

Methodical modeling of the investment value of land plots for housing development

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Abstract. Analysis of housing construction in the Russian Federation showed that the development and regulation of the segment of the housing market for the integrated development of territories for residential development, is a priority national socio-economic task. Currently in the construction complex of the country it can provide a maximum supply of affordable housing from major developers that in the context of the turbulent economy it is especially important. In this regard great scientific and practical interest is the modeling of the investment value of land plots for housing development. The article presents the results of research on the development of the main stages of the method of calculation of the investment cost of land plots for integrated residential development areas, and give an algorithm of its application.

1 Introduction

To study the nature of the investment cost in respect of land plots for integrated development in housing construction shows that the investment cost is an economic instrument, an important criterion in the selection of investor-developers of managerial decisions at the stage of land development. It is at this stage identifies the purpose of investing in land, the expected return and the probability of using public-private partnerships. In this regard, the further evolution of the mechanism of management of investment value of land for complex development of territories in housing construction is an actual scientific and practical problem. Its application in practice, according to the authors, will increase the investment attractiveness and economic reliability of the project of complex development of territories.

2 Materials and Methods

When using the concept of cost in the implementation of the evaluation activities indicated a specific form of value, which is determined by the intended use of evaluation results. The concept of investment value is regulated by the Federal law "On valuation activities in the Russian Federation" No. 135-FZ of 29 July 1998 (with amendments and additions) and the Federal evaluation standards. In addition, adopted FES No.13 [1-6] concerning the

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application of the investment cost in the evaluation practice. The problem of evaluating the investment and cost aspects of the management of its value were raised in the publications of Russian scholars such as S. Baronin [1-12], Sergei Bazoyev, I. Blank, G. Bulycheva, S. Gribovskaya, S. Valdaitsev, A. Gryaznov, V. Grigoriev, V. Kovalev, K. Kulakov [2-9] and others [5,13,14]. On the subject, as shown by the analysis work and foreign scientists and specialists [10,11,15].

However, the concept of investment value of land plots for integrated development of the territory of the residential development and the principles of its calculation require clarification, as the construction sector has industry-specific features. Consider the methodological foundations of investment evaluation of land plots for comprehensive development areas in more detail.

There are three generally accepted approach to the assessment value of the land:

1. A comparative approach, reflecting the combination of pricing factors of the specific market (supply and demand, competition, etc.) present at the valuation date;
2. The income approach, reflecting the position of most probable buyer (investor);
3. The cost approach, reflecting the point of view on the creation of the object of evaluation from the position of costs incurred.

The choice of a particular approach to assessment is based on the specifics of the evaluated object, the characteristics of the specific market and the composition of information contained in the submitted information. Within the framework of each approach to specific assessment methods, but not all of them can be applied to the assessment of investment value of land.

Following the action of algorithm of calculation of investment cost of land plots for integrated residential development of the site, you must perform several steps (Figure 1).

Figure 1 shows that theoretically the investment value can be determined by all prospective approaches to assessing the value of land and methods within these approaches. However, taking into account the provisions FES No.13, often use the income approach, which involves assessing land for the purposes of integrated development of the territory only on the basis of specific information on development projects and possibilities of a particular investor. This implies that investment estimate will depend on potential investors, their capabilities and needs.

