DIGITAL PLATFORMS FOR PROJECT MANAGEMENT AND COORDINATION IN CONSTRUCTION

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Abstract: This article examines the principles and advantages of using digital platforms for the management and coordination of construction projects. The relevance of the topic stems from the urgent need to reduce time losses and eliminate errors in project-related information exchange. It is shown that traditional communication approaches lead to considerable inefficiencies: according to estimates, up to 35% of working time is spent on data retrieval, conflict resolution, and rework, while nearly half of all rework cases are caused by data inconsistency [1]. The implementation of Building Information Modelling (BIM) technologies and the use of a Common Data Environment (CDE) as a unified digital platform provide all project stakeholders with a single source of up-to-date information, thereby improving collaboration and reducing the risk of errors [2]. This study analyses international BIM standards (ISO 19650, PAS 1192, BS EN 17412, etc.), national regulatory documents under development in Uzbekistan (SHNK 1.05.01–1.05.13), and three widely used platforms: Autodesk BIM 360, Trimble Connect, and Allplan Bimplus. A comparative assessment of their functionalities and implementation in real-world projects is conducted. The findings are presented in the form of tables and diagrams that demonstrate the practical benefits of digital platforms, such as reduced time for construction supervision, fewer design clashes, and lower rework rates. The article concludes with recommendations for introducing BIM platforms in Uzbekistan, taking into account both international practices and the evolving local regulatory framework.

Keywords: building information modeling, BIM, digital platforms, project management, common data environment, coordination, Uzbekistan, ISO 19650, Autodesk BIM 360, Trimble Connect, Allplan Bimplus.

Introduction

Effective coordination of design and construction activities requires timely and accurate information exchange among all project stakeholders. Under traditional conditions, project information is often stored in a fragmented manner — in the form of separate drawings, documents, and spreadsheets — and distributed via email or paper-based workflows. This approach leads to data duplication, difficulty in tracking current document versions, and an increased number of errors. Research shows that a substantial portion of professionals' working time is spent resolving inconsistencies and searching for up-to-date information. For example, according to a global survey conducted in 2018, construction teams lost up to 14 hours per week (approximately 35% of working time) on non-productive tasks such as locating project data, resolving clashes, and correcting errors [3]. Furthermore, 48% of all rework was directly caused by communication breakdowns and data inconsistencies within project documentation [3]. On a global scale, the financial impact of poor information exchange was estimated at $280 billion in rework-related costs in 2018 [3]. These figures underscore a critical issue: in the absence of digital information management tools, a significant share of project resources is wasted, adversely affecting both deadlines and budgets.

A promising solution to this problem lies in the adoption of digital collaboration platforms that establish a unified project information environment. The concept of a Common Data Environment (CDE) refers to a centralized system for storing and managing all project-related information, ensuring that each data update is validated and accessible in its most current form to all relevant parties [2][4]. As defined in ISO 19650, a CDE is "an agreed source of information for any given project or asset, used to collect, manage, and disseminate each information container through a managed process" [2]. In practical terms, implementing a CDE replaces fragmented file-based exchanges with a controlled flow of information through a single repository. This ensures team-wide access to the most recent versions of models, drawings, markups, and other documents only after verification and approval — significantly reducing the likelihood of errors and miscommunication [2]. As a result, project transparency and control are improved: all stakeholders (including clients, designers, contractors, and operators) work with coordinated and validated information, which enhances decision-making quality and mitigates risks associated with late-stage changes [2].

Over the past decade, there has been a rapid global increase in the use of digital platforms and BIM technologies in construction. Many countries have adopted mandatory BIM requirements or national strategies to encourage its use. In the United Kingdom, for example, the government introduced the mandatory Level 2 BIM standard in 2016, based on national documents BS 1192:2007 and PAS 1192-2:2013 — the first to formally define the CDE concept [4]. The UK experience laid the foundation for the development of the ISO 19650 international standard (first published in 2018), which now provides a unified framework for information management in BIM-enabled projects [2]. The ISO 19650 series regulates the structure of information management processes, including a consistent system for document and model identification, standardized file naming conventions (via national annexes), the use of status codes (e.g., "Work in Progress," "Shared," "Published"), strict version control, and full change audit trails [2][4]. Another important development is the BS EN 17412-1:2020 standard, which introduces the concept of the Level of Information Need as a replacement for traditional Levels of Detail (LOD). This standard precisely defines what information BIM models should contain at each project stage and for specific purposes [5]. Together, these international standards aim to harmonize BIM practices across countries and improve the efficiency of digital project coordination.

