

# **Factors Effecting On The Delays In Civil Engineering Projects**

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B.Sc. in Civil Engineering

February 2022

## **ABSTRACT**

Construction technology has a great potential to improve productivity and decrease project duration.

Delay happens in many construction projects, although the priority of delay causes is different in various countries due to environmental effects. Delays can lead to considerable negative effects such as lawsuits between owners and contractors, loss of productivity and revenue, and contract termination. This paper presents key sources of construction projects delay, following a review of publications related to delay. In addition, the paper presents the relationship between new technology and time overrun in those projects. One of the main causes of delay in many projects is that they use an old generation of construction technologies; however, the role of technology adoption in the delay is ignored. Many delay causes were identified in the projects, in which factors were related to the new technology restriction. The result of the study assists policymakers and practitioners to understand the actual factors causing the delay.

By good management and management of those cases, the time of non-executable delay of the project may be minimized. Extension of the contract period, if it's as a result of poor management of the project, despite written agreement liquidated harm, will increase website indirect value and name harm of the playing organization.

# CHAPTER 1

## INTRODUCTION

As the construction industry is growing, construction projects are also expanding in size and complexity. In this term, the delay has remained as project managers' concern. Identifying the main causes of delays in large construction projects is very difficult and often initiates disputes about responsibility for the delay.

The Delay may be a scenario during which a project as a result of some causes associated with the contractor, client, client's adviser, or different causes has not been finished in a written agreement or united amount. Delays are insidious usually leading to time overrun, cost, disputes, litigation, and complete abandonment of comes. Few comes will be found that the worry of not finishing the project on time isn't the foremost concern of the relevant project manager. Therefore time performance is one of the key measures of the project success. As a number of the causes of the development delays will be controlled throughout the life cycle of the project, a big resource-saving will be achieved by characteristic and managing higher these causes.

This paper presents the main causes of delay in industrial construction projects and recommends how technology can reduce the risk of time overrun in the projects.

Time overrun is a significant problem in the construction industry (Al-Khalil and Al-Ghafly, 1999b; Shehu et al., 2014). Delays can lead to some negative effects such as lawsuits between project parties, increased costs, loss of productivity and revenue, and in some cases contract termination. Delay and disruption to contractors' progress are some of the major sources of claims and disputes in the construction industry

(Braumah and Ndekugri, 2008). According to Bordoli and Baldwin (1998) and the World Bank (1990), completed worldwide varied between 50% and 80% from 1974 and 1988. The problem of delays in the construction. The industry is a global phenomenon (Sambasivan and Soon, 2007; Kaliba et al., 2009). Stumpf (2000) defines delay as an act or event extending the time required to perform the tasks under a contract. It often appears as additional days of work or as a delayed start or finish of an activity. Even with today's advanced technology, and professional management systems, construction projects continue to suffer delays and project completion dates still get pushed back (Stumpf, 2000). The question raised is how new technologies can affect the project time and prevent project overruns.

This research is motivated by an important problem called delay that causes cost overrun and has other impacts on construction projects. Project managers experience significant delays in many countries around the world. In the 2000s, the number of claims submitted to the American Arbitration Association (AAA) reached almost 25% of the 1.7 million claims submitted over the past 74 years (Kassab et al., 2006). In the United Kingdom (U.K.), a report by the National Audit Office, entitled modernizing construction, revealed that 70% of the projects undertaken by government departments and agencies were delivered late. In addition, recent research by Building Cost Information Service (BCIS) found that nearly 40% of all studied projects had to overrun the contract period (Lowsley and Linnett, 2006).

## **CHAPTER 2**

### **RESEARCH METHODOLOGY**

Many causes of delay were identified through the interview and official report. A questionnaire was designed to evaluate the frequency of occurrence, severity, and importance of the identified causes companies' information was collected from official published lists. The research questionnaire is divided into two main parts. Part one is related to the participants' background. Part two includes a list of the potential causes of delay in the construction projects. These causes are initially divided into the project, owner, contractor, consultant, design-team, material, equipment, manpower (labor), and external factors to make a clear questionnaire to the participants. Based on previous studies (Le-Hoai et al.,n2008; Marzouk and El-Rasas, 2014), two questions for each factor were asked: 1) what is the frequency of occurrence for each cause? 2) what is the degree of severity of each cause of project delay? The answer for the first question is categorized as "always, often, sometimes, and rarely," on a 4 to 1 point scale. The second question similarly was considered as "extreme, great, moderate and little" on a 4 to 1 point scale. The point for the leave questions is considered zero.

