Organizational and Economic Aspects of Improving the Efficiency of Major Repairs of the Housing Stock

A N Kirillova¹, N N Musinova²

¹Moscow State University of Civil Engineering, Moscow
²Financial University under the Government of the Russian Federation, Moscow

E-mail: fareastcon2019@gmail.ru

Abstract. The article provides insight into the key problems arising during the implementation of regional long-term programs for major repairs of the common property in apartment buildings (AB), including the following: poor development of financial resources and inconsistent repair works, nonobservance of repair time and failure to comply with the terms of subsequent warranty remedial work. The authors have identified a number of tasks, which, if accomplished, will make it possible to promote the efficiency of major repairs management, including the improvement of communication efficiency between residents, who own the property, Major Repairs Fund, contractors, property management companies and social structures, ensuring the application of project-based management methods, expansion of local governments authority enabling them to monitor the implementation of short-term plans of major repairs. The above tasks could already be accomplished using the existing innovation and technology solutions allowing for a complex transition to implementing smart city technologies. It is proposed to extend the AB information model, generated using the BIM process, which involves a compilation of full information about a physical object, characteristics of structural components, construction materials, building structure and physical depreciation, the major repairs project, types of work, cost, repair completion period, time schedules, etc. An improvement in the management of major repairs is associated with further refining of the engineering design policy on major repairs along with the following: development of standard design solutions regarding the scope and types of work covered by contributions from the premises owners; development of maintenance requirement cards and method statements; application of innovation-based and durable materials and structure types that would ensure a reduction in maintenance expenditure through optimizing the intermaintenance periods and wear-out characteristics; resources conservation and improvement of functional performance of residential houses. It is proposed to create three units within the Fund structure: a project office to perform building structural surveys with a view to ensure a pre-project (including instrumental) inspection of apartment buildings listed in the short-term plan of major repairs; a project office to monitor the implementation of the major repair projects in compliance with plans of previous years; a project office in charge of control over the implementation of major repairs projects for the current year. Continue to be relevant are the mechanisms of state support for co-funding the major repairs programs for those regions where the floor for minimum major repairs contribution is set at a level lower than economically feasible. The implementation procedure for the proposed measures may include a development and enactment of a regulatory legal act on amendments to regional programs of major repairs and their short-term implementation plans.
1. Introduction
The current trends in the housing stock structure, its life characteristics, as well as reliability and comfort-level factors translate into the task of improving the efficiency of major and current repairs by choosing certain strategic changes, which go hand in hand with the process of extended reproduction of residential property (reconstruction, renovation, and construction).

Under present-day conditions, major repairs are a repetitive stage in the life cycle of apartment buildings regarded as a system of financial and economic models, and as a combination of legal, social, diagnostic, pre-project, project, process control and management activities aimed to reduce the AB physical depreciation and improve functional performance, technical quality and consumer appeal of residential property.

2. Relevance
Currently (as of July 1, 2019), in the Russian Federation, regional long-term programs for major repairs of the common property in apartment buildings (AB) include 734 148 apartment buildings with a total area of 2556.80 million sq. m. As of 2019, major repairs are scheduled in 69 376 houses with a total area of 344 986.23 sq. m (according to the plan of the previous years and the current year). Over the first six months of 2019, major repairs were carried out in 13 793 houses (according to the plan of previous years and the current year), which makes up for only about 20% of the total number of residential houses scheduled for repairs this year. That having been said, the financial target for major repairs to be carried out in 2019 was 308 675.40 million rub., however, during the first half of 2019, only about 15% of the plan was executed.

The monitoring data on the implementation of the regional programs of AB major repairs suggest that, in general, the key problems associated with the matter include poor development of financial resources and inconsistent repair works.

Among other problems that residents face in relation with major repairs are operator’s nonobservance of repair time and failure to comply with the terms of subsequent warranty remedial work. The terms of facade works contracts often coincide with the autumn and winter period. This fact leads to significant irregularities in the procedure and, hence, a poor state of facades.

3. Problem statement
The contractors’ failure to comply with the deadlines of major repair works hinders a sustainable implementation of major repairs programs. For example in Moscow, to address this issue, there is a city control board monitoring the progress of major repairs; it has a dedicated hotline available to the residents of every house included in the city repair program. Should it be necessary, the board representatives respond as a kind of an “ambulance”: they arrive at a place where a controversy comes up, invite the representatives of the Major Repairs Fund, contractor organization, authority, management company and residents to solve the problem quickly. In the present context, this control mechanism is only a single example of mechanisms included in the overall quality control of construction and repair works.

