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Analysis of the efficiency of interaction between participants in the implementation of projects under the renovation programme on the example of the city of Moscow

One of the most important directions of the social and economic policy of each state is to provide citizens with safe and comfortable housing conditions that would meet not only the requirements of current norms and regulations, but also the established requirements of modern society. In order to improve housing conditions and renovate dilapidated and emergency housing, a programme of residential renovation is underway. One of the peculiarities of the housing stock in many cities of the Russian Federation is the large and often predominant number of residential buildings built in the period from 1958 to 1967 — the period of industrial housing construction. According to current regulations, the service life of these houses is up to 70 years, provided that they are maintained in a timely manner. This means that in the next 10–15 years the general condition of the housing stock may significantly deteriorate and there will be a sharp increase in dilapidated and emergency housing. In order to prevent the mass appearance of emergency buildings, for which at this stage of their life cycle capital repairs are inexpedient, a programme of residential renovation is being implemented. The main objective of this programme is to modernize the existing housing stock and renovate the living environment in order to bring it in line with quality standards ensuring comfortable living conditions. Many participants are involved in the residential renovation programme: from government agencies to local contractors. Such a wide range of participants requires the most coordinated mutual work to achieve all the set tasks. But, as practice has shown, the participants do not always act in a coordinated manner, which leads to various consequences expressed in a significant increase in the cost or timing of construction. Thus, it is necessary to thoroughly study the existing procedure of participants' interaction in order to identify possible problems and analyze them in order to improve the mechanism of management and interaction between the programme participants. **Keywords:** residential development renovation programme, integrated territorial development, improvement of the interaction mechanism, Moscow City Renovation Programme

In many cities of the Russian Federation, including Moscow, the housing stock in large numbers is represented by industrial housing construction — residential buildings built between 1958 and 1967. According to the current normative documents (SP 255.1325800), the service life of these serial houses is from 50 to 70 years (subject to proper maintenance and current repairs) [1–3]. This fact indicates a sharp increase in emergency and dilapidated housing, which may occur within the next 10–15 years. In this regard, the federal and regional authorities have decided to develop and apply a programme of integrated development of the territory. In the Moscow region, this programme is frequent and is called “building renovation programme of residential development”. On the territory of Moscow, the programme of residential development renovation is presented in the form of demolition of outdated, dilapidated and emergency housing stock and construction either in place of demolished houses or on new starting sites of new residential buildings that meet all modern standards and requirements of comfort and energy efficiency [1, 2, 4].

In accordance with the current definitions, the renovation of the housing stock is understood as a process of replacement and restoration of elements of the housing stock (residential buildings and their parts) that have been retired as a result of

functional and physical deterioration by new elements or objects [2, 3, 5].

Renovation of housing stock is a cyclical process of renewal of residential development, which can be represented by the following methods (Table 1):

1. New construction refers to the erection of new residential buildings on undeveloped or vacated reused land.
2. Capital repair of housing stock — complex of construction works on restoration, replacement or strengthening of separate parts of residential buildings or whole constructions, parts and engineering equipment in connection with their physical depreciation.
3. Modernization of the housing stock is a complex of construction works that provides improvement of consumer and operational qualities of residential buildings without restructuring of the objects themselves. Modernization allows eliminating their functional deterioration and is usually limited to redesign of internal premises and improvement of existing engineering systems.
4. Restoration of the housing stock is a complex of construction works that ensures restoration of the lost architectural, artistic, and engineering and construction and historical appearance of residential buildings in their original form.
5. Reconstruction of housing stock is a complex of construction works related to change of main technical and economic indicators of residential

buildings — number and area of flats, construction volume and total area of buildings, as well as purpose of premises [4, 6, 7].

As can be seen, the renovation of the housing stock can be represented by different types. The choice of the type of renovation is based on various factors: the degree of deterioration of the existing building stock, physical feasibility of implementing one or another type, economic feasibility and possibility. For example, in Moscow, new construction prevails within the framework of residential renovation due to the high degree of deterioration of many residential buildings, as well as due to the economic feasibility of implementing a resource-intensive project. In turn, in Europe, such types of residential renovation as reconstruction and modernization have become the most popular [8, 9]. It is also worth noting that the housing stock of eastern Germany has much in common with the housing stock of the Russian Federation, but in eastern Germany the regional authorities have decided to modernize residential buildings in stages, which allows to significantly increase the service life and create comfortable conditions for citizens without demolition of residential buildings [10, 11].

