Formation of Normative and Legal Regulatory Criteria of As-Assessment of Organizational Process Management in the Impel-Mentation of Projects of Repurposing of Major Urban Territories

Dmitry Topchiy, Ekaterina Kochurina

Abstract*: *In this article, the authors analyzed the effectiveness of applying the standards of the ISO 9000 series in the construction industry in foreign countries. In Russia, the regulatory and technical framework governing the organization of construction in urban areas does not provide for an integrated approach to the conduct of this construction. In foreign countries, as well as in Russia, there are no normative documents defining special rules of construction in conditions of dense urban development. At the same time, in contrast to the domestic construction industry, on foreign sites they use an integrated approach to the management of the construction industry and apply the standards from the ISO 9000 series as a quality control document. Update and correct adaptation of the international quality standard ISO 9001 "Quality management system. Requirements" on domestic market, under the requirements of the construction sector, will allow to introduce a system of full control and interaction of all construction processes from the development stage to the stage of delivery and operation of objects of any complexity and to bring the organization of construction production in Russia to the World market.

***Index Terms*: Construction; ISO 9000; Organizational and Technological solution; Quality management systems; QMS; Quality in construction**

I. INTRODUCTION

In the context of undergoing processes of urbanization and expansion of industrial centres, a particular focus should be put on the challenges of construction in confined urban areas. However, no normative or technical base that would regulate construction in such areas has been developed yet. This problem is vital not only in Russia, but in large international cities as well. A major part of construction sites in Russia are located within the boundaries of such cities as Moscow, Saint-Petersburg, Novosibirsk, Yekaterinburg, Nizhniy Novgorod, Kazan, Chelyabinsk, Omsk, and Samara.

In order to determine the need and effectiveness of the implementation of ISO 9000 series documents on domestic platforms, factors such as were analyzed:

- the number of construction sites in urban areas in Russia;
- problematic factors of construction work in urban areas;
- the scope and duration of the impact of these standards on the construction process;
- economic costs for the introduction of QMS;
- the effectiveness of the application of the considered regulatory documents abroad.

II. MATERIALS AND METHODS

Figure 1 shows a diagram of breakdown of construction sites by Russian regions according to “PoiskStroek”, Russia’s first digital platform for construction site search.

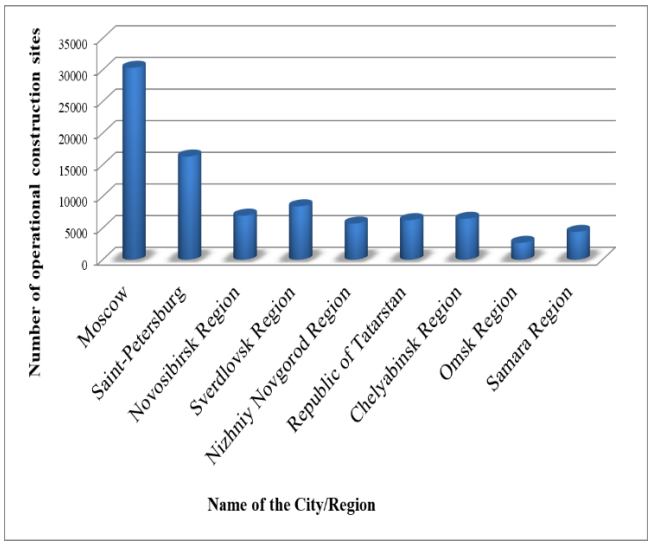

Fig. 1. Number of construction sites broken down by Russian regions with the highest development rates

As shown by the diagram, Moscow, Russia’s central part, accounts for the largest portion of construction sites [9].

According to Ruling of the Government of Moscow No. 497-PP “On the Renovation Program for the Housing Stock in the City of Moscow”, there are plans to create comfortable residential conditions in the city by preventing and eliminating the growth of hazardous dwelling and by creating new residential and development areas in locations, where buildings are scheduled for demolition under this program [2].

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New residential construction under the renovation program provides for development efforts on new and already developed territories that include projects of demolition and subsequent construction in the areas with an established infrastructure, i.e. in restrained urban conditions.

Optimization of capital construction works in urban areas with account for the provisions of federal laws of the Russian Federation requires an assessment, at the construction organization stage, of the impact of a number of factors that inevitably arise due to proximity of existing buildings and structures to the construction site and space-limited environment.

