

# Causes of delay in large construction projects

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## Abstract

A survey on time performance of different types of construction projects in Saudi Arabia was conducted to determine the causes of delay and their importance according to each of the project participants, i.e., the owner, consultant and the contractor. The field survey conducted included 23 contractors, 19 consultants, and 15 owners. Seventy-three causes of delay were identified during the research. 76% of the contractors and 56% of the consultants indicated that average of time overrun is between 10% and 30% of the original duration. The most common cause of delay identified by all the three parties is “change order”. Surveys concluded that 70% of projects experienced time overrun and found that 45 out of 76 projects considered were delayed.

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## 1. Introduction

In construction, delay could be defined as the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. It is a project slipping over its planned schedule and is considered as common problem in construction projects. To the owner, delay means loss of revenue through lack of production facilities and rent-able space or a dependence on present facilities. In some cases, to the contractor, delay means higher overhead costs because of longer work period, higher material costs through inflation, and due to labor cost increases.

Completing projects on time is an indicator of efficiency, but the construction process is subject to many variables and unpredictable factors, which result from many sources. These sources include the performance of parties, resources availability, environmental conditions, involvement of other parties, and contractual relations. However, it is rarely happen that a project is completed within the specified time.

## 2. Objectives of the study

The main objectives of this study include the following:

- To identify the causes of delays in construction in Eastern Province of Saudi Arabia.
- To test the importance of the causes of delay between each two groups of parties.
- To study the differences in perceptions of the three major parties in any constructions, namely, owners, contractors and consultants.

## 3. Literature review

Many articles and studies conducted on causes of delay in construction projects, both locally and internationally have been reviewed. Surveys conducted by Assaf et al. [4] outlined 56 main causes of delay in large construction projects. Delay factors are assembled into nine major groups with different levels of importance to different parties. Al-Ghaffly [2] discussed the delay in public water and sewage projects. Sixty causes were identified and classified. Al-Ghaffly [2] concluded the following: the delay occurred

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frequently in medium and large size projects, and 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. Important causes are financial problems, changes in the design and scope, delay in making decisions and approvals by owner, difficulties in obtaining work permit, and coordination and communication problems.

Chan and Kumaraswamy [5] conducted a survey to evaluate the relative importance of 83 potential delay factors in Hong Kong construction projects and found five principal factors: poor risk management and supervision, unforeseen site conditions, slow decision making, client-initiated variations, and work variations.

Kaming et al. [6] studied influencing factors on 31 high-rise projects in Indonesia and found out that cost overruns occur more frequently and are more severe problem than time overruns. They pointed out that the major factors influencing cost overrun are material cost increase due to inflation, inaccurate material estimation and degree of complexity. While in time overrun, the most important factors causing delays are design changes, poor labor productivity, inadequate planning, and resource shortages.

Kumaraswamy and Chan [7] studied the causes of construction delays in Hong Kong. They found that there was a difference in perceptions as to causes of delays by different groups of participants in building and civil engineering works. They suggested that biases of different industry groups might direct blame for delays to other groups.

Noulmanee et al. [9] investigated causes of delays in highway construction in Thailand and concluded that delays can be caused by all parties involved in projects; however, main causes come from inadequacy of sub-contractors, organization that lacks of 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 [3] investigated causes of delay in 130 public projects in Jordan. The main causes of delay were related to designer, user changes, weather, site conditions, late deliveries, economic conditions and increase in quantity. The study suggested that special attention to factors will help industry practitioners in minimizing contract disputes. Delays have strong relationship with failure and ineffective performance of contractors.

Ubaid [10] discussed the performance of contractors as one of the major causes of delay. Thirteen (13) major measures were considered. These measures are related to contractor resources and capabilities. Al-Barak [1] discussed the main causes of failure in Construction industry in Saudi Arabia by surveying 68 contractors and about 34 different causes of failure. The study concluded that lack of experience, poor estimation practices, bad decisions in regulating company's policy, and national slump in the economy are the severe factors.

#### 4. Research methodology

The research methodology contained: Seventy-three (73) causes of delay were identified through literature review and discussion with some parties involved in construction industry. A questionnaire was developed in order to evaluate the frequency of occurrence, severity and importance of the identified causes. Contractors information was collected from Chamber of Commerce and from the lists of contractors from literature. Also, information about consultants and design engineers were collected from lists of consultants found in literature, as well as from Building & Engineering Consultation Directory published by Engineering Committee in the Ministry of Commerce of Saudi Arabia [8].

Data were gathered through a survey, analyzed by using frequency, severity and importance indices, taking in view owners, contractors and consultants. Agreement on the ranking of the importance of the causes of delay between each two groups of parties was also tested. Recommendations for minimizing delay in construction projects were emphasized in view of the results of the study.

#### 5. Questionnaire design

Data were gathered through a questionnaire. The questionnaire is divided into two main parts. Part I is related to general information for both the company and respondent. Both contractors and consultants were further requested to answer questions pertaining to their experience in the construction industry and their opinions about the percentage average time delay in projects they experienced. Part II includes the list of the identified causes of delay in construction project. These causes are classified into nine (9) groups according to the sources of delay: Factors related to project, owner, contractor, consultant, design-team, materials, equipment, manpower (labor), and external factors.

For each cause/factor two questions were asked: What is the frequency of occurrence for this cause? And what is the degree of severity of this cause on project delay? Both frequency of occurrence and severity were categorized on a four-point scale. Frequency of occurrence is categorized as follows: always, often, sometimes and rarely (on 4 to 1 point scale). Similarly, degree of severity was categorized as follows: extreme, great, moderate and little (on 4 to 1 point scale).

#### 6. Data analysis approach

The collected data were analyzed through the following statistical techniques and indices:

*Frequency index:* A formula is used to rank causes of delay based on frequency of occurrence as identified by the participants

$$\text{Frequency Index (F.I.) (\%)} = \sum a(n/N) * 100/4 \quad (1)$$

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