In addition, modernization of residential buildings allows to significantly reduce operating costs for the maintenance of residential buildings through the use of energy efficient solutions in terms of engineering systems, the use of modern insulation materials and so on, which reduces the financial burden on the residents. Nevertheless, many residential buildings built in Moscow and other regions of the Russian Federation do not have the same margin of safety and reliability, and their physical deterioration is significantly higher. In many respects, the changes are the result of lower frequency of current repairs, peculiarities of operation and even weather conditions.

Thus, the most rational method for renovation of the housing stock in Moscow turned out to be new construction [7, 12, 13].

The Moscow housing stock renovation is an extensive programme, which includes more than 5,000 demolished houses, which should result in the construction of more than 9 million sq. meters of housing. In the preparatory phase of the programme, 561 start-up sites have been identified on which modern and comfortable houses will be built. The housing renovation programme is designed for a period of 25 years, from 2017 to 2032, and consists of three phases of wave resettlement [1, 2, 5]. As part of the legal and regulatory framework, government decrees have been developed that define the list of houses to be demolished and dictate the rules for the participants in the process (Table 2).

Given the success of the building renovation programme in Moscow, other cities in the Russian Federation have also announced the start of the renovation programme. For example, cities such as Nizhnevartovsk, Ufa and Novosibirsk have started to develop regulations for the implementation of a region specific programme. In turn, as of the third quarter of 2022, in Irkutsk, Yaroslavl and Yekaterinburg, construction work has already begun on new houses, demolition of the emergency fund, as well as capital and current repairs of habitable residential buildings [11, 14, 15].

Irkutsk should be singled out from the list, as the ratio of emergency building stock to total number of dwelling square meters is the highest in Irkutsk. This arose in view of the large number of wooden houses on its territory, so the implementation of the renovation programme in Irkutsk is particularly detailed. The following table provides a more detailed look at the status of renovation in some of the participating cities (Table 3).

Table 1. Methods of implementation of residential renovation

Renovation methods	Characteristic features	A set of works
New construction	The construction of new residential properties on undeveloped or reused land that has been cleared from existing development	• construction of a new capital construction facility on a vacant land plot or land plot to be vacated through demolition. These works may include the re-laying and installation of new utilities, landscaping of the adjacent area, etc.
Capital repair of housing stock	A set of construction works to restore, replace or reinforce parts of residential buildings or entire structures, parts, and engineering equipment due to their physical deterioration	• restoration of building envelopes, openings, restoration of facade structures; repair and/or replacement of engineering systems and equipment
Restoration of the housing stock	The complex of construction works ensuring restoration of the original architectural, engineering and historical appearance of residential buildings	• restoration of envelope structures, openings, restoration of facade structures; • refurbishment of premises; • repair and/or replacement of engineering systems and equipment
Modernization of the housing stock	The complex of construction works that provides improvement of residential buildings in terms of quality of use and performance without any modification of the building itself. Retrofitting eliminates functional deterioration and is usually limited to redesign of internal spaces, improvement of existing engineering systems	• replacement and improvement of engineering systems, increasing the energy efficiency of buildings; • improvement of envelope and roof structures; • improvement of surrounding area; • redesign of premises and flats; • replacement of glazing
Reconstruction of housing stock	The complex of construction works related to the change of basic technical and economic parameters of residential buildings — the number and area of flats, building volume and total floor area, as well as the purpose of the premises	• modification of the building exterior, improvement of the building envelope; • construction of additions and/or extensions; • enlargement of the flats; • changes in floor plans; • enlargement of window openings; • replacement and modernization of utilities, systems and equipment; • rehabilitation and/or replacement of the load-bearing structures of the building

Table 2. General parameters, indicators and regulatory documents for the renovation of residential buildings in Moscow

