

# BIM Capabilities to Achieve Projects Key Performance Indicators in Kingdom of Saudi Arabia Infrastructure Projects

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## Abstract

The Kingdom of Saudi Arabia (KSA) construction industry is now undergoing essential expansion due to many governmental initiatives. The conventional approaches proved to be inadequate in achieving the demands of the contemporary era, leading to the failure to attain key performance indicators (KPIs) of projects and facing project delay issues on infrastructure projects in KSA. Therefore, this research aimed to identify the delay factors and prioritise the BIM applications toward project KPIs. To achieve the objective, the literature analysis on the KPIs and relative BIM capabilities was conducted. A novel feature of the robust methodology employed by the researchers was the study of the Delphi study and the Fuzzy Analytic Hierarchy Process (FAHP). The initial phases of the study, professionals offered multiple rounds of input and feedback utilizing the Delphi method. In the third round, a consensus was reached. Subsequently, an enhanced FAHP was employed to establish a correlation between KPIs of a project and BIM capabilities. This research revealed that the utilisation of BIM software for infrastructure projects can facilitate that clash detection, and cost estimation. Construction monitoring plays an important part in the successful utilisation of BIM applications and can help reduce costs, save time, and improve quality. In addition, the utilisation of 4D, which involves project scheduling and construction planning, and 5D, which involves cost estimation, has subsequently had positive impacts on the KPIs of infrastructure construction projects in KSA.

## 1. Introduction

The development of infrastructure networks is a crucial factor in fostering the country's growth, and the demand for infrastructure projects has been growing due to rapid urbanization[1]. As a result, appropriate procedures and approaches are required to overcome the problems related to developing infrastructure

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projects [2]. Infrastructure projects are complicated, politically sensitive, and economically risky; projects contain community versus private distributional problems and environmental apprehensions. Therefore, more innovative approaches to problem-solving and infrastructure development are required [3]. Traditional methods failed to fulfill modern era requirements, resulting in projects not achieving project key performance indicators (KPIs) and delay, cost overrun, and time overrun. Construction projects face constant delays regardless of project type [4]. Delay in a construction project is a time overrun over the delivery date specified in the contract [5]. Despite any project controls in place, delays and interruption are virtually unavoidable, especially on large-scale infrastructure and massive construction projects in KSA, and 70% of projects did not achieve KPIs (cost overrun and time overrun) [6].

The issue of construction project delays has been extensively studied by various researchers [7], [8], [9], [10], [11] and has emerged as a significant concern due to its detrimental impact on the economy of the country. The Riyadh Metro Project, which is recognized as the largest urban transit system globally, serves as an illustration of a delay in the KSA infrastructure construction projects. The project has been in the construction phase since 2013, with an anticipated completion date of the end of 2018, as reported by [12]. Gopang et al., [7] have reported that the Riyadh Metro Project's development did not adhere to the predetermined budgetary and temporal constraints.

Building construction projects broadly implemented BIM for a few decades; although, BIM in infrastructure has been slow in its implementation and applications [13]. The rate of BIM implementation in KSA and at the stage of infrastructure projects is much below the current potential due to a lack of work on research into the search for BIM capabilities in the construction phase and involvement to key indicators of project management [14]. Khanzadi et al., [15] observed that there is a notable shortage of research on identifying BIM potential usages in the construction stage and the associations with the project KPIs. Furthermore, [14] stated that evaluating decision criteria for BIM construction components and their relative importance in core KPIs can be noteworthy for construction development experts and policymakers. The construction business is a dynamic part of the worldwide economy since it develops a country's environment by producing a variety of structures and heavy engineering infrastructure. The infrastructure contributes to humanity's health, economic, social, and cultural well-being. Additionally, the building industry provides employment and a means of subsistence for both professionals and skilled and unskilled labourers [16]. The construction sector's effective management improves life quality by increasing tourism, creating a more sustainable environment, increasing money circulation, and creating jobs across across the country [17]. The KSA boasts construction sector with estimated annual spending of more than 15% of the country's entire workforce [18]. Saudi Arabia's ambitious Vision 2030 is a long-term strategy for reshaping the Saudi economy, culture, and social institutions, and the many major infrastructure and development projects in its portfolio are referred to as "Giga projects." The most notable project is the "New Enterprise Operating Model" (NEOM), and the future metropolis is anticipated to cost \$500 billion [19]. The KSA is undergoing a significant rise in infrastructure projects in urban and rural areas and the public sector is investing heavily in regional infrastructure development [20].

