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A Theoretical Framework on Factors Causing Delay of Construction Industries Projects

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Abstract: Time is one of the main important elements which should be taken into consideration during implementation of construction industry projects and project management life cycle as a whole and can be considered as one of the most significant parameters of a project and the main critical factor that determines the success of the project. The objective of this study is to propose the theoretical framework that causes construction projects delay in Yemen. The causes of delay were collected from the prior international journal papers. Time delay is a very recurrent phenomenon and is nearly associated with almost all constructing projects. However, little effort has been made to amputate the phenomenon. Delay can be defined as time overrun or expansion of time to accomplish the project. Construction delay cannot be avoided especially in government facilities in Yemen. Therefore, delay is a case when the actual work of a construction project is slower than the planned schedule or late accomplishment of the projects. The review of literature in relation to causes of delay in construction projects can be summarized under 3 main headings namely: delay caused by contractor, delay caused by acts of God and delay caused by consultant. These 3 variables form the framework upon which this review is based.

Key words: Factors, delays, construction projects, associated, parameter

INTRODUCTION

The construction industry is an important sector for the development and economic growth in Yemen which is developing country. The delay in implementation of construction projects in Yemen becomes endemic and recurrent phenomenon. The delays in construction projects occur because of different causes or factors. These causes lead to the delay in construction accomplishment and this delay leads to some negative effects on the construction project during implementation (Ahmad *et al*., 2013).

In Yemen, it is a very rare case that large construction projects are completed on the time specified. There are many large construction projects in Yemen which suffered delay or in some cases suffered suspension or abandonment. Some examples of large construction projects which suffering delay are: Renovation of Aden General Hospital (200 beds) and the Construction of new Cardiac Center (50 beds). The total cost of the project stood at 29 mln. US$ (YNA, 2014) Orphan Children Hospital Project (250 beds) with the total cost of the project standing at 40 mln. US. Dollars, Yemeni Parliament Building with total cost of the project standing at 30 mln. US$ (YNA, 2014) and The New Sana'a International Airport Project with the total cost of the project standing at 500 mln. US$ (Marib Press, 2012).

In most countries, experience through available literature showed that successful construction projects should be accomplished before project schedule and within budget. The key controlling features of time, cost, quality and safety for a project are adversely affected by the impacts of such delays (Doloi *et al*., 2012). The delays in construction industry have many impacts among which the main are time expansion, cost overrun, disputation, adjudication and litigation (Gardezi *et al*., 2014). Thus, reasons of delay are so crucial and significant to the profit of most of construction projects. Many researchers like Haseeb (2011), Aziz (2013), Fallahnejad (2013), Gardezi *et al*. (2014), Marzouk and Rasas (2014) have identified these problems as factors that may cause the delay in construction projects and will affect company's performance and total economy of the country as well. The delay factors in construction projects are usually connected with the efficiency of execution time, total cost, and quality. Meantime, identification and appraisal factors causing delay in construction projects that have been carried out in the last decennium however, a deeper

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grasping is still needed to improve that (Rahman *et al*., 2013). A construction project is generally acknowledged as successful when it is executed on time within budget in conformity with specifications and to a satisfaction of stake holders (Aziz, 2013).

In construction industry, contractors target to increase their gain for market growth. To realize this aim it is fateful for contractors to carefuly specify the factors that influence the success of project and estimate that effects before tender stage. Construction projects vary in size, duration, objectives, ambiguous, complication, pace and other dimensions. Delay means non-completion of project within the assigned duration agreed upon in contract. It is quite possible that construction project schedule plays a key role in project management due to its influence on project success (Abdullah *et al*., 2010).

Time is one of the main considerations during project management life cycle and can be considered as one of the most significance parameters of a project and the driving motivation of project success (Aziz, 2013). It is noted that the delayed projects are a huge loss to the states, individuals, loss of investments, the failure of the companies and recourse to the judiciary to resolve disputes. This may be due to the wrong policies of the administrative contracting firms from poor organization and lack of awareness of planning role to future possibilities, an underestimation of the cost and the weakness in resource management (Jammaz, 2010).

The main reasons for the delayed projects are poor management and engineering planning at companies contracting through their lack of identifying their targets precisely, the development of strategies, policies and plans which are necessary for the logical process of implementation of the project schedules phases (Aldari, 2011). The objective of this study is to propose the theoretical framework that causes construction projects delay in Yemen. The causes of delay are collected from journal study. The significance of this study is to do a future study about the causes of delays in construction industry projects in Yemen.

