PSYCHOLOGY AND EDUCATION (2021) ISSN: 0033-3077 Volume: 58(3): Pages: 1233-1248
Article Received: 13th September, 2020; Article Revised: 25th January, 2021; Article Accepted: 12th February, 2021

Major Causes of Delay in Power Construction Projects in Kingdom of Saudi Arabia

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ABSTRACT

This research paper summarizes the major causes of power construction project delays in Saudi Arabia. This study approach was to acknowledge various types of power construction project delays, their causes and effects from various perspectives, to determine the effect of identified issues on power construction project delays. Five (Independent variables) major issues identified were: contractor, external, consultant, client, and government related issues to examine the impact on (Dependent Variable) project delay. This study employed adopted and developed survey-based questionnaire to collect quantitative data from the sample of 408 employees from different power construction projects operating in different regions of Saudi Arabia. Research instrument used was observed valid and reliable. Whereas, descriptive statistics, correlation analysis, and regression analysis employed revealed that contractor, external, consultant, client and government related issues significantly positively affect project delay in Saudi Arabia.

Keywords
Project Delay, Contractor Issues, Client Issues, Consultant Issues, Government Issues, External Issues, Power Construction Companies

Introduction

Industrial growth of Kingdom of Saudi Arabia has increased the power demand and expansion of power networks across the country. This has led government to massively launch various power network expansion projects across the Kingdom depending upon the future load forecast.

A project is temporary endeavor with limited budget and creates a unique product. However, it is observed that 70% of the projects across the Kingdom are delayed or had extension in its technical completion as well as final acceptance from client and customer (Mahamid, 2013).

Project managers of power construction projects in developing countries face immense difficulties in effective management and monitoring of progress of projects. There can be many reasons causing delay, some consistent with various projects and some variable depending on size, time frame, budget, human resource, location etc.

The current study aims to investigate the causes of delay in power construction projects and conduct a qualitative research. Relevance of these causes will be determined and prioritized by conducting interviews with higher management, projects managers, construction managers, site managers and project engineers of the actual projects in Kingdom. These guidelines will then serve an early warning system concerning delays in power construction projects.

Statement of the Problem/Gap

In KSA the projects are being delay, for this reason, the cost and time of the projects are compromise. Therefore, we are going to evaluate the factors, if manage properly, would help in reducing the overall cost and time of the projects.

Research Question

What are factors that are causing delay in power construction projects of Saudi Arabia?

Objectives of the study

The objective of this investigation is to recognize the significant reasons for deferments of Power Construction extend in Saudi Arabia (KSA) utilizing a sentiment overview. In accomplishing this point, it is important to all together survey the current writing and Research's discoveries. In this way, the goals of this investigation are as per the following:

- To study the impact of contractor related issues on project delay in power construction sector of Saudi Arabia
- To study the impact of client related issues on project delay in power construction sector of Saudi Arabia
- To study the impact of consultant related issues on project delay in power construction sector of Saudi Arabia
- To study the impact of governmental issues on project delay in power construction sector of Saudi Arabia
- To study the impact of external issues on project delay in power construction sector of Saudi Arabia.

Literature Review

Project management is considered to be a critical step in the success of any project (Abbasi, Tarhini, Hassouna, & Shah, 2015; Masa'deh, Tayeh, Al-Jarrah, & Tarhini, 2015a; Masa'deh, Tarhini, Al-Dmour, Obeidat, 2015b; Orozco, Tarhini, Masa'deh, & Tarhini, 2015) and especially in power construction projects. This is because power construction projects are different from each other, since each one is designed for a different purpose and for a unique purpose. Brewer and Dittman (2010) explained that every project is constrained by a list of customer-requested requirements (scope), the amount of (time) available to produce the system in support to the requirements, and the limit of the money available (cost).

Successful project management can be defined as having achieved the project objectives, within time, within cost, at the desired performance\ technology level while utilizing assigned resources effectively and efficiently accepted by the customer (Brown et al., 2010).

Delay in power construction projects could be defined as the time overrun beyond the time frame specified in a contract that the involving parties have agreed upon. The power construction process is subjected to many unpredictable factors from many sources, thus completing projects on time is an indicator of efficiency. Delays have chain reactions on projects. Time delay leads to accelerated work and thus increased costs, loss of performance, and human resource fatigue. Therefore, identification and mitigation of causes of delays become significantly important. Consolidating useful knowledge and lessons from recent and related projects would also become beneficial in avoiding delays. A delay is a costly affair for any project, a construction delay means a time overrun beyond the contract date for the deliverables of the project (O'Brien, 1976). Therefore, identification of significant root causes of delays and developing suitable proactive management methods are essential to ensure timely completion of projects.

