining since 2015, in 2017 it
increased slightly, and only in 2018 there was a trend to increase the cost of real estate in the housing market. The increase in 2018 was 3.58.

To determine the effective trend equation, we need to pay attention to the approximation coefficient. Among the given trends, the power and polynomial functions have a higher indicator than the others. To make decisions and forecast, we will use the power function trend.

Let us check the selected model for adequacy by calculating the average relative error using formula 1. The result of calculating the average relative error showed that the power function has an error of 4.04%. So we can say that the function has high accuracy.

Let us check the selected model for adequacy using the Durbin-Watson criterion according to the formula:

\[ d = \frac{\sum_{t=2}^{n}(e_t - e_{t-1})^2}{\sum_{t=1}^{n}e_t^2} \approx 2(1 - r), \]  

where \( r \) – first-order autocorrelation.

The Durbin-Watson criterion \( d=1.99 \). We will determine the values of the Durbin–Watson statistics from the table at the 5% level of significance of the Durbin-Watson criterion, the upper and lower confidence limits. According to the Durbin-Watson table for \( n=12 \) and \( k=1 \), we find: \( d_1 = 0.97 \) and \( d_2 = 1.33 \). Therefore, there is no autocorrelation and the model is adequate. The resulting model can be used for forecasting. [11]

Thus, we can conclude that in the Orenburg region, construction plays an important role in the development of the socio-economic aspect of the population’s life. Crisis processes in the country’s economy as a whole have a negative impact on the financial sector of the region. However, despite the negative phenomena, the region managed to maintain a high volume of construction work in 2015-2017, and significantly increase it in 2018. [12]

One of the indicators of the economic activity “Construction” is the level of commissioning of residential buildings. In 2001-2018, there was a significant change in the dynamic range of the above indicator.

Commissioning of housing in the analyzed period was generally increasing. The first maximum peak occurred in 2007, when 852/4 thousand square meters of housing were introduced. Further, under the influence of the global financial crisis in 2008, commissioning of housing was decreasing and in 2010 this figure was only 586.6 thousand square meters.

The second maximum peak of housing commissioning was observed in 2015, and amounted to 1189 thousand square meters. This is 602 thousand square meters more than in 2010, i.e. more than twice. This phenomenon indicates a favorable financial situation of the population and an increase in the number of transactions for the purchase of housing. [21]

Since the beginning of 2016, the country’s economy has entered a period of recession, which has affected the number of built and commissioned meters of residential real estate. In 2017, the volume of commissioned housing was 892 thousand square meters, which is almost 300 thousand square meters less than in 2015.

The increase in commissioning of residential buildings in the Orenburg region is an indicator of the stable financial situation of the population, which resulted in an increase in the number of transactions for the purchase of housing.

During the period under review, there are periods of significant decline in the dynamics of housing stock commissioning; this is due to depressive phenomena in the economy. [10]

If the above trend continues, the volume of housing commissioning in 2019 may be 958.10 thousand sq.m. and in the range (883.31;1032.89), in 2020 it may be 973.30 thousand sq. m. and in the range (897.50;1049.10), in 2021 it may be 987.99 thousand sq. m. and in the range (924.40;1080.01), and in 2023 it may amount to 1015.97 thousand sq. m. and be in the range (937.18;1094.76).

The forecast of housing commissioning for 2019-2023 was carried out using the trend equation and the regression equation. [20]
The trend of housing commissioning is best described by a power trend. According to the forecast, the volume of housing commissioning will increase, and in 2019 it may reach 958.10 thousand sq. m. and be in the range (883.31;1032.89), and in 2023 it may reach 1015.97 thousand sq.m. and be in the range (937.18;1094.76) (table 1).

Table 1. Forecast values of residential real estate input in the Orenburg region (point and interval forecast), thousand sq. m.

| Years | Lower confidence limit | Forecast | Upper confidence limit |
|-------|------------------------|----------|------------------------|
| 2019  | 883.31                 | 958.10   | 1032.89                |
| 2020  | 897.50                 | 973.30   | 1049.10                |
| 2021  | 911.18                 | 987.99   | 1064.80                |
| 2022  | 924.40                 | 1002.20  | 1080.01                |
| 2023  | 937.18                 | 1015.97  | 1094.76                |

Source: compiled by the authors

The correlation and regression analysis revealed a strong dependence of housing commissioning on the level of per capita income of the population and the consumer price index. Using the trend equation, the values of the above parameters are predicted for 2019-2023. Based on this, the forecast of housing commissioning is made using the regression equation. According to the forecast, housing commissioning in the Orenburg region will increase in the next five years. In 2019, housing commissioning may amount to 1017.18 thousand sq. m. and be in the range (947.36; 1086.99), and in 2023 the level of housing commissioning can reach 1129.8 thousand sq. m. and may be in the range (1059.99; 1199.61).

The market value of housing is also an important indicator of the socio-economic development of the region, as it is the availability of housing that has a great impact on the social security of citizens.

4. Summary
Thus, we can conclude that the forecast values of the volume of housing commissioning in the Orenburg region are increasing. According to calculations based on the trend equation housing commissioning in the region in 2023 may reach 1015.97 thousand square meters.