Uzbekistan, in its efforts to modernize the construction industry, has also taken steps toward the adoption of BIM and digital platforms. Initial progress began in 2015–2016 as a grassroots initiative by individual design organizations [6]. By 2019, BIM development had received state-level support. In particular, Presidential Decree No. PP-4464, issued in November 2019, outlined the large-scale implementation of information and communication technologies in the construction sector, including Building Information Modelling (BIM) technologies [6]. The decree emphasized the development of internal BIM infrastructure within design institutes and the training of qualified personnel [6].

This was followed in 2023 by Presidential Decree No. UP-151, which explicitly mandated the transition to BIM and assigned institutional responsibilities for implementing and supervising digital solutions across the construction sector [6]. In parallel, the Ministry of Construction of Uzbekistan, in cooperation with the national university of architecture and construction, developed a draft series of national BIM standards, currently under approval. This series, provisionally designated SHNK 1.05.01–1.05.13, covers the core dimensions of information modelling — from general provisions and terminology to specific requirements for BIM models at each stage of an asset's life cycle (concept design, detailed design, construction, operation).

For instance, SHNK 1.05.08-25 introduces the concept of a Common Data Environment (CDE) and defines the structure of collaborative workflows within it, while SHNK 1.05.10–1.05.12-25 regulates the use of BIM technologies across design, construction, and operations organizations. SHNK 1.05.13-25 is dedicated to the procedures for expert review of BIM models, indicating a comprehensive approach to integrating BIM into the national project approval system. The adoption of this standards package positions Uzbekistan among the first CIS countries to develop its own regulatory framework for BIM. However, this framework still requires further refinement and adaptation to keep pace with rapidly evolving digital demands [6].

Accordingly, the relevance of this research lies in the convergence of global trends in construction digitalization and the domestic need for effective implementation of these technologies in Uzbekistan. The aim of the study is to examine contemporary digital platforms for project management and coordination (i.e., BIM platforms), to synthesize international best practices, and to evaluate the opportunities and constraints associated with implementing such solutions in the Uzbek context. The following sections provide a review of relevant literature and standards, a description of the research methodology, a comparative analysis of selected platforms, a discussion of the observed benefits and limitations, and finally, conclusions and practical recommendations.

Literature and Regulatory Review

The successful implementation of digital platforms requires a foundation built on established practices and internationally recognized standards, as presented in both academic literature and regulatory documents. Numerous studies confirm the benefits of using BIM and associated platforms for project coordination. Key effects identified in the literature include: improved transparency and data quality, reduced clashes between project disciplines, accelerated approval of design changes, and lower costs due to fewer reworks and delays [2]. For example, a meta-analysis of existing research demonstrated that applying BIM at the design stage significantly reduces drawing errors and on-site inconsistencies, which in turn saves time and resources otherwise spent resolving clashes [7][2]. Moreover, using platforms with integrated data environments improves communication across teams: architects, engineers, and contractors operate within a shared digital space, which greatly reduces the risk of different stakeholders working with outdated or conflicting information [2][8].

Guidelines and standards that form the methodological foundation for digital coordination are also central to the literature. The ISO 19650 international standard (Parts 1–2 published in 2018, Part 3 in 2020) has emerged as the global reference for information management in construction projects. It outlines how collaborative processes should be organized using BIM models, introduces requirements for folder structures and file naming conventions, and defines participant roles and responsibilities for managing project information resources [2]. ISO 19650 is largely based on earlier British standards BS 1192:2007 and the PAS 1192 series (2013–2015), which first systematized the UK's experience with Level 2 BIM adoption [4]. In particular, PAS 1192-2:2013 defined the creation of a Common Data Environment (CDE) and segmented information status into four categories: Work in Progress (WIP), Shared, Published, and Archived [4]. These principles have since been adapted into ISO 19650 for broader international application.

One of the current directions in standardization involves specifying content requirements for information models. The European standard BS EN 17412-1:2020 (adopted as EN 17412-1) introduces the concept of the Level of Information Need, which allows clients to define exactly what type of data — graphical, attribute-based, or documentary — should be included in a model at a given project stage for a specific purpose [5]. This concept evolves and expands upon the earlier notions of Level of Detail (LOD) and Level of Information (LOI), aiming to ensure sufficient information without unnecessary complexity. Combined with ISO 19650, this standard supports the structuring of model requirements in project briefs and the subsequent verification of model compliance against those requirements [5].

The local regulatory acts of Uzbekistan, referenced earlier in the Introduction, further develop and adapt these international principles. The SHNK 1.05.01–1.05.13 standard series is designed to cover virtually all aspects of BIM implementation. For example, SHNK 1.05.02-25, "Information Modelling in Construction: General Provisions," establishes key terminology and general rules for working with BIM models. SHNK standards 1.05.03–1.05.07-25 focus on information model requirements at various stages of an asset's life cycle — from concept design to operation — reflecting the logic of ISO 19650, where Part 2 addresses the design and construction phases, and Part 3 focuses on building operations.