Assaf, Al-Khalil and Al-Hazmi (1995) pointed out that material procurement and supply to sites as one of main cause of project delays. Bordoli and Baldwin (1998) analyzed the causes of delays and found several key factors: weather, labor supply, and sub-contractors were found to be the major causes of delays. Abd-Majid and McCaffer (1998) identified contractor's delays and found materials, equipment, and labor as major causes. Kaming, Olomolaiye, Holt, and Harris (1997) emphasized on several factors responsible for delays and pointed out that design changes, poor labor productivity, and inadequate planning were the key elements. Amer (1994) studied the major delay causes for construction projects and revealed that poor contract management, unrealistic scheduling, budget allocation, design changes during construction, and shortages in materials.

The above cited literature, though, identified few key factors that cause delay in power related projects but either they just presented the reasons for delay in broader spectrum. Additionally, the above literature is old and the current of advancements in project management can possibly mitigate many the factors highlighted by them, for instance, supply chain management, man and material management, and contract management. Furthermore, focus of the above literature focused was not the Kingdom of Saudi Arabia. These limitations and increasing number of power projects in Kingdom voice for the new research on identification of elements that cause delays in power construction projects. Sovacool, Gilbert, and Nugent, (2014a) surveyed 401 projects and concluded that power plants and investments in electricity infrastructure are risky ventures. Their conclusion is based on the fact that the average length of construction for the 401 projects they surveyed exceeded 70 months.
They further assessed the construction costs affiliated with 401 electricity infrastructure projects worldwide. They found that these projects collectively involved $820 billion worth of investment, and represented more than 325,000 MW of installed capacity and 8500 km of transmission lines. Taken together, these projects incurred $388 billion in cost overruns, equivalent to a mean cost escalation of $968 million per project, or a 66.3 percent overrun per project (Sovacool et. al., 2014b)

Another study performed by Sovacool et al. (2014c) summarized that electricity infrastructure projects seems prone to cost overrun issues independent, almost, of technology or location. Each of these different types of electricity infrastructure poses different construction risks.

In the above three comprehensive and authentic studies the focus of the authors was towards projects in USA as majorities of the projects assessed were based in USA. Importantly, they quantified the effects of delay rather than identification of elements that cause the delay.

Another study (Torbaghan, S. S., Gibescu, M., Rawn, B. G., Müller, H., Roggenkamp, Van der Meijden, M. M., 2015) presents a market-based dynamic transmission planning framework for the construction of a meshed offshore voltage source converter-high voltage direct current (VSC-HVDC) grid. Such a grid is foreseen for integrating offshore wind and electricity trade functions among the North Sea countries. It determines the optimal grid design, including grid topology and transmission capacities for each development stage. The model is used to investigate the impact of unanticipated delay constraints due to technical, economic and legal obstacles. It is quantified how (i) longer delays result in larger social welfare losses; (ii) different countries will be affected differently by the delays and so have unequal incentives for solving them; (iii) the length of the delay affects the capacity of cross-border connections. This study is limited to only one type of power related projects and only focused on one geographical location.

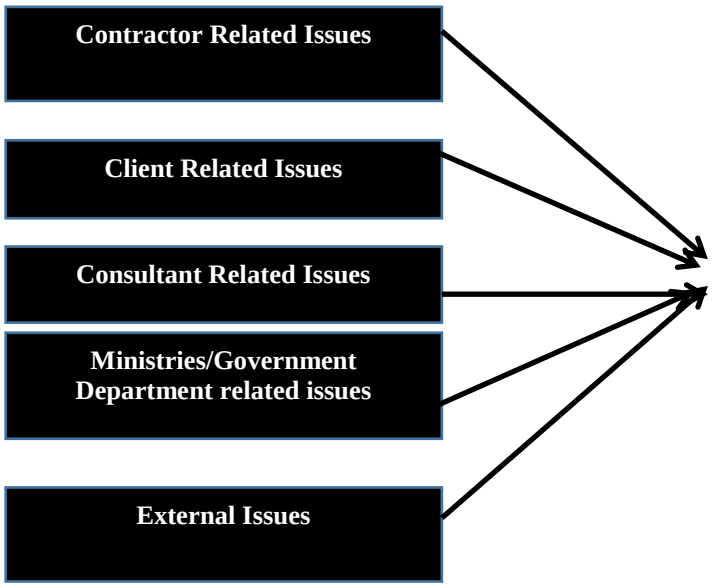
Government authorities in Kingdom of Saudi Arabia face a serious problem of lengthy delays in public sector projects. Several studies have been conducted to investigate the causes and extent of time overruns in such projects. It was found that according to the contractors 37% of all projects were subject to delay (Al-Khalil & Al-Ghafly, 1999a). Consultants reported that delayed projects accounted for 84% of projects under their supervision. In the same study average time overrun of 39% of the original project duration is reported.

