Analysis of options for using objects of a municipality property complex in urban area development management

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Abstract. Development planning of urban areas is based on existing legislation in the field of land use, architecture and urban planning. However, the planning process does not have a single algorithm of action. An important stage in the analysis of the effectiveness of the implementation of alternative possible options for using the object of property complex within the territory under consideration is missing in the planning process. The issue of assessing the options for using the object of property complex at the stage of analysis of further use is analyzed in this study. The process of current management of urban areas by local authorities formalized. An example of the implementation of a fuzzy conclusion to assess the effectiveness of the use of free land is considered. The introduction of this stage in planning the development of urbanized territories will help to avoid making incorrect decisions by local authorities and reduce the risk of irrational use for object of property complex. This procedure will help create optimal conditions for a comfortable stay of the local population.

1. Introduction

The most important task assigned to local authority and regional executive branch is the consistent development of the territory. This process involves the planning of actions aimed at achieving strategic goals and objectives for changing the territory through the coordinated work of performers, project managers, regulatory authorities in accordance with the established deadlines. At the same time, the current stage of development of urbanized areas in Russian Federation is formed under the influence of investments attracted to the construction, reconstruction, modernization of municipal entities.

Nevertheless, the policy of development management, which implies coordination of actions of state and private companies, is adopted in the practice of many countries in the field of development of new areas. In any case, it is necessary to ensure the quality of people life that depend on the level of area development in which the person lives. This process is impossible without planning of such development. Planning is carried out by the constant, professional, managerial activities of executive and local authorities, taking into account the population opinion. But in practice, the process of area development planning does not have a single algorithm of actions and a standard set of elements. At the same time, the management process currently implemented often does not imply a stage of evaluating the effectiveness of using an object of asset portfolio of a municipal entity (APME) [1].
2. Research background and problem statement
Territory planning in developed countries is taking place in conditions of providing citizens with access to decision-making in the field of city management and urban development. This helps to increase the effectiveness of managerial decisions, as well as the active interaction of citizens and local authorities [2, 3]. An effective communication strategy for interacting with citizens at the stage of developing a project concept lies at the heart of the development of many western cities. So, the foreign experience described by S.A. Krymov on the example of Los Angeles, Seattle, Richmond is based on the method of correlation with reality and establishing a vector of qualitative development based on the balance of all stakeholders [4].

Involvement of citizens in the decision-making process for the development of urbanized areas is carried out by holding public hearings initiated by local authorities at various stages of the project. Public hearings on urban development issues in Berlin are held only at the last stage of its preparation. Representatives of the public in London and Vancouver are actively involved in the project development at the initial stages of approval. The process of developing a comprehensive development plan in Shanghai is carried out through an outsourcing system, and public hearings are organized only at the approval stage and changes are allow to be made in the project [5].

Foreign experience in the economic evaluation of investment projects effectiveness is based on the inclusion of uncertainty and competitiveness indices. The first index characterizes the uncertainty of the situation in the country’s economy, which reduces investment attractiveness. The second index is calculated taking into account two other indices: current and future competitiveness [6].

However, rethinking and adaptation of foreign experience is required for the development of urbanized areas in Russia. So, it was established on the basis of a study of the planning process for the development of urbanized areas that the procedure for approving a project by local authorities does not include an analysis of alternative options for object using at the initial stage, called the “gateway” (see figure 1). In addition, the local population is practically unaware of the alleged actions on objects transformation. While enhancing civic participation is an important condition for achieving the planned results in the development strategy implementation. For this, it is necessary to create modern services based on information and communication technologies that will allow to analyze and coordinate the preferences of residents [7]. Using network functionality to support the process of municipalities development management and presenting a dynamic format of interaction for residents of local communities can increase the efficiency of local self-government [8].

3. Approaches to evaluating the most efficient use of property
The main documents that determine the territorial planning and development of municipalities in accordance with Art. 18 of Town Planning Code are spatial planning schemes for municipal areas, general plans of settlements and general plans of urban districts [9]. The decision to approve the general and territorial planning documents is made by the head of the local administration. The procedure for the preparation and approval of the settlement general plan, as well as the introduction of amendments to it, are determined by Art. 24 of Town Planning Code [9]. The preparation of general
plan draft, in accordance with part 3 of this article, is carried out taking into account regional and local standards for urban planning, proposals of stakeholders, as well as the results of public hearings.

Consideration of general and territorial planning drafts at public hearings held in accordance with Art. 28 of the Federal Law on Local Self-Government [10], as well as part 11 of Art. 24 Town Planning Code [9] is an important procedural condition. The development of necessary information resources in accordance with the Decree of the Russian Federation Government [11] is aimed at ensuring the publicity of the adoption and implementation of decisions in the field of territorial planning. But coverage of such events is not always carried out in an accessible format for the population, and at the moment the productivity of the actions taken can be assessed as ineffective.

The mechanism for the areas development is carried out through the management of objects included in its composition. At the heart of any management is a constant desire to improve and modernize the totality of objects forming the property complex. The proposed model for evaluating the use efficiency of an APME object is based on an analysis of the object development, taking into account its most effective use (MEU). Carrying out this analysis will allow to take into account the variability of further development of a particular object during its management.

MEU analysis mechanism defined by Federal Valuation Standards [12, 13]. The analysis involves consideration of the justifiable possible uses of land, free or improved (built up), from the point of view of the four unconditional criteria that are laid down in the very definition of MEU.