The Town Planning Code of the Russian Federation dated 12.29.2004, and Laws on Technical Regulation (FZ No. 184 dated 12.27.2002) and Technical Regulations on Safety of Buildings and Structures (FZ No. 384 dated 12.30.2009) provide the legal framework for construction processes, including those in restrained urban conditions, and obligate the Developer (the Customer) to assess the impact of external factors associated with works under given conditions [17].

Neither internationally, nor in Russia there are any normative documents that would lay down special rules for construction operations in restrained urban conditions. The efficiency of an organizational model of construction in such conditions for all intents and purposes depends on the skills of professionals, who tackle these issues, and their experience with construction projects in urban areas.

The quality management system (QMS) introduced in the company should be used as an instrument of regulating construction works assessed in terms of restrained conditions using the urban development density index (Pub) [18][19].

In the market economy environment, the proposed procedure of construction works that provides for rationing of the customer's expenses on organization of construction operations and systemized control of all construction stages taking into account the density of the existing built-up urban areas will enable domestic construction companies to achieve a new competitive level in the world market [16].

Construction operation methods in urban areas are assessed without using any quantitative indicators or regard for the full scope of influence of external factors. Thus construction organization forms are not the most optimal under given conditions, and as often as not completed projects fail to meet the customer's requirements and the provisions of regulatory documents [1][3].

Optimization of the process of organization and implementation of construction works in the vicinity of existing projects requires completion of the following stages:

Findings of this analysis can make it possible to optimize the organization and implementation of works only if the optimization processes are systemized, sufficient in scope, controllable and timely adjustable.

The international quality standard ISO 9001 "Quality Management System. Requirements" and the corresponding national standard GOST R ISO 9001-2015 "Quality Management Systems. Requirements" adapted for the domestic market offer a system of complete monitoring and interaction of all construction processes from the design stage to the stage of commissioning and operation of projects of any complexity.

The requirements of these standards are uniform. The main task for the construction industry is competent adaptation of these requirements in line with particular features of construction works.

In order to ensure the efficiency of the selected model of organization of construction operations it is necessary at all construction stages to introduce product quality management systems that would also enable construction and installation companies to reduce costs and improve the quality of their products thus ensuring a full-fledged operation of the organizational model [4][5].

The main documents that set forth product quality requirements have been developed by the British Standards Institution (BSI).

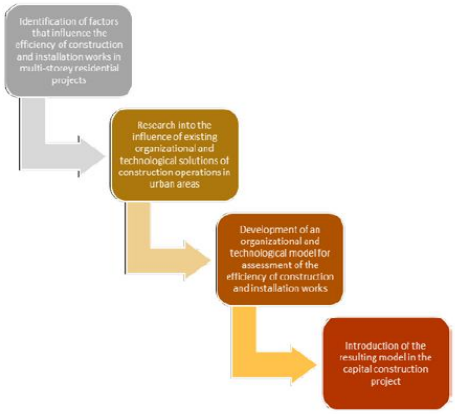

Fig. 2. Stages of process optimization of organization and implementation of construction works

International experience testifies to positive performance of the quality management systems (QMS) introduced in construction operations. Unlike domestic construction organizations, international companies use these systems on a permanent basis as a must for ensuring their competitiveness. Moreover, the need to use such systems by international companies is driven by the growth of technological and technical complexity of projects, the scope of works to be performed, including specialized works, the use of technical staff and construction materials and equipment from various countries, as well as the added complexity of construction organization in a growing number of construction projects in the existing high-density urban areas. Russian construction organizations are experiencing similar needs. Let's consider the structure of quality management systems of international construction companies [7].

For example, in the United Kingdom, before a construction contract for buildings and structures is signed, the customer requires from the contractor a warranty of high-quality performance of works — a written assurance from the contractor that he will apply an efficient product QMS. As a rule, such assurance is given in the form of a certificate of the company's compliance with the requirements of the ISO 9001 standards. These standards series contain requirements to the following corporate features Figure 3 [13]:

Fig. 3. Corporate features of standards series

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Such QMS requires special reporting and documentation and inspection checks in order to obtain objective evidence that the equipment and materials being used meet the requirements established by regulatory and design documentation.

Monitoring of proper functioning of a construction company's QMS is entrusted to the so-called quality manager, a duly skilled and certified staff member. The quality manager monitors compliance with the works performance requirements set forth by the QMS documents and coordinates the works as necessary.

Before the quality manager commences his duties, he draws up a works performance monitoring program with due account for specific features of the construction project for the whole term of construction. This program includes details of the project, the quality management system structure, and the need for the staff to carry out inspection checks of works performance, as well as structured information about the procedure of issuing construction materials on the site, arrival of construction machinery, and the need for and completeness of operational documentation for the project [11][12].