The underpinning theories: For the purpose of this study 4 distinct theories are considered appropriate and thereby adopted. They are organizational theory, agency theory, financial distress theory and resource-based theory. These theories form bases and foundation for organizations, contracts, finances and labour respectively as key determinants for a successful completion of any construction project (Kimani and Kimwele, 2014).

Organizational theory and organizations: The organizational theory centers on formal social organizations and bureaucracies and their relationship with the environment in which they operate (Daft, 2008). The organizational theory was evolved out of different perspectives aimed at achieving industrial effectiveness and rationalizes bureaucracy. The organizational theory describes the decision-making process as one that involves many steps when having to make choices. Shukla (2008) describes the decision-making process as one whose steps provide an occasion to change the decision. Organizations have formations that are used to make up the working units of the organization.

Each of this functional structure is set into groups that have defined products. With this arrangements and the dependency of each of them to produce an overall output issues arise that prevent organizations to produce accelerated changes as well as deal with the demands they face (Zetterquist *et al*., 2011). It is for these reasons that organizational decision-making processes as once that need time and resource to be able to produce solutions that have value addition to the organization.

Organizations are difficult and making sense out of them may demand the use of multiple perspectives and enough knowledge to be able to bear a wide range of analysis, decisions and plans without having to delay its operations. Modern organizations focus on how to increase efficiency, effectiveness and other objective indicators of performance through governing structures and controls (Rodrigues, 2006).

Agency theory and contracts: Contract laws were influenced by the ancient Greek as a form of devotion to agreements as well as a basic category for canceling agreements (Elliott and Quinn, 2007). Its framework is concerned with the contractual relationships of stakeholders, managers, employees in an organization. Agency theory addresses incentive and information problems inside and outside the firm (Shalhoub, 2002).

Agency theory deals with problems caused by contractual conflicts. Occasionally, different subjective interests give rise to conflicts of interest between contracting partners. These conflicts may result in either of the contracting parties or both contracting parties to undertake action that may be against the interest of the other contracting party. According to Gossy (2008) agency theory describes the relationship between 1 actor or group the agent and another actor or group the principle where the agent has to fulfill certain obligations for the principle. The basis of the relationship between the actor and the principle is on an explicit or implicit contract. Contracts describe the relationships between any 2 parties seeking to involve or already involved in collaborative actions or assignments.

Financial distress theory and finances: The financial distress theory seeks to look at the different factors that lead to a decline in a firm's performance (Brigham and Ehrhardt, 2013; Beaver *et al*., 2011) describe financial distress as the inability of an organization to pay its financial obligations as they mature. It is important to assess the probability of organizations financial distress because it will determine the payout distribution associated with an investment. An organizations investment decision and financing are separable and independent. However, not most organizations recognize this hence holding their balance sheets on debts and equity claims as one which then reduces their leverage on costs (Finnerty, 2013).

Resource based theory and labor: The resource-based theory is attributed to Penrose and was first developed in 1959. The resource-based theory was aimed at understanding how organizations achieve competitive advantage with the application of estimable physical and non-physical resources at the firms disposal (Kor and Mahoney, 2004). The resource-based theory is a strategic theory that fundamentally focuses on strategies that can be used to gain and support competitive power in a firm.

Projects experience labors issues that are principally caused by processes and exercises within the project lifecycle. Planning for project labor becomes a complex task since the extent and outcomes of wrong skill task to project activities can lead to adverse outcomes. Having an ability to determine the correct labor and skills required to perform certain project activities (Kor and Mahoney, 2004).

Literature review: There are 3 parties causing delay in construction projects according to Sninah and Ali (2011). This study which was conducted in State of Libya revealed that the shortcomings in competency of the owner representative's performance deficiencies in the level of efficiency measures of the owners for projects, presence of a relationship between individuals of owner and the occurrence of delay. Delay can be caused by the contractor or its purveyor through no mistakes by the owner. The contractor is in any event not entitled to relief and should either make up the lost time through recompensing the owner. Therefore, delays caused by contractors generally result in no extra money and no supplementary time being granted to the contractor. Delays caused by consultant are split into two: delays caused by owner while the other delays are caused by third Parties which is the consulting companies or incidents beyond the control of both the owner and the contractor. These delays are usually called "acts of God" because they are not the liability or fault of any specific party according to Gardezi *et al*. (2014). According to Aziz (2013) the study has added some of the factors out of human control due to the acts of God.

Marzouk and Rasas (2014) conducted a survey of the causes of delays in the construction industry in Egypt from the viewpoint of owners, contractors and architectural/engineering companies. Survey stated that the most significant causes of delay are that owners had more interest regarding to fiscal issues, contractors concerning contractual relationships which are the most important while consultants considered project management issues to be the most significant reasons of delays. The delay occurs from many aspects such as:

Owner related: Type of project bidding and award: negotiation, the lowest bidder.

