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Probing the Effect of Business Intelligence on the Performance of Construction Projects Through the Mediating Variable of Project Quality Management

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Abstract: Business intelligence is a new approach to helping project managers and personnel to make correct, informed decisions through preparing a series of analytical reports in a management dashboard by analysing and mining all of the related project data. This study aimed to investigate the effect of business intelligence on the performance of construction projects in Iran through the mediating variable of project quality management. In contrast to prior research that has evaluated the aforementioned variables in isolation, the current study introduced a comprehensive structural model to investigate the interrelationships among business intelligence, quality management, and construction project performance. This study employed a descriptive–correlational methodology utilising structural equation modelling, involving a sample of 102 Iranian construction industry specialists recruited by convenience sampling. Data were gathered using standardised questionnaires and analysed with structural equation modelling (SEM) in Smart-PLS and regression analysis in the SPSS software. The SEM indicated that business intelligence significantly enhances construction project performance ($\beta = 0.534$, $p < 0.01$) and influences project quality management ($\beta = 0.743$, $p < 0.01$) and that project quality management positively affects construction project performance ($\beta = 0.396$, $p < 0.01$). Furthermore, project quality management exerts a slight mediating influence in this relationship, with the indirect effect calculated at 0.295 and the direct effect assessed at 0.534. The regression analysis revealed that the business intelligence variable's dimensions (technical and managerial, financial and economic, and data and information management) can predict construction project performance, while the technical and managerial and financial and economic dimensions can predict project quality management. Implementing business intelligence technologies in construction project management enhances decision-making for managers and elevates project performance. This study's findings suggest that managers and specialists should employ data analysis technologies and business intelligence systems to enhance project quality and performance.

Keywords: business intelligence; project performance; project quality management; construction industry

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1. Introduction

Emerging technologies, new approaches, and rapid market changes have transformed work methods and pushed the project management profession toward evolution in recent years. Every industry, organisation, and project faces unique challenges. Project management team members must adapt their approaches to successfully manage projects and deliver achievements [1]. One common aspect that can be identified among these technologies is business intelligence. Business intelligence serves as an analytical instrument that enables organisations to convert raw data into significant information for strategic decision-making [2].

Perhaps the most important advantage of using business intelligence in construction projects is its role as a decision support system to increase the decision-making power of project managers—the senior managers of the project's beneficiary organisation—at a macro level. In the current situation in Iran, the lack of intelligent decision-making based on information and knowledge obtained from the available data has serious consequences.

Conversely, Iran's construction sector, a fundamental component of its economic advancement, encounters several obstacles that diminish its output, escalate expenses, and prolong project execution. Among the most significant difficulties are ineffective project management. The typical delay in construction projects surpasses three years, and the expenses frequently exceed early projections. Another issue is economic and financial challenges. Inflation and currency fluctuations generally complicate project financing, resulting in numerous projects remaining incomplete due to insufficient funding. Another factor is the inadequacy in the use of contemporary technologies in Iran. Digital systems and business intelligence are underutilised in Iranian initiatives, resulting in inefficient decision-making. Conversely, complex permit acquisition procedures and frequent regulatory modifications hinder project implementation. In light of the identified issues and challenges, it is expected that business intelligence will enhance managerial decision-making through project data analysis, cost optimisation, delay reduction, and the augmentation of productivity, performance, and project quality [3].

Conversely, business intelligence, as a contemporary data management tool, facilitates the sophisticated analysis of project information, enhancing decision-making processes and augmenting the monitoring of the execution quality [2]. The deployment of business intelligence tools can directly enhance the quality of construction projects by boosting data transparency, optimising resource management, and minimising execution errors. A critical aspect of business intelligence's influence on project quality is the precise analysis and forecasting of project performance utilising actual data. Business intelligence solutions utilise modern data processing and machine learning algorithms to uncover concealed patterns in project performance and avert possible issues [4]. This capability enables project managers to detect quality problems early and execute suitable corrective measures promptly. Furthermore, project quality management necessitates precise and current data regarding job progress, adherence to technical standards, and discrepancies from established plans [5]. In this context, business intelligence facilitates the ongoing surveillance of quality metrics through the provision of management dashboards and comprehensive analytical reports. These tools allow project managers to monitor project progress in real time and make remedial decisions before small issues escalate into significant catastrophes [6]. From a quality control standpoint, a primary difficulty in building projects is inadequate coordination among many project stakeholders, including contractors, consultants, suppliers, and employers. By consolidating project data from several sources, business intelligence enhances the coordination across these elements and mitigates information interference [7]. Utilising data-driven analytics to assess the performance of contractors and suppliers enables the selection of optimal solutions based on quality standards. Enhancing the quality

of construction projects will unequivocally elevate project performance [8]. Enhancing the execution quality diminishes resource waste, lowers the rework costs, and elevates the productivity of both human resources and equipment. This will result in a decrease in the project execution duration and an enhancement in the return on investment rate. Business intelligence significantly enhances the overall performance of construction projects [9]. The influence of business intelligence on project performance can be analysed from multiple perspectives. Initially, the management of financial and human resources through advanced data analytics facilitates the identification and control of supplementary costs [10]. Secondly, the capacity to anticipate issues and offer remedial options throughout the initial phases of the project results in diminished delays and enhanced precision in execution. Furthermore, prompt access to precise and consolidated information via management dashboards enhances the decision-making efficiency of project managers, hence improving the overall project performance [6].

Conversely, it is crucial to acknowledge that numerous poor nations, including Iran, experience challenges in construction projects due to inadequate data analysis, inefficiencies in risk assessment, and constraints in quality control. These issues result in diminished productivity, recurrent delays, and escalated implementation costs for projects. A critical issue that is overlooked in these countries is the implementation of data-driven technologies to enhance decision-making and quality control procedures. Meanwhile, business intelligence, with its capacity to analyse extensive data sets, discern performance trends, and furnish managerial insights grounded in precise and real-time information, can instigate a profound shift in this market. A primary reason for the necessity of employing business intelligence in Iran and analogous nations is the lack of integrity in construction project data and the constraints in information analysis infrastructure. In numerous nations, conventional project management methodologies and the dependence on empirical decision-making have resulted in inadequate coordination among various project components, insufficient risk assessment, and deficiencies in evaluating contractor and supplier performance. In these situations, business intelligence may enhance the transparency in executive operations and improve the decision-making precision by developing sophisticated analytical systems and offering management dashboards. This research's key innovative element is the introduction of a structural model to examine the mediating effect of quality management on the relationship between business intelligence and construction project performance. This study demonstrates that project quality management is a crucial aspect that enhances the influence of business information on organisational performance, offering a specific method of enhancing project outcomes, in contrast to prior studies that have typically focused solely on the direct relationship between business intelligence and organisational performance. The findings of this study may serve as a pragmatic resource for project managers, policymakers, and investors across many nations, particularly in developing countries. In light of the economic and infrastructural challenges faced by developing nations, the adoption of data-driven methodologies and the implementation of business intelligence systems can enhance the project execution quality, increase the efficiency, minimise extraneous costs, and optimise resource allocation within the construction sector. This study models the relationships among business intelligence, project quality, and project performance, establishing a scientific framework for the use of new technologies to enhance construction project productivity. It aims to determine whether business intelligence influences construction project performance via the mediating variable of project quality management.