The forecast of changes in the cost of housing in the primary market in the period 2019-2023 was made using the trend equation. According to the forecast, the cost of housing in the primary market will increase, and in 2019 it may be 40150.96 rubles/sq. m. and be in the range (37681.39;42620.53), and in 2023 it may reach 41420.05 rubles/sq.m. and be in the range (37711.26;45128.84).

Correlation and regression analysis was used to determine the relationship between performance and factor characteristics. Based on the regression equation, a forecast of changes in the value of primary real estate was made. According to it, the growth rate of the cost of primary housing in the Orenburg region with realistic forecast may be 102.3 % and be in the range (101.7;102.9), with optimistic forecast may reach 104.3% and be in the range (103.7;104.9), with pessimistic forecast may be 95.4% and may be in the range (94.8; 96.0) [22].

In the Orenburg region, construction activity is one of the most progressive, effective and large-scale types of activity, but there are problems such as:
- lack of qualified workers who leave for other, more developed regions on the background of the economic decline;
- the cost of building materials has increased, which leads to higher prices for residential buildings;
- irrational territorial placement of production facilities leads to high transport costs, which fall on the cost of construction projects.

To solve these problems, the Orenburg region needs to continue implementing new technologies and its own production of construction materials, which will simplify the process of building houses and make housing more affordable for the population. It is also necessary to create competitive jobs for high-quality professionals in order to build high-quality, comfortable and aesthetic housing.
5. References

[1] Akulova A Sh, Golchenko E I 2016 Analysis of the current state and main trends in the development of the construction market and its segments (on the example of the Orenburg region) (Scientific periodical) 11 33-35

[2] Alexandrova L A, Lapteva E V, Ogorodnikova E P 2019 Digital transformation of the Russian economy, features and ways of development Materials of the international research competition: YEAR EXPERT 2019 4-9

[3] Evseeva E I 2015 Modern problems of housing construction development in Russia Volga Region Scientific Bulletin 6-2 (46) 16 – 18

[4] Kitaev M A 2015 Advantages and problems of low-rise construction in Russia Volga Region Scientific Bulletin 7 82 – 87

[5] Lapteva E V, Portnova L V Practical training in statistics: theory of statistics and economic statistics. Orenburg: IPK “University” 227

[6] Kogan Yu V 2019 Topical issues of interconnected development of housing stock and social infrastructure Housing construction 9 48-52

[7] Kozhukhar A O 2016 Analysis of problems and main trends in the development of housing construction in Russia Problems of Economics and Management 12 (64) 46 – 49

[8] Buzyrev V V, Plakhiy A Yu 2016 Elimination of the housing problem based on the revival of industrial housing construction in the regions of Russia Problems of the modern economy 1 128 – 130.

[9] Ogorodnikova E P, Petrina A V 2017 Assessment of tax potential as a component of investment attractiveness of the Orenburg region Competitiveness in the global world: economy, science, technology 12 (59) 970-976.

[10] Korotin S A 2013 Features and development trends of the regional market of low-rise housing construction Regional economy 1 (22) 93 – 96

[11] Saenko I A 2013 Analysis of the dynamics and structure of housing commissioning in the Russian Federation Economic analysis: theory and practice 37(292) 60-65

[12] Svenik T V 2015 Adjustment of housing construction strategies in the context of the crisis Proceedings of Irkutsk State Economic Academy 6 941 – 946

[13] Soldatova L A, Soldatov S A, Davydova N Yu 2015 On the analysis of the housing construction market in the Orenburg region Housing strategies 2 (2) 101-108

[14] Starkova N O, Mirzoyan A R 2014 Current state and features of housing construction development in the Russian Federation Science and modernity 33 222-226

[15] Shubin I L, Umnyakova N P, Matveeva I V, Andrianov K A 2019 The quality of the building shell – the basis for creating environmentally safe living environment Housing construction 6 10-15

[16] Kannan M R, Santhi M H 2013 Constructability Assessment of Climbing Formwork Systems Using Building Information Modeling Procedia Engineering 64 1129-1138

[17] Lyalin D O, Mashtaler S N, Dmitrenko E A 2017 Application of the Autodesk Revit software complex in project activities Proceeding of the Donbas National Academy of Civil Engineering and Architecture 3 23-27

[18] Martin D D 2017 Evans External balances, trade and financial conditions The Journal of International Economics 107 165-184

[19] Roos G, Pike S, Fernström L 2010 Intellectual capital: management approach Saint Petersburg: Higher School of Management 436

[20] Sadkova E 2013 Out of 100,000 migrants having a work permit, only 352 persons are qualified specialists URL: https://ok-inform.ru/obschestvo/3702-v-peterburg-chashche-vsego-priezhuyat-uzbeki.html (access date: 15.04.2019)

[21] Combes P P, Mayer T, Thisse J F 2008 Economic geography. The integration of regions and nations. Princeton University Press 399
[22] Tsyganov A 2018 Control over Foreign Investments in the Economic Entities of Strategic Importance [Electronic resource] URL: www.usrbc.org/pics/File/tsyganov/FZ-57%20USRBC%202012%20%5BCompatibility%20Mode%5D.pdf (access date: 15.10.2019).