The state of Moscow's housing stock	Implementation of the renovation programme	Regulatory framework
- the total housing stock in Moscow amounts to 251.8 million sq. m; - the volume of panel housing of the demolished series is 9.8 million sq. m; - tear-down batch houses were built in the period from 1957 to 1968; - durability of houses of demolished series is no more than 70 years	- The programme is to run until 2032; 1st stage (2020 to 2024) — 930 houses; 2nd stage (2025 to 2028) — 1,630 houses; 3rd stage (2029 to 2032) — 1,800 homes. 561 start-up sites; - Construction potential — 8.8 million sq. m; 75,700 people resettled; 2.7 million sq. m under construction; 2.48 million sq. m under construction	Resolutions have been drawn up: - No. 497-PP “On the Programme for the Renovation of the Housing Stock in the City of Moscow”; - No. 245-PP “On Consideration of Public Opinion on the Housing Renovation Project in the City of Moscow”; - No. 708-PP “On Approval of the Addressed List of Neighbourhoods (Territories)”; - No. 515-PP “On Approval of the Basic Requirements for Improvement of the Residential Development Territory during Implementation of the Housing Renovation Programme in the City of Moscow”; - No. 516-PP “On Approval of the Requirements for Improved Finishing of Equivalent Residential Premises Provided in Replacement of Residential Premises in Multifamily Buildings”

Despite the development of the building renovation programme in various cities and regions of the Russian Federation, it is difficult to assess the quality and effectiveness of the decisions made by regional and municipal authorities at this stage, as the programme is just beginning to take effect. Therefore, it is proposed to assess the effectiveness of decisions in the implementation of the building renovation programme using the example of the city of Moscow, where the programme has been in place since 2017 [13, 15].

The main regulatory document is government decree No. 497 “Moscow Building Renovation Programme”. This decree defines the number of start-up sites: land plots that will be used for new construction [2, 3]. The decree also provides a list of residential buildings to be demolished whose physical and moral

deterioration makes it impossible to continue their safe operation even after a capital repair or it is economically inexpedient.

In accordance with Decree No. 497 the main participants of the Moscow building renovation programme are determined as well as the procedure, methods and stages of their interaction in the process of realization of the goals of the building renovation programme [2–4]. The main participants are:

- Department of Urban Planning Policy;
- Department of Urban Planning Property;
- Committee for Architecture and Urban Planning of Moscow;
- State Housing Inspectorate;
- Moscow Housing Renovation Fund.

Table 3. Progress of the building renovation programme in cities of the Russian Federation

City	Characteristics and condition of the housing stock	Programme implementation phase
Nizhnevartovsk	1,039 multi-apartment houses; - Total housing stock — 6,894 thousand sq. m; 107 houses are to be demolished — 28.1 thousand sq. m	Development of legal and regulatory instruments
Ufa	6,412 multi-apartment houses; - Total floor area — 24,683 thousand sq. m; 201 houses are to be resettled — 61.8 thousand sq. m	- Urban planning and development project is approved; - Drafting of legal and regulatory instruments
Irkutsk	5,589 apartment blocks; - Total floor area — 11,689 thousand sq. m; 597 residential houses are subject to resettlement — 397,09 thousand sq. m	- Elaboration and addition of legal acts; - Elaboration of land development project; - Resettlement of dilapidated wooden houses as part of the “Housing Programme 2019–2024 is underway”
Yaroslavl	4,452 multi-apartment houses; - Total floor area — 14,551 thousand sq. m; 115 dwelling houses are subject to resettlement — 87.3 thousand sq. m	- Development of legal and regulatory framework; - Identification of starter sites for the construction of houses; - Definition of list of houses to be demolished and reconstructed
Novosibirsk	8,107 multi-apartment houses; - Total housing stock — 26,500 thousand sq. m; 405 residential houses are subject to resettlement — 277.6 thousand sq. m	- Start-up sites have been identified; - Areas identified for demolition; - Development of legal and regulatory framework
Yekaterinburg	7,111 multi-apartment houses; - Total housing stock — 32,012 thousand sq. m; 528 residential houses to be resettled = 344.1 thousand sq. m	- Construction of the first new houses has started; - Regulations are being completed; - Site development project developed; - List of houses to be demolished and reconstructed identified

Table 4. Main participants of the building renovation programme in Moscow

Programme participant	Main tasks of each participant
Department of Urban Planning Policy	Within the framework of the State Housing Programme of the City of Moscow, the following tasks are carried out: • Identification of start-up sites for new construction; • Search and evaluation of land plots; • Assessment of transport accessibility and infrastructure
Department of Urban Planning Property	Determination of the list of houses to be demolished, reconstructed or overhauled
State Housing Inspectorate	Commissions to determine the technical condition, obsolescence and physical deterioration of residential buildings
Committee for Architecture and Town Planning of Moscow	• Determination of the architectural and planning solutions for the residential buildings; • Approving the appearance of the building; • Deciding on the landscaping; • Ensuring compatibility with adjacent development
Moscow Building Renovation Fund	• Assistance in demolition works; • Assistance in preparation of engineering surveys, design documents, construction; • Assistance in securing the housing rights of homeowners; • Implementation of investment activities; • Handing over to the city of Moscow the residential premises owned by the fund
General contractors, technical client service, design companies	• Selected after an open tender; • Prepare project documentation in accordance with the elaborated terms of reference; • Carry out construction of the object; • Carrying out engineering surveys; • Acquisition of initial and approval documentation

In order to provide a more detailed study of the functions and interaction of the above-mentioned actors, the information is proposed to be displayed in tabular form (Table 4).