Of particular relevance to this article is SHNK 1.05.08-25, "Organization of Collaborative Creation of Construction Data: Common Data Environment," which formally introduces the CDE concept at the national level and outlines requirements for the technical and software infrastructure needed to support this mode of collaboration [9]. This document defines a CDE as a unified and trusted source of data that enables all construction participants to share and use project information collaboratively across the asset's entire life cycle [9]. Notably, SHNK 1.05.08-25 emphasizes not only the technical platform but also the regulatory framework and procedures for collaborative work — fully aligned with the ISO 19650 approach [9].

Further standards such as SHNK 1.05.09-25 and 1.05.10-25 regulate the preparation of design documentation using BIM and the procedures for implementing BIM technologies in design organizations. Similarly, SHNK 1.05.11-25 and 1.05.12-25 define implementation rules for construction companies and facility management organizations. Overall, the local regulatory framework is generally consistent with international trends: it prioritizes the establishment of a Common Data Environment, defines model requirements, and integrates BIM workflows into the national project management system.

In addition to official standards, scientific and professional publications on digital platforms have begun to emerge in Uzbekistan. These works primarily address the local adaptation of BIM implementation: workforce training, economic efficiency, and alignment with national standards. By 2024, there were over 45,000 design and construction organizations operating in the country, and the growing volume of construction — with capital investment in 2024 reaching 30–40% above 2020 levels — has made digital transformation inevitable [6].

Analytical reviews of BIM development in Uzbekistan highlight the importance of state initiatives (e.g., presidential decrees and Ministry of Construction directives) and showcase examples of private companies already using BIM. For instance, the development company Murad Buildings has actively applied BIM since 2021 in designing residential and commercial complexes, partnering with international firms for knowledge exchange [6]. The joint venture NRG Uzbekistan (Murad Buildings and Kazakhstan's BI Group) has improved the quality of design documentation and streamlined construction workflows through BIM adoption [6]. Another major player, Golden House, has engaged digital modelling experts to enhance its design and construction management capabilities [6].

These cases demonstrate that the private sector in Uzbekistan is beginning to realize the advantages of digital tools. However, the broader diffusion of BIM in the country remains constrained by a number of systemic challenges.

The main barriers to the widespread adoption of digital platforms in Uzbekistan include a shortage of qualified personnel, limited investment, and the need to modernize the regulatory framework [6]. Most practicing engineers and project managers are accustomed to working with traditional 2D methods, and considerable effort is required to retrain them and to shift established workflows [6]. The lack of certified BIM professionals reduces the international competitiveness of local companies and complicates the execution of complex projects within the country [6]. Moreover, despite the existence of foundational SHNK standards, there is an urgent need for further elaboration and refinement of national regulations to reflect the realities of digital transformation. This includes integrating BIM models into the list of mandatory design documentation, defining rules for model-based expert reviews, and regulating author supervision procedures through Common Data Environments (CDEs). Literature sources emphasize that overcoming these barriers requires coordinated efforts among government bodies, private enterprises, and the academic sector [6]. The state is developing BIM implementation roadmaps, launching pilot projects, and supporting the creation of training programmes. Meanwhile, early adopters and private firms are independently mastering digital tools and sharing knowledge through professional communities such as BIM UZ [6].

In summary, both international and domestic experience indicate that digital platforms are highly effective tools for project management, provided that relevant standards are observed and participants are willing to embrace a new culture of collaboration. The next section outlines the research methodology used for a comparative analysis of these platforms' capabilities.

Research Methodology

This study employs a comprehensive methodology that combines elements of analytical review, comparative analysis, and case study. The research was conducted in several stages:

1. Review of regulatory and scientific foundations. In the first stage, international standards (ISO, EN, PAS) and local regulations on information modelling were reviewed, as discussed in the previous section. This provided the conceptual framework — including terminology, efficiency criteria, and data environment requirements — that underpins the subsequent platform analysis.

2. Selection of case study objects — digital platforms. Three contemporary digital platforms widely used for project data coordination were selected for comparative analysis: Autodesk BIM 360, Trimble Connect, and Allplan Bimplus. The selection criteria included global market relevance, diversity of origin and conceptual focus (American vs. European development, proprietary vs. openBIM orientation), and the availability of documentation and case studies describing real-world implementation.

