Design of organizational and industrial relations in the renovation of urban areas

D Topchiy, A Lapidus

Department of Technology and organization of construction production, Moscow State University of Civil Engineering, 26, Yaroslavskoye Shosse, Moscow 129337, Russia

E-mail: dvtopchiy0405@gmail.com

Abstract. This article presents a study of links in organizational and technological structures and information support in construction control in the Russian Federation and other countries, including Great Britain, the USA, Germany, etc. It describes particular features of interconnection between the Customer and the General Contractor in construction product quality management abroad and substantiates the need for development of an automated design system of construction quality management. The structure of the state construction supervision in Russia at the objects of industrial and civil purposes is presented. The features of conducting Supervisory activities in construction are revealed, as well as the main aspects of such activities are presented. The article describes in detail the differences between the implementation of supervision and construction control on capital construction projects. The main issues arising in the performance of construction quality control are formulated.

1. Introduction

Pursuant to Federal Laws of the Russian Federation, capital construction projects are subject to mandatory construction control. The Town Planning Code of the Russian Federation [1-3], the Federal Law on Technical Regulation [4-6] and the Technical Regulations on Safety of Buildings and Structures [7-9] have established a legal basis for ensuring construction safety, including a binding requirement to the Developer (the Customer) on construction control in construction operations. Under free market conditions in this country, the established construction control procedure that includes rate setting for construction control expenditures of the customer and the number of the customer’s staff responsible for construction control is in fact rarely complied with.

Experience of Western countries shows that a properly streamlined product quality management system reduces the costs of construction firms and improves the quality of their products. These systems are used by international companies in the conditions of growing technological and technical complexity of projects, scope of works to be performed, including specialized works, and demand for technical staff, construction materials and equipment from various countries. Russian construction enterprises find themselves in a similar situation. Let us review some quality management systems of international construction organizations.

2. Research methodology

Theoretical analysis and generalization of research literature and periodicals in the field of construction control and quality management in construction operations in this country and abroad.
In Great Britain, the Customer's priority requirement to a construction company is a guarantee of high-quality performance of works in the form of the contractor’s written undertaking to apply an efficient product quality control system that includes special reporting and document maintenance, as well as inspections held to verify conformity of the works, equipment and materials to regulations and design documentation.

The construction contractor appoints a member of his staff as a quality manager to control and coordinate the functioning of the product quality control system. This manager reports to the construction company’s technical director and has appropriate control and inspection personnel subordinate to him. His duties include drawing up and distribution of quality guidelines, and determination of the scope and character of quality control documentation. As a matter of priority, he should develop a quality control program for works performed at each project. This program should include data on the organizational structure of the quality control system, functions and duties of the inspection personnel, control procedures, procedures of acceptance and use of construction materials, document maintenance, etc.

The customer appoints his authorized representative to check the efficiency of the contractor’s quality control system. This authorized officer has access to all required documentation that certifies the quality of works. He is informed of all quality improvement measures and holds inspections directly at the construction site [10-12].

German construction companies apply Qualitatsicherungs system (QSS), a quality assurance system intended to ensure quality rather than controlling it after completion of works. Efficient cooperation between corporate quality subdivisions and construction supervision authorities coupled with close interaction with construction teams lays a solid foundation for preventing defects in products. The quality assurance system is legally regulated by ISO 9000 standards, while the basic working document is a quality assurance action plan for the entire term of construction. Work performance is monthly analyzed at production sites in terms of construction quality and focused on identification of causes of defects and readjustment.

The quality control system ensures continuous control of all stages of the construction process both at the construction site and at producers and suppliers of materials and equipment. All subcontractors and suppliers of construction materials and equipment must conform to unified principles.

A quality manager reportable to the construction project manager is appointed to ensure proper functioning of the quality control system (figure 1).

![Figure 1. Functions of quality manager.](image_url)
The quality manager develops quality control regulations to be approved by the customer within 30 days after entering into the contract. These regulations should include the following sections (figure 2):

The contractor is not authorized to undertake any construction or installation works without appropriate quality control regulations approved by the customer. As part of his quality control functions the contractor must provide the customer the following documents (figure 3).

The manager holds regular meetings approved by the customer to discuss construction quality issues. A quality control engineer is appointed for each construction project. He reports to the quality manager and follows his instructions. The project controller performs the following functions:

- Incoming control of building materials, parts and structures;
- Operational and acceptance control.