The order and structure of interaction of the voiced participants can be considered in terms of 4 main stages [2, 13, 15]:

- at the first stage, the Department of Urban Planning Policy and the Department of Urban Property determines the list of residential buildings to be included in the programme of residential building renovation, taking into account their technical condition. The Department of Urban Planning Property engages the State Housing Inspectorate to determine the physical and moral deterioration of residential buildings in order to accurately determine and select the method of renovation;
- the Department of Urban Planning Policy together with the Moscow Committee of Architecture search for land plots for the construction of new residential buildings — strata sites. On the basis of the data received, an initial terms of reference are developed and an initial budget for the project is agreed upon;
- at the next stage, the Department of Urban Planning Policy engages the Moscow Renovation Fund to organize and oversee the implementation of residential renovation projects outside of the city. The Renovation Fund, in turn, engages specialized organizations to directly carry out the design and management of the project (as a rule, a technical customer organization is selected for integrated project management). At this stage, an end-planning stage and an album of urban solutions are developed, which should be subsequently agreed and approved by the Moscow Architectural Committee, the Construction Department and the Department of Urban Planning Policy;
- after approval of the concept stage, the technical client organization together with the general design organization

proceed with the development of the design stage, more detailed engineering surveys in order to obtain a positive opinion from Moscow state Expertise [2, 3, 13, 15].

Based on the analysis and study of the regulatory documentation and practical implementation of residential renovation projects, it seems possible to identify the main levels and bring the order of interaction between the participants at the various stages of project implementation to a tabular form (Table 5).

To summaries the above, it can be said: the result of the first stage is the initial terms of reference, technical and economic indicators, and an initial budget for the project.

The next stage involves the Moscow Housing Renovation Fund, which undertakes to supervise and organise the work necessary to implement the renovation programme in accordance with the approved plan. In turn, the Renovation Fund usually organises a tender and concludes a contract with a technical client organization, which undertakes to carry out a set of design works. The result of this stage should be a duly approved architectural and urban design booklet (hereinafter — the AGR booklet). Based on the results of AGR booklet approval, the involved design organization shall develop documentation of “Project” stage for further passage of Moscow state Expertise and obtaining a positive conclusion during consideration of the full set of documentation [10, 12].

The following difficulties may arise during the third stage, which should result in: fully developed documentation of the “Project” stage, positive opinion of the Moscow state Expertise, as well as the clarified budget of the project. Due to the fact that detailed engineering surveys have not been carried out before, they may impose significant constraints on the Project. It is only at this stage that a more in-depth investigation of the area to be constructed begins, specifications are obtained and reports on the engineering survey are produced. Thus, if the results of the engineering survey reveal that it is impossible to design a building with the parameters

Table 5. Procedure of interaction, goals and objectives of the participants of the building renovation programme in Moscow

Level of interaction	Stage of project implementation	Participants in project implementation	Composition of tasks to be solved
I	1	Department of Urban Planning Policy Department of Urban Planning Property	Determination of the stages of citizens' resettlement, identification and approval of the list of houses to be demolished or overhauled
	2	Department of Urban Development Property State Housing Inspectorate	Determination of the technical condition of buildings, determination of the list of apartment buildings in need of maintenance or major repairs; determination of the list of apartment buildings to be demolished
	3	Department of Urban Planning Policy Committee for Architecture and Urban Planning of Moscow	Determination of the list of neighbourhoods and areas designated for the design and construction of starter homes. Development and approval of the primary architectural and planning solutions, external appearance of the designed buildings, definition of the technical assignment for project development
II	4	Department of Urban Planning Policy Committee for Architecture and Urban Planning of Moscow Moscow Housing Renovation Fund	Drafting and submitting the initial technical assignment for the construction of an apartment building within the boundaries of the allocated land plot; approval of the project budget
III	5	Committee for Architecture and Urban Planning of Moscow Moscow Housing Renovation Fund Management company, technical customer service	Approval of architectural and planning solutions; external appearance of the residential building; approval of landscaping solutions
IV	6	Moscow Housing Renovation Fund Management company, technical client service Design companies, general contractor	Implementation of preparation of architectural and urban planning solutions, design and working documentation, passing the Moscow state Expertise, organization of construction production, conducting engineering surveys, construction of capital construction facility

