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CHANGE MANAGEMENT IN THE ADOPTION OF BIM TECHNOLOGY IN UZBEKISTAN'S CONSTRUCTION PROJECTS: A CONCEPTUAL APPROACH BASED ON THE ADKAR MODEL

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Abstract. The growing complexity of construction projects requires Building Information Modelling (BIM) to be treated not only as a design tool, but also as a system for managing information and collaboration. BIM adoption, however, is not limited to software acquisition; it changes working practices, organisational processes, and stakeholder relationships. This study identifies the human, organisational, and institutional factors influencing BIM adoption in Uzbekistan and develops an adapted conceptual mechanism based on the ADKAR model. A systematic literature review, comparative analysis, examination of official documents, and conceptual modelling were employed. The proposed framework integrates the external institutional environment, organisational readiness, ADKAR stages, and stakeholder participation. It argues that engineers require all five ADKAR dimensions, while clients need not only awareness and desire, but also sufficient knowledge and capability to define information requirements and evaluate BIM deliverables. The framework supports phased adoption through pilot projects, role-specific training, contractual preparation, and reinforcement through internal standards. As the model is conceptual, further empirical testing in Uzbek construction organisations is required.

Keywords: BIM, ADKAR, change management, construction project, digital transformation, organisational readiness, strategic management, stakeholders.

INTRODUCTION

The construction industry plays an important role in economic growth, infrastructure renewal, and meeting the population's housing needs. In Uzbekistan, construction work valued at UZS 273,276.2 billion was completed between January and November 2025, representing a growth index of 114.6 per cent [8]. The expansion of the sector requires more precise management of project duration, cost, quality, and information exchange among participants.

Construction projects involve clients, designers, contractors, engineers, suppliers, and regulatory authorities. Their use of different drawings, estimates, and work schedules may lead to duplicated information, inconsistent versions, and delayed communication of changes. Building Information Modelling (BIM) helps reduce these problems by managing the geometric, technical, and economic information of a facility within a single digital model [10].

BIM enables the early detection of design clashes, quantity calculation, construction sequencing, and the use of consistent information by project participants [17; 18]. Nevertheless, the availability of the technology does not automatically ensure its effective use. As BIM affects organisational procedures, the distribution of authority, contractual arrangements, and employees' professional skills, its adoption must be managed as an organisational change [13; 14].

LITERATURE REVIEW

Scientific studies show that technological, human, organisational, and institutional factors jointly influence BIM adoption. Without alignment among people, organisations, and technology, software capabilities do not produce their full benefits [2]. Because BIM is a multi-party and systemic innovation, the readiness of one organisation must be aligned with the readiness of other project participants [3]. Top management support, organisational culture, and a clear strategy shape an enterprise's BIM capability [4; 7; 15].

The Technology Acceptance Model (TAM) explains how users assess the usefulness and ease of use of a technology [11]. However, a change-management model is required to explain the process from an employee's recognition of the need for change to the sustained use of a new practice during the transition to

BIM. The ADKAR model represents this process through five stages: Awareness, Desire, Knowledge, Ability, and Reinforcement [12].

Jaaron, Hijazi, and Musleh integrated ADKAR with BIM and proposed that all five stages are required for design and contracting engineers, whereas awareness, desire, and reinforcement are particularly relevant to government institutions [1]. Although the model provides an important theoretical basis, it was developed from eight interviews in the Palestinian construction industry and therefore requires testing in other national contexts. In Uzbekistan, the interrelated roles of government bodies, clients, design organisations, contractors, higher education institutions, and professional associations must be considered separately.

Measures aimed at digitalising construction supervision and permitting procedures in Uzbekistan are creating an institutional basis for the integration of information systems [9]. However, this does not mean that BIM has been fully implemented across all organisations. The purpose of this study is therefore to identify the human, organisational, and institutional factors affecting BIM adoption and to develop a conceptual mechanism adapted to the conditions of Uzbekistan on the basis of ADKAR. The study addresses barriers to BIM, the integration of ADKAR stages, and the responsibilities of key stakeholders.

RESEARCH METHODOLOGY

The study employed a conceptual-analytical research design. This approach was selected because publicly available empirical data on the human and organisational dimensions of BIM in Uzbek construction enterprises remain limited. The article does not statistically measure the level of BIM use; instead, international research findings are compared with the institutional conditions of Uzbekistan.

The BIM-ADKAR model developed by Jaaron, Hijazi, and Musleh was used as the principal theoretical source [1]. In addition, scientific publications on BIM adoption, organisational readiness, top management support, contractual issues, and the experience of developing countries [2-7; 13-18], together with official statistical and government sources from Uzbekistan [8; 9], were analysed.

