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FACTORS BEHIND CONSTRUCTION DELAYS IN SAUDI ARABIA

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ABSRTACT

The construction industry in Saudi Arabia had been developing rapidly. The huge construction project had made huge impact in Saudi Arabia and country's total Gross Domestic Product (GDP). The aim of this study was to investigate and analyse issues that construction projects face and caused their projects to be delayed. The study focused on construction delay factors from contractors' perception. A questionnaire was created for contractors to analyse the most important construction delay factors that were faced in Saudi Arabia and occurrence delay factored. Results from the Relative Importance Index (RII) technique, identified causes as primary contributors to construction delays are payment delays, project costs underestimation, legal issues, municipality permit obtain, lack of communication between parties involved, completion time underestimation, instruction delay from owners and consultants, and poor supervision. This study was focused on construction delay factors and main issues that faced by contractors.

INTRODUCTION

Saudi Arabia is experiencing rapid growth of infrastructure in urban and rural area [1]. In 2014, more than $66 million had been contributed by the government for projects [2]. The construction industry contributed 30% to 40% toward Saudi Arabia economy and government is investing more in this industry [3]. The construction industry has increased the job opportunity for the community.

The construction delay is defined as time consumption that is beyond completion date stated in a contract which the parties had agreed upon to deliver the project [4]. The project did not meet project constraint which

affects other factors involved in the project completion. Most construction delays have impact toward contractor and company's reputation, thus it is important to determine significant construction delay factors [5]. Contractors' reputations are defined by project completion and specifically such as complete project on time. Any construction delays due to lack of control can affects the contractors and reputation. Construction projects in different countries faces different problems due to different factors such as law regulations, weather and economy. The professional shortage and sufficient skilled workers in all management levels in construction industry were identified as project failures causes. High skill level was driving the project to be successful and completed on assigned time. Kikwasi [6] had determined several factors that influenced the 31-stories high-rise projects in Tanzania which included material concoct, material estimation, the degree of complexity, design changes, poor labour productivity, insufficient planning and resource shortages.

There are five factors that can cause time overrun included changes in orders, slow decision-making by the client, lack of client capability representative, construction financial difficulties and late material delivery [7]. In Qatar, there were 10 primary factors of construction delays which are material unavailability or shortage, payment process delay, frequency in order changes, lack of coordination among design disciplines, financial difficulties, late materials procurement, information respond delays, drawings and technical specifications clarity, slow decision-making process and skilled labour shortage [8]. Meanwhile, construction delays in Ghana are caused by delay in honouring payment certificates, cost underestimation, projects complexity, financial difficulties and poor supervision [9].

Finance also plays huge role in projects success and costs must be determined at the beginning to prevent additional payment in projects. Mahamid et al. [10] found construction delay in West Bank's road construction projects are due to political situation, segmentation and limited movement among different areas, project was given to lowest bidder, payment delay by the owner and equipment shortage. The project needs to meet project constraints included scope, time, quality, cost and risk. Any constraint changes might result in project failure. Hence, the study aimed to investigate and analyse issues that construction projects face and causes of their projects to be delayed.

METHODOLOGY

This study aim was to investigate and identify construction delays causes in Saudi Arabia. Besides, recommendations were provided to mitigate or eliminate delays. The study used questionnaire survey as data collection instrument which are designed to meet the study objectives. The questionnaire helped in addressing the most important causes of constructions project delays. The literature review and past studies had helped to formulize delay factors that were used in the questionnaire. Based on these past references, general causes of delay that were faced by the industry were determined. The survey was constructed ranking or selected delay factors that helped in prioritizing these factors based on current time and place.

In this study, total population composed of contractors working in the construction industry in Saudi Arabia. Contractors were chosen to represent population as they deal with both owners and consultants. Contractors act as middleman between all parties involved in the construction project completion. Moreover, sample population consisted of western and Riyadh provinces contractors. This sample was selected since it provided a good sample for population and helped in achieving the study's main goal. However, the sample was narrowed due to time constraints and difficulty of reaching distant areas. The respondents were approached through an email that contained survey link. The questionnaire was provided to the respondents who were located in Jeddah, Saudi Arabia. The questionnaire was distributed to 62 contractors and contracting agencies. 32 respondents had responded to the questionnaire.