Globally, the construction sector is confronted with the encounter of project delays, which is widely recognized as the most prevalent problem within the industry. The construction business exhibits a notably elevated level of risk and uncertainty in comparison to other industries. The occurrence of delays is a frequently encountered challenge in the realm of the projects. The prolongation of project timelines can result in elevated costs associated with damage, manufacturing, and income and may also give rise to conflicts between proprietors and contractors, as well as the termination of contracts [20]. Furthermore, construction project supervisors in worldwide and local contexts are required to complete projects within their management objectives. However, the low output and fragmentation that plague the construction industry in the KSA require a noteworthy standard shift in thinking about construction KPIs in relation of developing methods and procedures [21].

Numerous studies indicated that the mainstays of these construction KPIs are time, cost, and quality. Other factors, such as safety and sustainability [22], [23], have recently been included as shown in Table 1 the Project KPIs. Furthermore, the literature study finds that no previous research has investigated the competencies of BIM throughout the construction phase of an infrastructure project in KSA and established an association with construction KPIs utilising a comprehensive and combined method. Therefore, the aim of the study is to find and prioritise BIM capabilities in connection to project KPIs in the context of infrastructure development projects to implement BIM applications to accomplish project objectives.

As previously stated, construction KPIs can make BIM crucial because of its exceptional skills in coordinating and integrating the construction project process.

**Table 1** Literature review for key performance indicators (KPIs)

Key Performance Indicators	Reference
Cost performance	Habibi et al., [25]
Time performance	Radujković et al., [26]
Quality Improvement	Dejaco et al., [27]
Safety	Sibiya et al., [28]
Construction Improvement	Sun et al., [22]
Client Satisfaction	Mahmoud et al., [21]
End-User Satisfaction	Seshadhri & Paul, [29]
Productivity of labour	Velimirović et al., [30]
Profitability	Sibiya et al., [28]
Business Performance	Radujković et al., [26]

BIM takes the form of a data source that entails collecting, gathering, implementing and maintaining the complete digital representation of all project information throughout different phases of the construction project life cycle. It provides a comprehensive procedure and tools that incorporate all data of the project [31]. Nevertheless, BIM surpasses its role as a mere repository for models of buildings. It serves as an object-oriented framework for project design and construction, enabling the seamless exchange and compatibility of data in a digital format[32],[33].

Adopting BIM supports minimising mistakes while simultaneously enhancing efficiency, timetabling, safety, expenses, and the standard of construction projects [34],[35],[36]. It is argued that BIM can increase industrial performance and resolve issues resulting from the fragmented structure that now dominates the business [37]. BIM is revolutionising the construction industry by transforming 2D modelling into 3D modelling and incorporating advanced techniques such as 4D, 5D, and 6D. These advancements employ intelligent data analysis to enhance performance and deliver an accurate as-built product [38]. Table 2 depicts BIM applications used in the industry.