Additionally, the following research questions are addressed in order to clarify and establish the relationships between the variables of the study: (i) Does business intelligence have an effect on the performance of construction projects? (ii) Does business intelligence

affect project quality management? (iii) Does project quality management affect the performance of construction projects? (iv) Can the dimensions of business intelligence predict the performance of construction projects? (v) Can the dimensions of business intelligence predict project quality management? The research is structured as follows. The next section of the paper discusses the research background. Section 3 explains the methodology, data collection, and analysis procedures. Section 4 includes statistical tests and study findings, followed by the discussion of the results in Section 5. Section 6 presents the conclusions and recommendations of the study.

2. Literature Review

2.1. Business Intelligence

In recent years, business intelligence systems have been consistently recognised as one of the primary priorities of information systems and business leaders [11]. Business intelligence is the art and science of preparing projects for the future using a systematic management process. Creating knowledge from clearly available information using this systematic process includes planning, gathering, analysing, and managing it, which leads to the correct actions of the decision-maker [12]. Business intelligence is a set of mathematical models and analysis methods for the systematic exploitation of the available data to retrieve useful information and knowledge to support complex decision-making processes. A business intelligence system includes the ability to manage and make logical decisions [13]. Using business intelligence database systems will improve the quality of decision-making. The use of mathematical models and algorithms makes it possible to analyse more options with more accurate results and achieve more efficient decisions [14]. As a result, the most important advantage of the business intelligence system is to increase the effectiveness of the decision-making processes of project managers [15]. The use of business intelligence systems in the project will lead to the transformation of data into useful information and real-time decision-making by project managers [16]. The application of business intelligence in construction projects changes the attitude in reporting, enabling continuous access to project information, ensuring the accurate financial analysis of the project, identifying profitable partners and improving joint business processes, improving relationship management with contractors and buyers, and enabling an understanding of their needs, making it possible to maintain compliance with regulations [17,18]. In addition, other benefits of the application of business intelligence that have a significant effect on the quality and performance of construction include providing a simple user interface for project personnel, ensuring accurate and timely data for better insights among project managers about costs, ensuring safe and informed decision-making in the project process, providing a coherent operational view of projects, improving project performance by integrating management criteria, evaluating all functional aspects of the project (including financial performance, personnel performance), and controlling the progress of the project [19,20].

In this regard, Majd et al. [21] concluded that business intelligence facilitates superior strategic decision-making and enhances performance metrics by analysing extensive data, thereby ensuring competitiveness in a dynamic context. Tsiu et al. [22] recognised that small and medium-sized firms can enhance their performance, operational efficiency, strategic decision-making, and market competitiveness by utilising data mining and business intelligence technologies when confronted with specific obstacles. Haloul et al. [23] asserted that business intelligence is an established asset in construction projects, serving as an effective instrument for the successful execution of a project concerning time, costs, quality, and performance.

2.2. Project Performance

Project performance is dependent on methodologies, frameworks, and indicators that assist project managers in developing strategies and strengthening project employees to gain strategic insights, thereby enabling them to challenge strategic assumptions, measure strategic thinking, and enhance strategic decision-making and learning [24]. Project performance is a future-oriented and customised concept that reflects the characteristics of each project based on a model that links inputs and outputs to each other [25,26]. To investigate the performance of a project, it is necessary to identify characteristics that affect its performance as measurement standards or modelling factors [27]. Performance management establishes a direct connection between employee performance and project objectives and reveals employees' involvement in the project [28]. In this regard, the combination of business intelligence and project performance management can assist project managers in continuously improving their management techniques and guiding the project toward its objectives [29]. In addition, business intelligence improves the performance of construction projects in various fields by enhancing the identification of the underlying causes of project problems, verifying information at multiple project levels [30], and collecting, storing, and analysing data. Other functions include creating data to convert dispersed project data into meaningful information, integrating and rationally evaluating data [31]; forecasting future project activities to improve project managers' conditions [32]; monitoring huge projects with massive data in a simplified environment; assuring the completion of project milestones in accordance with the specific schedule for a project [33]; providing project managers with a comprehensive understanding of the allocation of resources, equipment, and expenses; facilitating profitability and financial analysis in a project [20]; enabling project risk trend analysis and profitability forecasting with reliable data [34]; and maximising the benefits of analytical and preventive decision-making [35].

According to Richards et al. [36], a significant and positive correlation exists between business intelligence and business analyses. They also stress that business intelligence is integral to business analysis procedures. Consequently, business intelligence contributes positively to the efficacy of business analysis and, of course, to the performance management of firms. Moreover, Caseiro and Coelho [37] argue that business intelligence capabilities have a beneficial and significant impact on the learning, innovation, and performance of startups. Consider the impact of business information capabilities on the performance of companies while addressing these capabilities in startup businesses. Offering business information practices is a new obstacle to overcome due to the fact that start-up organisations typically lack resources and are exposed to many demands [ibid]. However, expanding the usage of business intelligence technologies has a favourable and substantial effect on performance [33]. Wieder et al. [38] concluded that the quality of managerial decision-making is influenced by the quality of the data in business intelligence systems and that the quality of business intelligence management in an organisation is a necessary antecedent of both the data quality and decision-making quality. To ensure not only success but also survival, firms must have access to accurate and timely business data and intelligence. In addition, the crucial role of managers in business intelligence will improve decision-making, learning, and economic growth on a broader scale. Therefore, economic expansion boosts the performance of businesses [39].

2.3. Project Quality Management

In the modern environment, which is distinguished by intense international competition on the one hand and technological changes and advancements on the other, the analysis, correct comprehension, and appropriate application of concepts such as quality management can be extremely useful and applicable. Numerous management and quality

techniques and procedures can be incorporated into a comprehensive and integrated quality management system [40]. The quality of a project is the degree to which its intrinsic features satisfy the project requirements. Quality generates client happiness and ensures enduring corporate success [41]. Due to the volume of funds spent, their social and economic sensitivity, and their strategic importance, the importance of the quality of construction projects has increased in recent years. However, despite special attention in the form of specialised laws and regulations, there are still projects that are not delivered on time, within budget, and with high quality and specifications that meet expectations [42]. Implementing project quality management to continuously empower and enhance project management, satisfy the needs of employers, decrease redundancies, boost employee engagement, and foster cooperation generates substantial profits [43]. Business intelligence and related tools can be used to access this vital information. Using business intelligence to enhance the quality management of the project, it is possible to control the operational activities of project managers and save the project schedule [44]. In order to discover problems and increase public awareness of the status of the project, Gudfinnsson et al. [45] used intelligent data to obtain a competitive edge over competing projects [46]. Furthermore, Villamarin and Diaz Pinzon [47] found that 70% of business intelligence programs worldwide fail. They argue that the common factor associated with failure in business intelligence projects is the existence of poor alignment between the business, viewpoint, and goals. Therefore, the senior managers of organisations can ensure the successful implementation of business intelligence and improve the quality of the organisation by anticipating organisational challenges and having a stable and long-term strategic vision [48].