The study used questionnaire survey which was developed based on study's objectives to understand construction delays causes in Saudi Arabia. The questionnaire was translated to Arabic to assist Arabic speaking contractors. There were three different sections in the questionnaire. The sections were respondents' profile and background, construction delay factors and respondents' opinion regarding the issue.

In this section, general information questions were asked to the respondents. There were two aspects of questions, which were personal and work-related demographics. In the first part, the respondents had chance to share their names and contact information. The respondents also had choice to either provide or leave these questions due to confidentiality matters. The second part questions focused on broader view of contractor's experience. The respondents were asked regarding their experience years in the industry. Moreover, the respondents were also asked whether they worked for a public/governmental sector, private sector, or both sectors. In addition, the respondents were asked to provide project percentage that involved in and finished in the original targeted completion date or finished based on the original budgeted cost.

In the second section, two questions were proposed for respondents to answer and all regarding construction delay factors. This part consisted of Likert scale questions in four-category scale. The first question asked the respondents to provide the responses using closed-ended important question in which equal to not important, 2 equals to slightly important, 3 equals to important and 4 was equal to very important. These factors were provided and respondents had to select level of importance for each factor. The second question required the respondents to provide the opinions using closed-ended frequency question which 1 equal to never, 2 equals to sometimes, 3 equals to often and 4 equals to always. These factors were provided and the respondents had to select the occurrence frequency from construction delays causes. This part consisted of one open-ended question were contractors shared and provided further information regarding construction delay factors. This question helped in identifying factors that might had not been provided in the previous questions. In addition, the respondents were given chance to leave any comment or opinion based on their experience.

The study used three main data analysis techniques. First technique used was descriptive technique that was survey method. The survey was used for participant to collect their responses. The descriptive statistics method was used to determine simple frequencies. Third technique was relative importance index (RII), was used to determine delay factor rank that was surveyed. Higher RII indicate stronger perceived effect of delay causes.

RESULT AND DISCUSSION

Table 1 represented the working experience and contractor sector types. The working experience of the contractor who participated was ranging from 2 years to 30 years. 18 respondents had working experience between 5 years and 10 years. Meanwhile, 10 respondents had working experiences of more than 10 years with 31%. There were 8 respondents (25%) who worked in public sector and 9 respondents (28%) were worked in private sector. Besides, there are 15 respondents (47%) who worked in both sectors.

Table 1: Respondent Characteristics

Respondent characteristics		Total	Percentage (%)
Working experience	<5 years	4	12
	5-10 years	18	57
	> 10 years	10	31
Sector	Public sector	8	25
	Private sector	9	28
	Both sector	15	47

Table 2 presented the percentage of project completion that the respondents were involved. Based on the result, 47% of the respondents had mentioned 75% of total projects that they were involved, completed within the original target dateline. Furthermore, 10 respondents selected that only 25% of the project were completed within the given timeline while 6 respondents agreed that only 50% of the projects were completed by the deadline. These results indicated all contractors were facing delay issues in Saudi Arabia.

Table 2: The Project Percentage and Original Target Completion Date

Percentage of project completion	Respondent count	Respondent percentage (%)
10%	1	3
25%	10	31
50%	6	19
75%	15	47
100%	0	0

In Table 3, it is shown that 38% of the respondents agreed that only 50% of the projects were completed using the original budget cost. Meanwhile, 9 respondents and 3 respondents respectively selected 75% and 100% that the projects were done according to the initial costing. These results indicated that

projects in Saudi Arabia completed based on original budget cost but did not meet the completion dateline.

Table 3: The Project Percentage and Original Budget Cost Completion Date

Percentage of project completion	Respondent count	Respondent percentage (%)
10%	2	6
25%	6	19
50%	12	38
75%	9	28
100%	3	9

Figure 1 depicted the respondents' ranked answers for each of the factors causing construction delays. The provided delay factors were interpreted from literature review. In this study, the analysis stated respondents answer and showed Relative Importance Index which was created through respondent answer.

In first part, 1 respondent ranked payment delays was unimportant and similarly only 1 respondent ranked this factor was slightly important. 5 respondents selected payment delays as an important factor. Moreover, most respondents found payment delays were very important in causing delays. This result showed that payments and financial issues contributed to the completion time of construction project and affected targeted planned completion date.