The rationale for selecting these specific platforms is as follows:

- Autodesk BIM 360 is one of the most widely adopted cloud-based project management systems, fully integrated with Autodesk products such as Revit and Navisworks. It provides a comprehensive suite of collaboration modules — from model and drawing storage (BIM 360 Docs) to model coordination tools (BIM 360 Coordinate/Glue) and construction site management (BIM 360 Build). Studying BIM 360 allows for understanding the capabilities of an integrated CDE across all phases — from design to construction [8];
- Trimble Connect is a cloud platform developed by Trimble, originally designed for collaboration on 3D models and data, with a strong focus on openBIM (IFC) standards. It is often used in combination with Trimble software such as Tekla Structures and SketchUp, and offers tools for model viewing, task assignment, comment tracking, and version control. Trimble Connect is of particular interest as a CDE example centered around model-based coordination and support for a wide range of data formats [10];
- Allplan Bimplus, developed by the Nemetschek Group (Germany), represents an openBIM ecosystem. Bimplus is positioned as an "open platform for interdisciplinary collaboration," enabling the aggregation of discipline-specific models in a unified cloud environment and supporting collaborative workflows [11]. A key emphasis is placed on interoperability with various CAD systems (via IFC import, APIs, and plug-ins), as well as on tools for task management, clash detection, and model version control [11]. The analysis of Bimplus provides insight into how a CDE can be implemented with a focus on multi-source data integration and model quality assurance.

3. Data collection on platforms. For each of the three selected platforms, data was collected from multiple sources: official documentation and developer websites (including feature descriptions and technical specifications), independent reviews and publications, as well as case studies — descriptions of real-world projects where the platform was implemented. Particular attention was paid to both quantitative and qualitative performance indicators, such as time savings, user count, project scale, cost efficiency, and team feedback. A content analysis method was applied: key statements from case study texts were extracted to identify how the platform influenced project workflows and outcomes.

4. Comparative analysis. Based on the collected data, a comparative evaluation of the platforms was conducted across several criteria: functional capabilities, supported file formats and software integrations, Common Data Environment (CDE) organization, user interface and accessibility, project process management tools (e.g., RFIs, issue tracking, task assignments), and the advantages and limitations reported in case studies. The results of this analysis are summarized in a comparison table to support visual interpretation. In addition, diagrams were prepared to illustrate selected comparative metrics and effects (e.g., time savings, number of users, percentage of resolved clashes), based on available case study data.

5. Synthesis of findings and development of recommendations. The final stage involved interpreting the research findings in the context of project management practices. Identified advantages of digital platforms — such as accelerated decision-making and reduction in design changes — were weighed against potential implementation challenges, including workforce training requirements and changes to established workflows. This discussion formed the basis for conclusions on the applicability of the analyzed solutions to the Uzbek context and the formulation of practical recommendations.

It is important to note that the research is subject to limitations in the availability of open-source data on platform adoption. Many quantitative results (such as BIM-related ROI or percentage of budget savings) may vary depending on the specifics of each project. Nevertheless, the selected case studies cover a wide range of project types — including buildings and infrastructure, as well as international and local examples — providing a reasonably representative picture. The next section presents the findings of the study, including a comparative characterization of the platforms and key observations from their practical application.

Research Results

Comparative Overview of Digital Platforms. Table 1 presents a comparison of Autodesk BIM 360, Trimble Connect, and Allplan Bimplus across key parameters.

Table 1 – Comparison of Functions and Implementation Experience: Autodesk BIM 360, Trimble Connect, and Allplan Bimplus

Criterion	Autodesk BIM 360	Trimble Connect	Allplan Bimplus
Developer and Origin	Autodesk (USA); developed since 2011 as part of Autodesk Construction Cloud	Trimble (USA); launched after acquisition of GTeam in 2014	Nemetschek / Allplan (Germany); launched in 2016 as an openBIM collaboration service
Purpose and Positioning	The cloud-based platform Autodesk BIM 360 is a comprehensive solution for managing project information and workflows across all phases of the building lifecycle. It includes a centralized CDE repository for models and documents, tools for coordination and clash detection, as well as a construction site management module (quality control, safety, and RFIs) [8]. The platform is intended for projects of any scale, with a strong emphasis on integration with Autodesk software such as Revit, AutoCAD, and Navisworks.	The Trimble Connect cloud service is a collaborative platform for working with 3D models and drawings. Its main focus is to provide all project stakeholders with access to the latest building model via web, desktop, and mobile applications [10]. The platform integrates well with Trimble design tools (e.g., Tekla, SketchUp) and supports open formats including IFC, PDF, and DWG. It is primarily aimed at improving project coordination and visualization.	Allplan Bimplus is an openBIM platform designed for the integration and management of model data from multiple sources. It is positioned as a unified environment for interdisciplinary collaboration: combining architectural, structural, and MEP models, managing attributes, and coordinating tasks [11]. Although tightly connected to Allplan CAD tools, it supports IFC import and offers API-based integration, providing a "single source of truth" for project models.
Functional Capabilities	Autodesk BIM 360 offers a full-featured Common Data Environment (CDE), supporting cloud-based model storage (Revit, Navisworks, IFC, and others), version control, and	Trimble Connect facilitates collaborative work with models and drawings, enabling users to upload files (e.g., IFC, SKP, Tekla), view them in a browser, overlay	Allplan Bimplus supports centralized BIM model management by aggregating architectural, structural, and MEP models into a unified cloud-based environment.

