



An Exploration into Delay-Influencing Factors on Healthcare Construction Projects: The Case of Saudi Arabia

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Abstract

The construction project's delay is one of the biggest challenges that concern practitioners in the construction industry. The success or failure of construction projects is usually measured by the building team's achievement of the project's goals and objectives (ex., time and cost). The Kingdom of Saudi Arabia (KSA), one of the largest construction industries in the MENA region, is experiencing significant delays in some construction industry projects for different reasons. The major causes of delays in project completion in the construction sector in the KSA and how sensitive it is to healthcare projects specifically differ from one project to another. Thus, there is an urgent need to identify construction project-specific causes of delay in the healthcare sector. The research is based on a quantitative approach using the systematic review methodology, where 100 delayed projects in Saudi Arabia were sampled from the healthcare sector, and the causes of delays were captured and recorded. Various factors contributed significantly to the projects' delays, such as change orders, high expenditure, and poor budgetary estimates. This study's results will help project managers reduce the risks of project delays by identifying the influencing factors and their local context, monitoring them, and finding the proper way to mitigate or element their impacts, if possible.

Keywords: Project delay; Healthcare construction project; Influencing factors; Saudi Arabia

1 Introduction

Delays in construction projects often occur, but the magnitude, scope, and overall impacts on project completion may be an essential consideration. For example, major construction projects often undergo long planning and approval phases that should eliminate any barriers that may hinder project progress. Construction delays in the healthcare sector in Saudi Arabia can be caused by various factors, including lack of funding, clear project plans, and difficulties obtaining necessary permits and approvals. Additionally, the complexity and scale of healthcare construction projects can make them particularly susceptible to delays. It's also possible that the COVID-19 pandemic has played a role in delaying construction projects in Saudi Arabia. To mitigate these delays, project managers must have clear project plans, adequate funding, and good communication with all stakeholders, including government officials and community members. Additionally, it may be helpful to bring experienced construction management teams with a track record of completing similar projects.

2 Literature Review

Zidane & Andersen (2018) established that the major factors accounting for delays in construction projects include change orders during construction, design issues, and internal bureaucracy, among others. Design issues may be associated with unclear technical obstacles, while internal bureaucracy affects the approval of financial procedures. According to Keane et al. (2010), change orders by the owner during construction occur due to a lack of coordination between the owner and reviewing team. Several other factors also cause change orders during construction, and their cumulative effects impact construction projects' cost, time, and quality. The impacts on project quality and organizational reputation may not necessarily occur, but the existing literature on the subject needs to consider the possibility of the same. Further surveys also show that the variations brought by the change orders increase the overall project cost while causing delays in construction schedules because of the additional work required. Assaf & Al-Hejji (2006) also identified change orders as the most common cause of delays in construction projects. It is the most critical contributor to time overruns in major construction projects, alongside delays in deliveries by external vendors and more extended review periods for the project materials. Failure to estimate the project's cost may account for delays in progress payments, while unclear technical obstacles occur due to planning and scheduling issues. Change orders generally occur due to common causes between the two parties, the owner and the contractor. According to Waty and Sulistio (2021), change orders are often associated with a mismatch between the designs and field conditions, delays by the contractors, and field security considerations. Natural factors, underground conditions, changes of authority, and working techniques may also account for this challenge.

Other factors accounting for delays in construction projects include cost planning inefficiencies associated with the failure to determine the project's cost (Maqsoom et al., 2019). It is regarded as a financial management challenge that affects even the major construction firms. Failure to estimate the project's cost accounts for most cases of cost overrun in large construction projects (Flyvbjerg et al., 2018). Cost overrun is a product of underestimation and mostly occurs several years after the commencement of the project. Outrun costs are often higher than the actual estimates due to changes in scope and complexities in the project, among other issues. Further investigations indicate that inaccurate cost estimates often occur because of incomplete information and errors in establishing the scope and complexity of the project. For example, Lesniak and Zima (2018) support these findings indicating that effective cost estimation is crucial for the sustainable development of the project schedule.