The customer appoints an officer responsible for inspection of this scheme of monitoring of works performance by the contractor. This officer is authorized to check all documentation developed and completed by the contractor and must also be informed of any corrective action of the contractor with regard to his works in the event that the customer or the contractor reveals any violation in the procedure of their implementation.

Moreover, for the accepted quality management system to function properly, the company's governance team conducts monthly inspections of the works performance process on the basis of information derived from reports of onsite inspection staff.

This system testifies to the concern for the quality of works of all parties. It also ensures timely response to deficiencies revealed by the QMS, decision-making on appropriate corrective action, and evaluation of the results of any adjustments made.

In Germany, the quality level of construction products has also recently grown with virtually all construction products being certified. This trend is explained by the fact that traditional German ideas of quality are found to be insufficient, and internationally accepted requirements must be complied with [10].

Considering that quality management covers all construction sectors from the construction site to suppliers of materials and equipment, it ensures full-fledged functioning of the selected model of organization and performance of works as it obligates all subcontractors, contractors and suppliers to abide to uniform requirements.

In the Russian Federation, there is also a normative document that regulates the requirements to project management.

The document in question is GOST R 54869-2011 "Project Management. Requirements to Project Management". This document describes the requirements to project management at all construction stages.

Like similar international documents, these regulations are focused on a high quality of construction products, namely, a high quality level of a project expected by the customer. This document regulates the means of ensuring efficient tackling of the project tasks. The regulatory document under review has been developed and adapted as a subsidiary document of the ISO 9001 series with account for requirements of the domestic regulatory framework.

The document under review identifies the following project management aspects:

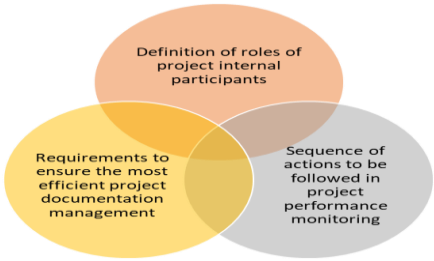

Fig. 5. Project management aspects

Unfortunately, this document contains only general requirements to project management. It is not adapted to specific features of construction operations and, regrettably, is not a binding normative and technical document.

Besides the above-mentioned document, the normative and technical basis of the Russian Federation also includes one more document aimed at optimization and systematization of project management processes in various fields of business operations [6].

The document in question is GOST R ISO 21500-2014 "Project Management Guidelines".

The sense and the focus of this document are different from those of the above-mentioned document inasmuch as its target audience is corporate top managers. As concerns the above-mentioned document, it describes the requirements to all project participants.

III. Results and Discussion

Unlike in foreign countries, where the QMS operates at construction sites, which makes it possible to view construction processes as a whole and control them with a single tool, in Russia the construction process within the same object is considered handicraft, which affects the coordination of work and prevents all processes simultaneously.

According to the results of the work carried out the main procedures of timely assessment of the quality of works being performed include:

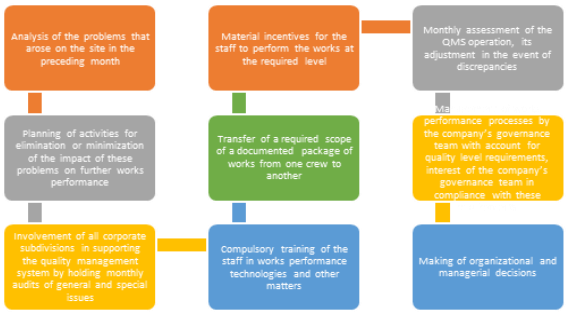

Fig. 4. The main procedures of timely assessment of the quality of works

IV. Conclusion

To optimize the processes of building production and bring them together into a single system will allow the system developed by the Members of the British Institute, in which firms register that have confirmed their compliance with the requirements of ISO standards.

Analysis of the quality of works performed by the firms with valid ISO quality certificate points to the fact that this system makes it possible to reduce the duration and costs of construction projects due to lower frequency of design deviations.

Unfortunately, at this stage of development of the domestic market of construction production, due to the large number of people involved in the work, such as contractors and subcontractors, it is possible to introduce a QMS at a time only by erecting this requirement at the mandatory level, which will eliminate the doubts of construction participants and will oblige allocate funds for these procedures.

The introduction of the considered standards will allow to bring the competitiveness of domestic construction production to the world level.

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