Criterion	Autodesk BIM 360	Trimble Connect	Allplan Bimplus
	user permission management. The Design Collaboration module enables tracking of changes and model merging across disciplines. The Model Coordination tool (formerly BIM 360 Glue) performs automated clash detection. Additionally, the platform supports RFI management, approvals, issue tracking, and task assignment. Construction workflows are managed through BIM 360 Build, which includes daily logs, quality inspections, and photo documentation [8]. Mobile apps are available for field access. A key advantage is deep integration with the Autodesk ecosystem, allowing direct cloud-based access to Revit and Civil 3D models.	disciplines, and annotate or comment on model elements. The platform supports To-Do task assignment with responsibility tracking, model and file versioning, and revision comparison. It also includes integrated clash detection tools [10]. The platform connects with ProjectSight, Trimble's construction management system, for managing RFIs, submittals, and related workflows. The core focus is to provide stakeholders with real-time access to up-to-date project information "anytime and anywhere" [10].	It includes attribute management, clash detection, and an Issue Management system that assigns and tracks resolution of design issues [11]. The change tracker enables users to visually compare different model revisions [11]. Documentation and metadata are linked directly to the model. A major strength of Bimplus is its transparency and change control: all stakeholders can see the live model state, and all edits are logged to reduce errors and duplication [11]. The platform also supports 4D scheduling and progress monitoring within the Allplan environment.
Practical Use (Case Studies)	Autodesk BIM 360 has been deployed on large-scale international projects. For instance, during the construction of a multifunctional complex in Vietnam, the platform enabled over 300 users from multiple organizations to collaborate within a unified digital environment [12]. The shift from traditional paper-based quality control to digital workflows using BIM 360 Field/Build reduced inspection and defect resolution time by up to 2.5 hours per team per day [12]. In the Oakland International Airport renovation project	Trimble Connect has been adopted by several major construction firms. In 2018, VolkerWessels—a global contractor operating in the Netherlands and the United Kingdom—standardized its workflows around Trimble's digital ecosystem, establishing a unified Common Data Environment (CDE) using Trimble Connect and associated software tools. As a result, over 600 of the company's projects have been managed through Trimble Connect,	Allplan Bimplus has been implemented in complex infrastructure projects that require intensive coordination among multiple engineering disciplines. One notable example is the construction of the new Terneuzen lock in the Netherlands—one of the largest locks in the world—where the Sassevaart consortium utilized Allplan Bimplus to manage reinforcement detailing for reinforced concrete structures during both design and construction phases [11]. The shared BIM

Criterion	Autodesk BIM 360	Trimble Connect	Allplan Bimplus
	managed by Turner Construction (USA), the implementation of BIM 360 Glue accelerated coordination workflows and facilitated the integration of complex engineering systems. The project has remained on schedule and within budget, partly due to the benefits provided by the platform [8]. According to project engineers, having a single, centrally accessible model eliminated ambiguity regarding drawing versions and significantly minimized rework [8].	with more than 6,000 users involved [10]. This transition enabled efficient dissemination of up-to-date models and drawings among all stakeholders—from designers and subcontractors to clients—eliminating the need for fragmented email-based exchanges. According to the company, “the common data environment has transformed collaboration methods and enabled a fully scalable, data-driven approach to construction” [10]. Another example is DPR Construction (USA), which integrates Trimble Connect with Tekla for reinforced concrete coordination and quality control. This combination allows teams to compare models from different departments and rapidly detect inconsistencies [13].	environment enabled all project participants—including designers, contractors, and technical supervisors—to access a unified reinforcement model, simultaneously review and comment on design elements, and systematically track all changes and assigned tasks within the platform [11]. According to the project’s BIM coordinator, working in a unified model significantly enhanced both accuracy and efficiency. The team saved time by avoiding information loss between project stages and successfully prevented errors in drawings by identifying reinforcement clashes early [11]. Ultimately, Allplan Bimplus became “an integral part of project management,” ensuring control and transparency throughout the construction of the lock [11]. Another case involves general contractor Depenbrock (Germany), who reported successful use of Bimplus for coordination during the construction of an industrial facility. The platform enabled all stakeholders to instantly access the latest 3D model, reducing time spent on coordination processes (according to Allplan data).

As the comparison table demonstrates, all three platforms implement the concept of a unified information environment for the project, but each possesses distinct characteristics. Autodesk BIM 360 stands out for its comprehensive coverage of processes, ranging from collaborative model development to construction requests and field supervision. Trimble Connect focuses on providing easy access to models and basic coordination tools (such as comments and task assignments), and is often used in conjunction with other specialized applications to ensure full functionality—such as ProjectSight for construction management. Allplan Bimplus, in contrast, emphasizes openness and cross-platform integration, functioning as a “data backbone” for various BIM tools while ensuring rigorous version control and high-quality model federation.

