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Application of complex analysis provisions in order to assess the efficiency of residential renovation projects

Implementation of the municipal program of residential development renovation in Moscow is a large-scale and long-term directive socio-economic policy aimed at sustainable renovation of the existing outdated housing stock and wave resettlement of citizens into newly constructed residential buildings. This program is implemented to provide citizens with comfortable and safe housing create new centers of attraction and create conditions for the renovation of residential development in the districts under consideration. The municipal program of residential development renovation includes three stages of wave resettlement, namely: 1st stage — 2020–2024; 2nd stage — 2025–2028; 3rd stage — 2029–2032. During the program realization, it is planned to carry out demolition of 5,175 residential buildings, which are in a high state of physical and moral deterioration, as well as to develop more than 650 starting sites for construction of new residential buildings.

The first phase for the implementation of individual projects under this program is the determination of the starting site — the selection of a land plot for the construction of a new residential building. As the practical experience of the program shows, the peculiarities and restrictions imposed by the surrounding development, parameters and physical characteristics of the land plot and other initial parameters can have a negative impact on the efficiency of project implementation: insufficient analysis conducted at the stage of concept and land plot selection can significantly increase the risks of the project and have a negative impact on the economic efficiency and timing of the project, which in the conditions of the need to comply with the plan for the introduction of a new residential building. In order to solve this problem, we propose to consider the feasibility of applying the provisions of complex analysis in the process of implementation of residential renovation projects in the city of Moscow in order to determine the probable risks in advance and develop mechanisms to minimize them.

Keywords: *residential development renovation programme, integrated territorial development, complex analysis, improvement of the interaction mechanism, Moscow City Renovation Programme*

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The basis for the preparation of the principles of improving the efficiency of construction project execution is the need to conduct a deep and comprehensive analysis of the project: its strengths and weaknesses, construction conditions, likely risks and other aspects that need to be taken into account in order to develop and apply the most optimal mechanisms to improve the overall efficiency of the project. The main task of applying a comprehensive analysis of the project is to consider the main and most significant parameters of the project to identify and determine the basic efficiency of the project, which will allow to form a number of necessary measures to reduce the likely risks in the implementation of the project, taking into account the characteristics of the project (surrounding development, the peculiarities of interaction between the main participants in the process of project implementation, limit parameters and so on)[1].

The application of a comprehensive analysis in relation to the implementation of projects under the municipal residential renovation programme will also allow assessing the list of the most important parameters[2]. As part of the implementation of the residential development renovation program, the efficiency indicators of the projects under consideration are assessed, the main ones being: cost and time indicators of project implementation, which should ensure timely wave resettlement of citizens. It should be noted that, taking into account the peculiarities of the implementation of the residential development renovation program, the most important is the time indicator — the project implementation period. This fact is related to the planned wave resettlement of citizens, which makes it necessary to comply with the declared and calculated time indicators[3] [1, 2].

Also, one of the most important performance indicators of the project implemented under the residential development renovation program is the indicator of social significance, which can be characterized by the following parameters[4]:

1. Remoteness of the new house under construction from the house to be resettled (in case the resettlement of citizens takes place in a new residential house built at a remote location, if it is impossible to build a residential house on the land plot of the house to be resettled).

2. Provision with social infrastructure (proximity of polyclinics, city hospitals, schools, kindergartens and other objects of social infrastructure).

1 Approval of the Basic Requirements to Improvement of the Residential Development Territory during the Implementation of the Program for Renovation of the Residential Stock in the City of Moscow : Government Decree No. 515-PP.

2 Approval of the Requirements for Improved Finishing of Equivalent Residential Premises Provided in Replacement of Residential Premises in Multifamily Buildings : Government Resolution No. 516-PP

3 Consideration of Public Opinion on Housing Renovation Project in Moscow : Decree of the Government No. 245-PP.

4 Approving the Addressed List of Neighbourhoods (Territories) : Government Decree No. 708-PP.

3. Transport accessibility: distance from the nearest metro stations, public transport stops, public parking lots [1, 2].

The social indicator is one of the most important, as it can have a significant impact on the attitude of citizens to the implemented program of residential development renovation, shows the significance of the residential building to be constructed on the selected site and the provision of social infrastructure to the citizens relocated from the demolished residential buildings[5] [1]. The social indicator can be assessed by analyzing the adjacent development in terms of, among other things, the availability and number of social infrastructure facilities relative to the number of relocated citizens — additional load on the existing social infrastructure facilities; assessment of the accessibility of these facilities for citizens. This assessment should be carried out at the stage of project conceptualization, taking into account the possible number of resettled citizens depending on the expected capacity of the projected residential building.

