Project Management and Implementation of Bim in a Project in Albania

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Abstract

Information technologies and systems have become a familiar, inevitable or vital part of business. Firms with a focus on information systems are trying to gather the information needed for decision-making at various levels of management. Their influence is very visible in the way a business is managed and operated. They offer not only relief and faster solutions to problems, but also quality and efficiency. This paper focuses on the implementation and impact of Building Information Modeling (BIM) on monitoring and controlling construction projects. It identifies the challenges and potentials of this technology in improving the performance of construction companies, emphasizing the need for fundamental changes in work processes to increase productivity. Additionally, a specific case illustrates the tools used for project management during the implementation of BIM. In conclusion, the study asserts that the full utilization of BIM requires significant changes in work processes to improve productivity and emphasizes that BIM is a key tool for achieving the goals of construction projects.

Keywords: information technology, business, software, project management, digitalisation

Introduction

An information system is a way through which data or information flows inside/outside a company, from an employee or department to other employees or departments/organizations. They are being used by companies or any type of institution at all levels of its management and operation. Their influence is very visible in the way a business is managed and operated. They offer not only relief and faster solutions to problems, but also quality and efficiency. In an enterprise, the recognition of problems as well as the design of strategies for the management of information systems is very important for its continuity, which exercises its activity in such a dynamic environment and prone to changes. Technology, in rapid development, has changed the way we communicate and manage information. Building Information Modeling (BIM), an advanced technology in Building Information Modeling, is altering

the landscape of the construction industry. This 3D virtual model provides an efficient tool for organization and control of projects, coordinating models, and uncovering potential clashes. The use of BIM by managers and contractors has improved project management and risk control, bringing about a fundamental change in the way construction is carried out. The precise geometry and accurate data in BIM are utilized for the development of cost estimates and plans, bringing about a fundamental change in how projects are executed in the construction industry. This is a significant step forward, moving away from traditional practices and bringing innovation to construction processes [1], [10], [5].

The text focuses on the lack of information and clear guidelines for the use of BIM in companies in Albania. It identifies the difficulties that the society faces in the implementation of BIM and attempts to explain the impact of this technology on construction project management. Describing the research objectives, including the identification of opportunities for effective BIM management, presenting a case study, analyzing the current use of BIM technology in projects, studying best practices in BIM management, and drawing conclusions and recommendations for improving the future use of BIM. A construction project is a group of specific activities organized into smaller parts with a defined purpose. Project management aims to coordinate these activities to ensure timely, budgeted, and high-quality completion. The construction industry faces unique challenges in adopting new technology, requiring good collaboration and effective communication to achieve project goals. Project management in construction is complex, involving various roles and skills that must collaborate to ensure quality results within set deadlines and budgets. The construction industry faces challenges in adopting new technology, so companies need to explore innovations to improve project monitoring. Monitoring and control are key elements for project success. Monitoring and control in projects involve assessing progress and addressing organizational challenges. This process defines actions, timeframes, and responsibilities. Small projects may be easier to monitor, but complex projects require advanced tools and techniques to assess the project team's progress. Risk management in projects includes identifying, assessing, managing, and controlling risks. These are done in four steps: identification begins in the early stages by creating a preliminary list of risks, assessment involves evaluating the probability and impact to develop response strategies, the third step includes selecting and planning actions to control risks. The final step is monitoring and reviewing the status of risks at regular intervals and after any significant project activity. Quality management in projects involves ensuring budget and time goals using quality control techniques to identify and prevent defects in the early stages of the project [14], [4], [2].

The use of technology such as Building Information Modeling (BIM) allows for accessible project data maintenance and appropriate efficiency monitoring. Project time management involves monitoring and organizing time for specific tasks. The use of time management software helps assess resources, team productivity, and

facilitates employee payment calculations. This helps break the project into manageable parts and ensures completion within planned deadlines.