Meanwhile, 1 respondent ranked legal issues as non-important factor to construction delay in second part. 6 respondents found legal issues factor as slightly important. In addition, 6 respondents as well answered legal issues to be important and 19 respondents found legal issues were very important. These results indicated legal issues contributed to construction industry. The requirement might complicate for some and difficult to achieve since the process took time.

In third part, contractors and all parties involved obtained permits from municipality. The permit varies depending on project types. 2 respondents found this factor as non-important factor. Nonetheless, 8 respondents ranked permit obtain from municipality was slightly important and 18 respondents selected permit as very important factor causing construction delay. The respondents' answer showed that obtaining permit from municipality was very important factor that can cause construction delays in Saudi Arabia. These resulted due to huge demand and increment in construction project; thus, contractors need to go through the process of obtaining permit for the project.

For fourth part, costs were also considered as factor which contributed to project constraints besides than duration and scope. The right cost setting from beginning would help contractors involved to complete their projects based on budget. Any increment in the budget could affect the whole project and completion duration. In this part, 1 respondent found project cost underestimation was not important, while 2 respondents found this factor was

slightly important. 13 respondents found project cost underestimation was important factor of construction delays and 16 respondents agreed that that project cost underestimation was a very important for construction delays.

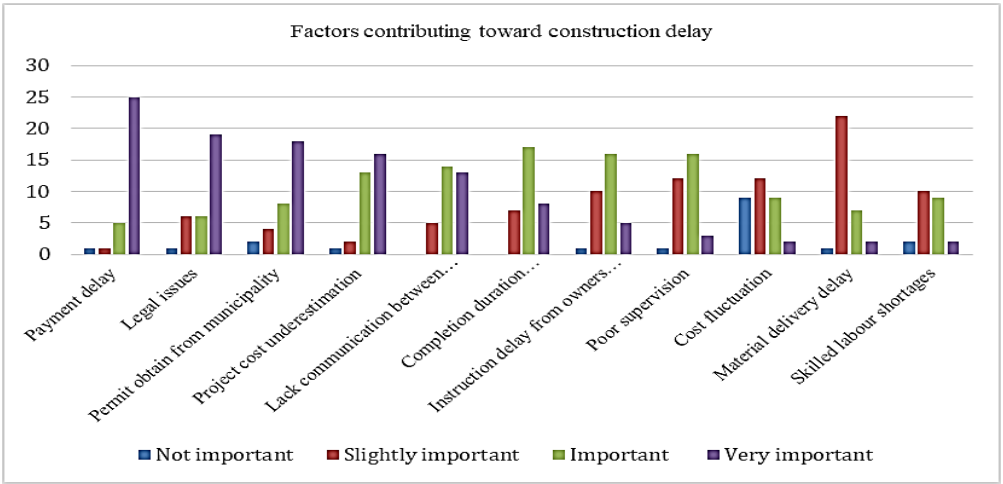

Figure 1: Construction Delay Factors

There were three parties involved in every construction project included owner, consultant and contractor. In the fifth part, no respondents found lack communication between parties involved was not an important factor. Meanwhile, 5 respondents found lack communication between parties was slightly important factor while 14 respondents found lack communication between parties involved was important and 13 respondents found lack communication between parties involved was very important.

The planning process in the project was very important with guidelines for all the parties. If the planning was inaccurate, project constraints will not meet the requirement. Contractors need to consider all factors to provide correct completion duration. In sixth part, no respondents considered completion duration underestimation was not important factor, while 7 respondents found completion duration underestimation was slightly important factor. These results indicated that completion duration underestimation was important factor that could potentially lead to construction delays.

The delay in instruction from owners and consultants also caused construction delays. In the seventh part, 1 respondent found delay instruction from owners and consultants was not important and 16 respondents claimed delay instruction was important. Meanwhile, 5 respondents found delay instruction from owner and consultants was very important and 10 respondents found delay instruction from owner and consultants was slightly important.

In eighth part, 1 respondent considered poor supervision was not important while 12 respondents considered poor supervision was slightly important. Meanwhile, 16 respondents considered poor supervision was important and 5 respondents considered poor supervision was very important factor. The result varied due to some respondents' opinions toward poor supervision was

slightly important factor while other respondents believed poor supervision was an indicator of construction delay.