He is authorized to do the next arrangement (figure 4):
The project controller cooperates with the construction superintendent to accomplish the common task of project construction.

An important role in ensuring the functioning of the quality control system belongs to a construction laboratory. The contractor ensures its operation throughout the term of construction and draws up a list of required tests for all types of materials, products and structures as well as all construction and installation works to be performed.

Quality improvement issues are priority agenda items of biannual and annual meetings of the company’s management team. All these and other activities improve the quality of construction of buildings and structures and reduce considerably defect rectification and rework expenses [13].

In Sweden, property owners are legally responsible for compliance with construction laws. Instead of a state inspector, construction supervision functions are vested in a private independent quality assessment engineer. This engineer can be hired by the property owner for the duration of a required inspection [14].

In the US, local construction supervision and control bodies are governed by construction permit regulations. In terms of civil law, a construction permit is a license agreement between subjects of technical regulation, wherein the licensor is a state authority represented by an officer of a construction supervision and control body and the licensee is the property owner or the developer, designer or contractor acting on his behalf. Under this agreement the licensor empowers the licensee to produce construction products (or perform certain actions with regard to existing products) in accordance with the construction documents submitted by the licensee to the licensor for review and approval. A construction permit like any other civil transaction imposes certain liability on the parties thereto. By signing an application for a construction permit, the property owner (or his agent) undertakes to comply with construction norms and regulations, which implies adherence to procedures and directions of the construction supervision and control body, timely notification of construction control officers of the readiness of the project for inspections, ensuring unimpeded access of inspectors to the construction site, and other duties.

By granting the property owner’s application, the supervision and control body undertakes to perform activities aimed at ensuring conformity to construction laws including verification of construction documents with a view of issuing a permit for construction, installation or other works and regular inspections [15,16].

In Georgia, construction control by the customer or the developer is voluntary. However, in the event of detected violations of fire regulations, regulations on the safe use of construction machines and equipment, or occupational safety and labor regulations, liability rests with the developer or, in the
case of operation of a completed construction project, with the property owner. It is in the interests both of property owners and developers to cut down legal risks of production incidents or accidents resulting from incompliance with construction laws, standards and regulations. As a consequence, developers and owners contract with qualified construction control professionals, who may be designers or experts officially registered in the expert register of Georgia’s Economic Development Ministry and accordingly authorized to perform expert assessments of property [17,18].

In New Zealand, construction control is not compulsory either. But issuing of a construction permit is subject to inspection. Proceeding from particular features of the project, the issuing authority establishes the objective and the number of inspections to be undertaken in the course of construction. This is the duty of the property owner or his duly authorized representative. The owner must notify the inspector in a timely manner on the readiness of the project for inspection and ensure unimpeded access to the project at the time determined by the inspector. Inspections are generally held within 24 to 48 hours after receipt of the project readiness notice by the inspector. In other words, the developer is interested in producing high-quality construction products from the very beginning [19].

In the USSR in 1921, the state became the sole owner and customer of all construction projects and assumed control of all contracting operations. In 1938, a governmental Construction Committee was established with the powers of construction project and operations management, development of the production and estimate standards, and technical regulation of the industry. In 1939, the Committee transferred its functions to Narkomstroy, or the USSR People’s Commissariat of Construction.

The USSR Narkomstroy was in charge of all specialized, construction and installation works, quality control of completed products, and delivery of projects ready for commissioning to the customer [20].

International experience shows that a quality control system can be instrumental in reducing the term of construction and cutting down its costs owing to fewer deviations from the design.

3. Conclusions
The construction control procedures in the Russian Federation are based on the Town Planning Code [21-23] and the Government Decree on the Construction Control Procedure in Construction, Reconstruction and Capital Repair of Capital Construction Projects (hereinafter the Construction Control Procedure) [24]. Under current free market conditions in this country, these procedures that stipulate the rate of the customer’s construction control expenditures and the number of his staff responsible for construction control are in fact rarely complied with. In the situation of the current construction boom, the existing construction control procedures fail to prevent growing accidents at buildings and structures or construction product defects [25].

One of the solutions to this problem is to develop an automated design system for the quality management process of construction products, which will be used to improve construction control. In addition, it is necessary to take into account the peculiarities of the construction control, depending on the characteristics of a particular construction object. Of particular importance in ensuring quality control is the level of training of specialists of the organization, as well as the availability of the necessary measuring equipment. Of great importance is the quality management system used in the organization.

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