**Table 2** Literature review of BIM application

BIM Applications	Reference
Safety	Marefat et al., [24]
Clash Detection	Nguyen et al., [39]
Cost Estimation	Plebankiewicz et al., [40]
Constructability	Seo et al., [41]
Prefabrication	Cui et al., [42]
Project Coordination	Kubicki et al., [43]
Project Supply Chain	Deng et al., [44]
Project Scheduling and Construction Sequencing	Barati et al., [45]
Site Layout Planning	Schwabe et al., [46]
Construction Monitoring	Irizarry et al., [47]
Integration of Subcontractor and Supplier Data	Shojaei et al., [48]
Rework Reduction	Khalesi et al., [49]
Automatic Compliance Checking	Malsane et al., [50]
Flexible Project Changes	Shourangiz et al., [51]
Project Logistic Optimization	Whitlock et al., [52]

BIM has not been documented as a significant research area in developing nations due to few papers are available. Alenazi [9] conducted a study for public sector construction projects in KSA, and the findings reveal

that regardless of interest and confidence in BIM, the construction industry is still in the initial stages of achieving maximizing benefits. Overall, the findings show an eager and informed market that is untried in BIM. Similarly, BIM represents a novelty in the KSA infrastructure construction industry, in contrast to several measures to promote BIM in KSA, such as drafting BIM implementation guidelines [53].

## 2. Research Methodology

The research aims to discover BIM functional characteristics in relation to KPIs throughout the construction period, as well as their related weight and bearing. This was accomplished by reviewing the literature on KPIs and related BIM applications, then utilisation of third-round Delphi study to tailor the result KSA context. Then, using information gathered from construction experts, an advanced FAHP approach was implemented to prioritise KPIs and related BIM capabilities.

### 2.1 Delphi Study

This stage involved customizing the key construction supervision management criteria and developing a list of BIM performance characteristics in the construction period based on literature research within the context of the KSA Infrastructure Projects. Furthermore, the practical advantages of BIM to be scrutinised through the lenses of local and technical capabilities [54]. As a result, the Delphi method was selected for this goal, which is an organized technique for establishing an expert panel's consensus agreement via numerous conversations in the form of questionnaires[55]. Generally, there are two to seven rounds, and the participants range from ten to hundreds [56]. Although a panel size of 30 has been shown to provide sufficient reliability and small, homogenous samples of between 10 and 12 are often used in Delphi panel research due to the ease with which agreement may be obtained with a lower panel size [57]. While the existing literature on construction is ambiguous on the optimal size of a Delphi panel, Hollowell & Gambatese, [58], recommend a panel size of between 8 and 12 participants. During each round, the responses are analysed and based on the assessments, questionnaires' are produced, modified, and submitted to the experts for the next round. This change enables them to rethink their responses from the earlier round and revise based on the new remarks. This method's iterative nature offers panel feedback and fresh information from many perspectives[59].

This study uses the nine-point Likert scale due to more reliable and accurate compared to the five-point Likert scale [60], [61]. The nine-point Likert scale used in this study has the following meanings: 1 = Strongly not Important, and 9 = extremely important.

The interquartile range (IQR) of ratings was designed to establish a consensus between professionals. Experts with high rating factors should agree if their IQR is equal to or less than 1.0 [62]. The second round is final if all factors have IQRs of 1.0 or less [63]. The Delphi Study requires two to N rounds to explore, create a consensus among experts, understand, resolve disagreements, and confirm the outcome with 10 to 100 participants [56]. In this study, the Delphi survey was conducted in 3 rounds.

### 2.2 Fuzzy-AHP Approach

This stage utilized the Fuzzy-AHP approach to calculate the importance of KPIs and BIM advantages throughout the construction phase of infrastructure projects. Zadeh (1965) developed a mathematical theory called the fuzzy set to address the ambiguity and impreciseness of human cognitive processes. A fuzzy set, an extension of a crisp set, allows for partial membership of elements through a membership function [64]. Triangular fuzzy numbers are the most often utilized in practice [65]. Triangular fuzzy numbers are used in this study due to the ease of calculation and suitability as representation. The membership of a triangular fuzzy number is determined by three real values given as (l, m, u), representing the lowest possible value, the most promising value, and the biggest possible value, respectively [66], [67]. As represented in the Figure 1.