Contractors deal with different financial payment to conduct construction projects. The materials, wages and building costs were uneven. This problem has led to fluctuation in cost that affected project quality and outcome. In the ninth part, 9 respondents considered cost fluctuation was not important factor whereas 9 respondents found cost fluctuation was important factor. Moreover, 12 respondents found cost fluctuation was slightly important and 2 respondents found cost fluctuation was very important factor. Most respondents believed cost fluctuation was not very important while other respondents found cost fluctuation was important factor contributing to construction delay.

The delays in material delivering also slow down the project completion which resulted in construction delays. Contractors were assured that agreement with supplier to deliver material on time. In tenth part, a contractor found delay in material delivery was not important for construction delays while 22 respondents found this factor was slightly important. There were 7 respondents found that late material delivery to be important and 2 respondents found this factor to be very important cause of construction delay.

Skilled labour was required in the construction industry. Non-skilled labours also contributed toward project quality outcome. The rework process consumed more time which eventually delay the construction progress. In the eleventh part, 2 respondents found that skilled labour shortages were not important factor and 10 respondents found this factor was slightly important factor that contributed to the construction delays. However, 9 respondents found skilled labour shortage was important and 2 respondents found this factor was very important factor contributing to construction delays. These results showed contractors in Saudi Arabia did not expect that skilled labour shortages were important factor toward construction delay.

The Relative Importance Index was used to determine importance level for each factor. Table 4 showed important of construction factors in descending order. The analysis and RII helped in determined factors that contributed to construction delays in Saudi Arabia. Based on Table 4, most important construction delay factors were factors that were ranked as very important by the contractors and had received very high relative importance index.

Table 4: Relative Importance Index on Construction Delay Factors

Construction delay factor	RII	Rank
Payment delays	92.12%	1
Project cost underestimation	84.38%	2
Legal issues	83.59%	3
Permits obtain from municipality	82.81%	4
Lack of communication between the parties	81.25%	5
Completion duration underestimation	75.78%	6

Instruction delays from owners and consultants	69.53%	7
Poor supervision	66.41%	8
Material delivery delay	57.82%	9
Cost fluctuation	53.13%	10
Skilled labour shortages	44.53%	11

In Figure.2, the respondents were asked to determine occurrence from causes of construction delays. Manpower in the project is also important which contributed on the construction delay. Manpower shortage increased construction delay factors. In first part, 10 respondents never faced manpower shortage while 14 respondents mentioned sometimes that they faced manpower shortage. Moreover, 8 respondents claimed that they often faced this issue and no respondents always faced this issue.

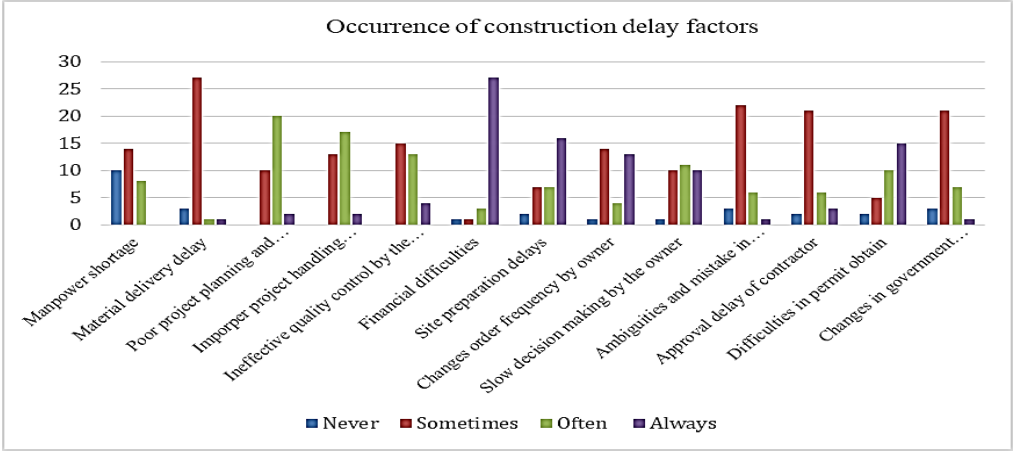

Figure 2: Occurrence of Construction Delay Factor

In the second part, 3 respondents claimed never faced material delivery delay issues while 27 respondents claimed that sometimes they faced this issue. Furthermore, 1 respondent claimed often faced material delivery delay and 1 respondent always faced this issue.