Advantages of Implementing Digital Platforms (Based on Case Study Evidence)

The practical use of digital coordination platforms has demonstrated a range of tangible improvements in construction projects:

– Reduction in time required for approvals and reviews. Many case studies report significant time savings due to the transition from paper-based workflows to digital processes. For instance, the digitization of issue tracking and approval procedures via BIM 360 led to a 20–30% reduction in daily time expenditures by engineers, thanks to automated data collection and status monitoring [12]. In the airport renovation project, the use of BIM 360 Glue accelerated decision-making on design changes: whereas previously such discussions required meetings and file transfers, they were now conducted in real time through shared viewing of the model on tablets [8]. Overall, platforms contribute to streamlining project workflows by delivering information to relevant stakeholders more efficiently and enabling faster feedback and revisions [8].

– Reduction in errors and rework. A centralized platform ensures that all team members work with up-to-date data, eliminating typical error sources such as outdated drawings, misplaced emails, or incorrect file versions. Turner Construction noted that thanks to BIM 360, there were no ambiguities regarding which model version was current, which significantly reduced on-site rework [8]. Similarly, the introduction of Trimble Connect at VolkerWessels increased trust in the data, enabling decisions to be made based on a unified model, which led to fewer changes at later stages and improved project predictability [10]. In the Terneuzen lock project (Bimplus), early detection of reinforcement clashes in the shared model helped avoid potentially costly on-site corrections [11].

– Improved coordination and team productivity. Digital platforms eliminate informational silos between stakeholders. Case studies repeatedly highlight enhanced collaboration: “BIM 360 broke down communication barriers between our team and subcontractors, saving significant time” [8]; “Trimble Connect enabled us to fully cover data exchange and visualization processes—when we can share everything, we learn and evolve faster” (DigiBase Director, VolkerWessels) [10]. This is reflected in improved mutual understanding among departments through the shared visual language of the model. Moreover, mobile access (e.g., tablets with BIM models on site) has engaged previously uninvolved personnel such as foremen and supervisors: “People who were never expected to work in 3D are now enthusiastically using the model” [8].

– Single source of truth and transparency. The implementation of a CDE eliminates multiple conflicting document versions, enabling more informed and timely managerial decisions. Project managers report that having a single reliable source of information improves oversight: managers and clients can instantly gain a comprehensive view of project progress, identify problem areas, and take corrective action [2]. According to Autodesk, companies that adopted CDEs achieved reduced project risks and more accurate timeline forecasting by accumulating reliable data and analyzing insights from previous projects [2].

– Security and access control. Digital platforms offer advanced access control mechanisms that are difficult to enforce through traditional email exchanges. In BIM 360, every user action is logged, and granular permissions can be configured to determine who can view or edit data, thereby preventing unauthorized modifications to models [8]. In the Turner Construction case, subcontractors were more willing to engage with the model once they were confident in the platform's security—"a couple of clicks, and you're inside the model, while still feeling assured that the information is protected and not subject to unauthorized changes" [8]. Thus, digital platforms provide critical control over information, fostering trust among stakeholders and ensuring data protection.

Identified Challenges and Limitations

Despite the many advantages outlined above, several challenges and limitations related to the implementation of digital platforms have also been identified:

– Learning curve and resistance to change. While modern platforms generally feature user-friendly interfaces, part of the project team often struggles with adopting new systems. For instance, one study noted that only 18% of firms systematically used mobile applications to access project data—even when the devices were provided [14]. This highlights the importance not only of supplying the tools, but also of properly training and motivating the team. In Uzbekistan, this issue is particularly relevant due to the acute shortage of BIM specialists [6].

– Investments and cost-effectiveness. Platform adoption entails initial costs—licenses, hardware, and personnel training. For smaller firms or low-budget projects, such investments may pose a significant barrier. Experience shows that executives are generally willing to invest if they clearly see existing inefficiencies and the potential for improvement [14]. However, poor information exchange remains a major cause of rework in construction: 22% of all rework incidents are directly linked to inadequate data, largely because many companies underestimate the importance of investing in managed communication processes [15][16]. In Uzbekistan, many clients are still reluctant to fund the BIM component of project delivery, which continues to hinder adoption [6].

– Need for localization and regulatory integration. Foreign-developed platforms require adaptation to local standards and languages. This includes aligning classification templates, reporting forms, and documentation structures with local norms. If the national regulatory framework does not mandate the delivery of digital models or the use of a Common Data Environment (CDE) for tracking design changes, project participants may regard these tasks as optional overhead. It is therefore essential that public authorities incorporate digital project management requirements into official contractual and regulatory documents—for example, by requiring a functioning CDE for all state-funded projects.