A set of methods of project assessment based on its initial parameters, determined in the framework of pre-project analysis, allows to sufficiently determine its effectiveness and choose the most optimal strategy for project implementation. It is fair to evaluate the initial parameters of the object and determine its efficiency using the method of complex analysis, which subsequently allows to form a factor space for building an economic and mathematical model [3].

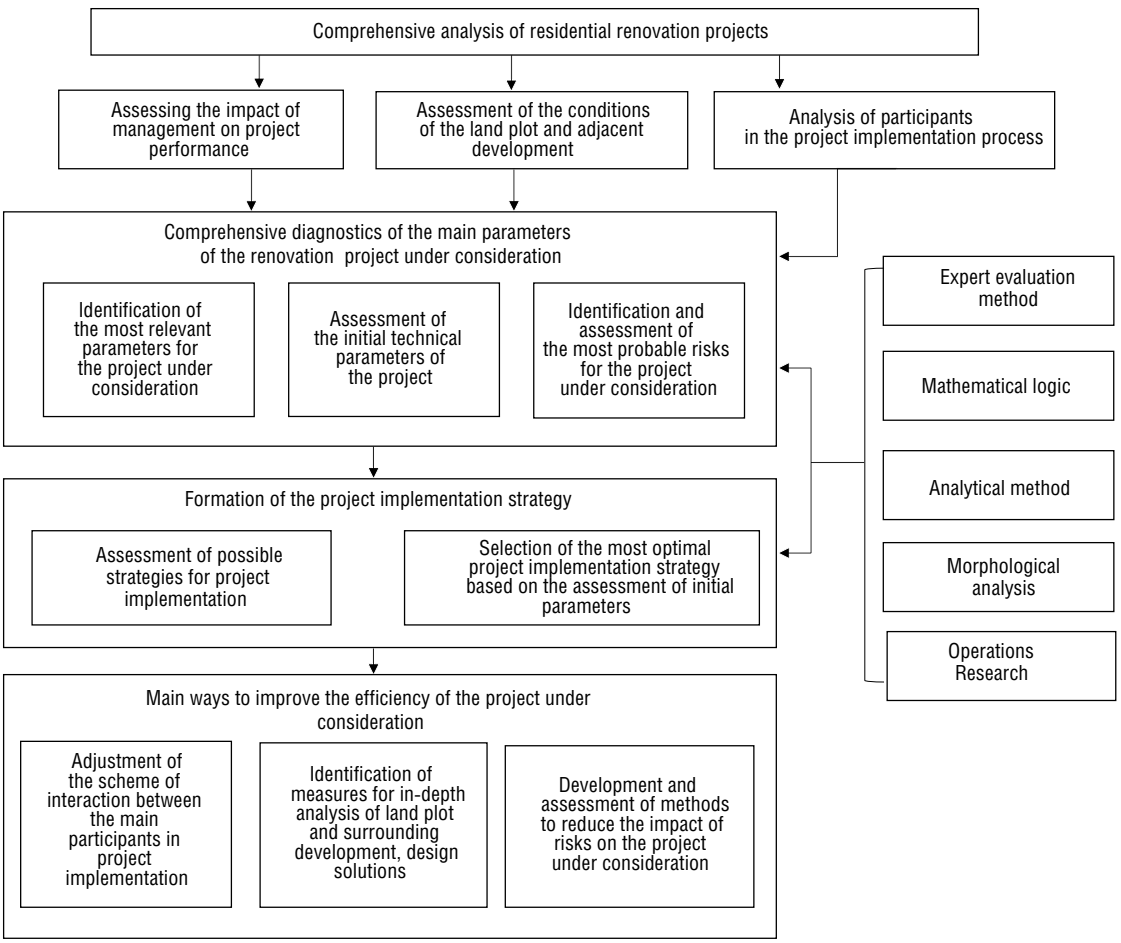
The main objective of the comprehensive analysis is to determine the initial efficiency of the project based on the assessment of initial parameters and conditions for its implementation. When considering a large portfolio of ongoing projects within the framework of the residential development renovation programme, which do not have sufficient efficiency, it can be concluded that the efficiency of the programme, expressed primarily in the timing of wave resettlement, will be at an insufficient level for its successful implementation [1]. Thus, the development of a method of integrated project appraisal is practically significant.

It is proposed to conduct project performance evaluation according to a set of actual indicators and baseline data in accordance with the provisions of comprehensive analysis. Comprehensive analysis of project effectiveness is carried out using such methods:

- expert evaluation method;
- principles of mathematical logic;
- analytical method;
- morphological analysis;
- method of research of the operations carried out in the process of project realization.