Another study (Al-Khalil & Al-Ghafly, 1999b) presented a survey search to investigate three components of delay in construction projects in Kingdom of Saudi Arabia. These components are frequency of delayed projects, extent of delay and responsibility of delay.

Both of the above studies are though in particular to the geographical location of interest but are not directed towards power construction projects and also are very old related to the current system of operations.

Mahamid (2013) conducted a survey on time performance of different types of construction projects in Saudi Arabia to determine the causes of delay and their importance according to each of the project participants, i.e, the owner, consultant and the contractor. Then finally he concluded that 76% of the contractors and 56% of the consultants indicated that average of time

Theoretical Framework



Hypotheses

H1: Contractor related issues have significant influence on Delay of Projects in Power Construction Projects of KSA.
H2: Client related issues have significant influence on Delay of Projects in Power Construction Projects of KSA.
H3: Consultant related issues have significant influence on Delay of Projects in Power Construction Projects of KSA.
H4: Government related issues have significant influence on Delay of Projects in Power Construction Projects of KSA.
H5: External issues have significant influence on Delay of Projects in Power Construction Projects of KSA.

overrun is between 10% and 30% of the original duration and also found 70% of the projects experienced time overrun in Saudi (i.e. 53 out of 76 projects). The limitations in above cited literature clearly state the importance of identification of delay factors in power construction project which has specific dynamics. Furthermore, Kingdom of Saudi Arabia is heavily investing in power construction projects and it is important to note that these projects are prone to delays. Therefore, the need arises to conduct a comprehensive study to identify the major delaying factors in power construction projects.

Moreover, factors causing delay are of different nature (critical and/ or non-critical), different owners, different occurrence and causing different time of delay. Literature does not present categorization of delay factors relate to power construction industry. This study will also categorize the delay factors on the basis of above mentioned categories

Delay of Project

Methodology

Research Design

Research design is consider as function of research objectives. It is define as "a collection of progressive decisions that establish the master plan determining the techniques and procedures for acquiring and analyzing the information needed" (Burns & Bush, 2000).

It involves proposing a hypothesis and then deriving its consequences in a specific context and then comparing these consequences with actual happenings (Wood & Welch, 2010). It is also known as theory then research approach, as it is initiated with a theory from which hypotheses regarding the nature of the theory are derived, later data is collected and analyzed that either confirm or reject the proposed hypotheses (Frankfort-Nachmias & Nachmias, 1996). In this study hypothesis was developed form the analysis of various literatures, and a field survey was carried out to test the proposed developed hypothesis.

Sample Design

It involves five steps for instance: defining population, determining sample frame, selection of sampling technique, determining the sample size and lastly to execute the process of sampling (Malhotra, 1999). Population is defined by Banerjee & Chaudhury, (2010) as a complete set of individuals which carries a specialized set of characteristics. However, the population is unknown for this study. Whereas, sampling is defined as the subset of individuals or things from the population, it is also known as sampling frame with the purpose of symbolizing specific population (Scott & Morrison, 2006).

This research employed a non-probability sampling technique for the selection of experience and knowledgeable participants. Therefore, a purposive sampling was carried out to select experienced as well as knowledgeable advisors and workers from the power construction companies of Saudi Arabia. Participants of this research study were firmly selected on the basis of their

involvement in power construction firms. A total sample of 420 individuals was selected and the number of participants selected was further considered as being sufficient for this study. However, a sample of 408 participants was accepted. Guadagnoli & Velicer, (1988) studied various research studies that suggested minimum sample sizes and consider it more relevant than item ration. Those studies recommend the range of sample size from 50 to 400.Comfrey & Lee(1992) reviewed and considered a sample size very good from range between 300 and 500.

Instrument Selection and Development

A research instrument used in this research study is structured adopted questionnaire. A survey-based questionnaire is select as it permits the researcher to gather data and address the issues of research study in more standardized and economical way. Questionnaire is selected and developed in alignment with the literature overview, theoretical framework and objectives of this study.

A related questionnaire was developed for this study according to the variables. Items for contractor related and clients related issues were adopted from (Ibironke, Oladinrin, Adeniyi, & Eboreime, 2013), items for consultant related issues were adopted from (Marzouk & El-Rasas, 2014), and external issues, government related issues and project delay items were adopted from (Buertey, 2014). A total number of 41 questions were developed for the proposed variables. Contractor related issues contained 20 items, client related issues involved 7 items, consultant related issues and external issues contained 4 items each, government related issues contained 2 items, and project delay encompassed 4 items. The questionnaire also included demographic related items such as: age, service length, designation, and qualification.