## CHAPTER 3

### CAUSES OF DELAYS

Some causes and effects of delays in construction projects can be country-specific. In this research, the major causes of delay will be identified and categorized as client-related, contractor-related, consultant-related, material-related, labor-related, contract-related, contract relationship-related, and external factors. There are many reasons why delays occur. For example, construction rework, poor organization, material shortage, equipment failure, change orders, the act of God, and so on. In addition, delays are often interconnected, making the situation even more complex (Alkass et al., 1996). Frimpong et al. (2003) found that 33 out of a total of 47 projects completed between 1970 and 1999 were delayed while 38 projects were overruns in Ghana. The research data indicated that 75% of the projects exceeded the original project schedule and cost whereas only 25% were completed within the budget and on time. Al-Ghafly (1995) focused on public water and sewage projects and found sixty delay causes. He concluded that delay occurred frequently in medium and large-size projects, and was considered severe in small projects. There are many important causes of delay related to owner involvement, contractor performance, and the early planning and design of the project. In this study, important causes are reported as financial problems, changes in the design and scope, delays in making decisions and approvals by the owner, difficulties in obtaining a work permit, and coordination and communication problems.

Noulmanee et al. (1999) investigated the causes of delays in highway construction in Thailand and concluded that delays can be caused by all parties involved in projects. However, they reported that the main causes come from the inadequacy of sub-contractors, an organization that lacks sufficient resources,

incomplete and unclear drawings, and deficiencies between consultants and contractors. The study suggested that delay can be minimized by discussions that lead to understanding. Al-Momani (2000) investigated the causes of delay in 130 public projects in Jordan. The study reveals that the main causes of delay were related to the designer, user changes, weather, site conditions, late deliveries, economic conditions, and an increase in quantity. The study suggested that special attention to factors will help industry practitioners in minimizing contract disputes. Delays have a strong relationship with failure and the ineffective performance of contractors. Assaf and Al-Hejji (2006) reported thirteen (13) major causes that related to contractors' performance. For example, they explain that difficulties in financing projects, improper construction methods implemented, ineffective planning and scheduling of projects, poor site management, and supervision by contractors are some of the major factors affecting the project duration. Al-Barak (1993) discussed the main causes of the project failures in the construction industry in Saudi Arabia by surveying 68 contractors. The study concluded that lack of experience, poor estimation practices, bad decisions in regulating a company's policy, and a national slump in the economy are severe factors. Based on the Lo et al. (2006) report and the previous studies, the main causes are summarized and shown in Table 1. Odeh and Battaineh (2002) investigated 28 construction delay factors. These factors categorized by Sambasivan and Soon (2007) into the following eight major groups:

client-related factors, contractor-related factors, consultant-related factors, arterial-related factors, labor and equipment-related factors, contract-related factors, contract relationship-related factors, external factors.

**Table 1. The Main Delay Causes**

<b>No.</b>	<b>Owners</b>	<b>Contractors</b>	<b>Consultants</b>
1	Shortage of labor	Delay in progress payments by the owner	Type of project bidding and award
2	Unqualified workforce	Delay in reviewing and approving design documents by owner	Shortage of labor
3	Ineffective planning and scheduling of project by the contractor	Change orders by the owner during construction	Delay in progress payments by the owner
4	The low productivity level of labor	Delay in producing design documents	Ineffective planning and scheduling of project by the contractor
5	Hot or cold weather effect on construction activities	Delay in reviewing and approving the design documents by consultant	Change orders by the owner during construction
6	Conflicts encountered with sub-contractors schedule in project execution	Difficulties in project financing	The low productivity level of labor
7	Poor site management and supervision by the contractor	Mistakes and discrepancies in design documents	Difficulties in project financing
8	Inadequate contractors experience	Delay in procurement	Poor site management and supervision by the contractor
9	Effect of surface conditions	Inflexibility of consultants	Poor qualification of the contractor's technical staff
10	Change orders by the owner during construction	Slowness in the decision-making process by the owner	Delay in procurement