2.4. Project Quality Management and Construction Project Performance

Quality management is closely connected to the project and involves evaluating the quality of the outputs at the end of the project; it also includes policies and procedures that can affect the performance of the project. For instance, Zehir et al. [49] stated that project quality management leads to the production of higher-quality products, which increases customer and staff satisfaction while decreasing the project's current expenses.

Many studies have been conducted related to quality management. For example, Kalogiannidis [50] evaluated the effect of comprehensive quality management and marketing on organisational performance in the United States. He found that there was a positive and significant relationship between comprehensive quality management practices and organisational performance and between marketing activities and organisational performance. This study also indicates that comprehensive quality management methods and marketing are among the most effective factors in quality; therefore, they should be applied continuously in organisations. Unegbu et al. [27] concluded that the strong relationship between customer satisfaction and project success is followed by that between project performance and project success, and project scope management has a positive effect on performance and customer satisfaction. In general, the relationship between project quality and performance, client satisfaction, and project success is direct. In another study, Lu et al. [51] concluded that governance has a positive effect on project management practices and is a tool to strengthen the effect of quality management practices in inter-organisational projects. They also argue that project quality management enhances inter-organisational project performance.

Studying the research literature indicates that, despite the importance of business intelligence's impact on the performance of construction projects, this issue has received less attention from previous researchers, especially considering the issue of quality management. Previous studies have only examined the roles and effects of these variables two by one. In addition, the effects of these variables on each other in construction projects have not been

analysed, while the use of new technologies such as business intelligence in construction projects could play a significant role in increasing the awareness of project managers about business intelligence technology, enhancing the organisational culture through the use of new technologies, and increasing the ability to allocate resources with sufficient knowledge of business intelligence technology. Thus, it plays a role between the managers and employees of construction projects. Furthermore, the use of business intelligence in construction projects can be considered as the driving engine of these projects, and, by using it, project managers can improve their project quality management as well as the performance of construction projects in a desirable manner.

3. Research Methodology

The current study was an applied study in terms of its purpose and a correlational study in terms of its type and methodology. A research method is a systematic process adopted to find the answer to a question or solve an issue; it is a set of rules and tools, as well as reliable and methodical techniques, used to investigate the facts, discover unknowns, and achieve solutions to problems [52]. Since this research aimed to acquire the necessary knowledge to solve the known issues and improve a specific situation, it consisted of correlational research in terms of its practical purpose and its research method. The correlational method is used for the two main purposes of discovering the relationships between variables and for predicting a subject's score in one variable from the scores of other variables [53]. The method of data collection was based on a comprehensive literature review, questionnaires, and interviews. The researcher-created questionnaire on business intelligence consisted of 4 dimensions and 22 items (competitive, technical and managerial, financial and economic, data and information management) (Appendix A), while the researcher-created questionnaire on project performance consisted of 7 dimensions and 24 items (time, budget/cost, quality, scope, project control, procurement and human resources, and risk management) (Appendix B). Meanwhile, the standard questionnaire on project quality management consisted of 7 dimensions and 27 items (customer-focused, internal/external cooperation, continuous improvement, leadership, employee performance, learning, and process management) (Appendix C). Finally, a questionnaire consisting of 18 dimensions and 73 items based on a five-point Likert scale was developed. The face validity of the questionnaire was confirmed using the opinions of several respondents, and the content validity was confirmed using the opinions of subject experts. The construct validity of the two self-administered questionnaires was assessed using confirmatory factor analysis in the Smart-PLS software. The reliability was estimated using Cronbach's alpha coefficient for the questionnaires on business intelligence (0.957), project performance (0.912), and project quality management (0.926). Finally, in October 2023, an online survey was disseminated to the target group, with the link shared through email and social networks. The data collection process lasted until January 2024.

The statistical population consisted of engaged specialists, professionals, and experienced experts in Iranian construction projects. Due to the research's unlimited statistical population, the sample size was calculated to be 98 using Cohen's formula, based on the effect size and power of the test. This was selected based on the statistical population distribution and sample members' accessibility. This method is used to estimate the required sample in structural equation models and partial least squares.

In this research, the convenience sampling method was used after determining the sample size for the collection of data through the research questionnaires. The convenience sampling method is the most common non-probability sampling method; it is used to collect samples that can be easily located in a statistical population. Moreover, sampling using this method enables the selection of respondents who are suitable for a given statistical

population [54]. Hence, convenience sampling was used in this study. All respondents had sufficient knowledge and competence related to business intelligence. They were also aware of the different construction project management methods and had sufficient experience in the field. In particular, the respondents also had the desire to participate in the research. Due to the possible loss of subjects, 10 people were added to the sample size. Overall, 108 questionnaires were distributed, and 102 questionnaires were collected and analysed. The data in this study were analysed using the SPSS 25 and Smart-PLS 4 softwares. Descriptive data analysis and stepwise regression analysis were conducted using the SPSS software, while the Smart-PLS software was employed for structural equation modelling (SEM) utilising partial least squares. Consequently, the research flow chart is illustrated in Figure 1.

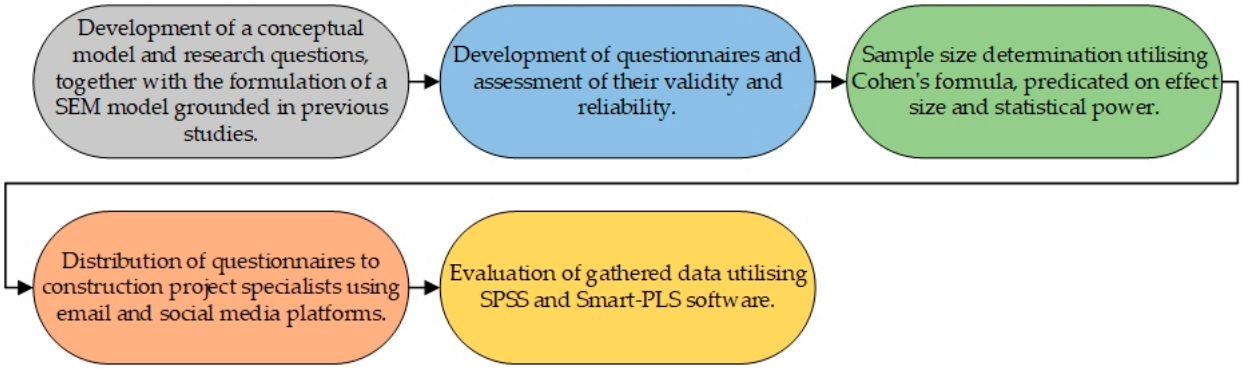

Figure 1. Research workflow diagram.

Table 1 shows that, out of the 102 respondents, 81 were male (79.4%) and the rest were female (20.6%). Regarding their age, most of the respondents were between 36 and 45 years old (74.5%), and only 16 (15.7%) were under 35 years old. Furthermore, 78 people (76.5%) had higher education degrees. In addition, the participants in the research exhibited various organisational positions, including financial manager (12.7%), architect (13.7%), project manager (7.8%), surveyor (12.7%), supervisor/inspector (7.8%), site manager (23.7%), project engineer/advisor (18.6%), operation manager (1%), and faculty member (2%). The range of occupations shows that the data included various perspectives. This improved the accuracy of the results obtained. In terms of work experience in construction projects, 27 of the respondents (26.5%) had work experience spanning between 6 and 10 years, while a high percentage of respondents (67.6%) had work experience spanning more than 11 years; this showed their qualification for participation in this research survey, as they had adequate practical work experience in the field. In addition, while all respondents stated that they were aware of business intelligence and its tools, 92.2% of them had more than five years of hands-on experience in using business intelligence tools.