Sources were selected on the basis that they addressed management, personnel, or the institutional environment in addition to the technical functions of BIM; that their bibliographic details could be verified; and that their findings were clearly presented. During the analysis, the identified factors were classified into human, organisational, technological, contractual, and institutional groups and were then linked to the ADKAR stages and relevant stakeholders.

A limitation of the study is that the proposed model has not been empirically tested using data from Uzbek enterprises. The relationships are therefore theoretical and should be examined in future studies through surveys, interviews, and project performance indicators.

ANALYSIS AND RESULTS

The analysis identified six groups of factors that are important for successful BIM adoption. The first is awareness of the meaning and benefits of BIM. If the technology is interpreted only as three-dimensional drafting, its information-management and collaboration capabilities remain underused. Employees must receive a clear explanation of the existing problem, the reason for the change, and the expected outcome.

The second factor is the strategic support of top management. Management should align BIM objectives with the enterprise strategy, appoint responsible personnel, allocate resources to a pilot project, and approve criteria for evaluating results [4; 7]. The third factor is employees' readiness for change. Resistance often arises not from the technology itself, but from uncertainty about its effects on responsibilities, workload, and professional status. Communication and employee involvement in the process are therefore essential.

The fourth factor is knowledge and practical ability. In addition to software skills, employees should be trained in BIM processes, information exchange, model checking, and the allocation of responsibilities. If training is not linked to a real project, knowledge does not develop into practical ability. A limited and clearly defined pilot project, mentoring, and technical support are therefore required [13; 15].

The fifth factor is internal standards and reinforcement mechanisms. If the BIM execution plan, file-naming rules, version control, quality assurance procedures, and role descriptions are not formalised in internal documents, the technology is likely to remain an isolated initiative. The sixth factor is inter-organisational and contractual readiness. Data ownership, rights to use the model, liability, and information security should be defined in advance [6].

For engineers, managers, and project teams in construction enterprises, the ADKAR stages have the following practical meaning (Table 1).

Table 1. Practical meaning of the ADKAR stages in BIM adoption

ADKAR stage	Key question	Practical measures in an Uzbek construction enterprise
Awareness	Why is the change necessary?	Present existing problems, explain the specific purpose of BIM, and clarify changes in employee responsibilities.
Desire	Why should I participate?	Address employees' interests and concerns, introduce incentives, and demonstrate visible management support.
Knowledge	How should the work be performed?	Provide role-specific training: strategy for managers, modelling and coordination for designers, and information requirements for clients.
Ability	Can the knowledge be applied in practice?	Use a pilot project, mentoring, technical support, model-quality checks, and learning from errors.
Reinforcement	How can the change be sustained?	Apply a BIM execution plan, internal standards, KPIs, periodic audits, and continuous professional development.

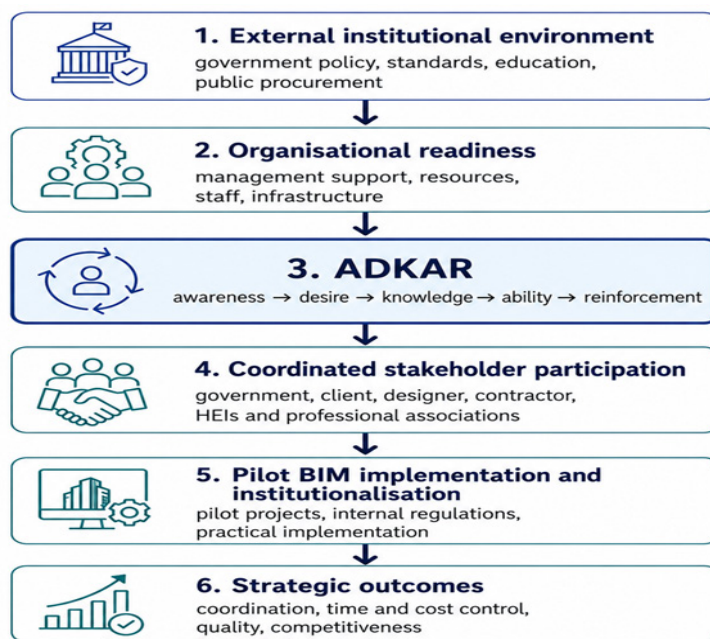
Source: Author's elaboration based on the ADKAR model [12] and studies of BIM adoption.

Because design and contracting engineers use BIM directly, they should progress through all ADKAR stages. They must understand the need for the technology, be willing to use it, acquire the necessary knowledge and skills, and turn the new practice into a routine working method.

For a client, awareness and desire alone are insufficient. The client should be able to define the expected BIM outcomes, specify the information required at each project stage, and establish criteria for accepting the model. Clients therefore require at least sufficient knowledge and organisational capability to formulate information requirements. These requirements should be reflected in the contract, technical brief, and BIM execution plan [6].