Data Collection Procedures

This research is based on a survey, and respondents were asked by presenting a developed and structured questionnaire regarding issues of power construction companies. It is one of the primary sources of data collection. The decision to choose a survey-based questionnaire was based on various factors such as nature of study, sampling, content of questions, costs and time constrains.

Data Analysis Technique

To determine the statistical analysis of the study, data collected from the respondents were fed into the SPSS (Statistical package for social sciences) software. According to (Sekaran U. , 2006) there are three objectives of data analysis: first, feel for the data, testing the accuracy of data, and testing the developed hypothesis for the research study. The data was first checked for any discrepancies, and this process is called cleaning and screening of data. It includes the cleaning and screening of data that is inconsistent and some missing responses (Malhotra, 1999). Data was collected from a tentative 420 respondents, however after running into analysis, 18 of the completed questionnaires were reported to be unusable due to some missing responses from the respondents and discarded immediately. Therefore, 402 respondents were selected and considered as sample for the study to maintain the consistency in the study.

Reliability and Validity

Reliability and Validity test was applied for the selected developed research instrument. In order to test the reliability of research instrument, the most common method used to evaluate the reliability is the Cronbach coefficient alpha. The coefficient ranges from 0 to 1, and the range depicts the similarity and consistency between a set of items. Though, a suggested and better reliability should generate a coefficient value of 0.60 at least (Pallant, 2001). In this research study, a Cronbach coefficient alpha has been taken to test the reliability of the research instrument. The measure of a questionnaire is regarded as valid only when it essentially measures what it is proposed to measure. Validity of the instrument ascertains the ability of scale of instrument to measure the proposed idea (Sekaran, 2003). However, some of the items in the research instrument were found to be unreliable and invalid. 6 questions were removed form contractor related issue variable, and the total number of items were reduced to 35 items from the previous total of 41 item.

Findings

Empirical Results

Table 1 Frequency Distribution (Age)

Age					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20-25	51	12.5	12.5	12.5
	26-35	147	36.0	36.0	48.5
	36-45	126	30.9	30.9	79.4
	Above than 45	84	20.6	20.6	100.0
	Total	**408**	**100.0**	**100.0**	

The first demographic question asked from respondent is regarding their "Age". Respondents are offered four categories of age range: 20-25, 26-25, 36-45, and above than 45. Results showed that 12.5 percent of respondents belong to age range of 20-25. The largest percentage of respondents is from age range of 26-35 and comprised of 36 percent. The number of respondents is from the age range of 36-45 and comprised of 30.9 percent. Whereas 20.6 percent of the respondent belongs to age range of above than 45 years. Total number of respondents is 408

Table 2 Frequency Distribution (Service Length)

Service Length					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-5 years	105	25.7	25.7	25.7
	6-10 years	188	46.1	46.1	71.8
	11-15 years	86	21.1	21.1	92.9
	More than 15 years	29	7.1	7.1	100.0
	Total	**408**	**100.0**	**100.0**	

Respondents are asked regarding their length of service in their field and provided with four categories: 1-5, 6-10, 11-15, and lastly more than 15 years. Results generated through frequency distribution for service length generated 25.7 percent of respondents are in the range of 1-5 years of service. The largest numbers of respondent are in the range of 6-10 years of service and comprise of 46.1 percent in total. 21.1 percent of the respondents are in the range of 11-15 years of service. Whereas, the lowest number of individuals responded to service range of more than 15 years and comprise of only 7.1 percent.

Table 3 Frequency Distribution (Designation)

Designations					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Engineer	131	32.1	32.1	32.1
	Manager	125	30.6	30.6	62.7

Supervisor	127	31.1	31.1	93.9
Others	25	6.1	6.1	100.0
Total	**408**	**100.0**	**100.0**	

They were asked regarding their concerned designation in their respective companies and offered four categories: Engineer, Manger, Supervisor and others. The largest number of individuals responded to select the designation of engineer, comprising 32.1 percent of the total. 30.5 percent of the respondents represented manager designation. The second largest number of individuals represented supervisor designation and comprised of 31.1 percent. Whereas 6.1 percent of the respondents represented other various designations.

Table 4 Frequency Distribution (Designation)

Qualifications					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Matric	41	10.0	10.0	10.0
	FA/DAE	192	47.1	47.1	57.1
	BA/BSC/B-TECH	136	33.3	33.3	90.4
	Masters and above	39	9.6	9.6	100.0
	Total	**408**	**100.0**	**100.0**	

Respondents are asked regarding their qualification level and provided with four different categories: Matric, FA/DAE, BA/BSc/B-Tech, and lastly master's and above. Results generated for the variable showed that 10 percent of the responded are having qualification of matric level. The most number of individual responded to have qualification of having FA/DAE level and comprised of 47.1 percent. The second largest respondents comprised of 33.3 percent hold qualification level of BA/BSc/B-Tech. whereas, the lowest number of individuals responded to have qualification level of Master and above and only comprised of 9.6 percent.