Table 1. Demographic and professional characteristics of the survey respondents.

Characteristics		Frequency (%)
Gender	Male	81 (79.4)
	Female	21 (20.6)
Age	Below 35 years old	16 (15.7)
	36–45 years old	76 (74.5)
	46–55 years old	6 (5.9)
	Over 56 years old	4 (3.9)

Table 1. *Cont.*

Characteristics		Frequency (%)
Education	Diploma level	1 (1)
	Bachelor's degree	14 (13.7)
	Master's degree	23 (22.5)
	Ph.D. degree	64 (62.7)
Job position	Financial Manager	13 (12.7)
	Architect	14 (13.7)
	Project Manager	8 (7.8)
	Surveyor	13 (12.7)
	Supervisor/Inspector	8 (7.8)
	Site Manager	24 (23.5)
	Project Engineer/Advisor	19 (18.6)
	Operation Manager	1 (1)
	Faculty Member	2 (2)
Work experience (construction industry)	Below 5 years	6 (5.9)
	6–10 years	27 (26.5)
	11–15 years	62 (60.7)
	Over 16 years	7 (6.9)
Awareness of business intelligence and its tools	Below 5 years	8 (7.8)
	6–10 years	59 (57.85)
	11–15 years	32 (31.4)
	Over 16 years	3 (2.95)

The SPSS software was used to analyse the collected data. In addition, the Smart-PLS software (structural equation modelling) was used to model and analyse the relationships between the variables and to build and fit the model.

4. Presentation of Key Findings

4.1. The Main Question: Does Business Intelligence Affect the Performance of Construction Projects Through the Mediating Variable of Project Quality Management?

Regarding the mediating role of project quality management in the effect of business intelligence on the performance of construction projects, using the well-known bootstrapping method, the direct and indirect paths of the independent variable (business intelligence), dependent variable (performance of construction projects), and mediator variable (project quality management) were analysed according to Figure 2, and the results can be seen in Table 2.

The results in Table 2 demonstrate that the overall impact of business intelligence on project performance, excluding the mediating variable, is considerable and is quantified at 0.828. The direct impact of business intelligence on project performance, considering the mediating variable, is substantial and is quantified at 0.534. The indirect effect via project quality management is substantial, quantified at 0.295; consequently, project quality management serves as a partial mediator, indicating that a portion of the impact of business intelligence on project performance is conveyed through this variable.

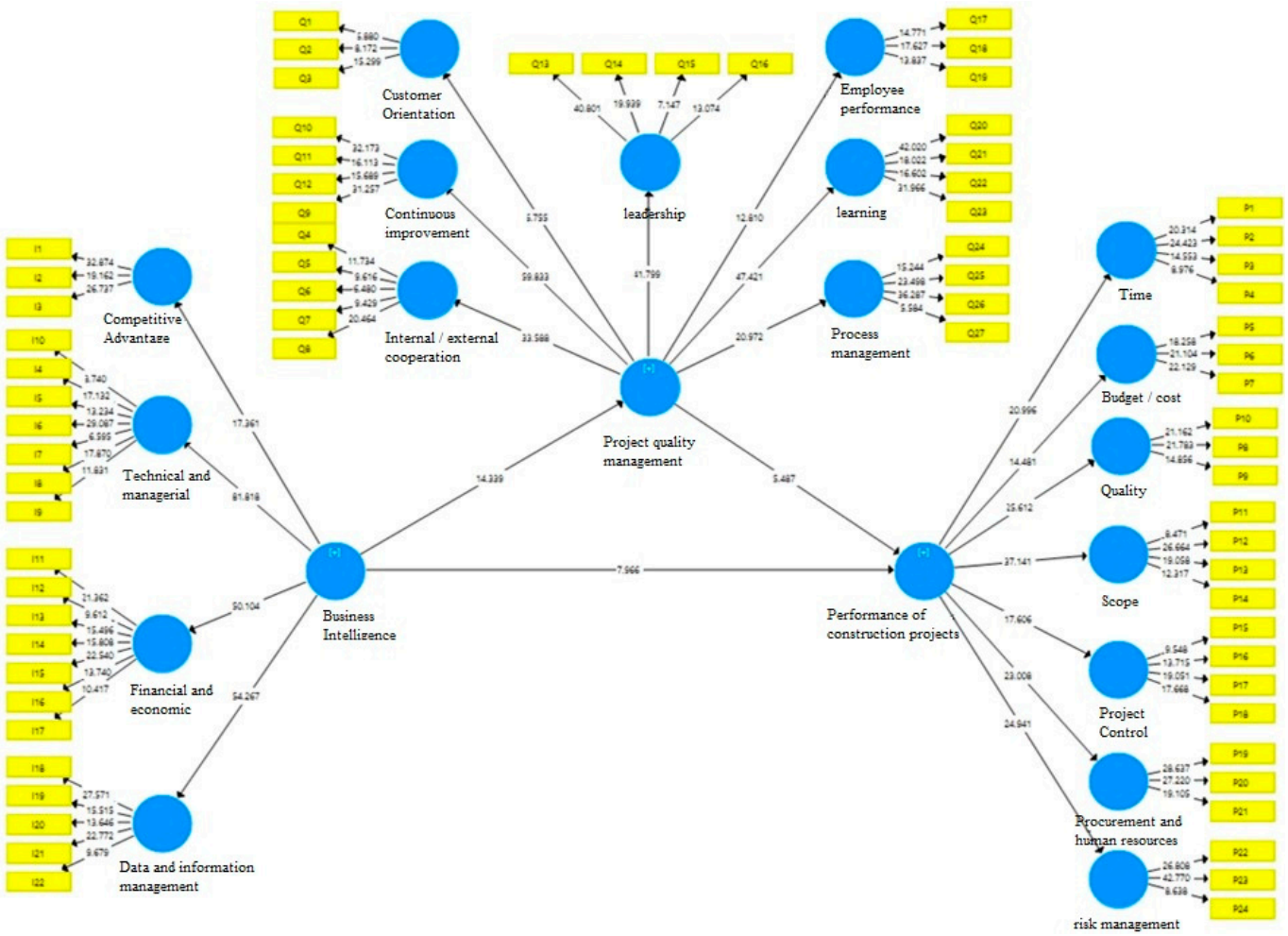

Figure 2. Investigating the significance of the research conceptual model coefficients using T-values.

Table 2. Path coefficients and significance of direct and indirect paths.

Path Name	Path Coefficient	Significance Value	Significance Level	Interpretation
Business intelligence→project quality management→performance of construction projects	0.295	5.399	0.000	Significant
Business intelligence→project quality management	0.743	14.399	0.000	Significant
Project quality management→performance of construction projects	0.396	5.478	0.000	Significant
Business intelligence→performance of construction projects	0.534	7.966	0.000	Significant

4.2. The First Sub-Question: Does Business Intelligence Affect the Performance of Construction Projects?

The path coefficient and t-value for this question are shown in Table 3. As can be seen, business intelligence has a positive (direct) effect on the performance of construction projects at 0.534; because the value of t is outside the range of ±2.58 (t = 7.966), this path coefficient is significant at the level of 0.01. As a result, this question is confirmed with 99% certainty. This relationship shows that the higher the business intelligence level, the higher the performance of construction projects will be.