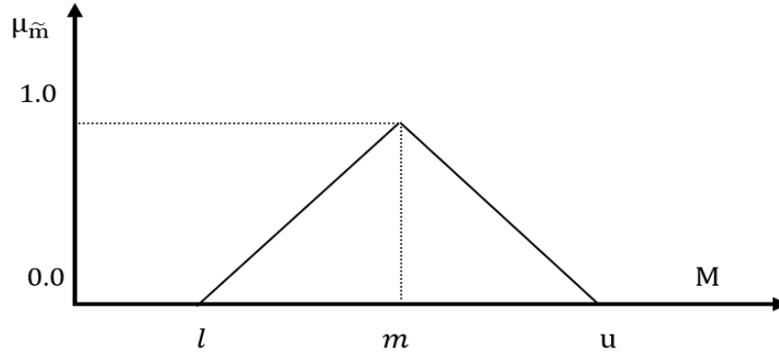


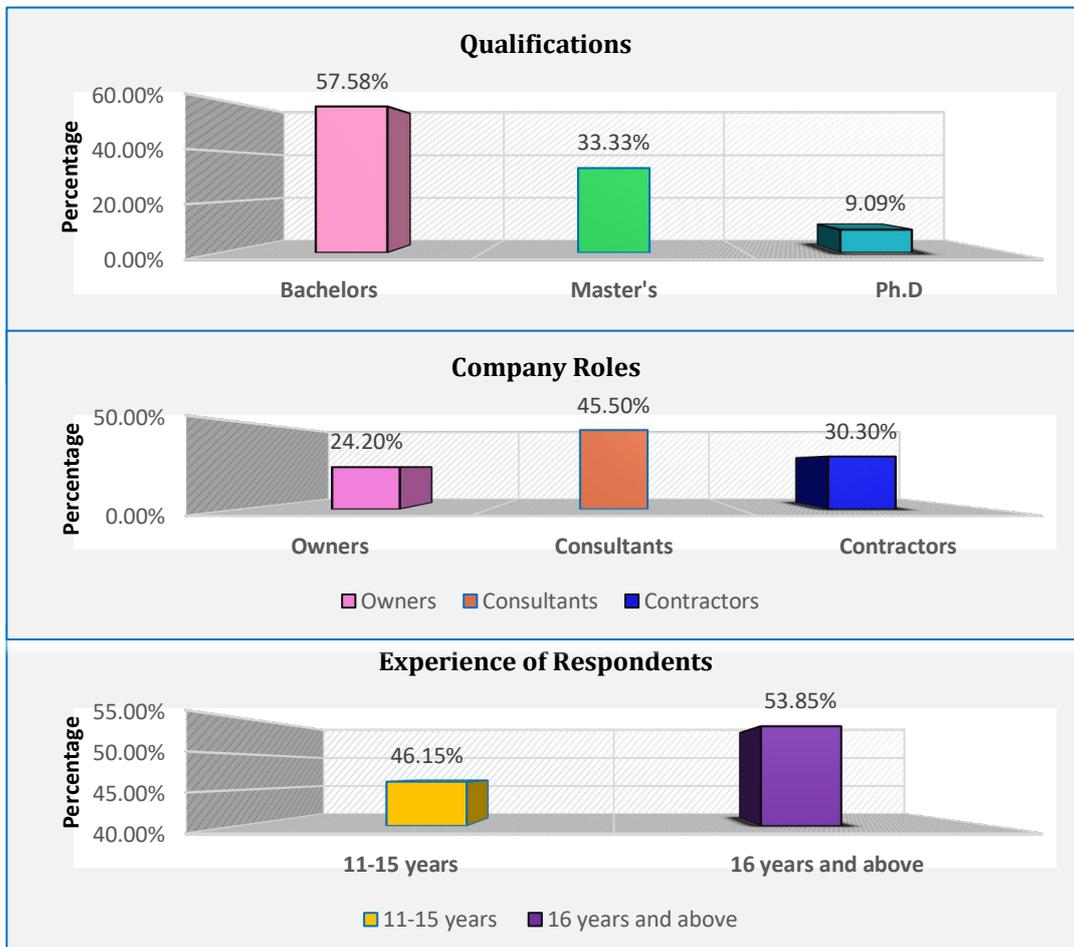
Fig. 1 Triangular fuzzy number ( $\tilde{M}$ ) [67]