The selection of an object MEU is considered from the following positions [14]:

- Physical opportunity – compliance with the size and shape of the land, its availability, engineering-geological and environmental conditions.
- Legal validity – compliance with the rules of use and development established by public and private restrictions.
- Financial feasibility – compliance with the prevailing market conditions, which determines the level of profitability of different types of real estate.
- Maximum productivity – ensuring maximum land value or return on invested capital.

4. Model of evaluation the effectiveness of property object use

The APME object use evaluation process has two implementations. In the first case, the object of research is a free land plot. The basis for the formation of initial information on the object is the data generated by the real estate objects on the Public Cadastral Map and stored in the databases of the Rosreestr [15], as well as other sources characterizing the qualitative properties of the object (engineering survey results, topographic survey data, etc.).

MEU analysis, taking into account the information available in the database, is the first step in planning the development of an object. The efficiency evaluation model of APME object helps to conduct a consistent analysis of the feasibility of possible project development options. The finished project development option is evaluated at the gateway. The model evaluates the rationality of the proposed planning option, taking into account the incoming information on the factors of expedience (reasonable opportunity is the starting point and conclusion for use, which is considered as the most effective), time (an assumption of a change in current use in the near future), multifunctionality (due to market and consumer requirements for changes in existing use), intensity of use, existing competition between different mode of uses. Informed management decisions about MEU property can be taken based on our detailed market analysis [16, 17].

MEU of free land plot is clearly reflected in the cost. If the land plot is not built up, then its value is formed only by those quantitative and qualitative parameters and characteristics that are inherent for these lands. If the land plot is built up, then the improvement built on it will add a certain share to its value. Therefore, the MEU of free land should be considered in terms of its existing and all possible uses. This rule should always be followed, except the improvements are able to support MEU for a sufficiently long period or when the demand for current use in the market decreases (see figure 2).

In some cases, the MEU of the plot will consist in abandoning its development or in its temporary use. At the same time, the achievement of MEU for most land plots requires a change in zoning or a
radical change in the adjacent infrastructure and other external improvements, allowing the transition to a new use [18, 19]. Thus, MEU of a land plot as vacant is possible with its existing use, planned development, division of the plot, or its addition to adjacent land plots, and also as an alternative, it may include temporary use or refusal of any use until development demanded by market.

Figure 2. The process of assessing the effectiveness of the use of free land.

If the MEU of a free land plot will be built up, then it is necessary to determine and describe the type and nature of the ideal improvement, which must meet clearly established criteria. In this case, the efficiency evaluation model of APME object will be aimed at identifying the following components: (i) the constructed improvement should maximize the potential of the plot under consideration in terms of market demand; (ii) it must comply with current market standards, as well as the nature of adjacent buildings.

The second scenario for the development of the APME object is based on the theory of valuation, according to which it is believed that MEU consist in use improved real estate while the cost of improved real estate is higher than the cost of land that free of improvements. However, in practice, a new property owner can eliminate existing improvements. And the costs of capital construction object liquidation and its cost will be taken into account when studying the financial feasibility of the transformation. Thus, the development of the built-up land comes primarily from the state of the property, market trends of appropriate segment, as well as the proposed development of area.

The efficiency evaluation model of APME object use will be aimed at study the real estate market and assessing the current state of the object (comparison of existing space-planning solutions and engineering equipment with current trends in the field of construction, design and functionality; population opinion study) to implement this scenario. The decision to maintain the improvement in the current state or its change is made at the gateway after analyzing the cost and technical condition of the object.

An alternative use case must be chosen in order to change the current purpose of the capital construction project. MEU analysis is the next challenge when using the efficiency evaluation model. The MEU of an improved land plot may consist in maintaining the current use (including modernization, reconstruction, expansion, adaptation of existing improvements), or conversion to another use with partial or complete demolition of an existing capital construction object, or a combination of alternatives (see figure 3).

Various methods can be used to quantify MEU. In the framework of the task, the most interesting are those that make it possible to take into account multicriteria and uncertainty, and also allow the analysis of many alternatives of various types in the presence of criteria having different types of measurement scales. Methods based on fuzzy logic have the most of these qualities [20].
Figure 3. The process of assessing the effectiveness of the use of built-up land.

An example of the application of the fuzzy inference model to assess the effectiveness of the project of using the free land plot will be considered below (see figure 4). The following linguistic variables of the model were selected as input: project investment (capital), construction period (term), net income (revenue), change in the general index of internal ruble inflation (inflation), the impact of the project on public health (ecology). Assessing the commercial/social effectiveness of the APME object (efficiency) is an output variable.

The fuzzy inference system is based on converting the values of the input variables of the management process (development of the land plot) into output variables based on the use of fuzzy production rules. Rule construction example: if the project requires a significant amount of investment in the project, a significant (long) construction period is established, a significant increase in the total ruble inflation is expected, a small amount of revenue, as well as the average level of environmental impact of the project, then the APME object efficiency will be assessed as low. The APME object use efficiency assessment model, used to analyze the MEU of the land as free or improved, is the basis for a logical final conclusion (judgment) on further use or transformation of the object [21, 22].

Figure 4. The structure of the fuzzy model for use efficiency assessment of free land.

5. Conclusion
The presented model for assessing the effectiveness of APME object use is aimed at acquiring new consumer qualities those are in demand by the market, increasing its value taking into account the criteria for MEU. The process of ongoing management of urban areas has been formalized in the work. An example of the use of fuzzy conclusions to assess the effectiveness of the use of free land is
considered. A method of reorganizing the performance evaluation process, which includes the stage of analysis of various options for using the APME object, is proposed as part of the existing process. This increases the validity of decisions made when transforming urban areas.

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