Peculiarities of Housing Construction Development in the Region

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Abstract: The article deals with the main distinct features of housing construction development by the example of one Russian region. The main obstacles for housing construction development are revealed. The construction is the basis for development of other sectors of national economics that is why the policy of stimulation of investment activity in construction sector is carried out in the region. In order to predict the volume of housing construction, a modified method of running moving average with weighting coefficient combined with the system theory of linear equations was used. The calculations revealed that the stable rates of dwelling commissioning are predicted in the region. The authors developed a set of measures for regional housing construction support, which include the following: measures on tax regulation updating; simplification of registration procedure of construction documents; development of communal infrastructure; stimulation of housing demands by means of support of real estate mortgage programs and development of rental housing system.

Key words: Housing construction · Prediction · State regulation

INTRODUCTION

Economic development of the Russian Federation is based on the priorities of growth, reasonable, economically viable distribution of productive forces and housing construction, providing the existing and planned population needs. Positioning of the state role as a guarantor of civil law observation should include its coordinate actions in development of construction sector and formation of favorable investment conditions to provide the interest in implementation of housing programs of the construction organizations themselves.

At present, the investment-construction sector is the leading industry of national economy, where the vital problems of structural reorganization of material base of the whole country production potential and development of non-production sphere are solved. Thus, based on the data of National Agency for Financial Studies, one work place in construction sector insures employment for up to six people in related sectors [1]. Construction of both housing and commercial properties has a synergetic effect

of investment attraction to other sectors - banking sector, consuming goods industry, trade, the services of which provide the arising demands of new owners of the constructed real estate [2]. Besides, housing construction is also a generator of tax revenues to the budgets of all levels, the size of which is fully able to cover the required expenditures of the sector on preparation of the ground for complex housing construction. According to preliminary estimates, one ruble of state investments to construction of social and engineering infrastructure in housing construction brings about from 3 to 6 rubles of investments of capital providers and population, ensuring almost 100-percent repayment of invested state funds to the budget as tax revenues [3]. In whole, construction is a growth point for the state economy, security of its effective growth both in economic and social plan.

The solution relevancy of the range of problems in the sector of housing construction development is outlined by the fact, that, despite the creation of basis for residential real estate market performance in the Russian Federation, at present, only a limited family ambiance with

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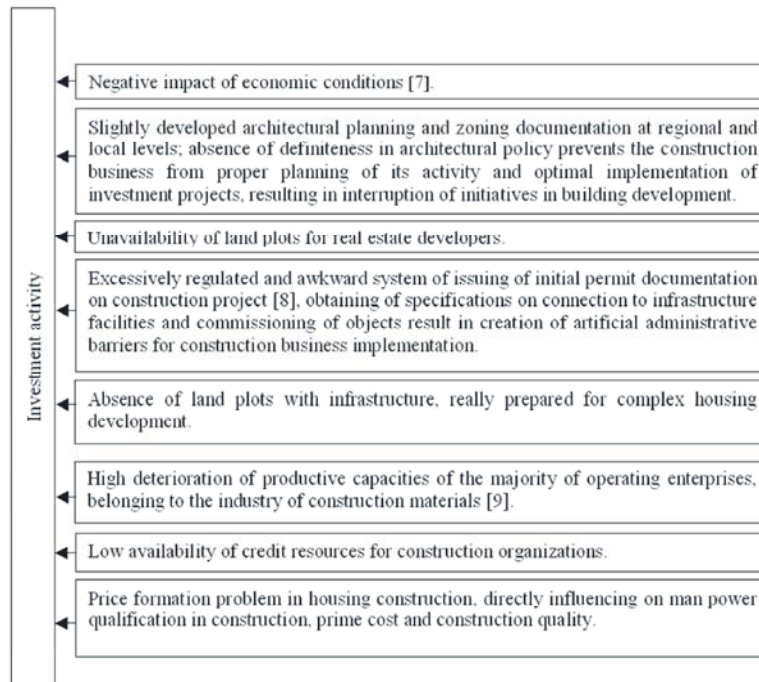
Fig. 1: Reasons of low investment activity in the construction.

