Organizational-Technological Modeling In The Reconstruction Of Higher Education Institution Buildings

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Abstract
The reconstruction of higher education institution buildings represents a critical challenge in modern educational infrastructure development, requiring sophisticated organizational-technological approaches to ensure minimal disruption to academic activities while achieving optimal renovation outcomes.
Keywords: reconstruction, higher education buildings, organizational modeling, technological modeling, project management, construction planning

Аннотация. Реконструкция зданий высших учебных заведений представляет собой важнейшую задачу развития современной образовательной инфраструктуры, требующую применения сложных организационно-технологических подходов для минимизации помех учебному процессу и достижения оптимальных результатов реконструкции.
Ключевые слова: реконструкция, здания высших учебных заведений, организационное моделирование, технологическое моделирование, управление проектами, планирование строительства

Introduction. The upgrading of educational institutions' buildings has become an important issue that is hard to ignore in today's educational paradigm. This takes place as a result of the necessity to do away with old infrastructure, welcome the new with better facilities, and at the same time, keep exercising energy efficiency standards. The application of organizational-technological modeling comes as a powerful tool to cope with such challenges by offering structured ways of conducting the planning, simulating, and optimizing reconstructive operations ahead of their actual physical implementation [1]. The importance of this research is not just limited to the individual project's success but rather extends to the entire institutional strategic planning as the effective reconstruction modeling could provide guidance for the long-term campus development strategies and resource allocation decisions. The case of Central Asian nations, particularly Uzbekistan, where the reconstruction of the Soviet Union era educational infrastructure, adds more difficulties and complexities that necessitate to treated with utmost care the issues of structural rehabilitation, enhancement of seismic safety, modernization of obsolete building systems, and at the same time, safeguarding architectural heritage values [2].
Methodology and Literature Review. This study employs a comprehensive literature review methodology to examine organizational-technological modeling approaches in higher education building reconstruction. Ginzburg has analyzed the application of organizational modeling to large-scale reconstruction projects in post-Soviet educational institutions, identifying critical success factors including comprehensive pre-project surveys, phased implementation strategies, and robust communication protocols among academic administrators, construction professionals, and end-users [3]. Uzbek researchers have contributed valuable insights into the specific challenges of educational infrastructure modernization in Central Asia, with Shodmonov examining the technical and organizational

aspects of reconstruction projects in higher education institutions, emphasizing the importance of comprehensive condition assessments and systematic project planning approaches [4].

Russian scholars have developed comprehensive frameworks for construction organization and management, with Volkov and colleagues examining digital transformation in the construction industry and its implications for organizational and technological processes in reconstruction projects [5]. Research by Kasimov and colleagues has examined construction technology and organization in Uzbekistan, providing insights into regional practices and identifying opportunities for methodological improvements in project planning and execution [6]. Project management principles applied to construction contexts, as explored by Russian and international scholars, provide essential frameworks for understanding the coordination challenges inherent in university reconstruction projects [7]. Research examining construction processes in Central Asian contexts highlights the importance of adapting international best practices to local conditions, regulatory frameworks, and institutional capabilities [8].

Results and Discussion. The analysis of organizational-technological modeling applications in higher education building reconstruction reveals several significant findings with important implications for project management practice and institutional planning. First, the integration of comprehensive modeling approaches consistently correlates with improved project outcomes across multiple dimensions including schedule performance, budget adherence, and stakeholder satisfaction. Evidence from comparative case analysis suggests that projects employing systematic organizational modeling—characterized by formal stakeholder coordination structures, documented communication protocols, and explicit decision-making hierarchies—experience substantially fewer schedule disruptions compared to projects managed through traditional ad-hoc coordination methods [3].

The technological modeling component demonstrates similarly positive impacts, with Building Information Modeling implementation enabling more accurate cost estimation, reduced change orders, and enhanced coordination among architectural, structural, and building systems disciplines [1]. Particularly noteworthy is the capacity of technological modeling to identify spatial conflicts between proposed renovation work and existing building conditions before construction commencement, thereby avoiding costly field modifications and associated schedule delays. The research synthesis indicates that effective organizational-technological modeling in university reconstruction contexts requires careful attention to several critical success factors. Phasing strategies emerge as particularly important, with successful projects demonstrating sophisticated approaches to sequencing work to minimize disruption to academic activities while maintaining construction productivity.

The role of existing condition assessment in reconstruction modeling cannot be overstated, as incomplete or inaccurate documentation of existing buildings represents a primary source of project uncertainty and risk [4]. Advanced survey technologies including laser scanning and non-destructive testing methods have substantially enhanced the quality of existing condition data available for modeling purposes, enabling more realistic project planning and reducing contingency requirements. Stakeholder engagement practices constitute another critical dimension of organizational modeling, with evidence suggesting that regular, structured communication between project teams and university constituencies significantly enhances project acceptance and reduces resistance to temporary inconveniences associated with construction activity.

Conclusion. This examination of organizational-technological modeling in higher education building reconstruction demonstrates that systematic approaches to planning, coordinating, and executing renovation projects yield substantial benefits in project performance, stakeholder satisfaction, and institutional outcomes. The synthesis of international, Russian, and regional research and practice reveals that effective modeling integrates both organizational dimensions—encompassing stakeholder coordination, communication protocols, and governance structures—and technological dimensions including Building

Information Modeling, construction simulation, and existing condition documentation. Key findings indicate that comprehensive modeling approaches reduce schedule disruptions, enhance cost predictability, and improve coordination among diverse project participants while accommodating the unique constraints of operational educational environments.

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