The Fuzzy AHP has different approaches to prioritised the required objectives, however, this study utilized the geometric mean method, which is called Buckley's Fuzzy-AHP. The geometric mean method is simple and easy to develop a fuzzy hierarchical analysis by enabling fuzzy numbers for pairwise comparison and finding the fuzzy weight for each criterion's alternatives [68], [69], [70].

### 3. Results and Discussion

#### 3.1 Findings of Delphi Study

A total of 33 professionals who met the Delphi survey conditions were selected. The Delphi study specialists had over ten years of KSA infrastructure construction expertise. Fei and Khan [71] established an "expert" as someone with at least ten years of experience. KSA construction specialists were invited and Figure 2 shows the respondent's demography.



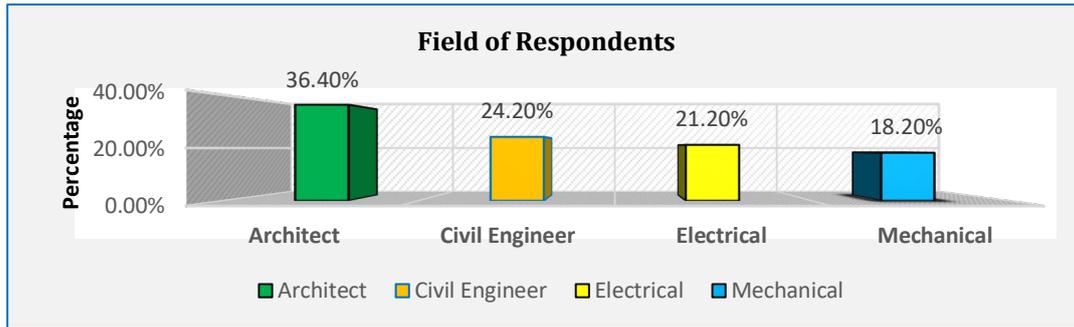


Fig. 2 Demographic characteristics

In the first round of the Delphi survey, panelists (n = 33) were asked to rank the importance of each KPI and BIM application to determine the Median, Mean, and IQR for round two. In the second round, participants were urged to compare their answers with the group and revise or justify their selections. In the second round of 10 KPIs, six items had IQR =1, four had IQR ≥ 1, and the mean and IQR improved from round one. In round two of 15 BIM applications, the mean and IQR improved. Round two of the Delphi survey increased consensus. More rounds are needed until experts reach a consensus (IQR = 1 or IQR < 1) on all elements, including KPIs and BIM applications.

The third round of Delphi aims to achieve consensus among the experts and monitor the median’s stability. Allowing re-evaluating the factors; hence, the third-round questionnaire provides information between the group and the original answers of each individual in the third round. Experts may adjust their thoughts in response to input to reconcile their differences with the group. Median and IQR data analysis determined each variable’s rating and consistency. Table 3 (KPIs) and Table 4 (BIM applications) comprise Delphi rounds, and the IQR for all factors was 1 or less. The Delphi third round concludes the Delphi consultation.

Table 3 Delphi round 2 &3 results of KPIs

S. no.	Key Performance Indicators (KPIs)	Round 2			Round 3			
		Median	Mean	IQR	Median	Mean	IQR	Rank
1	Cost of Construction Reduction	9.000	8.242	1.00	9.000	8.515	1.00	1
2	Time-Efficient Construction Delivery	8.000	7.576	1.00	8.000	7.788	0.00	2
3	Quality Improvement	7.000	6.909	2.00	7.000	7.121	1.00	3
4	Construction Safety	6.000	6.515	2.00	7.000	6.758	1.00	5
5	Construction Improvement	6.000	6.697	1.00	7.000	6.879	1.00	4
6	Client Satisfaction	6.000	5.303	1.00	6.000	5.485	1.00	9
7	End-User Satisfaction	6.000	5.636	2.50	6.000	5.727	1.00	8
8	Profitability	6.000	5.636	1.00	6.000	5.909	0.00	6
9	Productivity of Labour	5.000	4.697	1.00	5.000	4.969	0.50	10
10	Business Performance	5.000	5.152	2.00	6.000	5.758	1.00	7