Sepasgozar and Shirazi (2008) investigated that the most important causalities for the delay in Iranian construction projects are: delay in earth delivery, delay in the delivery of the project design and engineering documents to a contractor, delay in confirmation or approval of the contractor's work, engineering documentation, change orders, weakness of communication between project parties, delay in materials and building tools delivery or preparation of some products by a contractor, delay in confirmation or payment of on-time inventory and undoing of some financial undertakings by the contractor. Financial problems have been reported as the reason for a 40.1 percentage of delays in improvement-national projects and a 67.7 percentage of delays in delayed state projects from 2000 to 2004 (Sepasgozar and Shirazi, 2008). In 2006, the financial problems were identified as 38.9 percent, the deficit in finance and allocation and deficiency in payment is 16.1 percent, 19.4 percent, and 3.4 percent respectively. Weakness of contractors an operational system is 11.1 percent of delay reason in improvement-national projects and 11.3 percent of delay reason improvement-state projects during 2000-2004. In 2006, 8.6 percent of delay reasons is termed as weakness in operational systems. The contractor's weakness caused 5.7 percent of delay reason in improvement national projects and 4.7 of delay reason improvement state projects during 2000-2004. In 2006, contractor difficulties were 3.6 percent of delay reasons. Also in that year, the important reasons for improvement-national projects are unforeseen weather change, flood-water, earthquake and in public natural problems. Delay on attention to claims and additional costs stemmed from primitive delays by contractors.

## CHAPTER 4

### DATA ANALYSIS AND RESULT

The data were collected and analyzed through the following statistical formulas:

$$\text{Frequency Index (F.I)}(\%) = \sum a * (n / N) * 100 / 4$$

$$\text{Severity Index (S.I)}(\%) = \sum a * (n / N) * 100 / 4$$

Where:

N is the total number of respondents for each question, a is the integer response value ranging from 1 to 4, and n is the frequency of responses for each integer value.

The importance index of each factor is calculated as follows:

$$[\text{F.I.}(\%) * \text{S.I.}(\%)] / 100$$

Table 2 shows the most important causes of delay according to the owners, contractors, and consultants. The causes are classified into nine various groups. The table shows that the contractor, labor, and external factors are three main factors in the projects, while project-related factors and consultants are of less importance.

**Table 2. Ranking of causes by participants**

Sources of delay	Frequency of occurrence		Degree of severity		Importance index	
	Index (%)	Rank	Index(%)	Rank	Index(%)	Rank
Project attributes	55.13	9	56.17	5	30.97	9
Owner attributes	58.65	5	55.29	7	32.43	6
Contractor organization	67.45	1	65.45	1	44.15	1
Consultant attributes	55.77	8	54.01	9	30.12	8
Design issues	58.41	7	55.89	6	32.65	5
Material deficiency	61.38	4	61.54	2	37.77	4
Technology restriction	58.46	6	54.42	8	31.82	7
Labour shortness	65.77	2	60.00	4	39.46	2
External factors	63.46	3	60.10	3	38.14	3

## **CHAPTER 5**

### **CONCLUSION**

In this study, the key causes of construction delays come are known through a form survey. We tend to give the elaborated survey over the construction delays comes. Particularly, the study was to understand the priority of causes affecting time and the project duration focusing on technology attributes. Top ten factors were identified as the main causes of delay: (1) contractor organization attributes, (2) labor shortness, (3) external factors, (4) material deficiency, (5) design issues, (6) owner attributes, (7) technology restriction, (8) consultant attributes and (9) project attributes. As the result shows, technology restriction is one of the top ten most important factors affecting delays in construction projects. Most previous publications investigated overall factors affecting time. However, fewer publications focused on a particular attribute such as technology to measure the exact impact of technology on delay. This study is a step forward to understanding how construction technology (new crane, loader, and dozer) restriction may affect the project time.

While the results show poor contractor management is generally the most important factor. The overall ranking results indicate that the major ten attributes such as new technology restriction can cause excessive project overruns in developing countries. Also, by good management and management of those cases, the time of non-executable delay of the project may be minimized. Extension of the contract period, if it's as a result of poor management of the project, despite written agreement liquidated harm, will increase website indirect value and name harm of the playing organization.

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