The mentioned methods of conducting a comprehensive analysis of project efficiency allow to sufficiently assess such basic blocks of parameters as:

- assessment of the conditions of the considered land plot and surrounding development;



Scheme of comprehensive analysis

5 The Program for Renovation of Housing in the City of Moscow : Decree of the Government No. 497-PP.

- assessment and analysis of the limit parameters of the projected residential building and possible related restrictions;
- assessment of possible and most probable risks associated with the implementation of the project under consideration in order to determine them and develop solutions to minimize them;
- assessment of the impact of management peculiarities in the project realization;
- analysis of the main participants and methods of their interaction in the implementation of the project.

It should be noted that only a comprehensive analysis, consisting of various methods of analysis allows conducting a full-fledged and multifaceted assessment of the initial parameters of the project under consideration by a list of criteria that form the overall assessment of project efficiency and allow to form further methods for its improvement [4–6].

In the following, the comprehensive analysis of the project under consideration will allow to form a list of the most significant parameters for the residential renovation project under consideration with the help of certain evaluation methods at each stage of the analysis. In turn, the selected parameters will help to form a multi-criteria evaluation of the project in order to apply an economic-mathematical model to select the most optimal strategy for the project implementation based on the comprehensive analysis with the use of these evaluation methods.

It should be noted that an isolated diagnosis (evaluation) of the project without taking into account how the project implementation is managed, its initial parameters, data on the surrounding development, probable encumbrances, risks and other data can only partially conduct a comprehensive assessment of the project efficiency and will not allow to form the most optimal strategy for project implementation with the achievement of the highest efficiency. Only taking into account the set of data can develop a project implementation strategy and select areas for reforming the initial parameters (management structure, technical parameters) of the project [3, 7].

Taking into account the provisions described above, it seems possible to form a model for the evaluation of projects implemented under the residential renovation programme in the following form Figure.

The results of the morphological analysis can be used to assess the effectiveness of management in the implementation of the project at various stages, which will allow to choose the most effective scheme of interaction between the main participants of the process, as well as to propose methods of reforming the current management structures [7, 8].

The application of the above complex assessment of the project efficiency will allow to determine the directions for reforming the basic (initial) model of the project, including: management features, the system of interaction of the main participants of the process, to determine the main and most likely risks in the implementation of the project under consideration and to propose a strategy for the project implementation, taking into account its initial parameters to achieve the highest efficiency [9, 10].

The result of the comprehensive analysis of the project is to obtain the necessary data to assess its initial parameters, the final cost of the finished construction object, as well as its other components, including an assessment of the most likely risks in the implementation of the project, possible encumbrances, and subjects of object management. The results obtained in the course of complex analysis allow us to conclude that a deeper complex analysis at the pre-project stages of project implementation and land plot selection will allow us to identify the most likely risks that may arise at further stages of project implementation, as well as to develop mechanisms to minimize them in advance. Thus, the application of complex analysis provisions in the implementation of the residential development renovation programme, taking into account the previously described features, is expedient and practically significant in order to optimize the project implementation process and improve its efficiency.

REFERENCES

1. Ovsiannikova T.Yu. Renovation of residential buildings in the regions: organizational and financial mechanisms and constraints. Real Estate: Economics, Management. 2023; 1:44-48. DOI: 10.22337/2073-8412-2023-1-44-48 (rus.).
2. Khokhlov O.B. Evaluation of Efficiency of Housing Renovation Projects and Programmes : dissertation of Candidate of Economic Sciences. Tomsk, 2006. (rus.).
3. Zharikov I.S. Development of tools for investment design of real estate objects during renovation : dissertation of Candidate of Economic Sciences. Voronezh, 2020. (rus.).
4. Shahraki A.A. Renovation programmes in old and inefficient neighborhoods of cities with case studies. City Territory and Architecture. 2022; 9(1). DOI: 10.1186/s40410-022-00174-1
5. Nezhnikova E.V. Formation of strategic priorities for the development of the housing industry based on the creation of competitive housing construction facilities : dissertation of a doctor of economic sciences. Moscow, 2017. (rus.).
6. Mangold M., Österbring M., Wallbaum H., Thuvander L., Femenias P. Socio-economic impact of renovation and energy retrofitting of the Gothenburg building stock. Energy and Buildings. 2016; 123:41-49. DOI: 10.1016/j.enbuild.2016.04.033
7. Rusakova Ya.D. Organizational and economic mechanism for managing the integrated development of the territory in large cities : dissertation Candidate of Economic Sciences. St. Petersburg, 2012. (rus.).
8. Visscher H., Femenias P., Thuvander L., Jensen P.A. Sustainable building renovation — strategies and processes. Construction management and economics. 2022; 40(3):157-160. DOI: 10.1080/01446193.2022.2045717
9. Prokhorova Yu.S. Organizational and economic mechanism for managing the cost of object construction in conditions of public investment : dissertation Candidate of Economic Sciences. Moscow, 2020. (rus.).
10. Pastukhov V.E. Rational use of urban land in projects of renovation of residential development building renovation business: the effects of specialization on profitability of Territory : dissertation Candidate of Economic Sciences. Moscow, 2022. (rus.).