Table 5 Validity Analysis

Rotated Component Matrix[a]

Items	Contractor Related Issues	Client Related Issues	Project Delay	External Issues	Consultant Related Issues	Government Related Issues
CRI-1	.661					
CRI-2	.782					
CRI-3	.790					
CRI-4	.683					
CRI-5	.716					
CRI-7	.810					
CRI-8	.632					
CRI-9	.388					
CRI-10	.760					
CRI-11	.628					

CRI-13	.581					
CRI-16	.505					
CRI-18	.475					
CRI-19	.427					
CRI-20	.511					
CLRI-1		.773				
CLRI-2		.827				
CLRI-3		.805				
CLRI-5		.783				
CLRI-6		.715				
CLRI-7		.815				
PD-1			.852			
PD-2			.811			
PD-3			.870			
PD-4			.709			
EI-1				.852		
EI-2				.826		
EI-3				.872		
EI-4				.727		
ConRI-1					.752	
ConRI-2					.745	
ConRI-3					.658	
ConRI-4					.695	
GI-1						.794
GI-2						.779

The factor analysis was applied to test the soundness of the variables. There were 20 items of contractor related issues. During the process of factor analysis, it was observed that 5 items were loading under different columns or they had negative values however these items were removed from instrument.

Similarly, there were 7 items of client related issues and during the process of factor analysis it was observed that the items from 1 item was loaded under other column however it was removed from instrument. Furthermore, all other items related to external issues, consultant related issues, government related issues and project delay were loaded in their respective columns. Component transformation matrix is given below.

Component Transformation Matrix						
Component	1	2	3	4	5	6
1	.912	-.030	-.050	-.070	-.058	-.004
2	.016	.995	.000	-.011	.032	.078
3	.031	.004	.991	-.092	-.050	-.068
4	.068	.038	.052	.916	-.324	-.213
5	.026	-.060	.100	.381	.807	.413
6	.010	-.050	.042	.037	-.464	.880
7	.403	.026	.020	-.014	.147	-.001

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Table 6 Descriptive Statistics and Reliability

	Variables	*M*	*SD*	No. of Items	Cronbach's A
1.	Contractor Issue	2.911	.75180	15	.919
2.	Client Issue	2.869	.83236	6	.877
3.	Project Delay	3.4136	.70496	4	.839
4.	External Issue	3.2892	.76269	4	.684
5.	Consultant Issue	3.7688	.66801	4	.841
6.	Governmental Issue	3.4896	.97766	2	.898

The above presented table depicts the reliability statistics of research instrument developed for the study. Contractor related issue depicts a Cronbach's Alpha of .919 for 15 items used to measure the contractor related issues. The value of Cronbach's Alpha for the items of contractor related issues is reliable and consistent (.919) > (.60). Total mean of all of its items (2.911) with Std. Deviation source (.751). The value of Cronbach's Alpha for the items of client issues is reliable and consistent (.877) > (.60). Total mean of all of its items (2.869) with Std. Deviation source (.832). Moving on items related to project delay are reliable and consistent owing to its value (.839) and the mean score for all of its items (3.41) quite high in value. Cronbach's Alpha value is (.684) with mean value 3.289. Besides, the Cronbach's Alpha value is (.841) for consultant related issues and its mean value is 3.768. Lastly, items related to government related issue are reliable owing to the value (.898) and the mean score (3.48). All mean values support the significance of issues that have been selected related to the project delay in power construction projects in Kingdom of Saudi Arabia
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Table 7 Correlation Analysis

	1	2	3	4	5	6
1.Project Delay	1					
2.Contractor related Issues	408 .484** .000	1				
3. External Issues	408 .344** .000	408 .228** .000	1			

	408	408	408			
	.145**	.024	.071	1		
4. Client related Issues	.003	.635	.152			
	408	408	408	408		
	.179**	.051	.112*	.181**	1	
5.Consultant related Issues	.000	.307	.024	.000		
	408	408	408	408	408	
	.245**	.154**	.133**	.129**	.176**	1
6.Government related Issues	.000	.002	.007	.009	.000	
	408	408	408	408	408	408

The table depicts that correlation of contract related issues with project delay is positive. The value of correlation between project delay and contractor related issues are 48.4 percent or r =0.484 and significance value is p < .000, expressing the significant and positive correlation between the two variables. The co-movement of external issues with project delay is positive with the value of correlation between external issues and project delay is 34.4 percent or r = 0.344 and significance value is p < .000, which shows the significant and positive correlation between external issues and project delay. The correlation of client related issues with project delay is positive, the correlation value between client related issues and project delay is 14.5 percent or r = 0.145 and significance value is p < .003, which represents a significant positive correlation between client related issues and project delay. The co-movement of consultant related issues with project delay is positive, and the correlation value between consultant related issues and project delay is 17.9 percent or r = .179 and significance value is p <.000, expressing a significant positive correlation between the two variables. The co-movement of government related issues with project delay is positive, and the correlation value between government related issues and project delay is 24.5 percent or r = .245 and significance value is p <.000, expressing a significant positive correlation between the two variables.