Table 1: Commissioning of total area of dwellings and hostels in the regions of Volga Federal District (thousands.sq.m of total area) [10]

Volga Federal District	2007	2008	2009	2010	2011
The Republic of Bashkortostan	1865,8	2351,8	2352,7	2006,3	2109,9
The Republic of Marij El	283,7	298,8	299,9	302,3	314,8
The Republic of Mordovia	242,8	284,1	276,6	289,2	298,1
The Republic of Tatarstan	2040,7	2222,5	2010,2	2202,7	2396,1
The Udmurt Republic	483,0	486,4	464,8	485,5	504,9
The Chuvash Republic	1004,5	977,8	852,2	874,1	886,4
The Perm Territory	8884,1	832,8	695,1	691,4	748,8
The Kirov region	375,8	425,8	335,9	370,8	405,4
The Nizhny Novgorod Region	1072,0	1353,9	1403,9	1452,1	1470,7
The Orenburg Region	752,4	775,9	740,1	581,1	743,3
The Penza Region	554,3	605,1	610,2	624,1	671,1
The Samara Region	1287,0	1328,2	1025,2	1040,0	1331
The Saratov Region	1022,1	1112,5	1129,9	1142,6	1169,6
The Ulyanovsk Region	429,4	508,5	530,6	467,0	553,8
Total in all Volga Federal District	12288,6	13563,9	12727,2	12353,5	13603,9

the income level above average is able to buy a dwelling using the market mechanisms. The main reasons for the low effectual demand on dwellings is a low availability of the long-term mortgage housing credits, as well as the high level of risks and overhead costs at this market. Each fourth family has a dwelling in bad or very bad condition [4].

In one of the Russian regions - the Republic of Tatarstan - a potential share of families, able to buy a dwelling based on the existing mortgage programs (social and classic mortgage in terms of the mechanism, implemented by OJSC "Housing Mortgage Finance Agency", constitutes approximately 33 percent [3].

Thus, at the present time, more than 2/3 of the population of this region is unable to improve their housing conditions.

Besides the low purchasing power of population at real estate market [5], there is a whole complex of problems (Fig. 1), which prevents the investment activity in construction, at that, it involves both the impossible implementation of housing projects by large real estate developers and the restriction of investment activity of citizens themselves in part of individual housing construction [6] and joining to housing construction and funded cooperatives.

Republic of Tatarstan is a leader by volume of housing construction in Volga Federal District (Table 1).

To form the support programs for investment-construction complex, it is necessary to make up the substantiated predictions of dwelling availability level and dwelling commissioning on the territory of the Republic of Tatarstan.

Procedure: To predict the factors, influencing on the volumes of dwelling commissioning, a modified method of running moving average with weighting coefficient is used [11]. The predicted values of environment factors, influencing on the volume of dwelling commissioning, can be calculated based on the following formula:

$$x_{i,k}' = \frac{x_{i,k-1}w_{k-1} + x_{i,k-2}w_{k-2} + ... + x_{i,k-N}w_{k-N}}{w_{k-1} + w_{k-2} + ... + w_{k-N}} \tag{1}$$

or the same based on the formula

$$x_{i,k}' = x_{i,k-1}\omega_{k-1} + x_{i,k-2}\omega_{k-2} + ... + x_{i,k-N}\omega_{k-N}, \quad \sum_{j=k-N}^{k-1} \omega_j = 1,$$