Contractor related: Ineffective planning and scheduling of the project.

Consulting related: Variation orders/changes the targets precisely by owner through construction.

Lateness in approving design documents and reviewing by owner: The researcher's study revealed that the main causes of delay in construction projects resulting to designers, user changes, weather, site conditions, late deliveries, economic conditions and increment in quantities which consistent with study of Patil *et al*. (2013).

MATERIALS AND METHODS

In the study of Mydin the results revealed that ten factor causing delays which are: poor weather conditions, poor site conditions, poor site management, deficient documents and lack of experience, disc problems, contract modifications, delay in approving variations, contractor coordination problem with other parties and construction errors and inglorious works. The consequences of the delays would lead to time overrun, cost overrun, different in parties opinions, negotiations, legal actions and total abandonment.

Salunkhe and Patil (2014) stated in their study which was conducted in India entitled effect of construction delays on project time overrun. The results showed that

the most important factors are financing and payment for executed works poor of contract management, changes in site conditions, shortage of material and incorrect planning and also revealed that 57% of Indian construction projects are experiencing time overrun. These time extension always lead to additional expenses to all parties.

Abdullah *et al*. (2010) the study carried out with the field survey on delay on Majlis Amanah Rakyat (MARA) which is one of states agencies in Malaysia. The participants were consultant engineer, executive manager, resident engineers, work clerk and customer. MARA consist of manager, project officer and engineers. The study revealed that the most important factors causing delay were cash flow and financial difficulties faced by contractors, contractor's poor site management and ineffective planning and scheduling by contractors.

Jammaz (2010) stated in his study which was conducted in the State of Qatar on the impact of administrative factors on the performance of the construction projects. The perspectives of sample of project managers from all consulting offices and contracting companies are analysed. The study concluded that the significant factors causing delay are: lack of leadership abilities, leadership skills, active human resources, awareness of the complementary elements of the performance and the skills of dealing with time, team establishment, understanding the internal environment of the contractor, dealing with external parties, human relations between management and workers, scientific competence and cognitive but the study of Gandhak and Sabihuddin (2014) stated that some of delays resulting from natural cases which out of human control and related to acts of God like: occurrence fire in the site, transportation delays.

The studies of Orangi *et al*. (2011) and Patil *et al*. (2013) revealed a set of root causes in Victoria-based pipeline projects which include design changes, design errors, poor communication, customer/end-user related issues, subsurface investigation inadequacies, issues regarding permissions/approvals, weather conditions, procurement delays, site management problems, subcontractor issues, rework, cultural and heritage management issues. Fallahnejad (2013) conducted a study in Iran to identify and rank the causes of delay of pipeline projects in Iran. About 24 gas pipeline projects were studied and then extracted delay factors were conferred with ten experts from multiple disciplines. The result showed 43 item of factors and ranked using a questionnaire survey. The result reveals that the 10 major delay factors are: Imported materials, unrealistic project duration, client-related materials, land expropriation, change orders, contractor selection methods and payment to contractor, obtaining permits, suppliers and contractor's cash flow. This also agreed with the study of (Salunkhe and Patil, 2014).

According to Abdelghany and Aboutaleb study on the causes of hotel renovation delays in Egypt. The study adopted a qualitative method in collecting data. The results showed that the most recurrent causes of delay in hotel renovation are: deficiencies in coordination between the involved parties in the implementation stage as well as inexactness in the planning and design phase that lead to significant changes in the implementation phase. Other factors such as change orders by agent, unfit choice of tendering method and political disturbance are also found to have great impacts on renovation cost and time.

Yang and Kao (2012) conducted a study in Taiwan entitled impact of delay to influence the critical path-based delay analysis method for construction projects and suggests an innovative model delay analysis method called the effect-based delay analysis method (EDAM method). The EDAM method is efficient in delay analysis and efficacious in settling concurrent delays and determining schedule. The main categories of delays implicate engineering, supply of equipment, exterior delays, labor, material, owner, subcontractors and weather. Haq *et al*. (2014) and Shehu *et al*. (2014) proved that the delay consequences lead to cost overruns in construction projects and that dependent completely on the early stages of the project which is the planning preparation also study the influence of cost overrun in the construction industry projects in Malaysia due to schedule delay which lead to delay the implementation of projects and stated that the design and build were correlated with decreased cost overrun followed by traditional then project management, eclectic tendering experienced 48% cost overrun followed by negotiated method 52% then open method 60%.