Table 8 Regression Analysis

Hypothesis	IV	R^2	F	Beta	t-test	Sig	Status
		0.324	40.072			0.000	
H_1	Contractor related Issues			0.408	9.67	0.000	Accepted
H_2	External Issues			0.217	5.135	0.000	Accepted
H_3	Client related Issues			0.086	2.064	0.040	Accepted
H_4	Consultant related Issues			0.0970	2.298	0.0220	Accepted
H_5	Government related Issues			0.125	2.970	0.003	Accepted

The table suggests that the independent variables of the study: contractor related issues, external issues, client related issues, consultant related issues and government related issues bring 32.4 percent variation in the dependent variable: Project delay. It shows that all of the five independent variables contribute in significant change in project delay variable. However, it can be expressed that 32.4 percent out of 100 percent variation in project delay is caused by contractor related issues, external issues, client related issues, consultant related issues and government related issues.

The above presented table also shows that contractor related issues, external issues, client related issues, consultant related issues and government related issues are valid interpreters to contribute to value of project delay. Since the presented model is appropriate to produce a variation in project delay. The value of F is 40.0702 and significance value is .000 > .05. The proposed model is considered appropriate as the value of F is significant.

Furthermore, coefficient shows that contractor related issues, external issues, client related issues, consultant related issues and government related issues have significant positive impact on project delay. The beta coefficient value and significance value for contractor related issues is .408 and .000 respectively. The beta coefficient value is .217 and significance value is .000 for external issues. The beta coefficient and significance value for client related issues is .086 and .040 respectively. Beta coefficient value and significance value for consultant related issues is .097 and .022 respectively. Whereas, the beta coefficient value and

significance value for government related issues is .125 and .003 respectively. Therefore, the most significant variables are contractor related issues and external issues that effects project delay. Whereas, the least significant variable to affect the project delay is consultant related issues. Thus, it is accepted that contractor related issues, external issues, client related issues, consultant related issues and government related issues have significant positive impact on project delay.

DISCUSSION

The Effect of Contractor related Issues on Power Construction Delay

The first objective of current research study was to establish the extent to which contractor related issues affect power construction project in Saudi Arabia. The study observed that contractor related issues in power construction project are the most significant factor. The contractor related factor involved 15 delay factors. Respondents in the questionnaire survey experienced various delay factors, however the delay factors high on scale were: inadequate experience with contractors, poor site management and supervision, inappropriate project scheduling and planning, unreliable subcontractors, problems in project financing by contractors, poor communication between contractors and other parties, problems of payments between contractors and subcontractors, materials late delivery, and scarcity of labors. These issues of contractor have significant positive impact on power construction project and causing delays in terms of time shortage, legal disputes between parties involved in project. It implies that if the project has high level of issues regarding contractors, the more it will be delay causing it to take more completion time.

Current research however revealed that 6 factors in contractor related issues had minimal influence on causing power construction project delays, they include: inaccurate time estimations, poor qualification of contractor's technical staff in the project, shortage of project material in the project, misunderstanding between workforce, low productivity of labors and frequent strike actions. Findings of the current study are consistent with previous studies conducted by (Alghbari, Kadir, Salim, & Ernawati, 2007; Mahamid, 2011; Mahamid, 2013). They revealed that contractor related issues have significant positive impact on power construction project delay. Hisham & Yahya observed that problems between contractors and subcontractors, and poor site management and supervision by contractors as the most significant causes in power construction delay.

The effects of External issues on Power Construction Project Delay

The second objective of current study pursued to create the extent to which external related delay components affects power construction projects in Saudi Arabia. Results of the study revealed that external issues have positive significant impact on power construction project delay. The external related factor included 4 delay factors. The respondent attributed external issue to only factor as the inflation rate and price fluctuations that cause delay in power construction project. Whereas, it is also revealed from the findings that 3 factors in external issues had minor influence on power construction project delay in Saudi Arabia, these factors encompass: unforeseen ground conditions, weather conditions and issues such as war, terrorism etc.