In addition, Unclear technical obstacles before the project's start occur due to failure to customize the standards and processes to the construction environment. This challenge may accrue because of the need to customize construction equipment to the construction site alongside other factors that may affect daily operations. Changes in the operating procedures may also have a similar impact by distorting the standard execution processes. Sambasivan and Soon (2007) established that delays in construction projects occur due to improper planning by the contractor, site management issues, material shortages, challenges in paying for completed work, mistakes during the construction stage, and time and cost overruns. Material shortages occur due to the failure of external vendors to make timely deliveries. At the same time, challenges in fulfilling financial obligations are a subset of the long time taken to approve financial decisions. Bad contractor experience also arose as a significant hindrance that is partly to blame for awarding contracts to the lowest bidders. Lastly, equipment availability challenges and failure to account for unclear technical obstacles significantly affect many construction projects.

The Kingdom of Saudi Arabia (KSA) is a rapidly developing country with numerous construction projects to attain its strategic developmental milestones (Alenazi et al., 2022). However, recent observations into the management of Saudi's healthcare construction projects indicate that the sector is experiencing significant delays. It is a sensitive issue, given that it occurs in the healthcare sector and significantly impacts project costs and completion times. Its impacts are significant in countries such as KSA, characterized by a fast-growing population that increases demand for expansive infrastructure projects. In addition, delays generally negatively affect the construction industry's reputation. Therefore, it is necessary to investigate the factors accounting for delays in KSA construction projects. Finally, this study focuses on the influencing factors causing these delays in the KSA.

3 Methodology

The study is a quantitative research using the systematic review methodology to assess the nature of the challenges affecting healthcare construction projects in KSA, focusing on establishing and evaluating the factors causing delays in healthcare construction projects. There are numerous ongoing healthcare construction projects in KSA. A total of 100 projects that are behind schedule within the last ten years were considered from the healthcare construction sector, and the most critical delay causes were collected and analyzed. These projects include the construction of medical cities, hospitals, medical rehabilitation, long-term care facilities, and the restructuring of primary care centers. The study utilizes insights from the literature review to establish the critical factors to this effect and how they play out in the progress of the overall construction project. The project reports detailing the progress of the ongoing construction projects that were obtained from the KSA Ministry of Health's Construction Projects Database. The project reports were analyzed to identify the critical factors contributing to project delays. The impact of each factor on the overall construction projects' progress was then tabulated in the results section.

Methodology Steps:

1. Collect projects that are behind schedule in the Ministry of Health database.
2. Investigate the most critical factors of delay.
3. Analyze the influencing factors, their impacts, and their frequency.

4 Results

Results indicate that several owners' and contractor-related factors account for the delays in construction projects. These factors, as identified from the healthcare construction projects' reports in Saudi Arabia, include change orders during construction, high expenditure, failure to estimate the project's cost, and unclear technical obstacles before starting the project. Other factors include long waiting times for the approval of financial procedures, failure by external vendors to make timely deliveries, and awarding contracts to the lowest bidder. Findings from the literature reviews show that a considerable proportion of these factors arise from design issues and elements of internal bureaucracy. Lack of coordination between the teams participating in the project also contributes to the most incidences of change orders. Cumulative impacts of these factors are experienced through time and cost overruns that accrue from the delays and implementation of design changes. The results also indicate that the project cost estimation challenges often contribute to delays in payment processing, and project planning and scheduling issues contribute to the technical challenges encountered during construction. Additionally, the overrun costs mainly resulted from cost overruns, incomplete information that made it difficult to estimate the project's cost, and erroneous projections.

The common factors influencing delays in KSA’s healthcare construction projects are summarized in Table 1.

Table 1: The KSA’s Healthcare Construction Projects Delays Common Factors and their Impacts

Factor	Impact
Change orders during construction	Time Overrun
High spending compared to the actual work completed	Time Overrun
Fail to estimate the project’s cost	Time Overrun & Cost overrun
Unclear technical obstacles	Time Overrun & Cost overrun
Approval of financial procedures takes time	Time overrun
External vendors don’t deliver on time	Time overrun
Contract awarded to the lowest bidder	Time overrun

The influencing factors causing delays, the responsible project party category, reasons for occurrence, and frequency are shown in Table 2. They are ranked from the highest to the lowest frequency.