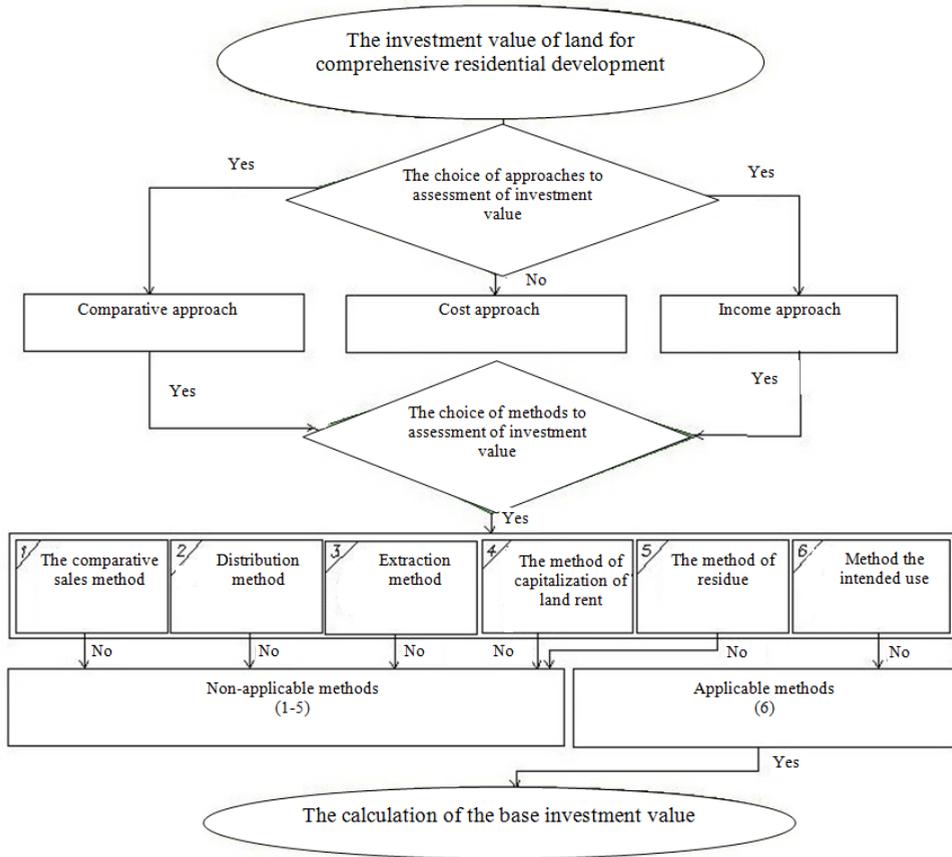


Fig. 1. The algorithm of calculation of the investment cost of land plots for integrated residential development site.

It is proposed as a methodological basis of the calculation of the investment cost to use the income approach as the primary. At the same time from two classic options of methods of the income approach method income capitalization method and discounted cash flow, you can only use the method of discounting in the form of a technique proposed use of land for comprehensive residential development. The capitalization method is not used because the rental market of land of this type does not exist. Perhaps the use of the sales comparison approach, if possible mapping of the investigated object with peers and making appropriate adjustments, although the application of the sales comparison method is not provided FES No.13. Thus, as the primary method of calculating investment value is offered primarily to use the method the intended use of the land, also does not prevent the use in some cases, the sales comparison approach.

The research allowed as a basic conceptual term investment value of land plots for integrated residential development use the following:

The investment cost of land plots for integrated residential development is a kind of value which is formed for a specific developer-oriented implementation of the investment project integrated development of the territory, which determines the technical feasibility, economic feasibility and efficiency of participation of the developer in the form of housing based on the income approach and the method the intended use in terms of land at auction, when the investment attractiveness of participation in the project is determined a positive value in net investment income.

Methodical modeling of the investment cost of land plots for integrated residential development presupposes structuring and formalization of methods of calculation and includes several stages.

Stage 1 (S1). Identification of the estimated land plot intended for integrated development for housing construction: purpose, land category, cadastral number, engineering infrastructure, identifying the special circumstances and constraints.

Stage 2 (S2). Determination of the degree of readiness of land for construction (the availability of communications, transport accessibility, availability of documents for the land plot, etc.).

Stage 3 (S3). The formation of the original design data on the technical conditions on engineering infrastructure construction: list of works and the estimated cost of the engineering construction of construction of residential district consisting of technical conditions (water supply, drainage, electricity supply, heat supply, gas supply, storm Sewerage, telephone, outdoor lighting).

Stage 4 (S4). The formation of the initial data on the burden of building social infrastructure as an element of the investment contract (the objects of social infrastructure shall be established in accordance with plan of development).

Stage 5 (S5). Analysis of the master plan and its technical and economic indicators.

Stage 6 (S6). Development of the organizational-technological scheme of building of district in the stages of constructing.

Stage 7 (S7). The development of a consolidated construction schedule.

Stage 8 (S8). Budgeting sales and residential and commercial areas.

Stage 9 (S9). Budgeting of construction costs.

Step 10 (S10). The determination of the balance sheet profit of the project.

Step 11 (S11). The calculation of the net investment income of the project.

Step 12 (S12). Calculation of the investment value of the land for the preparation of the developer (the developer) to the auction for the acquisition of property rights or the right to conclude a lease agreement with the multivariate modeling of the allowable zone of investment attractiveness.

In the most typical case, the investment cost is calculated for the land plots in state or municipal ownership. In this case the object of the calculation of the investment cost can be primarily lease rights. Not excluded and the calculation of property rights. The expert accepted that the developer can buy land in the area of investment attractiveness. The additional condition we accept the assumption that the investor can spend at the auction no more than 10-30% of the expected value of net discounted income. The value of investment value of land calculated by the formula:

$$C = NII_{present} \times k, \quad (1)$$

where k is the predicted proportion of net investment income (NII) the builder that he can schedule the payment of the cost for the land at auction.