Findings of current study were consistent with previous studies of (Aziz & Abdel-Hakam, 2016; Dinesh, 2016; Elhaniash & Stevovic, 2016). Results of their studies found significant positive effect of external issues on project delay. Analysis carried out by Nazer (2016) suggested that inflation and price fluctuation in Saudi Arabia are mainly impacted by the supply of money and import value prices. Furthermore, the shock in oil prices caused import values to increase which have caused inflation rate. The study is relevant to the external issue of increase in inflation rate and price fluctuations caused in Saudi Arabia have put power construction projects in delay. These issues are also referred to as financial related causes of delay in projects. Financial related issues as the most relevant factor of external issues in project delays is found consistent with prior research study of (Abdul-Rahman, Takim, & Min, Financial-related causes contributing to project delays, 2009). They included material price, labor wages and transportation costs increase and increment of foreign exchange rate as financial related instability component in project. Results of the study showed that financial instability significantly positively affects projects.

The effects of Client related Issues on Power Construction Project Delay

The third objective of the study sought to establish the degree to which client related issue as delay factors that affect power construction project in Saudi Arabia. Findings of the current research suggested that client related issues appeared to be the least significant cause of delays in power construction project in Saudi Arabia. The client related issues contained 6 delay factors. Respondents through survey-based questionnaire ascribed client related issues to various delay factors such as: location clearance, unavailability of existing design and technical documents and lastly, delay in progress of payments by client or owner. Respondents found these 3 factors high on scale as the most significant delay factors in power construction project. Whereas, results also discovered that 3 delay factors in client related issues had minor effect on power construction delays. These factors include: lack of client experience in

relevant project, lack of communication and coordination and lastly, improper project feasibility study.

Discoveries of current study are in line with previous studies carried out by (Muhwezi, Acai, & Otim, 2014; Albogamy, Scott, & Dawood, 2012; Dinesh, 2016). A common conclusion is found in their study regarding client issues. They have revealed that client related issues significantly and positively affect the project delays. Implying that increase in client related factor delays will lead to delay the project. Current research is in line with previous research study by Dinesh (2016). His study indicated the delay in progress payments by client as the most significant delay factor in client related issues that increases delay in projects. Whereas, current study also supports previous findings by Muhwezi, Acai, & Otim (2014) that delay in payment progress is the most significant factor, and it also support the minimal influence on delay causes by: lack of client experience and interest in project.

The effects of Consultant related Issues on Power Construction Project Delay

The study also considered to establish the extent to which consultant related delay factors affect power construction project in Saudi Arabia as the fourth objective of the research. Results of the current research showed that consultant related is the second least significant source of delays of power construction project in Saudi Arabia. There were 4 delay factors related to consultant issues that include: insufficient knowledge of consultant, quality assurance or control, mistake and discrepancies in documents designing and delay in approving drawing and sample materials. Results illustrated through research based-survey that respondents attributed inadequate experience of consultant as the most significant delay factor in consultant related issues. On the other hand, observations of the current study revealed that three factors had slight influence on power construction project delays and they include: mistakes and inconsistencies in documents designing, delay in approving project drawing and sample materials, and lastly quality control.

The results implied that issues related to consultant results in legal disputes between various parties involved, thus most of the power construction projects are delayed. Findings of current study support evidences from previous research studies of (Abdul-Rahman, Wang, Takim, & Wong, 2011; Aziz R. F., 2013; Atout, 2016; Emeka, 2016).They concluded that consultant related issues significantly and positively affect project delays. Emeka (2016) found that being inexperience on the part of consultant and staff are the significant factors that impacts project delay. His findings share similarity with current study in terms of inexperienced consultant. Aziz (2013) also found the lack of consultant experience in projects as the most significant factor related to consultant category that causes project delays. Whereas, current findings regarding inexperienced consultant as the most significant factor are supported by research findings of Atout(2016), as he revealed that lack of technical experience have significant impact on project delays.

The effects of Govern related Issues on Power Construction Project Delay

The study viewed to demonstrate the extent to which government related delay issues affect power construction project in Saudi Arabia as the last objective of the research. Results of the current research showed that government related is the second most significant source of delays of power construction project in Saudi Arabia. There were only two delay factors in government related issues, they are: approval from government departments and ministries and unavailability of utilities at site. Respondents through survey-based questionnaire considered approval from government department and ministries as the most significant delay factor of government related issues that causes power construction project delays. On the contrary, results showed that respondents considered that unavailability of utilities at power construction sites had minor influence on project delays.

Findings of the study implies that approval processes of project from governments departments and ministries in Saudi Arabia takes longer time that results in project delays. Results of current study are in line with previous studies carried out by (Pai & Bharath, 2013; Kikwasi, 2012; Aziz R. F., 2013).They revealed that government related issues significantly and positively affect project delays. Current findings of the study also support previous findings in terms of approval of permits from governmental departments and ministries as the most significant delay factor in government category that causes project delays. Pai & Bharath(2013) revealed that delay in obtaining government permits from ministries and changes in government regulations and laws are the most significant delay factors of government related category.