Table 3. Test of the effect of project quality management on the performance of construction projects.

Variable	Path Coefficient (β)	T-Value	Result
Business intelligence and performance of construction projects	0.534	7.966	Confirmed
Business intelligence and project quality management	0.743	14.399	Confirmed
Project quality management and performance of construction projects	0.396	5.478	Confirmed

4.3. The Second Sub-Question: Does Business Intelligence Affect Project Quality Management?

The path coefficient and t-value for this question are shown in Table 3. As can be seen, business intelligence has a positive (direct) effect on project quality management at 0.743, and, because the value of t is outside the range of ±2.58 (t = 14.399), this path coefficient is significant at the 0.01 level; as a result, this question is confirmed with 99% certainty. This relationship shows that the higher the business intelligence level, the higher the level of project quality management will be.

4.4. The Third Sub-Question: Does Project Quality Management Affect the Performance of Construction Projects?

The path coefficient and t-value for this question are shown in Table 3. As can be seen, project quality management has a positive (direct) effect on the performance of construction projects at 0.396, and, because the value of t is outside the range of ±2.58 (t = 5.478), this path coefficient is significant at the 0.01 level; as a result, this question is confirmed with 99% confidence. This relationship shows that the higher the project quality management level, the higher the performance of construction projects will be.

4.5. The Fourth Sub-Question: Can the Dimensions of Business Intelligence Predict the Performance of Construction Projects?

Due to the results shown in Table 4 and the significant *p*-value obtained in the first, second, and third steps at zero, the technical, managerial, financial, and economic dimensions and data and information management can determine the performance of construction projects. Thus, it is concluded that the relationship between the technical, managerial, financial, and economic dimensions and data and information management and the performance of construction projects is significant. The regression model is significant, and the technical, managerial, financial, and economic dimensions and data and information management are able to predict the performance of construction projects.

Table 4. Significance of stepwise regression model in the fourth sub-question.

Step		Predictor Variable		Sum of Squares	Mean of Squares	F-Statistic	Level of Significance
1	-	Technical and managerial	Regression	26.025	26.025	16.0124	0.000
			Residual	15.978	0.160		
			Total	42.183			
2	-	Technical and managerial	Regression	23.730	13.865	94.968	0.000
	-	Financial and economic	Residual	14.454	0.146		
			Total	42.183			
3	-	Technical and managerial	Regression	28.444	9.480	67.611	0.000
	-	Financial and economic	Residual	13.742	0.140		
	-	Data and information management	Total	42.183			

Dependent variable: performance of construction projects.

The results listed in Table 5 show that technical, managerial, financial, and economic dimensions and data and information management in the third step have a 67.4% ability to predict the performance of construction projects. Moreover, one of the hypotheses considered in linear regression is that the errors (the difference between the actual values and the values predicted by the regression equation) are independent of each other. If the question of the independence of the errors is rejected and the errors are correlated with each other, it is not possible to use linear regression. The Durbin–Watson test was used to check the independence of the errors from each other. The Durbin–Watson statistic was between 0 and 4. If there is no serial correlation between the residuals, the value of this statistic should be close to 2. If it is close to zero, it indicates a positive correlation, and if it is close to 4, it indicates a negative correlation. In general, if this statistical value falls between 1.5 and 2.5, it is acceptable. The value for this question was 1.771.

Table 5. Summary of the stepwise regression model of the fourth sub-question.

Step	Predictor Variable	Correlation Coefficient	Square of the Correlation Coefficient	Durbin–Watson Test
1	- Technical and managerial	0.788	0.621	
2	- Technical and managerial - Financial and economic	0.811	0.657	
3	- Technical and managerial - Financial and economic - Data and information management	0.821	0.674	1.771

Dependent variable: performance of construction projects.

As can be seen in Table 6, in the third stepwise regression, technical and managerial dimesions had a T-value of 3.329 and significance level of 0.001; financial and economic dimensions had a T-value of 2.757 and significance level of 0.007; and data and information management had a T-value of 2.253 and significance level of 0.026 at a 95% confidence level. Thus, they can significantly predict the performance of construction projects, and the regression line equation with non-standard coefficients is as follows:

Table 6. Coefficients of the stepwise regression model of the fourth sub-question.

Step	Predictor Variable	Unstandardised Coefficient		Standardised Beta Coefficient	T-Statistic	Significance Level
		Beta	Standard Error			
1	Fixed coefficient	1.148	0.210		5.474	0.000
	-Technical and managerial	0.711	0.055	0.788	12.807	0.000
2	Fixed coefficient	1.010	0.205		4.930	0.000
	-Technical and managerial	0.502	0.083	0.557	6.022	0.000
	-Financial and economic	0.250	0.077	0.299	3.231	0.002
3	Fixed coefficient	0.921	0.205		4.504	0.000
	-Technical and managerial	0.352	0.106	0.390	3.329	0.001
	-Financial and economic	0.214	0.077	0.256	2.757	0.007
	-Data and information management	0.205	0.091	0.241	2.253	0.026

Dependent variable: performance of construction projects.

Performance of construction projects = 0.921 + 0.205 data and information management + 0.214 financial and economic + 0.352 technical and management.

4.6. The Fifth Sub-Question: Can the Dimensions of Business Intelligence Predict Project Quality Management?

Dependent Variable: Project Quality Management

According to the results obtained from Table 7 and the significant *p*-value obtained in the first and second steps at zero, the technical, managerial, financial, and economic

dimensions are able to predict the quality management of the project. Thus, it is concluded that the technical, managerial, financial, and economic dimensions have a significant relationship with project quality management, and the regression model is significant.

Table 7. Significance of the stepwise regression model in the fifth sub-question.

Step	Predictor Variable		Sum of Squares	Mean of Squares	F-Statistic	Level of Significance
1	- Technical and managerial	Regression	23.732	23.732	117.236	0.000
		Residual	20.243	0.202		
		Total	43.975			
2	- Technical and managerial - Financial and economic	Regression	24.929	12.462	64.788	0.000
		Residual	19.046	0.192		
		Total	43.975			

Dependent variable: project quality management.

The results given in Table 8 show that the technical, managerial, financial, and economic dimensions in the second step have a 56.7% ability to predict the quality management of the project. Moreover, the Durbin–Watson value was 1.729, which is appropriate.

Table 8. Summary of the stepwise regression model of the fifth sub-question.

Step	Predictor Variable	Correlation Coefficient	Square of the Correlation Coefficient	Durbin–Watson Test
1	- Technical and managerial	0.735	0.540	
2	- Technical and managerial - Financial and economic	0.753	0.567	1.729

Dependent variable: project quality management.