$$\omega_j = \frac{w_j}{w_{k-1} + w_{k-2} + ... + w_{k-N}}.$$

where $x_{i,k}$ is the data based on x_k for the k-year, $x_{i,k}$ is the prediction of value x_k for the k -year and ω_k are the weights, reflecting the efficiency of value $x_{i,k-j}$ on the predictable $x_{i,k}$-value. At that, we consider that ω_j do not increase, it reflects our opinion that the more the obtained value is apart from the predictable one in the past, the less is its influence on the further $x_{i,k}$. Below in calculations we suppose N=3. Taking it into consideration, the formula (1) is the following

$$x_{i,k}' = x_{i,k-1}\omega_1 + x_{i,k-2}\omega_2 + x_{i,k-3}\omega_3, \tag{2}$$

where k=4,...,17.
For k=18 use the following formula:

$$x_{i,18}' = x_{i,17}'\omega_1 + x_{i,16}\omega_2 + x_{i,15}\omega_3,$$

for k=19:

$$x_{i,19}' = x_{i,18}'\omega_1 + x_{i,17}'\omega_2 + x_{i,16}\omega_3.$$

According to statistics about the value x_i throughout all parameter groups x_i, the prediction is made up separately for the weight groups.

$\omega_1 = 0{,}8, \ \omega_2 = 0{,}1, \ \omega_3 = 0{,}1,$

$\omega_1 = 0{,}7, \ \omega_2 = 0{,}2, \ \omega_3 = 0{,}1,$

$\omega_1 = 0{,}6, \ \omega_2 = 0{,}3, \ \omega_3 = 0{,}1,$

$\omega_1 = 0{,}6, \ \omega_2 = 0{,}2, \ \omega_3 = 0{,}2,$

$\omega_1 = 0{,}5, \ \omega_2 = 0{,}4, \ \omega_3 = 0{,}1,$

$\omega_1 = 0{,}5, \ \omega_2 = 0{,}3, \ \omega_3 = 0{,}2,$

$\omega_1 = 0{,}4, \ \omega_2 = 0{,}4, \ \omega_3 = 0{,}2,$

$\omega_1 = 0{,}9, \ \omega_2 = 0{,}07, \ \omega_3 = 0{,}03.$

The sum $\sum\limits_{k=4}^{16} \left| x_{i,k} - x_{i,k}' \right|$ is calculated, which we take for the distance between the diagrams of real values $x_{i,k}$ and predicted values $x_{i,k}'$. The minimum one is selected from these sums. We consider that the weight set to be an optimum one, at which this sum is minimum.

For the volume of the dwelling for commissioning (*Y*), the predicted value is suggested to be determined using a system theory of linear equations [12]. Namely, we consider that *Y* is a linear function from x_i. For the last five years 2008, 2009, 2010, 2011, 2012, the system of linear equations to find the coefficients at x_i is made up based on the formulas:

$$\begin{aligned}
a_1x_{1,1} + a_2x_{1,2} + a_3x_{1,3} + a_4x_{1,4} + a_5x_{1,5} &= y_{1,1} \\
a_1x_{2,1} + a_2x_{2,2} + a_3x_{2,3} + a_4x_{2,4} + a_5x_{2,5} &= y_{2,1} \\
a_1x_{3,1} + a_2x_{3,2} + a_3x_{3,3} + a_4x_{3,4} + a_5x_{3,5} &= y_{3,1} \\
a_1x_{4,1} + a_2x_{4,2} + a_3x_{4,3} + a_4x_{4,4} + a_5x_{4,5} &= y_{4,1} \\
a_1x_{5,1} + a_2x_{5,2} + a_3x_{5,3} + a_4x_{5,4} + a_5x_{5,5} &= y_{5,1}.
\end{aligned} \tag{3}$$