**Table 4** Delphi round 2 & 3 results of BIM applications

S. no.	BIM Applications	Round 2			Round 3			
		Median	Mean	IQR	Median	Mean	IQR	Rank
1	Clash Detection	9.000	8.485	1.00	9.000	8.546	1.00	1
2	Project Schedule & Construction Sequencing	7.000	6.969	2.00	7.000	7.333	1.00	7
3	Project Coordination	6.000	6.546	2.00	7.000	7.364	1.00	6
4	Integration of Subcontractor & Supplier Data	7.000	6.394	3.00	7.000	7.212	1.00	8
5	Safety	7.000	7.242	3.00	8.000	8.212	1.00	2
6	Cost Estimation	8.000	7.818	1.50	8.000	7.939	0.00	3
7	Site Layout Planning	7.000	6.606	3.00	7.000	7.455	1.00	5
8	Prefabrication	6.000	6.030	2.50	7.000	6.939	0.00	10
9	Construction Monitoring	8.000	6.879	3.50	7.000	7.485	1.00	4
10	Project Supply Chain	6.000	5.788	1.00	6.000	5.969	0.00	11
11	Flexible Project changes	6.000	5.697	2.50	6.000	5.818	1.00	14
12	Project Logistic Optimization	5.000	5.515	2.00	6.000	5.879	0.00	13
13	Constructability Improvement	5.000	5.3030	2.00	6.0000	5.788	1.00	15
14	Rework Reduction	6.000	5.8485	2.50	6.0000	5.939	1.00	12
15	Automatic Compliance checking	7.000	6.5152	3.00	7.0000	7.091	1.00	9

As specified in the objective of the research, prioritize infrastructure project BIM applications based on project KPIs. A 6.00 rating cut-off point is used to achieve this. Only "Strongly to Very Strongly Important" indicators are kept when the cut-off value is 6.00. Percentage-wise, Fuzzy AHP will choose indicators with above 60% weight of importance [72]. This cut-off doesn't mean other things are insignificant. Due to time and resource limits, the researcher could only focus on "Strongly to Very Strongly Important" issues. This study didn't cover everything, thus more research is needed. Construction Safety was also eliminated from the tier BIM applications for further processing after scoring over 6.00 in both KPI and BIM tiers.

### 3.2 Finding of FAHP

The pre-determined BIM application hierarchy structure and associated KPIs were developed as a result of the results obtained from Delphi's study, as shown in Table: 3 (KPIs) and Table: 4 (BIM applications).

### 3.3 Structure the Hierarchy of Main Criteria KPIs

Structure of the Hierarchy of Criteria KPIs, the geometric mean of the fuzzy comparison value of the criteria is computed as in Table 5.

**Table 5** Geometric means of fuzzy comparison values of criteria KPIs

Criteria (KPIs)	Geometric Mean ( $\tilde{r}_i$ )		
Cost of Construction Reduction	3.245	3.844	4.416
Time-Efficient Construction Delivery	1.148	1.515	1.863
Quality Improvement	0.668	0.944	1.3191
Construction Improvement	0.380	0.506	0.684
Construction Safety	0.290	0.358	0.488
Total	5.733	7.169	8.772
Reverse	0.174	0.139	0.114
Increasing Order	0.114	0.139	0.1744

Fuzzy weight of each criterion is calculated as shown in Table 6.