Contractors received all information from consultants and owners to create an accurate guideline and schedule. This information helped in preventing project delays. All contractors agreed that this issue had never occurred. 10 respondents claimed that sometimes they faced this issue and only 3 respondents always faced the issue.

In the fourth part, no respondents claimed never faced improper project handling progress by the contractor but 13 respondents claimed that sometimes they faced this issue. Moreover, 17 respondents agreed that they often faced improper project handling and 2 respondents always faced this issue. Most respondents agreed that they often faced this issue.

In the fifth part, quality control was very important as it assured that project was completed with certain quality met. No respondents claimed they did not experience ineffective quality control while 13 respondents claimed that

sometimes they faced this issue. Meanwhile, 17 respondents claimed that they often faced this issue and 2 respondents claimed that they always faced ineffective quality control by the contractor.
In the sixth part, only a respondent claimed to have never faced financial difficulties and similarly only 1 respondent claimed to experience this issue sometimes. Meanwhile, 27 respondents claimed to have always faced financial difficulties. These results indicated that contractors in Saudi industry had been exposed to financial difficulties.

Besides, contractors were exposed to the sites which the site was not properly equipped. This problem was led to construction delay. In seventh part, 2 respondents claimed to have never faced site preparation delays and 7 respondents claimed that this issue happened sometimes. 7 respondents claimed they often faced site preparation delays and 16 respondents found there were always site preparation delays. These results showed many contractors faced site preparation delay.

In the eight part, a respondent answered no to ever faced many orders changes from owner and 14 respondents claimed sometimes they faced this issue. Meanwhile, 4 respondents often faced many orders changes from owner and 13 respondents claimed always faced this issue.

Good information flow was required between the parties involved as to maintain projects based on the plan. The owners were requested to make decision to prevent any delays. In the ninth part, only a respondent claimed never have to face a slow decision-making from owner and 10 respondents claimed to have this issue sometimes.

Detailed information and drawing were required to assure that the project meet the objectives. In the tenth part, 3 respondents faced ambiguities and 22 respondents claimed of facing this issue sometimes. 6 respondents who often faced ambiguities and mistake in specifications and drawings and only 1 respondent always faced this issue.

In the eleventh part, 2 respondents admitted to have never encounter approval delay of contractor submission by the engineer and 21 respondents claimed to have sometimes faced this issue. Most contractors sometimes faced delay in contractor submission approval by the engineer.

Furthermore, 2 respondents claimed to have never faced difficulties in obtaining permit and 5 respondents claimed that they sometimes faced difficulties to receive permit. 10 respondents who claimed often and 15 respondents found to have always face difficulties in getting their project permit. Half of the respondents mentioned that they have always faced difficulties in obtaining permits.

In the thirteenth part, 3 respondents claimed to never face changes in government regulations and laws and 21 respondents claimed sometimes they faced this issue. Furthermore, 7 respondents agreed that they often faced

changes in government regulations and laws and only a respondent always faced this issue.

The relative importance index was used to determine occurrence of construction delays in Saudi construction industry. Table 5 showed the important level of construction delay factors in descending order. The result showed the factor that had the occurred most with the contractors was financial difficulties with 93.75% which is followed by difficulties in obtaining permit (79.69%).

Table 5: Relative Importance Index on Occurrence of Construction Delay In Saudi Construction Industry

Occurrence of construction delay	RII	Rank
Financial difficulties	93.75%	1
Difficulties in permit obtain	79.69%	2
Site preparation delays	78.91%	3
Slow decision making from owner	73.44%	4
Changes order frequency from owner	72.66%	5
Poor project planning and scheduling by the contractor	68.75%	6
Improper project handling progress by the contractor	66.41%	7
Ineffective quality control by the contractor	66.41%	8
Approval delay of contractor submissions by the engineer	57.81%	9
Changes in government regulations and laws	54.69%	10
Ambiguities and mistake in specifications and drawings	53.91%	11
Manpower shortage	48.44%	12

CONCLUSION

In conclusion, construction delays were considered as major problem suffered by most construction projects in Saudi Arabia. This study examined the root cause of construction delays that were contributed by contractors, owners and consultants. Based on the findings, this study found that the 8 important factors which caused delay in the Saudi construction industry included financial difficulties, difficulties in permit obtain, site preparation delay, slow decision making from owner, changes order frequency from owner, poor project planning and scheduling by the contractor, improper project handling progress by the contractor and ineffective quality control by the contractor.

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