CONCLUSION

Conclusion finishes up the research study by posting down the consequences of the information investigation. The aim of this study was to recognize the factors that causes delay in power construction projects in Saudi Arabia. The study involved five factors: contractors, consultant, external, governmental, and client related issues that cause project delays. These factors include further delay factors that aimed to observe the responses related to each factor that causes project delays. Results of the study found 15 major causes of delay from all the five identified factors. A sample of 408 respondents was accepted to be analyzed, and a survey-based questionnaire distributed among the respondents to gather data to be analyzed and interpreted. The study employed frequency distribution, descriptive statistics, reliability and validity, correlation analysis, and regression analysis for analyzing data collected from the respondents.

The most significant reason identified from client related issues is delay in progress payments by clients that causes power construction project delay. The second and third most significant factor identified form contractor related issue are late delivery of project material on site and

improper planning and scheduling of project respectively, that causes delay in project. Right of way or location clearance is found the fourth significant delay factor in client related issues. The fifth and sixth factors identified from contractor related issues are difficulties in financing project by contractor and scarcity of labor respectively. Unavailability of existing design and technical documents of projects is the seventh delay factor identified in client related issues. Inadequate contractor experience is recognized as eighth, poor communication by of contractor with other parties involved in project as ninth, poor site management and supervision as tenth, and unreliable subcontractors as eleventh significant delay factors in contractor related issues.

The twelfth identified delay factor is inadequate experience of consultant in consultant related issues, and thirteenth identified delay factor is inflation rate and price fluctuations in external related issues. The fourteenth and fifteenth recognized factors are the approval from governmental departments or ministries and problems among contractor and subcontractors with regards to payments as significant in government related issues and contractor related issues respectively. Results of the study revealed that these identified delay factors result in legal disputes between various parties, thus majority of power construction projects are delayed. Results of current research are consistent with previous studies carried out by researchers (Alghbari, Kadir, Salim, & Ernawati, 2007; Sambasivan & Soon, 2007; Abdul-Rahman, Takim, & Min, 2009; Mahamid, 2011; Abdul-Rahman, Wang, Takim, & Wong, 2011; Aziz R. F., 2013; Mahamid, 2013) and latest studies by (Atout, 2016; Dinesh, 2016; Emeka, 2016).

The study revealed that contractor related issues and external issues are the most significant factors in delaying the project. It implies that inadequate contractor experience, improper site management/ supervision, improper project planning / scheduling, unreliable subcontractors, late delivery of materials, scarcity of labor, payment problems between contractor and subcontractors, inflation rate and price fluctuations will increase the delay in power construction project. Government related issue is found to be second most significant factor in delaying project. It entails that delay in approval of permits and other documents from governmental departments and ministries results in overall delay of the power construction project. The most least significant factor identified is client related issues in delaying project. Postulating that right of way and unavailability of technical documents and existing design of project causes power construction project delay. Lastly, the second least significant factor identified is consultant related issues in delaying project. It suggests that inadequate experience of consultant, delay in providing material etc. will result in power construction project delay.

Implications

Project delays are unavoidable; however, delays can be avoided, or their effect can be minimized when their causes are effectively identified and examined. The aim of current research study was to evaluate the effect of various delay factors or issues on power construction project is Saudi Arabia. Project delay in a project management is of major importance. It is essential to recognize the causes of delay effectively. This paper provides implications for all factors that creates delay in projects.

Contractors of the project must possess adequate knowledge and experience regarding the project. They are also requiring properly supervising and managing the construction site and making deals with reliable subcontractors. Furthermore, contractors must know calculate nearly accurate time and cost estimations in order to avoid difficulties in financing the project and completing the project on time. Whereas, the external or environmental related issues must be anticipated before time to be prepared on the time of construction projects such as accurate forecasting of inflation rate, import prices fluctuations, weather forecasting, seeking security in conflicts in communities in order to avoid any delays in project.

Consultants should minimize their mistakes and discrepancies in designing project documents, delays in approval of project drawings and sample materials by having an experience and educated consultant through proper quality control. Whereas, clients must properly communicate and coordinate with other departments and make sure the availability of project design and other technical documents by employing experienced staff to avoid delays in project. Lastly, Government should minimize the delay process in approval of permits, and companies must prepare and approve all documents required for project before time to complete project within time without delay in approval processes.

Future Directions

Scope of the current study on power construction project delays can be widened by carrying out studies in order to develop such guidelines or techniques that could possibly minimize the effects of power construction project delays. Furthermore, similar studies can be carried out in various other cities of regions of Saudi Arabia. The number of power construction projects can also be increase to examine the impact on large data by increasing the number of power construction projects and sample size.

Furthermore, a comparative study can be carried in the similar field or other construction projects by comparing two or more countries.

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