**Table 6** Relative fuzzy weights of each criterion

Criteria (KPIs)	Fuzzy Weights ( $\tilde{W}_i$ )		
Cost of Construction Reduction	0.369	0.536	0.770
Time Efficient Construction Delivery	0.131	0.211	0.325
Quality Improvement	0.076	0.132	0.230
Construction Improvement	0.043	0.071	0.119
Construction Safety	0.033	0.050	0.085

The Centre of Area (COA) technique is employed to determine the Best Nonfuzzy Performance (BNP) score for each criterion as shown in Table 7.

**Table 7** Defuzzied relative weights of criteria

Criteria (KPIs)	Defuzzification ( $M_i$ )
Cost of Construction Reduction	0.559
Time-Efficient Construction Delivery	0.222

Quality Improvement	0.146
Construction Improvement	0.078
Construction Safety	0.056
<b>Total weight</b>	<b>1.061</b>

Lastly, normalize (Ni) the de-fuzzified weight criteria as presented in Table 8.

**Table 8** *The final weight of each criteria*

Criteria (KPIs)	Normalized final weight (Ni)
Cost of Construction Reduction	0.526
Time-Efficient Construction Delivery	0.209
Quality Improvement	0.137
Construction Improvement	0.074
Construction Safety	0.054
<b>Total weight</b>	<b>1</b>

### 3.4 Determining Weights of Alternatives with Respect to Criteria

The analysis was repeated five times for each criterion, namely "Cost of Construction Reduction," "Time Efficient Construction Delivery," "Quality Improvement," "Construction Improvement," and "Construction Safety". The final weight of the alternative with respect to the criteria as shown in Table 9.

**Table 9** *Final weight of alternatives with respective criteria*

Alternatives	Final Weight of alternatives with respective Criteria				
	Cost reduction	Time Efficient	Quality Improvement	Construction Improvement	Construction Safety
Clash Detection	0.271	0.265	0.294	0.284	0.229
Cost Estimation	0.265	0.300	0.255	0.248	0.200
Construction Monitoring	0.111	0.082	0.093	0.088	0.149
Site Layout Planning	0.070	0.050	0.042	0.096	0.102
Project Coordination	0.103	0.056	0.091	0.121	0.129
Project Schedule & Construction Sequencing	0.085	0.037	0.069	0.059	0.074
Integration of Subcontractor & Supplier Data	0.040	0.069	0.045	0.025	0.050
Automatic Compliance checking	0.022	0.074	0.070	0.050	0.042
Prefabrication	0.033	0.067	0.041	0.029	0.025
<b>Total weight</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>

### 3.5 Final Weights Identifying Priorities Among Alternatives

The final phase involves the determination of priorities among various alternatives in relation to the established criteria. The final weight of the criteria is applied to the alternatives through multiplication, and the resulting total weights of the alternatives are utilized to prioritize the final alternatives in order to accomplish the research objectives.

The fuzzy AHP analysis indicates that among the criteria KPIs, the reduction of construction costs has obtained a higher degree of significance when compared to the remaining KPIs. Table 9 displays the importance of the remaining categories in terms of their order of precedence. Specifically, the categories are ranked based on their relative significance, with time-efficient construction delivery occupying the highest position, followed by quality improvement, construction improvement, and construction safety. Moreover, the study analysed alternatives based on the criteria of the second layer of the Fuzzy AHP. The results indicated that clash detection holds the highest priority among BIM applications, with a relative importance value of 0.272. Cost estimation, construction monitoring, project coordination, and prefabrication were identified as the second, third, fourth, and ninth alternatives, respectively. Table 10 presents the final weight matrix of alternatives (BIM capabilities).