Overall, the results of this study confirm that, when properly implemented, digital platforms significantly enhance project management efficiency, transparency, and control. However, realizing their full potential requires substantial shifts in both organizational culture and participant competencies.

Discussion

The results of this study demonstrate the considerable advantages of digital platforms in the management and coordination of construction projects. However, their practical implementation depends on several important conditions.

First, the benefits—such as time savings, reduced errors, and improved communication—are most pronounced in large-scale and complex projects, where traditional methods are particularly inefficient. In smaller projects, although these platforms still provide advantages, the impact may be less visible, and the return on investment tends to take longer. Nevertheless, over time and with accumulated experience, even small firms can begin integrating into digital ecosystems—for example, by participating in larger BIM-driven projects as subcontractors.

Second, the standardization of approaches is a critical factor. When each project stakeholder relies on their own systems and formats, the value of a common platform diminishes. This is precisely why international standards (such as ISO 19650) and national regulations play a decisive role—they establish a unified framework for collaboration. In Uzbekistan, the emerging standards (SHNK 1.05.xx series) provide an important foundation, but their application in practice remains largely voluntary and limited. Introducing mandatory requirements—such as including a BIM model and a Common Data Environment (CDE) as part of the deliverables for major government-funded projects—could accelerate adoption. Without such regulatory incentives, there is a risk that digital platforms will remain the domain of early adopters and enthusiasts, while the broader industry continues to operate under legacy paradigms.

Third, the human capital factor. Even the most advanced platform will fail to deliver results if users lack the necessary competencies. Workforce training and reskilling are among the most critical tasks. The experience of private Uzbek companies such as Murad Buildings and NRG demonstrates that hiring experts and training staff can quickly lead to improved project quality [6]. However, to achieve large-scale impact, such programmes must be supported at the national level—potentially through universities, certification centres, and courses offered by the Ministry of Construction. It is also worth noting the emergence of a BIM community in Uzbekistan—groups of professionals and firms jointly promoting these technologies [6]. Their efforts (seminars, localized methodologies, knowledge sharing) can significantly facilitate the industry-wide transition. International cooperation also plays a role: exchange with neighboring countries such as Kazakhstan and Russia—where BIM is likewise advancing—can help Uzbekistan adopt best practices adapted to similar regional contexts.

Another important issue is the localization of platforms. Autodesk BIM 360 and Trimble Connect are global products, with interfaces available in major languages, though not yet in Uzbek. Russian-language interfaces do exist (for example, BIM 360 Docs supports Russian), but localization of content—such as templates, libraries, and regulatory reference data—requires additional effort. Allplan Bimplus, being part of a European software ecosystem, also likely lacks Uzbek localization. In the short term, Russian or English will remain the working languages for BIM projects in Uzbekistan, which imposes further requirements on personnel qualification. In the longer term, full Uzbek interfaces and localized content may emerge, provided that the domestic market grows sufficiently. Lastly, the issue of technological infrastructure must be considered. Effective use of cloud-based platforms requires stable internet connectivity at construction sites, adequate equipment (e.g. tablets, laptops), and strong cybersecurity measures. While this is manageable in major urban areas, remote project locations (e.g. regional infrastructure or energy facilities) may face limitations. Therefore, implementation strategies must also address the development of ICT infrastructure.

Overall, the discussion confirms that digital platforms are not a panacea in themselves, but rather tools whose effectiveness depends heavily on the implementation context. Supported by standards, skilled personnel, and management commitment, these platforms can transform project management. Without these enablers, however, deployment may result in frustration and resistance.

For Uzbekistan, which is at the onset of a large-scale digital transformation in construction, the experience of other countries and domestic pilot projects is extremely valuable. International practice shows that BIM and CDE are typically first adopted in flagship initiatives—such as landmark public buildings or infrastructure projects—often with support from foreign consultants. These pilot implementations then serve as models for the broader industry. Simultaneously, it is essential to update regulations (a process already underway) and remove administrative barriers (e.g. enabling expert reviews to be conducted digitally). These and related aspects are addressed in the final recommendations section.