This theoretical approach to the calculation of the investment value of the land as a certain percentage of the NII from the implementation of the investment project of housing development can have different variable values of expert k_{max} and k_{min} . It is determined by the specifics of the investor and the current macro - and microeconomic situation in the real estate market.

To implement this method on the level of corporate management, investors, developers-developers and for the purposes of state-municipal management of land resources the proposed algorithm is its application. This algorithm involves 5 consecutive blocks of the implementation:

Block A - determine the goals the evaluation of the investment cost IS the land. It should be noted situational assessment purposes, which largely defined the modern

regulatory requirements for granting land plots under the town Urban Planning and Land laws in Russia. It is characterized by four situations. Despite the fact that in some cases, land plots are provided free of charge for development of territories to the developer, but the economic feasibility and effectiveness of such participation to business systems at any level may remain dubious, because negative values of economic effectiveness of investment projects as the negative value of the investment cost will make these projects investment unattractive.

In this situation it is recommended to calculate the investment cost of the project development and their possible positive values of a positive decision on the participation of investors and developers in such projects. Other situational varieties purposes of calculating investment value is a calculation of the general case for integrated development for housing construction (situation 2) and economic situation of the construction of economy-class (situation 3), as well as comprehensive residential development of economy class (situation 4)

Block B. Formation of the initial data (ID) and their regulation (control). It is proposed to allocate ID for the base content and the degree of control. In the part of the base ID allocated to the following components:

1. ID land plot (ΣLi), which include multiple information characteristics of land, such as: L1 - the location of the land plot, L2 - the area of land, L3 – the cadastral number, L4 – land category, L5 – permitted use and the purpose, L6 - the presence of engineering infrastructure and other;
2. Urban solutions (ΣUi), which include multiple continuum information on the following parameters: U1 - technical and economic indicators of residential buildings number of residential buildings, their number of storeys, total area, etc., U2 - technical and economic performance of commercial buildings, U3 - techno-economic indicators of social development, U4 - total area, U5 - number of queues of construction, U6 – duration of construction, etc;
3. Economic indicators of the investment project (ΣEi), which include multiple information on the following parameters: E1 - the value engineering arrangement, E2 - value engineering arrangement of social infrastructure, E3 - the cost of building social infrastructure, E4 - the estimated price of housing (market or economy class), E5 - the market value of commercial development, E6 - annual inflation:, E7 - income tax, E8 is the discount rate, E9 - land rent, etc.

The algorithm of application of the methodology provides for the allocation of managed data source settings that allow you to manage the amount of the investment cost of land (ΣM). Such controllable parameters in this dissertation study include: the number of storeys of the building, the cost of the investment based on public-private partnership, the spatial location of object of construction in different regional and local property markets, and the regulation of life cycle cost of buildings, which is associated with the priority formation of the energy efficiency requirements for buildings that generate savings at the operational stage, which in turn determines the need for setting standards of cost for the life cycle of real estate. This block is iterative, provides multiple regulation ID. The completion of the regulatory process source data allows you to navigate the actual application of the method or block C.

Block C. Application of the calculation steps (S_i) of methods of evaluation of basic IS.

The method of calculation IS was explained in detail. It should be noted that its application necessarily requires the use of a copyrighted scale estimations of investment value allocation as a positive zone ZI and negative – ZII. Multiple calculation of the investment cost is performed in order to work with positive area ZI. Its presence means the possibility of transition to the next stage of the calculation – implementation block D.

Block D. Determination of the final (interval) investment value of land based on the

allocation of minimum and maximum values of net investment income, which is expected in the payment for the land.

Block E. Using the results of the evaluation of investment value. This may be different users of this technique. First, it is the investors, the developers who take the decision to participate in investment projects and determine the valid interval of the value of the land. Secondly, the authorities of public management, which determine the initial cost land auctions, the optimal parameters for PPP regulatory requirements for life-cycle costs of buildings and their energy efficiency classes.

3Results

The authors carried out testing of the developed methodology generated by the algorithm. As the basis of implementation of the investment project adopted a "Big settlement" in Kazan. Development project on housing development will be implemented in the South-Eastern part of the city on the edge. Thus, we have developed two scenarios-rise residential buildings: the first (S I) - nine of a twelve-story buildings, four fourteen-storey buildings, the second situation (S II) - nine fourteen buildings, four sixteen-storey building.