This system can be written in matrix view:

$$XA = Y, \tag{4}$$

where

$$X = \left[x_{ij} \right], \quad A = \begin{bmatrix} a_1 \\ a_2 \\ a_3 \\ a_4 \\ a_5 \end{bmatrix}, \quad Y = \begin{bmatrix} y_1 \\ y_2 \\ y_3 \\ y_4 \\ y_5 \end{bmatrix}.$$
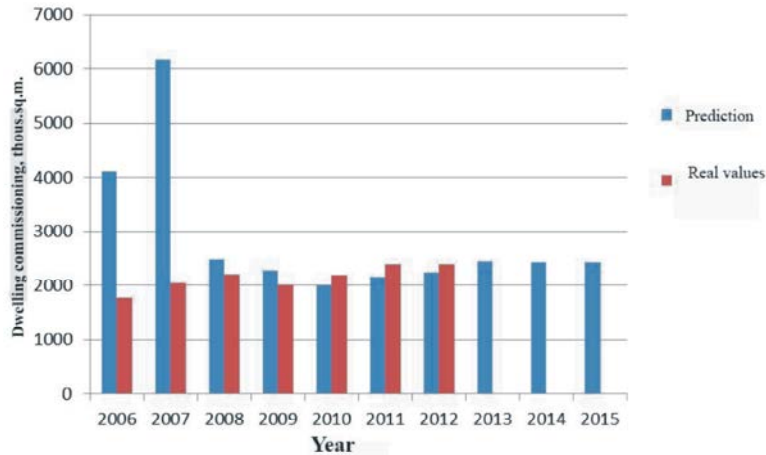
Fig. 2: Real and predicted values of dwelling commissioning in the Republic of Tatarstan

Table 2: Construction volumes as per the program of social real estate mortgage in the Republic of Tatarstan

Index	2005	2006	2007	2008	2009	2010	2011
Program budgeting, mln. rub.	4029,7	6460,8	9005,5	11313,3	15238,2	14007,8	8865,0
Quantity of constructed (under construction) dwellings, thousands.sq.m	330,0	472,2	611,6	718,4	805,0	714,2	593,2
Quantity of flats, provided as per the program	6061	7420	8897	10261	11721	11146	10340

An equation system (3) is solved using the inverse matrix method. Let us find the values $a_1, \ldots, a_5$. After this we use these values to get the predicted values Y for 2013, 2014, 2015 years based on the following rule. Let us take the predicted values x_i for 2013 and substitute them instead of the corresponding values without prime marks. As a result, we find the predicted values Y for 2013. The predicted values Y for 2014 and 2015 are calculated in the same way.

Main Part: We predicted the factors, which reflect the influence of environment on investment-construction complex of the Republic of Tatarstan. Based on this data, using the system of linear equations, the total area of dwelling to be commissioned was predicted. The volumes of dwelling to be commissioned are affected by the following factors: balanced financial result of large and medium-sized enterprises, scope of work, executed using the enterprises' own resources under construction contracts, refinancing rate of the Central Bank of the Russian Federation and consumer price index. Let us take the predicted values X for 2013 and substitute them to the system (4) instead of the corresponding values. As a result, we find the predicted values Y for 2013. The values of housing affordability ratio for 2014 and 2015 are found in the same way. The results are given in Fig. 2.

Due to creation the predictive models, the values of dwelling commissioning volumes for 2013, 2014 and 2015 were obtained. According to the obtained results, there will comprise constantly nearly 2440 thousands.sq.m.

Housing construction market capacity in the Republic of Tatarstan is determined by the value of effectual demand of population, desiring to improve living conditions. Based on statistical data [10] about the income level of the population of the Republic, 33.9 percent of families have an opportunity to improve their living conditions by means of buying the standard flat with area equal to 54 sq.meters per 1 family using the mortgage housing credit and at their own cost. The increase of housing affordability for population can be achieved using the programs of mortgage credit, as well as the development of system of rental housing and commercial apartment buildings. Table 2 shows the construction volumes as per the program of social real estate mortgage in the Republic of Tatarstan.

To provide the low-income population categories with the affordable housing, the program of social real estate mortgage is being implemented in the Republic of Tatarstan within the last five years [13]. The priority to use the mechanism of social real estate mortgage in order to improve the living conditions belongs to public sector workers and enterprise workers, participating in implementation of the abovementioned program.