Conclusion and Recommendations

Conclusions. The conducted study confirms that the implementation of digital platforms (BIM/CDE) fundamentally transforms project management and coordination processes. The key findings can be summarized as follows:

- A digital common data environment significantly improves communication efficiency within projects by providing all participants with access to current and verified information. This reduces the time required for approvals and decreases the number of errors, ultimately mitigating schedule delays and budget overruns [1][2].
- International standards (such as ISO 19650, PAS 1192, and others) offer proven frameworks for the implementation of CDE. The experience of leading construction companies demonstrates that adherence to these standards leads to measurable improvements: projects managed via BIM platforms exhibit higher transparency and control, with rework reduced by nearly 50% [14].
- The local regulatory framework in Uzbekistan (specifically the SHNK 1.05.xx series) already establishes a foundation for the use of BIM and CDE. This provides a solid basis that must now be translated into practical application. Several Uzbek development and design companies have successfully completed pilot BIM projects, demonstrating improvements in the quality of design documentation and construction workflows [6].
- The analysis of Autodesk BIM 360, Trimble Connect, and Allplan Bimplus reveals that all three platforms are capable of solving coordination tasks, albeit with distinct strengths. BIM 360 offers the most integrated end-to-end solution across the entire project lifecycle; Trimble Connect serves as a lightweight, flexible system for collaborative work with models; and Bimplus functions as an open platform for aggregating heterogeneous data sources. In practice, the choice of platform depends on project scale, CAD tools in use, and client requirements.

- The main barriers are human and financial. Without trained specialists and a willingness to invest time and capital into new software and workflows, the transition to digital methods is delayed. However, delaying implementation also incurs hidden costs: companies that fail to adopt BIM gradually lose competitiveness relative to those who have achieved higher efficiency.

Recommendations. To accelerate and ensure the successful implementation of project management and coordination through digital platforms in Uzbekistan, the following strategic steps are proposed:

1. Development of regulatory frameworks and mandates. At the governmental level, it is advisable to adopt a phased roadmap for the transition to BIM in the design and construction of public assets. At a minimum, a specific deadline should be set after which providing an information model and establishing a Common Data Environment (CDE) becomes mandatory for large-scale projects—e.g., those exceeding a defined budget threshold or strategic importance. This will create market demand and encourage broader platform adoption. Simultaneously, related legislation (e.g., Urban Planning Code, project review procedures) should be updated to assign legal status to digital models and regulate collaborative workflows. International experience—such as in the United Kingdom, Singapore, and Russia—demonstrates that setting BIM standards at the client level significantly accelerates technology adoption [17][6].

2. Education and certification of professionals. The preparation of qualified BIM professionals must be scaled up. It is recommended that basic knowledge of BIM and CDE workflows be integrated into university curricula for construction-related disciplines. Dedicated competency centers or professional development courses should be established at specialized institutions to retrain practicing engineers. In the short term, international experts can be invited to deliver training sessions and share best practices. Additionally, introducing a nationally recognized certification system (e.g., “BIM Manager,” “BIM Coordinator”) would help employers assess professional qualifications more reliably.

3. Pilot projects and localization of solutions. Launching several pilot projects that fully utilize digital platforms would offer compelling demonstrations of their benefits. Ideally, these pilots should be applied to high-profile public buildings or infrastructure projects, supported by experienced consultants to refine methodologies. The results—such as time savings and cost reductions—should be widely disseminated across professional communities to build trust in the technologies. Parallel efforts should focus on localization: developing templates, libraries, and terminology glossaries in Uzbek and Russian for selected platforms. For instance, adapting classification systems, RFI forms, and report templates to national standards will allow local users to work within familiar frameworks.

4. Market stimulation initiatives. Government incentives can play a catalytic role—such as incorporating BIM-related expenditures into allowable project budgets or offering grants and tax relief to firms adopting digital technologies. Additionally, foreign contractors operating within the country could be required to deliver BIM models and provide local staff training as part of their project deliverables—creating a knowledge legacy. In the private sector, developers should be encouraged to include BIM requirements in procurement processes; many international investors already demand BIM-compliant documentation as a condition for financing.

5. Technical infrastructure and cybersecurity. It is essential to ensure that construction sites are equipped with reliable internet access and the necessary hardware (e.g., tablets, laptops) for working

with digital platforms. Major contractors may need to invest in on-site corporate networks. At the same time, cybersecurity policies must be implemented: secure data storage, regular backups, and protection from unauthorized access are vital. Trust in digital platforms depends heavily on the assurance that project data will neither be lost nor compromised. Therefore, decisions regarding data hosting—whether on foreign cloud servers or domestically—should account for national legislation and data security considerations.

In conclusion, it is essential to emphasize that the digital transformation of project management is not a one-time event but a progressive and systemic process. It requires a departure from established practices and workflows; however, the benefits are substantial: improved construction quality, enhanced financial transparency, reduced rework-related costs, and accelerated project delivery. Uzbekistan, demonstrating political will for modernization and drawing upon international experience, has a realistic opportunity to build an effective national system for digital construction project management in the coming years. The implementation of the above recommendations—standardization, professional training, and adoption incentives—will enable the full realization of the potential offered by information modelling technologies and digital platforms for the benefit of the national construction sector. As experts have noted, the transition to BIM and Common Data Environments is “a key step toward increasing quality, efficiency, and transparency in the country’s construction industry,” one that requires coordinated action from all stakeholders involved [6].

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