As can be seen in Table 9, in the second step of the stepwise regression, technical and managerial dimensions had a T-value of 5.135 and significance level of 0.000, and financial and economic dimensions had a T-value of 2.494 and significance level of 0.014 at the confidence level of 95%. Thus, they can significantly predict the variable of project quality management, and the regression line equation with non-standard coefficients is as follows:

Table 9. Coefficients of the stepwise regression model of the fifth sub-question.

Step	Predictor Variable	Unstandardised Coefficient		Standardised Beta Coefficient	T-Statistic	Significance Level
		Beta	Standard Error			
1	Fixed coefficient	1.154	0.236		4.891	0.000
	-Technical and managerial	0.676	0.062	0.735	10.828	0.000
2	Fixed coefficient	1.032	0.235		4.930	0.000
	-Technical and managerial	0.492	0.096	0.534	5.135	0.000
	-Financial and economic	0.221	0.089	0.260	2.494	0.014

Dependent variable: project quality management.

Project quality management = 1.032 + 0.221 financial and economic + 0.492 technical and managerial.

5. Discussion of Analytical Results

The present research was conducted to determine the effect of business intelligence on the performance of construction projects through the mediating variable of project quality management using a descriptive–correlational method. The inferential findings of the research indicate that the full effect of business intelligence variables on the performance of construction projects without the presence of a mediator is significant (0.828); the indirect effect of business intelligence on the performance of construction projects with the presence

of a mediator (0.295) is significant; and the direct effect of business intelligence on the performance of construction projects with the presence of a mediator (0.534) is significant. Moreover, project quality management has a partial mediating role in the effect of business intelligence on the performance of construction projects. Business intelligence also has a positive (direct) effect on the performance of construction projects; therefore, the higher the level of business intelligence, the higher the performance of construction projects. In addition, the technical, managerial, financial, economic, and data and information management dimensions of the variable of business intelligence are able to predict the performance of construction projects; therefore, there is a significant relationship between the mentioned dimensions and the performance of construction projects. Moreover, the technical, managerial, financial, and economic variables of business intelligence are able to predict project quality management; therefore, there is a significant relationship between the mentioned dimensions and project quality management.

The findings of this study regarding the influence of business intelligence on project performance align with the conclusions of Majd et al. [21], who demonstrated that business intelligence promotes strategic decision-making and improves performance metrics. Tsiu et al. [22] asserted that small and medium-sized firms can enhance their operational efficiency and strategic decision-making through the utilisation of business intelligence. This finding aligns with the current study's results, demonstrating the beneficial impact of business information on organisational performance. Richards et al. [36] highlighted the significant correlation between business intelligence and business analysis, aligning with the favourable impact of business intelligence on performance shown in this study. Conversely, the conclusions of this study differ somewhat from the results of the studies outlined below. Caseiro and Coelho [37] highlight the influence of business intelligence on learning and creativity within startups, whereas the current study focused on building projects. Villamarin and Diaz Pinzon [47] discovered that 70% of BI programs fail owing to misalignment with business objectives. This matter was not examined in the current study.

Haloul et al. [23] determined that business intelligence (BI) is an essential instrument in achieving project success concerning time, cost, quality, and performance in project quality management. This discovery validates the beneficial effect of BI on project quality. Wieder et al. [38] demonstrated that the calibre of BI management and its data quality directly influence managerial decisions. This is indirectly aligned with the current study's finding that BI enhances project quality. In contrast to Lu et al. [51], who demonstrated that corporate governance amplifies the influence of quality management on project performance, the current study indicates that BI can also exert a direct effect on quality management.

The findings of this study regarding the impact of project quality management on construction project performance align with those of Zehir et al. [49]. They demonstrated that quality management results in enhanced products, heightened customer happiness, and diminished expenses. Kalogiannidis [50] underscored that quality management exerts a favourable and substantial influence on organisational performance, aligning with the current study's findings. Lu et al. [51] proposed that quality management enhances the performance of inter-organisational projects, aligning with the findings of the current study; however, the current study specifically addresses construction projects. Unegbu et al. [27] demonstrated that quality management significantly influences customer satisfaction, which subsequently impacts project success, but the current study emphasises the immediate effect on project performance. This study demonstrates that quality management serves as a mediating variable in the relationship between business intelligence and project performance, a position that has been inadequately explored in other research.

One of the most important industries that can be mentioned is the construction industry, which should be dealt with in a specialised manner, and each country should seek to

provide the best conditions for the construction industry because certain types of structures cover a vast amount of urban land. As this industry becomes more competitive and the quality standards rise, the variety of domestic products will increase, and this can be addressed by relying on new technologies and using up-to-date knowledge. One of these technologies is business intelligence, which is a set of processes, concepts, and methods that not only improve decision-making but also support the strategies of construction projects. The use of business intelligence systems in construction projects helps users and personnel to better understand the project requirements, manage relationships with customers and suppliers, and supervise project inspectors and senior managers to guarantee the quality of the project. Project quality management is a management point of view that has expanded its position in projects with increasing speed, focusing on paying attention to the needs and initiatives of customers, providing services, and improving quality. This focus on quality and on efforts to constantly improve the project has played a fundamental and important role in improving the performance of construction projects. Today, most construction projects must have competitive advantages to improve their performance and face competitors, so that they can achieve superior performance in complex and changing conditions and maintain themselves in the market. Changes in the technologies used in construction projects could be one of these competitive advantages, as found in the current research. In order to achieve this, construction projects need technologies and modern information systems, including business intelligence, to create integrated reporting systems and enable the better measurement of personnel's performance. Moreover, managers and upstream organisations require accurate information about customer demands so as to respond to these needs. This also enables greater preparation and flexibility and a quick response to market environment changes, strategy management and the early detection of project risks, the optimisation of relationships with customers and investors, and the production of wealth and added value.

It can be concluded that mastering new technologies such as business intelligence in projects, especially construction projects, is an inevitable necessity. On the other hand, the investigation of the construction project conditions in Iran, as a developing country, indicates that most of these projects are affected by large volumes of information and data; if no appropriate tools are used to manage these, they will lead to poor decisions and mistakes, which will hinder the performance of the project. Consequently, this could lead to the waste of project resources.

Generally, while business intelligence can enhance the performance of building projects, its efficacy is contingent upon the economic conditions [55], technological infrastructure [56], and regulatory frameworks [57] of each nation. In volatile economic conditions characterised by elevated inflation and insufficient financial resources, organisations do not prioritise investment in data-driven technology [58]. Conversely, in nations with favourable policies and clear regulatory frameworks, the adoption and use of business intelligence is promoted [59]. Furthermore, access to suitable digital infrastructure, including high-speed internet and cohesive information management systems, significantly influences the efficacy of this technology. In addition, practical problems may also impede the application of business intelligence. A primary issue is data security and the safeguarding of project information, which, in the absence of suitable procedures, renders organisations vulnerable to cyber threats [60]. The absence of integration between conventional project management systems and advanced analytical tools may result in data discrepancies and erroneous decision-making [61]. Organisational resistance poses a significant obstacle, particularly in entities without a data-driven culture. Numerous managers and employees may oppose change owing to unfamiliarity with this technology [62]. In these circumstances, instituting training programs and fostering a culture of

data-driven analytics can enhance the adoption of this technology [63]. Ultimately, while business intelligence possesses significant potential to enhance the quality and productivity of construction projects, its effective implementation requires economic, infrastructural, and organisational obstacles to be addressed [64]. Companies must optimally utilise this technology by implementing suitable solutions related to data security, information standardisation, and human resource training.