Material and Methods

In the construction industry, there has been a significant increase in Albania's GDP in recent years, but challenges are hindering its productivity. Besides issues with material and information flow, there are delays in collaboration and a lack of standardization, characteristics that make it difficult for the sector to adopt technological innovation. Moreover, construction projects appear as unique entities, diverse in technical, financial, and socio-political nature, requiring continuous and specific adjustments for each case. The construction industry operates based on customer requirements, distinguishing it from other sectors that simply follow market pressure. Government regulations and procurement policies have a powerful impact on technological development in this field. Supply chain management is a crucial aspect of construction, requiring a high level of adaptability and flexibility compared to other sectors. Innovation is a critical component that makes the construction industry competitive, even though its level is described as lower than in other industries. These innovations fall into three main categories: advancements in materials and production methods, innovative management techniques, and innovative tools of information technology (IT). Improvements in materials and equipment enhance productivity, innovative techniques provide better process control, while IT tools provide accurate information in real-time, reducing construction costs and time. In conclusion, to enhance innovation in construction, the exchange of knowledge and technological skills is essential for improved management in this sector [7], [12], [15].

Case description and analysis

Building Information Modeling, is more than a three-dimensional representation of a building. It integrates information for the design, construction, and operation of objects in a single environment. BIM reduces the need for extensive documentation and provides a reliable basis for construction decisions from start to finish.

The implementation of BIM is influenced by a lack of trust in the offered information, cost, lack of engineers' experience, and necessary training. Researchers have identified four categories of factors influencing BIM adoption: organizational, project selection, services, and software. Organizational factors are critical for initiating the process, while technical factors also have an impact. Initial implementation requires clarity and clear objectives for using this technology. BIM is a complex field that requires careful attention to achieve successful implementation.

BIM, or Building Information Modeling, brings benefits such as model-based decision-making, alternative possibilities in design, and various analyses such as costs, energy, and the building's lifecycle. It allows information exchange and its management, connects organizations, and facilitates multidisciplinary coordination. It offers

intelligent documentation, supporting decisions in the conceptual phase. An implementation plan for BIM should contain various information related to the project, starting from project schedule and location data, detailed illustration of the BIM implementation process, collaborative effort list, offering strategy for the project, among many other important elements that need to be documented and included.

• BIM is a method for managing a construction project from start to finish, while CAD is mainly used for design.

• BIM uses parameters to design 3D models, while CAD uses line-by-line designs.

• BIM provides more information than CAD models, such as cost, plan, and constructability.

• BIM is used only for buildings, while CAD is used for various engineering projects.

• BIM uses a single database accessible to all project members, while CAD uses separate files.

The "Bellevedere Korça" project is a residential and tourist villa complex planned to be built near the "Rinia" park in Korçë. This complex will include the construction of more than 80 villas with 9 different typologies, ranging in size from 150 to 500 square meters. The construction is planned to commence on September 15, 2021, and conclude on December 30, 2025. This project is the subject of a study to analyze the effectiveness of using BIM in the context of constructing the "Bellevedere Korça" villa complex.

In the "Bellevedere Korça" project, the implementation of BIM began gradually as part of the company's preparation for the necessary application programs. This process did not start from the beginning of the project but developed gradually over the past year. BIM interventions have influenced project monitoring and control, especially in data reporting and communication between different parties.

The project has numerous models created by different designers and architects, which are integrated into the "Navisworks" program to avoid unnecessary file conversions. These models are then provided to facility managers to support continuous facility operation and management, and to design consultants for their use in their work.

However, due to the massive scale of the project and the traditional management approach, it is not practical to consolidate all information into a single model. In the future, there will be BIM involvement in the key project management stages, where the use of this technology will have particular importance.

Results and discussions

Risk Analysis

The main categories of risk management in projects include property, investment time extension, financing, zoning regulations, real estate market, building permit approval, geological risk, as well as risks during the construction/development phase. The implementation of BIM and the use of AEC standards have brought changes to risk response strategies. The methods used include the risk assessment matrix, determining the probability and impact of each risk. Based on the identified level of risk, decisions can be taken for risk avoidance, reduction, or acceptance.