As part of the development of methodological proposals for management of investment value of land for comprehensive residential development developed 5 options for managing the costs of the investment project on a PPP basis (including the base):

Variant 1. PPP on the basis of joint financing of construction of social facilities and engineering infrastructure in the ratio of 25% by the state, 75% for investor;

Variant2. PPP on the basis of joint financing of construction of social facilities and engineering infrastructure in the ratio of 50% by the state, 50% by the investor;

Variant 3. PPP on the basis of joint financing of construction of social facilities and engineering infrastructure in the ratio of 75 % by the state, 25% by the investor;

Variant4. PPP on the basis of joint financing of construction of social facilities and engineering infrastructure in the ratio of 99% -at the expense of the state, 1%-at the expense of the investor;

The basic variant. PPP on the basis of joint financing of construction of social facilities and engineering infrastructure in the ratio of 0%, 100%-at the expense of the investor.

In Figure 2 modeling multiple zones of investment attractiveness of land plots for complex development of territories on the basis of the investment value according to the criterion of net investment income on the cost management of the investment project on a PPP basis (project of housing development "Big settlement", Kazan, Russia) on the situation of S I.

Graphically defined allowable level of funding for the construction of social facilities and engineering infrastructure of the state under PPP. This point is at the intersection of a line NII (disk) with a horizontal axis X. Thus the breakeven point (the maximum share of participation of the state) amounted to 18.75%), which requires expenditures of the consolidated budget in the amount of 289,46 million RUB. At this point, NII=0, which corresponds to the zone ZI.

Also in Figure 2 shows the intervals of values of the investment value of the land calculated for the positive area of the project realization $ZI = \Sigma \{ Y^{-0}; Y^{+1}; Y^{+2}; Y^{+3}; Y^{+4} \}$.

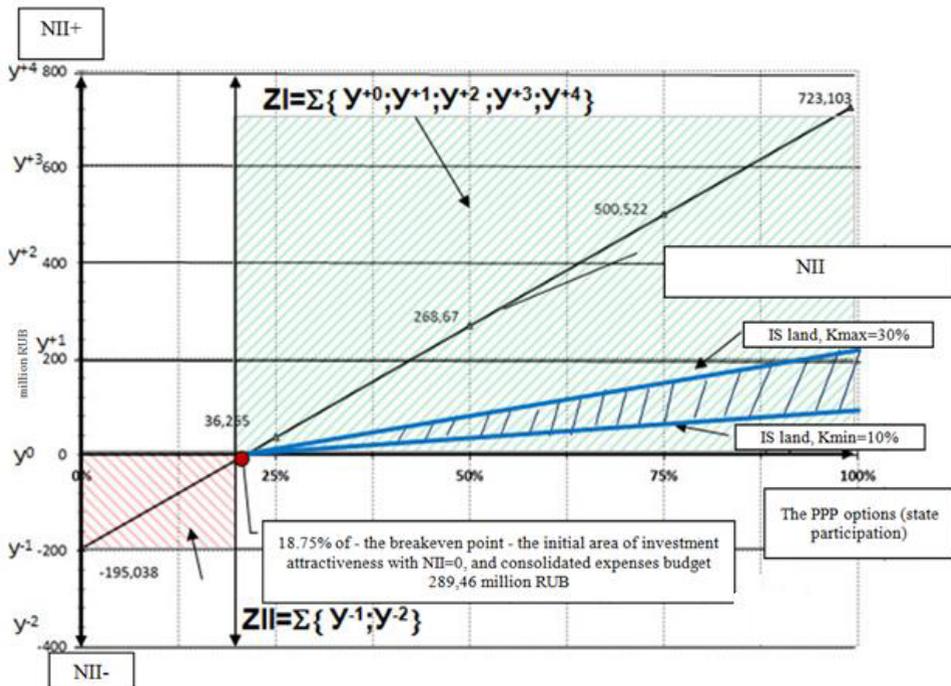


Fig. 2. Multivariate modeling of zones of investment attractiveness of land plots for complex development of territories according to the criterion of the NII for the situation of S I with lowered floors.

The value of investment value of land will be positive only if the value of the net investment income will be non-negative. In this case, the part of this income can be predicted as the value of the land.

4 Conclusion

Thus, the author's developments on the modeling of the investment cost of land plots for integrated residential development showed its relevance and demand in scientific and practical terms. Their application allows you to make more rational decisions when making decisions on the management of investment activities in the preparation and implementation of the largest investment projects of development of territories for housing construction worth up to 10-15 billion. They are focused on major developers, and government and municipal authorities involved in the preparation of such major projects. Using the developed technique and algorithm of its application calculates the investment value of land as a multivariate value of public-private partnership and identifies its optimal value that allows the administrative system to regulate the investment attractiveness of projects of this type.

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