6. Conclusions and Recommendations

This study aimed to address gaps in the research literature by analysing the influence of business information on construction project performance, with project quality management serving as a mediating factor, thereby offering a comprehensive analytical framework. The results indicated that, while business intelligence can markedly enhance project performance, this effect is strongly contingent upon the quality of project management and the level of organisational preparedness to embrace data-driven technology. Business intelligence alone cannot enhance project performance; its efficacy is contingent upon structural, managerial, and cultural elements within the organisation. Notwithstanding these findings, a significant difficulty highlighted in this study is the absence of a conclusive causal relationship between business intelligence and enhanced project success. This study's findings indicate that, in organisations lacking high-level project quality management, the influence of business information on project performance is markedly diminished. This indicates that business intelligence should not be viewed as an isolated solution but must be integrated with quality enhancement programs and structural reforms. Consequently, the use of business intelligence must be supported by a reassessment of conventional project management methodologies and the enhancement of monitoring and performance assessment tools. This study innovatively emphasises the significance of environmental and organisational elements in the influence of business intelligence. Numerous prior studies have posited that any organisation can enhance its performance through the use of business intelligence systems; nevertheless, this study demonstrates that economic, infrastructural, and organisational impediments significantly influence the efficacy of this technology. Specifically, in volatile economic conditions and within organisations devoid of suitable digital frameworks, the implementation of business intelligence may result in heightened managerial complexity and diminished efficiency. These findings underscore the need for project managers to meticulously evaluate the organisation's preparedness and the supporting infrastructure prior to investing in business intelligence technologies. This research examined not only the implementation challenges but also the ethical implications and potential risks associated with business intelligence in building projects. A primary problem in utilising analytical tools is the potential for data misinterpretation and an excessive dependence on predictive models. If project managers base critical decisions exclusively on analytical results, without comprehensive awareness of the constraints inherent in data-driven models, the probability of strategic errors and resource misallocation would be escalated. Consequently, the effective use of business intelligence in the construction sector necessitates not just the advancement of data-driven technology but also the enhancement of project managers' data literacy. This study's findings require further scrutiny to assess their validity and generalisability, which might be classified as research limitations, as outlined below.

1. A significant observation in this study was the variation in individuals' perceptions of the influence of business intelligence on project performance under differing settings. Participants with expertise in traditional workplaces, resistant to technological advancements, assessed business intelligence as less successful, whilst those from data-driven organisations regarded this technology as significantly more beneficial.

This finding indicates that individuals' perceptions of the influence of business intelligence are contingent not solely on the presence of analytical systems but also on their cognitive preparedness and technological acceptance; consequently, alongside technological advancement, it appears essential to enhance the levels of awareness and cultural acceptance among employees.

2. The current study employed structural equation modelling (SEM), utilising the SmartPLS software to examine the interrelationships among the variables. The SEM method is a robust approach for the concurrent analysis of several intricate interactions among variables. This strategy also has drawbacks that must be acknowledged. A significant disadvantage of the SEM method is its focus on analysing correlations between variables, which precludes the establishment of unambiguous causal links. In essence, while the study's findings suggest a correlation between business intelligence and project quality and performance, they do not establish a direct causal relationship between the variables. This study demonstrates that business intelligence significantly enhances project performance. It indicates that a higher level of business intelligence correlates with improved project performance; however, it does not establish whether enhanced business intelligence directly enhances project performance or whether other factors contribute as well. Consequently, establishing causality necessitates the utilisation of experimental or quasi-experimental methodologies that involve the manipulation of the variables to assess the direct impact of one variable on another.
3. This study demonstrates that quality management mediates the effect of business intelligence on project performance; however, further factors influencing this relationship were not explored in this research. These include organisational IT maturity (entities with robust data analysis infrastructure are likely to experience a more significant impact from business intelligence), leadership and decision-making styles (executives with a strategic and data-centric approach are more adept in utilising analytical tools to enhance project performance), and governmental support and regulatory frameworks (in certain nations, government regulations can either promote or hinder the deployment of business intelligence systems).

In light of these concerns, it is recommended that future studies explore additional aspects by implementing mixed methodologies (qualitative and quantitative), cross-national comparative studies, and longitudinal analyses. Finally, the following recommendations are proposed according to the derived results.

- Considering the unsatisfactory performance and quality of some construction projects, particularly in developing countries, authorities should support the use of innovative technologies such as business intelligence in construction projects by adopting relevant, established rules and guidelines.
- With the help of business intelligence analytical tools, project managers can help to improve the performance of projects by predicting the market conditions, enhancing the competitiveness of the projects, and increasing their profitability through informed and timely decisions.
- It is necessary for the project managers of construction projects to facilitate more prompt decision-making by designing an effective business intelligence system and benefiting from experts in the field.
- Due to the current intense competition in the construction industry, project managers are required to monitor competitors' activities through market development and improved investor relations and to always use this information to market their products and services.

- The compilation of various performance measurement systems for general contractors and subcontractors based on suitable templates would offer a strong solution to improve the performance of construction projects.
- Project managers should regularly update their strategies by collecting robust information and data on the performance of previous successful projects.
- It is possible to adopt business intelligence successfully in construction projects if the usage of such systems can be combined with the typical duties and even incorporated into the routine activities of the project team.
- Holding more training workshops for managers and personnel on construction projects is crucial, recognising that training is not an expense but an investment. This would enable them to comprehend that project quality management is a crucial management perspective that must be continuously evaluated and measured.
- The implementation of business intelligence systems necessitates investment in digital infrastructure, analytical software, and personnel training. Organisations ought to perform a cost–benefit analysis prior to the use of this technology to ascertain how the utilisation of business intelligence might reduce their operating expenses and enhance their productivity. Additionally, selecting scalable alternatives, such as cloud-based software, might reduce the early expenses.
- The insufficient familiarity of project managers and executives with data-driven systems constitutes the primary obstacle to the adoption of business intelligence. Organisations ought to develop specialised training programs to instruct on data interpretation, the utilisation of management dashboards, and the execution of advanced analytics. Conducting training seminars and employing experienced advisors during the initial phases of implementation might enhance the learning process.
- A primary obstacle in the adoption of new technologies is employees' reluctance to change. Numerous project managers and engineers are familiar with conventional information management methods and may exhibit resistance to change. Organisations should foster a culture of data utilisation at all levels to mitigate this resistance. This can be achieved through motivational training, incentives for staff utilising data-driven technologies, and incremental employee involvement in the implementation process.
- Business intelligence should not be seen as a universal solution for all building projects. Each project possesses distinct characteristics, varying scales, and diverse requirements; hence, the choice of business intelligence tools must be determined by the project's needs, complexity, and accessibility to organisational data. Employing customisable solutions (customisable BI solutions) that can be adjusted to particular project conditions can enhance productivity and eventually improve project quality and performance.
- A significant barrier in the implementation of business intelligence in construction projects is the lack of integrity in organisational data. Numerous projects employ island information management systems that hinder access to precise data. To address this issue, it is essential to develop connected databases, utilise project information management systems (PIMS), and incorporate them with business intelligence tools. The storage and analysis of substantial quantities of project data pose security challenges. Employing business intelligence without adhering to suitable security standards may render organisations vulnerable to cyberattacks and the compromise of sensitive information; thus, implementing robust security protocols, encrypting data, and establishing user access levels are essential measures to consider when deploying business intelligence systems.
- Following the implementation of business intelligence systems, qualified personnel involved in the project must consistently assess their efficacy and execute the requisite

optimisations. This assessment may encompass the analysis of key performance indicators (KPIs), the evaluation of employee system acceptability, and the comparison of project performance metrics prior to and subsequent to the implementation of business intelligence.