RESULTS AND DISCUSSION

The development of the framework was from different researchers by Marzouk and Rasas (2014) and Doloi *et al*. (2012) grouped the factors to a few group in the construction field. Liability was rated amongst the parties that involved in a construction project starting from the owner, contractor and consultant, external factor, project, materials, labour and equipment. The result of this study is as follow: Fiscal difficulties and economic problems, Financial problems, ineffective supervision and lateness

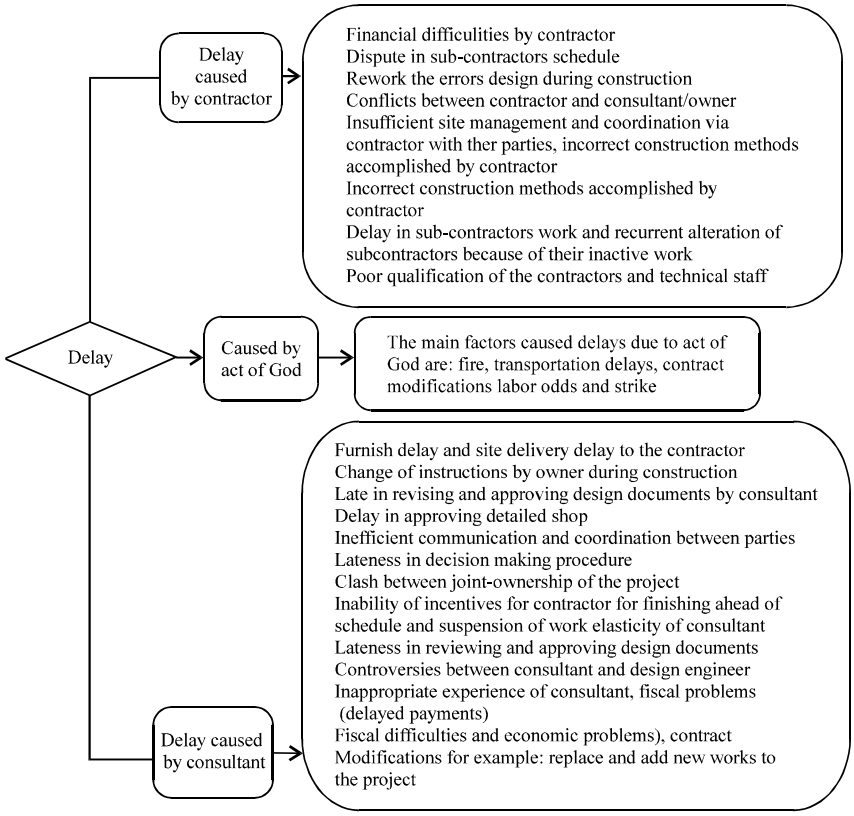

Fig. 1: Construction project delay theoretitical frame work

in making decision, Slow to give directives, difficulties in finding materials on market, inefficient site management, materials lack on project site, construction errors and inglorious work, delay in submission of materials to project site and lateness in making decisions (Patil *et al*., 2013).

Salunkhe and Patil (2014) grouped the causes of delay by responsibility and type of delay. The result of the study from grade number one to rank number 10 is as followed: building declaration approval, change order, changes in drawings, incomplete documents, inspections, changes in specifications, decision during development stage, detailed shop drawings approval, design development and changes laws and regulations.

According to Fallahnejad (2013), the study grouped the causes of delay by responsibility. There is contractor, owner, consultant and external factor. The findings from the study are as contractor's inappropriate planning in the first place followed by contractor's poor site management, ineligible contractor experience, inapplicable client's finance and payments for accomplished work and the problems with subcontractors. Moreover, shortage in material and then labor supply, equipment availability and failure, inappropriate communication between parties and errors during the construction period. Gandhak and Sabihuddin (2014) stated that some of delays resulting from natural cases which are out of human control and related to acts of God such as: occurrence of fire in the site and transportation delays (Fig.1).

CONCLUSION

For many years delay in Yemen construction projects has been a recurring phenomenon. The amelioration of delay factors not only limited to technical factors, it can be caused also by non-technical factors which are delay. The factor delay can be caused by all parties involved in projects (consultant, contractor and acts of God). With that spirit, study based on the same issue and problems but looking from a different angle had been conducted and delay framework has been proposed. The depth studies as to what extent these factors and variables can positively and negatively affect the construction project are suggested for future study also showed the types of factors that can influence the project schedule resulting from all parties. The criticality and reliability of framework are required to legitimize the importance of the framework.

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