Table 2: Factors Causing Delays in KSA’s Healthcare Projects

Factor	Category	Main Reason(s)	Frequency
Change orders by the owner during construction	Owner	Coordination challenges between the owner and the reviewing team	450
High spending compared to the actual work completed	Owner	Cost planning inefficiencies	321
Fail to estimate the project’s cost	Owner	Incomplete information and failure to establish the scope of the project	209
Unclear technical obstacles before the start of the project	Contractor	Design issues & equipment availability challenges.	121
Approval of financial procedures takes time	Owner	Internal Bureaucracy	118
External vendors don’t deliver on time	Materials Suppliers	Material shortages	92
Contract awarded to the lowest bidder	Owner	Inadequate contractor experience	54

5 Discussion

Healthcare construction projects in KSA are huge undertakings encompassing the development of complex structures. The complexity of these structures implies that their associated costs and time requirements are extensively huge. Given the need to adhere to strict timelines and tight construction budgets, major interventions must be deployed to minimize delays that may affect the project’s progress. Unfortunately, despite the extensive design, approval, and implementation procedures, healthcare construction projects in KSA still need to be completed on time. The study utilized data from the database on Healthcare Construction projects in Saudi Arabia to establish the most probable

causes of delays. Outcomes from the exploration indicate that the delays accrue due to failures from the owners and contractors. The most common factors include change orders, failures in estimating the overall project cost, high expenditure, long waiting times for financial approvals, awarding contracts to the lowest bidder, unclear technical obstacles, and failure to make timely deliveries. These factors, alongside the reasons for their occurrence, are summarized in Table 2. According to the table, the owner accounts for 5 out of the 7 factors. The contractor only bears the blame for technical issues and procurement challenges. As highlighted in the literature survey, the most critical outcomes of these delay-causing factors are cost and time overruns. Therefore, the owner contributes a considerable portion of the delay influencing factors while the contractor plays a minor role.

In addition, exploring the occurrence frequency of these influencing factors in healthcare construction projects reveals insightful information regarding where efforts should be invested to minimize the impact of the delay. The utilized data of Healthcare Construction projects in Saudi Arabia shows that the change orders by the owner during construction were the most frequent factor that affected 450 healthcare projects, followed by high spending compared to the actual work completed and failure to estimate the project's cost which took place at 321 and 209 healthcare projects, respectively. Other influencing factors, such as the unclear technical obstacles before the start of the project, late approval of financial procedures, and delivery delay from external vendors, have occurred in 121, 118, and 92 healthcare projects, respectively. Lastly, the contracts awarded to the lowest bidder have a lower frequency of occurrence, which occurred in only 54 healthcare projects.

Future efforts should be dedicated to investigating the impact magnitude of these influencing factors to better project management and control. Additionally, the integrative design approach has a high potential for reducing the healthcare project delay through alignment and better stakeholders' communication, which will enhance the control and reduction of delay influencing factors.

6 Conclusion

The study has indicated that despite the sensitivity of healthcare construction projects, they still experience delays due to various factors. Owner-related factors include change orders during construction, high expenditure, cost estimation failures, long waiting times for approval of financial procedures, and awarding contracts to the lowest bidder. Failure by external vendors to deliver materials on time arises from the materials segment, while the contractor is to blame for technical obstacles. Consequently, these factors culminate in time and cost overruns as the major negative impacts. A major limitation faced by the investigator is the lack of accurate information or data. Data collection in the construction sector can be challenging due to the dynamic nature of construction projects and the lack of standardized data collection practices. This can lead to inaccuracies in the data and limit the conclusions drawn from the study. Moreover, the data about the construction project's performance may have a bias due to the involvement and influence of stakeholders, such as the project developers, contractors, and government officials.

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Cite as: Almutairi B. & Bin Mahmoud A., “An Exploration into Delay-Influencing Factors on Healthcare Construction Projects: The Case of Saudi Arabia”, *The 2nd International Conference on Civil Infrastructure and Construction (CIC 2023)*, Doha, Qatar, 5-8 February 2023, DOI: <https://doi.org/10.29117/cic.2023.0039>