Table 1. Risk Table

		Impact				
		1 = Extremely low	2 = Low	3 = Average	4 = High	5 = Very high
Probability	1 = Extremely low	1	2	3	4	5
	2 = Low	2	4	6	8	10
	3 =Average	3	6	9	12	15
	4 = High	4	8	12	16	20
	5 = Very high	5	10	15	20	25

The Risk Register is a table that records every potential risk in a project and includes information about their identification and response. For the specific project, no potential risk cases have been identified so far, and this is the current status of the risk register for this project. To manage these risk levels, a risk register has been developed, but as of now, no potential risk cases have been identified in the project at hand.

Cost, Time, Quality Management

Cost management is critical for the success of projects. The main objective is to prevent budget overruns, avoid unexpected risks, and optimize resources for future planning. In the mentioned project, cost monitoring indicates that the majority of the work is being carried out within the budget, but there are slight changes in the pool area, which were not planned. Also, excavation works have exceeded the initial budget, resulting in a variance from the forecasted amount. This information provides

a clear view of the project's situation, allowing an assessment of the possibility of budget overrun in the completion phase. Time management through BIM has been enhanced by using the TimeEye application in the Microsoft Office 365 package. This has facilitated the monitoring of work time and budget control. Through this application, employees mark the start and finish of their tasks, allowing the calculation of time spent on the project. The method of assigning tasks with set deadlines and predefined budgets has helped improve the monitoring of team involvement in their projects. Through the application, the company has enabled:

1. Time tracking with a single click.
2. Project monitoring in Microsoft Teams.
3. Synchronization of all project-related information within the platform.
4. Timely delivery of assigned tasks.

The use of tables and graphs in the application displays the distribution of time for project tasks and presents information related to the budget, indicating whether the work is under budget, within it, or has overruns. This analysis is based on the cost per hour/work for each employee and does not include the constructive development of the project itself.

Quality control and assurance are essential in a project. While control addresses issues after identification, assurance aims to prevent them. Quality management requires collaboration, well-coordinated BIM processes, and clear communication. The use of Microsoft Office 365 for documentation and communication has aided more efficient collaboration and reduced information losses. Teams allow effective collaboration within the group, increasing productivity and facilitating information sharing within the team.

Transition from CAD Design to BIM

The implementation of BIM in the residential project has brought significant advantages in project management. BIM has provided 3D modeling of the object, aiding in anticipating issues, coordinating, and analyzing constructions. The use of BIM has impacted the improvement of data distribution and allowed a quick response to changes. This method has fulfilled the project's requirements more efficiently and coordinated, enhancing the quality and safety of the final structure. Regarding expenses, although the implementation of BIM causes considerable initial costs, the comparison with 3D CAD shows that BIM is more efficient and requires less working time, reducing labor hours. A survey of BIM users in a company has shown positive feedback regarding its impact on project management, increased efficiency, and cost reduction. Even though the use of BIM is not fully realized in all projects, the majority of users have appreciated the process improvement when it is utilized. The survey indicates that the use of BIM has facilitated coordination and improved project documentation, making it more accessible and efficient. Users have appreciated the increased efficiency of documentation with the use of BIM. However, challenging interactions with contractors and partners have been a hurdle in the adoption of BIM.

Nevertheless, the majority of respondent's value BIM as a valuable tool for monitoring and managing projects, considering it a significant change to improve the efficiency and quality of the work process.

Conclusion and recommendations for future research

BIM has brought significant changes and innovations to construction, emphasizing that this model is a big step forward in transforming construction processes. The paper provides a significant theoretical and practical contribution to the field of construction management, identifying clear benefits of using BIM, including the improvement of monitoring processes, cost and time reduction, as well as the enhancement of project quality. The conducted survey confirms that traditional project management methods lag behind when it comes to the use of BIM. The results show that the benefits of using BIM are evident, and this model has the potential to be more widely employed in projects. The paper describes the importance of identifying best practices in BIM implementation management, offering guidelines for successful BIM implementations. However, it is emphasized that more research is needed to better understand the effects and benefits of using BIM in various construction projects. The lack of data and clear ways to measure the effects of BIM are key challenges that need to be addressed to fully assess the impact of this model on construction projects. Therefore, the conclusions and suggestions of the final chapter highlight the importance of continued studies and research in the field of BIM to better understand its benefits and impact on various construction projects.

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