An in-service training system for construction workers must be implemented and expanded; it is unquestionable that a trained worker would perform better, with fewer project resources wasted and with the shortest possible time needed to complete their site tasks. Governments must continuously improve functional areas and demonstrate their commitment by allocating sufficient funds to provide the necessary infrastructure for the fundamental design and implementation of effective project management systems, including project quality management and information storage and retrieval systems, enabling the use of business intelligence in construction projects.

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Appendix A

#	Dimension	Business Intelligence
1	Competitive advantage	Project managers enhance their comprehension of their project's standing in relation to competitors and streamline the administration of competitive strategies.
2		Recognise business prospects prior to competitors exploiting them.
3		Managers have a heightened willingness to be adaptable and respond swiftly to environmental changes relative to other organisations.
4	Technical and managerial	Capability to oversee managers and operational personnel via management dashboards utilising data.
5		Developing integrated reporting systems and delivering diverse comparison findings, including the outcomes of historical analyses and the efficacy of certain ideas.
6		Enhancing project managers' capacity to deliver timely information to experts prior to its obsolescence.
7		Timely identification of hazards prior to the project encountering significant threats.
8		Capacity to identify issues and shortcomings, together with public awareness of the performance status of project staff.
9		Utilising analytical methods to forecast future project actions, thus establishing specific targets and monitoring their attainment.
10		Optimisation and management of relationships with joint venture investors, contractors, project consultants, and customers while comprehending their needs.
11	Financial and economic	Providing comprehensive visibility for managers regarding current project expenditures, supply chain dynamics, resource allocation, and equipment requirements.
12		Enhancing the investment return rate for the project.
13		Managerial decision-making aligned with market management, sales management, financial management, and capital management.
14		Mitigating dangers stemming from economic trends.
15		Consistently monitoring discrepancies in budget allocation.
16		Recognising lucrative collaborators.
17		Documenting financial transactions and identifying fraudulent activities and legal infractions.

18	Data and information management	The transparency of information in the project enhances the efficacy of project managers' decision-making processes.
19		Effectiveness of information dissemination channels coupled with simulation of outcomes pertaining to future development and forecasting.
20		Gathering, storing, and analysing data and establishing suitable access to them.
21		Transforming raw data into significant and practical information and generating knowledge from publicly accessible data.
22		Extracting data from multiple sources across all dimensions to assess a project's performance relative to key performance indicators.

Appendix B

#	Dimension	Project Performance
1	Time	Determining the sequence of tasks to minimise project activity execution time for optimal efficiency.
2		Assessing resource requirements to allocate all necessary resources for project tasks.
3		Determining the feasibility of executing a project activity while accounting for constraints through activity duration estimation.
4		Formulating a timetable to ascertain the commencement and conclusion times of a project activity.
5	Cost	Assessing the expenses required to finalise the project in accordance with the established budget.
6		Assessing the financial gain or deficit resulting from investment in the project.
7		Enhancing project performance through the assessment of market shares and diverse marketing strategies.
8	Quality	Establishing a project quality plan document to guide the implementation of the project in accordance with the defined requirements.
9		Oversight of inspectors and senior project managers to guarantee project quality and client assurance.
10		Regulating project quality through the implementation, monitoring, and documentation of strategies to eradicate sources of subpar performance.
11	Scope	Establishing a project scope plan document to assign the requisite workload to project team members.
12		Managers focus on actions within the project scope management plan to mitigate unforeseen changes and hazards in the project.
13		Graphical depiction of the project scope to enhance comprehension among customers and stakeholders regarding project performance.
14		Manage the project scope to guarantee that senior managers have a comprehensive awareness of customer requirements.
15	Project control	Gather and evaluate project data to inform expenses and timelines.
16		Regulate staff operating actions to minimise rework.
17		Evaluation and documentation to enhance project methodologies.
18		Attain peak performance, with senior executives focusing on problem resolution.
19	Human resources	Procurement planning to acquire project supplies in accordance with the specified timeline and quality standards.
20		Design a contract that delineates the rights and obligations of both the employer and the contractor.
21		Enhance the competencies of team members and incentivise senior managers through a combination of external and internal rewards.
22	Risk management	Assess the likelihood of occurrence and the consequences of risks on the project.
23		Implement preventative activities (before occurrence), corrective actions, and precautionary measures (subsequent to occurrence) to address risks.
24		Develop a formalised procedure for risk management throughout the project.

Appendix C

#	Dimension	Business Intelligence
1	Customer orientation	The operations of project managers are centred on ensuring customer satisfaction.
2		Ensuring customer satisfaction and meeting expectations is the paramount responsibility of a project manager.
3		Senior project managers act with regard to the significance of stakeholder and employer contentment.
4	Domestic/foreign cooperation	Project managers prioritise initiatives that foster collaboration between the organisation and external entities.
5		Managers, supervisors, and personnel across several project departments operate autonomously to fulfil their departmental objectives.
6		Collaboration is the standard and anticipated method for the execution of project tasks.
7		Employees readily express their ideas and recommendations.
8		All individuals contribute to the enhancement and advancement of project processes.
9	Continuous improvement	Employees engaged in the project typically have the option to propose alterations or improvements to current processes within the project.
10		Project managers typically promote ongoing learning and enhancement in all project procedures.
11		Senior project managers can facilitate the attainment and sustenance of superior project outcomes in the future through an integrated approach.
12		Project staff are efficient due to focusing on sustaining and perpetually facilitating all project activities.
13	Leadership	Senior managers possess analogous views and convictions regarding the future trajectories of initiatives.
14		Executive leadership endorses initiatives and investments that yield long-term advantages.
15		Project managers and supervisors permit their personnel to undertake essential actions regarding their tasks.
16		Senior project managers foresee change and strategise to accommodate it.
17	Employee performance	Ensuring that project people understand their collective responsibilities and accountability for performance.
18		Project managers ought to evaluate staff performance and provide rewards accordingly.
19		Employers can achieve resource conservation and possible profit generation through the effective performance of project managers and staff.
20	Learning	Project managers and supervisors guarantee that all personnel undergo training that enables them to comprehend their job responsibilities.
21		Project managers and supervisors engage in specialised training on executing operations and managing interactions with clients and workers.
22		Employees possess an adequate understanding of the fundamental ideas of the project.
23		Employees comprehend the methodologies employed in service creation.
24	Process management	Preventing flaws in the project is a key priority for project managers.
25		The methodologies employed in projects are seen as markers of project quality.
26		Processes are employed to design new services in the project to ensure quality.
27		Project managers and supervisors possess the ability to inspire people and facilitate optimal task performance.

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