The negative trends in the implementation of major repairs programs could be dealt with by taking an alternative approach and applying innovative solutions to the processes of management.

4. Theoretical
Several modular tasks allowing for an improved efficiency of major repairs management can be distinguished:
- improvement of communication efficiency between residents, who own the property, Major Repairs Fund, contractors, property management companies and social structures;
- ensuring the application of project-based management methods;
- expansion of local governments authority enabling them to monitor the implementation of short-term plans of major repairs.
The above tasks could already be accomplished using the existing innovation and technology solutions allowing for a complex transition to implementing smart city technologies. The concept of using the “smart city” information technologies is based on the residents, representatives of contractor organizations and local authorities sharing the data on the housing stock repair projects to analyze the existing flaws, defects, damages, and deviations from the design data. An information model of the apartment building may be fundamental for such a system, produced using the BIM technology, which involves a compilation of full information about a physical object, characteristics of structural components, construction materials, building structure and physical depreciation, the major repairs project, types of work, cost, repair completion period, time schedules, etc. The Major Repairs Fund websites provide certain information on the houses repair, however, the process of repairs is not monitored, their quality is not registered, and complaints from the residents are not accounted for. When creating an information model, it is necessary to ensure the following: an improved quality of acquisition, processing, storage and analysis of primary data on apartment buildings; approval of the regulations on entering data into the information system; regular updating, checking validity and consistency of information on target and actual figures on the implementation of a short-term plan and a regional program of major repairs in general.

Optimal models for scheduling major repairs imply a certain variability of projects that makes it possible to find the right models of combined repair strategies and introduce modernization, innovation and energy-efficient technologies. An improvement in management of major repairs is associated with further refining of the engineering design policy on capital repairs along with the following: development of standard design solutions regarding the scope and types of work covered by contributions from the premises owners, and development of maintenance requirement cards and method statements. Other important aspects are the application of such innovation-based and durable materials and structure types that would ensure a reduction in maintenance expenditure through optimizing the intermaintenance periods and wear-out characteristics, resources conservation and improvement of functional performance of residential houses.

It is important that the regional operators introduce project management processes into their activities concerning major repairs of apartment buildings, where the actual results of the executed works are evaluated not only by higher authorities and regulatory bodies, but also by local residents. By the way of achieving their goals, the management structure of regional operators is a process-based management system, where, at strategic level, goals are achieved by implementing a regional long-term program of major repairs, and, at tactic level, by implementing short-term plans of major repairs of the common property in apartment buildings when executing the projects mainly as standardized processes, which give structure to a set of construction and repair works, characterized by recurrence in their scope and types.

Today, many commercial and government organizations use the project-based management method in their activities, owing to objective impact factors of the external and internal economic environment. However, even large project-based companies may face some difficulties associated with the coordination of all their project resources. To solve some of the most important issues, project offices are established as functional units that centralize and coordinate the process of project management of a company.

When implementing short-term plans of major repairs, certain problems associated with the following types of residential houses are revealed: apartment buildings, where major repairs are not economically feasible (low-rise apartment blocks or buildings with significant physical depreciation of the main structural elements), which entails additional structural surveys of these buildings and making decisions on further remedial actions; apartment buildings recognized as unfit and subject to demolition. The major repairs project portfolio is reviewed more or less within the framework of a short-term plan, which can significantly affect the due date and cost of repairs. In this case, it seems appropriate to create three units within the Fund structure: a project office to perform building structural surveys with a view to ensure a pre-project (including instrumental) inspection of apartment buildings listed in the short-term plan of major repairs; a project office to monitor the implementation
of the major repair projects in compliance with plans of previous years; a project office in charge of control over the implementation of major repairs projects for the current year.

5. Practical significance
The establishment of project offices will provide for an efficient solution to resource-related conflicts of the existing projects, reduce unreasonable time expenditure when choosing a portfolio of the planned projects of the AB major repairs, ensure their synchronization and implementation, and reduce the risks associated with managing the regional program of major repairs of apartment buildings.

The functions of the current municipal authorities and organizations acting as technical coordinators should be extended through norms and regulations to manage major repairs in territories under the jurisdiction of local authorities more judiciously. At that, the mechanisms of state support for co-funding the major repairs programs for those regions, where the floor for minimum major repairs contribution is set at a level lower than economically feasible, remain fundamental.

6. Conclusion
The implementation procedure for the proposed measures may include a development and enactment of a regulatory legal act on amendments to regional programs of major repairs and their short-term implementation plans.

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