**Table 10** Final weight matrix of alternatives (BIM capabilities)

Alternatives (BIM applications)	Final Absolute Weight	Ranked
Clash Detection	0.272	1
Cost Estimation	0.266	2
Construction Monitoring	0.103	3
Project Coordination	0.094	4
Project Schedule & Construction Sequencing	0.070	5
Site Layout Planning	0.066	6
Integration of Subcontractor & Supplier Data	0.046	7
Automatic Compliance checking	0.043	8
Prefabrication	0.041	9

The potential cost reduction of infrastructure projects through the employment of BIM has been established. This is achieved by altering the interaction between project participants and consolidating information into a single database. The study conducted by [73] examined infrastructure projects and found that BIM has the potential to decrease the total cost by 8.4%. The importance of cost reduction in construction is widely recognized as a critical element in the overall financial performance of the construction sector, particularly in the KSA. The foremost alternatives for BIM-related applications pertain to clash detection. According to Mesároš & Mandičák [74], the implementation of BIM technology has the potential to mitigate costs during the construction process by identifying potential conflicts and errors in the design phase at an early stage. Cost estimation is the second most prominently ranked application associated with BIM. The efficient implementation of this application can be achieved through the utilisation of 5D BIM, which offers automated quantity take-off capabilities. The utilisation of specialized measurement tools and robust solutions in the implementation of 5D BIM enables the generation of precise bills of quantities while ensuring the consistency of cost data. The output obtained includes the essential parameters needed for the purpose of exportation [75]. The enhancement of cost-effectiveness can be attained by means of elucidating construction monitoring.

According to the research findings presented in Table 11, the nine alternative BIM applications were ranked based on their final weight. The results indicate that clash detection received the highest rank with a final absolute weight of 0.272, followed by cost estimation with an absolute weight of 0.266 in second place. Construction monitoring received the third position with an absolute weight of 0.103, while project coordination ranked fourth with an absolute weight of 0.094. Project schedule and construction sequencing ranked fifth with an absolute weight of 0.070, followed by site layout planning with an absolute weight of 0.066. Integration of subcontractor and supplier data received an absolute weight of 0.046, ranking it in the eighth position. Automatic Compliance checking and prefabrication received absolute weights of 0.043 and 0.041, respectively, ranking them in the seventh and ninth positions.

#### 4. Conclusion

The research findings unveiled compelling outcomes that depict the viewpoints of construction experts in the KSA concerning the advantages of BIM for different measures of construction project performance. The primary objectives were focused on reducing construction costs and achieving time-efficient construction delivery, with comparatively less emphasis placed on quality improvement, construction improvement, and construction safety. Construction corporations in the KSA commonly employ conventional methodologies, for the purpose of designing infrastructure projects. However, this practice has been observed to result in design flaws and a lack of coordination between numerous disciplines. Consequently, the project failed to achieve the KPIs established for it.

Upon subsequently evaluating the weighted values of the alternatives and their corresponding criteria, it can be inferred that clash detection, Cost Estimation, and Construction monitoring are crucial for the successful execution of BIM. Aid in cost reduction and saving time and quality improvement during construction by detecting potential conflicts and errors, at an initial stage in the design phase. Additionally, the utilisation of 4D BIM, which involves construction sequencing, and project scheduling. 5D BIM, which involves cost estimation, has consequent positive impacts on the KPIs of infrastructure projects in KSA.

This paper provided an initial exploration into the implementation of BIM capabilities in the context of infrastructure projects in KSA. It provides a basis for further research and offers managerial perspectives on the application of BIM. While it may appear overly optimistic to apply BIM in the current circumstances, its significance is comprehensive when viewed from an analytical perspective and practical. This is because the recommended Fuzzy-AHP model has the potential to improve experts' capacity to identify the most persuasive factors of BIM in construction KPIs.

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#### Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

#### Author Contribution

*The authors confirm contribution to the paper as follows: **study conception and design:** Sharafat Hussain, Muhammad Fikri Hasmori; **data collection:** Sharafat Hussain, Muhammad Wajidullah Khan; **analysis and interpretation of results:** Sharafat Hussain; **draft manuscript preparation:** Muhammad Fikri Hasmori, Ilias Said. All authors reviewed the results and approved the final version of the manuscript.*

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