CONCLUSION

From our point of view, the following measures of state support are required to stimulate the producers of goods and services at the real estate market:

Formation of state reserve of the Tatarstan Republic lands in order to provide the housing construction as per the social real estate mortgage and also to prepare and to present the territories on a competitive basis to the organizations of construction complex and investors for implementation of housing construction projects of economy class [14, 15].

Drawing of federally owned land plots to economic circulation under the interaction with Federal Fund of Housing Construction Assistance.

Establishment of tax sanctions with regard to owners, who use the land plots ineffectively.

Provision of housing development territories with infrastructure facilities. Based on the volumes of housing construction in the Republic of Tatarstan, the estimated cost to provide the development areas with the utilities comprises 43.2 bln. rubles, taking into consideration the prediction of cost increase, calculated using the deflator coefficient [10]. Taking into consideration that it is impossible to solve the problem of provision of housing development with the utilities either at the expense of budgets of all levels, or at the expense of real estate developers (automatic transfer of utilities construction expenses to the cost of dwellings and sharp reduction of its affordability for population), it is necessary to separate the cost of dwelling construction and the cost of utilities construction. Infrastructure objects can be constructed by the organizations of the public utility complex - network companies with their further operation. Construction cost recovery will be achieved by means of formation and protection of investment development programs, charging the connection cost from consumers and also adding the investment component to the rate charge on housing and utilities service.

The support of low-rise development shall be lent in the following directions:

- Projects of complex low-rise development (organized cottage settlements, including the economy-class ones);
- Low-rise housing construction for rural area habitants, carried out as a part of housing improvement program for young professionals of agricultural complex and members of their family as per the line of Ministry of Agriculture of the Russian Federation;
- Individual housing construction.

Decrease of administrative barriers in construction implies the following:

- Summarizing of all construction regulations of federal authorities into one document at the federal level and ordering of all approving control bodies, similar for all territories, despite the subject; establishment of strict sanctions for official bodies, making decisions as per these regulations, - for failure to meet the deadlines or make any decisions [16];
- Development and recommendation of the regulations for the local government, determining the structure and authority in execution of construction activity;
- Introduction of amendments to the Urban Planning Code of the Russian Federation for clear definition of agglomeration of urban districts and formulation of requirements on development of single document of urban district territorial planning and zoning and its adjoining municipal districts, which constitute one urban agglomeration;
- Exclusion of requirement to prepare a land plot development plan in that cases. when the construction of linear facilities is provided in land planning documents;
- If the real estate developer has the rights on the land plot, the works on ground preparation are permitted prior to getting the construction permit;
- Legislative recognition of validity period of not less than 3 years for the issued construction specification;
- Introduction of amendments to applicable legislation, including the tax one, in order to stimulate the development of segment of commercial apartment buildings, housing construction cooperatives and building-and-loan associations;
- An opportunity to provide real estate developers with the budget funds as per the "full cycle" contracts.

Further implementation of social real estate mortgage program.

Stimulation of private initiative of citizens and noncommercial associations of citizens in housing construction (housing construction and funded cooperatives, building-and-loan associations).

Creation of conditions in the Republic for formation of the segment of commercial apartment buildings at the real estate market and a social housing fund. Implementation principle of this measure shall be founded on the mechanism of private-public partnership, based on the execution of agreements between the local government of the municipal district, organization of the real estate developer and the organization, for the employees of which the dwellings are constructed.

Summary: The suggested prediction model of housing construction volumes allows to make the conclusion about stable rates of dwelling commissioning in the region at existing economic conditions. To develop the housing construction, state support measures are required. They shall be directed at formation of favorable investment climate. These measures include the updating of tax legislation, reduction of administrative barriers in the process of construction, provision of construction with land plots, development of real estate mortgage, as well as the alternative ways to provide the population of the region with the dwellings.

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