Применение положений комплексного анализа с целью проведения оценки эффективности реализации проектов реновации жилой застройки

Реализация муниципальной программы реновации жилой застройки на территории города Москвы представлена масштабной и долгосрочной директивной социально-экономической политикой, направленной устойчивое обновление существующего устаревшего жилого фонда и волновое переселение граждан во вновь возведенные жилые дома. Данная программа реализуется с целью обеспечить граждан комфортным и безопасным жильем, создать новые центры притяжения и создать условия для обновления жилой застройки в рассматриваемых районах города. Муниципальная программа реновации жилой застройки включает в себя три этапа волнового переселения, а именно: 1-й этап — 2020–2024 гг.; 2-й — 2025–2028 гг.; 3-й — 2029–2032 гг. За время реализации программы планируется осуществить снос 5175 жилых домов, находящихся в высокой

степени физического и морального износа, а также произвести освоение более 650 стартовых площадок для строительства новых жилых домов.

Первичным этапом для реализации отдельных проектов в рамках указанной программы является определение стартовой площадки — выбора земельного участка для строительства нового жилого дома. Как показывает практический опыт реализации программы, неучтенные особенности и ограничения, накладываемые окружающей застройкой, параметры и физические характеристики земельного участка и иные исходные параметры могут оказать негативное влияние на эффективность реализации проектов: недостаточный анализ, проводимый на этапе концепции и выбора земельного участка, может существенно повысить риски проекта и оказать негативное влияние на экономическую эффективность и сроки реализации проекта, что в условиях необходимости соблюдения плана по вводу новых жилых домов, обеспечения волнового переселения является одной из важнейших задач. Для решения данной задачи предлагается рассмотреть обоснование целесообразности применения положений комплексного анализа при реализации проектов реновации жилой застройки в городе Москве с целью заблаговременного детерминирования вероятных рисков и разработки механизмов по их минимизации.

Ключевые слова: *программа реновации жилой застройки, комплексное развитие территорий, комплексный анализ, программа реновации города Москвы*

СПИСОК ИСТОЧНИКОВ

1. Овсянникова Т.Ю. Реновация жилой застройки в регионах: организационно-финансовые механизмы и ограничения // Недвижимость: экономика, управление. 2023. № 1. С. 44–48. DOI: 10.22337/2073-8412-2023-1-44-48
2. Хохлов О.Б. Оценка эффективности проектов и программ реновации жилищного фонда : дис. … канд. экон. наук. Томск, 2006.
3. Жариков И.С. Развитие инструментария инвестиционного проектирования объектов недвижимости при реновации : дис. … канд. экон. наук. Воронеж, 2020.
4. Shahraki A.A. Renovation programmes in old and inefficient neighborhoods of cities with case studies // City Territory and Architecture. 2022. Vol. 9. No. 1. DOI: 10.1186/s40410-022-00174-1
5. Нежникова Е.В. Формирование стратегических приоритетов развития жилищной отрасли на основе создания конкурентоспособных объектов жилищного строительства : дис. … д-ра экон. наук. М., 2017.
6. Mangold M., Österbring M., Wallbaum H., Thuvander L., Femenias P.Socio-economic impact of renovation and energy retrofitting of the Gothenburg building stock // Energy and Buildings. 2016. Vol. 123. Pp. 41–49. DOI: 10.1016/j.enbuild.2016.04.033
7. Русакова Я.Д. Организационно-экономический механизм управления комплексным развитием территории в крупных городах : дис. … канд. экон. наук. СПб., 2012.
8. Visscher H., Femenias P., Thuvander L., Jensen P.A. Sustainable building renovation — strategies and processes // Construction management and economics. 2022. Vol. 40. No. 3. Pp. 157–160. DOI: 10.1080/01446193.2022.2045717
9. Прохорова Ю.С. Организационно-экономический механизм управления стоимостью строительства объекта в условиях государственного инвестирования : дис. … канд. экон. наук. М., 2020.
10. Пастухов В.Э. Рациональное использование городских земель в проектах реновации территории жилой застройки : дис. … канд. экон. наук. М., 2022.

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