Government bodies should create an institutional environment for BIM by developing standards, supporting pilot public projects, establishing education and qualification systems, and introducing requirements gradually. Higher education institutions should teach BIM not as an isolated software course, but as an integrated component of design, construction economics, and project management. Professional associations can support the process through short courses, methodological guidance, and the exchange of practical experience.

Based on the analysis, a six-block model of BIM adoption was proposed. The external institutional environment includes government policy, standards, education, and client requirements. Organisational readiness comprises management support, resources, culture, processes, and contractual preparation. Through the ADKAR stages, these conditions influence stakeholder behaviour and capability. This, in turn, shapes the extent to which BIM is piloted, repeatedly applied, and institutionalised. The expected strategic outcomes are improved coordination, early error detection, greater transparency of cost and schedule information, and increased competitiveness. These relationships are theoretical and require empirical verification (Figure 1).



Source: author's elaboration based on the scientific literature.

Figure 1. ADKAR-based model for BIM adoption in Uzbekistan's construction projects

Source: Author's elaboration based on the BIM-ADKAR model of Jaaron, Hijazi, and Musleh [1] and the sources analysed in this study.

The findings confirm that BIM adoption is a broader organisational change rather than a simple technology purchase. The model developed by Jaaron, Hijazi, and Musleh is useful because it manages individual readiness sequentially [1]. The present study extends that model by incorporating organisational readiness, the contractual environment, and stakeholder coordination. This extension corresponds to the systemic nature of BIM innovation [3].

ADKAR and TAM complement one another. TAM explains the perceived usefulness and ease of use of technology [11], whereas ADKAR describes the process from recognising the need for change to reinforcing a new practice. An employee may consider BIM useful, for example, but its use will not become sustainable without practical ability or management support.

A limitation of ADKAR is its stronger focus on individual change. BIM also involves inter-organisational information exchange, contractual arrangements, and standards. The model proposed for Uzbekistan therefore links ADKAR to institutional and organisational factors. The expanded role assigned to client knowledge and capability follows from the same requirement.

In developing countries, the absence of standards, training, and government support may slow BIM adoption [5]. However, findings from other countries cannot be transferred directly to Uzbekistan. The practical value of the model is that it avoids explaining the problem solely in terms of software or employee resistance and instead helps identify the stage and organisational level at which the adoption process is interrupted.

Practical Recommendations

1. Before purchasing BIM software, assess the enterprise's readiness in terms of management support, employee competence, technical infrastructure, processes, and contractual arrangements.
2. Define BIM objectives through measurable project outcomes, such as reducing design clashes, coordinating cost-estimate data, or improving project control.
3. Develop role-specific training programmes and an ADKAR-based communication plan for managers, clients, and technical staff.
4. Begin with a limited pilot project, define the responsibilities of a BIM manager or coordinator, and provide technical support.
5. For each project, regulate the BIM execution plan, information exchange, model checking, file versions, and the allocation of responsibility.
6. Standardise client information requirements and contractual provisions suitable for BIM-enabled delivery.
7. Reinforce pilot-project results through internal regulations, job descriptions, quality-control procedures, and employee performance-assessment systems.
8. Test BIM requirements for publicly funded construction through selected pilot projects and gradually

develop standards and qualification programmes on the basis of the results.

CONCLUSION AND SUGGESTIONS

The study shows that BIM adoption in Uzbekistan's construction projects requires alignment among technological, human, organisational, contractual, and institutional factors. The effectiveness of BIM depends less on the mere availability of software than on employees' readiness for change, management support, practical capability, and the establishment of internal standards.

Drawing on the BIM-ADKAR model developed by Jaaron, Hijazi, and Musleh, the study proposes a conceptual approach adapted to the conditions of Uzbekistan. The model integrates the external institutional environment, organisational readiness, ADKAR stages, stakeholder participation, practical BIM adoption, and strategic outcomes within a single logical framework.

All ADKAR stages are required for engineers and contractors. In addition to awareness and desire, clients require the knowledge and capability to formulate information requirements, evaluate BIM deliverables, and define responsibilities in contracts. Government bodies, educational institutions, and professional associations should contribute to the development of standards, pilot projects, and qualification systems.

The proposed model is conceptual and has not been empirically tested. Future studies should conduct surveys and interviews in large, medium-sized, and small construction enterprises in Uzbekistan, measure ADKAR constructs, and statistically test the relationship between BIM adoption and project schedule, cost, quality, and coordination outcomes.

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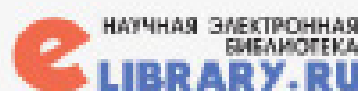
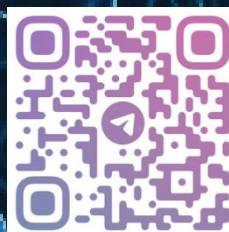
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