set earlier, one needs to coordinate them repeatedly with the Moscow City Architecture and Construction Department, which slows down or completely stops the design process until a decision is taken. As a consequence, it may be necessary to correct the detailed design documents and re-approve them at the Moscow City Court of Appeal, which also increases the timing and budget of the project [6, 8, 10].

The fourth stage should result in a capital construction project. For this purpose, construction and installation works are carried out by the general contractor. The technical customer performs financial and organizational control of the construction. It should be noted that due to the nature of works, structure of interaction between the sections and stipulated approval process, the working documentation is often issued simultaneously with civil and erection works. Therefore, if errors or inaccuracies are made at the design stage, it may be necessary to revise and modify the applied solutions and re-approve the corrected working documentation [7, 12]. During re-approval it is not possible to carry out construction works, which may have a significant impact on the project schedule. It should be noted that it is often at the construction stage that difficulties may arise in interaction with landowners of adjacent plots, which may also complicate, slow down or completely stop construction and installation works until all necessary approvals are obtained.

In view of the above-mentioned specifics of work performance during the implementation of the renovation programme, the existing procedure of interaction between the participants of the renovation projects may lead to unforeseen situations where project solutions need to be revised, additional approvals obtained etc. which

would either significantly slow down or fully stop the process of construction and assembly works until the situation is resolved.

The assessment shows that a more detailed engineering survey at the stage of land plot selection for residential house construction as well as obtaining approvals from the property owners of neighbouring plots and developing engineering solutions at an early stage of the project can considerably reduce the time needed to design and develop working documentation. Reduce the likely risks of controversy, redesign and design changes, and improve budget predictability. Reduce the duration of construction. Thus, increasing the duration and cost of pre-design work at the first stage of project preparation by 10–15 % can reduce the duration of design and construction work by as much as 25–30 %.

Thus, a change in the methodology of interaction between the participants of the renovation project implementation process may become more efficient and productive, which will have an impact on the financial results of the project. Therefore, the elaboration of new methodologies as well as the adjustment of the scheme and the order of interaction of the process participants is appropriate from an economic point of view.

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Анализ эффективности взаимодействия участников при реализации проектов в рамках программы реновации на примере города Москвы

Одним из важнейших направлений социально-экономической политики каждого государства является обеспечение граждан безопасными и комфортными жилищными условиями, которые бы отвечали требованиям не только актуальных норм и правил, но и сложившимся требованиям современного общества. С целью улучшения жилищных условий и обновления ветхого и аварийного жилья ведется программа реновации жилой застройки. Одной из особенностей представленного во многих городах Российской Федерации жилого фонда является большое и, зачастую, преобладающее количество жилых домов, построенных в период с 1958 по 1967 гг., в период индустриального домостроения. В соответствии с действующими нормативными актами срок эксплуатации данных домов составляет до 70 лет при условии своевременного обслуживания. Это означает, что в ближайшие 10–15 лет общее состояние жилищного фонда может существенно ухудшиться и произойдет резкое увеличение ветхого и аварийного жилья. С целью не допустить массового появления аварийных зданий, для которых на данном этапе их жизненного цикла капитальный ремонт нецелесообразен, реализуется программа реновации жилой застройки. Главной задачей данной программы является модернизация существующего жилищного фонда и обновление среды жизнедеятельности с целью приведения его в соответствие со стандартами качества, обеспечивающими комфортные условия проживания.

В реализации программы реновации жилой застройки задействованы многие участники: от государственных структур до локальных подрядных организаций. Такой широкий круг участников требует максимально слаженной взаимной работы для достижения всех поставленных задач. Но, как показала практика, не всегда участники действуют слаженно, что приводит к различным последствиям, выраженным в существенном увеличении стоимости или сроков строительства. Тем самым необходима тщательная проработка действующего порядка взаимодействия участников с целью выявления возможных проблем и анализа для совершенствования механизма управления и взаимодействия участников реализации программы.

Ключевые слова: программа реновации жилой застройки, комплексное развитие территорий, совершенствование механизма взаимодействия, программа реновации города Москвы

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