



Causes of construction delay: traditional contracts

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Abstract

Many projects experience extensive delays and thereby exceed initial time and cost estimates. In addition to imparting the economic feasibility of capital projects, extensive delays provide a fertile ground for costly disputes and claims. This paper presents the findings of a survey aimed at identifying the most important causes of delays in construction projects with traditional type contracts from the viewpoint of construction contractors and consultants. Results of the survey indicate that contractors and consultants agreed that owner interference, inadequate contractor experience, financing and payments, labor productivity, slow decision making, improper planning, and subcontractors are among the top ten most important factors. It is hoped that these findings will guide efforts to improve the performance of the construction industry, and will be useful to international engineering and construction firms seeking a share in the Jordanian and the regional markets. © 2001 Elsevier Science Ltd and IPMA. All rights reserved.

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1. Introduction

The successful execution of construction projects and keeping them within estimated cost and prescribed schedules depend on a methodology that requires sound engineering judgment [1]. To the dislike of owners, contractors and consultants, however, many projects experience extensive delays and thereby exceed initial time and cost estimates. This problem is more evident in the traditional or adversarial type of contracts in which the contract is awarded to the lowest bidder — the awarding strategy of the majority of public projects in developing countries including Jordan.

Although the construction industry in the Middle East has suffered ever since the Gulf war, recent events in the region coupled with the restructuring of economies, joining regional and global free trade organizations, and attracting foreign investments are expected to yield an unprecedented growth in the construction activities. The region is in desperate need for development projects in many areas, especially in the fields of water collection and distribution, tourism and housing. As a result, an unprecedented number of large-scale projects are currently under construction and in the planning and contract awarding stages. In Jordan, for example, the volume of

construction projects awarded in 1998 was 944 million Jordanian Dinar¹ (JD) of which 155 millions went to international contractors [2]. These projects include three dams with contract values of over 87.7 million JD. Another dam with an estimated cost of 200 million JD is in the contract award phase. A major water transport pipeline extending over 300 km with an estimated cost of 100 million JD is in the final design stage.

Unfortunately, the construction industry in Jordan is not adequately prepared for the project management problems accompanying the anticipated boom in construction activities and the increasing complexity of projects. Recent findings [3,4] revealed that delays in public projects in Jordan are extensive and warrant further investigation. It is imperative to understand the underlying causes of such delays for any corrective actions to be effective.

2. Related work

Leishman [5] presented the legal consequences of delays in construction. Herbsman et al.[6] studied the effect of delays on cost and quality. Yates [7] developed a decision support system for construction delay analysis called (DAS). The main categories of delays in DAS

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¹ 1 JD = \$1.424, the rate of exchange on 1 June 2000.

include engineering, equipment, external delays, labor, management, material, owner, subcontractors, and weather.

Ogunlana et al. [8] studied the delays in building project in Thailand, as an example of developing economies. They concluded that the problems of the construction industry in developing economies can be nested in three layers: (1) problem of shortages or inadequacies in industry infrastructure, mainly supply of resources; (2) problems caused by clients and consultants; and (3) problems caused by incompetence of contractors. Kumaraswamy et al. [9] surveyed the causes of construction delays in Hong Kong as seen by clients, contractors and consultants, and examined the factors affecting productivity. The survey revealed differences in perceptions of the relative significance of factors between the three groups, indicative of their experiences, possible prejudices and lack of effective communication. Mansfield et al. [10] studied the causes of delay and cost overrun in construction projects in Nigeria. The results showed that the most important factors are financing and payment for completed works, poor contract management, changes in site conditions, shortage of material, and improper planning.

Assaf et al. [11] studied the causes of delay in large building construction projects in Saudi Arabia. The most important causes of delay included approval of shop drawings, delays in payments to contractors and the resulting cash problems during construction, design changes, conflicts in work schedules of subcontractors, slow decision making and executive bureaucracy in the owners' organizations, design errors, labor shortage and inadequate labor skills. Mezher et al. [12] conducted a survey of the causes of delays in the construction industry in Lebanon from the viewpoint of owners, contractors and architectural/engineering firms. It was found that owners had more concerns with regard to financial issues, contractors regarded contractual relationships the most important, while consultants considered project management issues to be the most important causes of delays.

Battaineh [3] evaluated the progress reports of 164 building and 28 highway projects constructed during the period 1996–1999 in Jordan. The results indicate that delays are extensive: the average ratio of actual completion time to the planned contract duration is 160.5% for road projects and 120.3% for building projects.

Al-Momani [4] conducted a quantitative analysis of construction delays by examining the records of 130 public building projects constructed in Jordan during the period of 1990–1997. The researcher presented regression models of the relationship between actual and planned project duration for different types of building facilities. The analysis also included the reported frequencies of time extensions for the different causes of delays. The researcher concluded that the main causes of delay in construction projects relate to designers, user

changes, weather, site conditions, late deliveries, economic conditions, and increase in quantities. However, such conclusion can be misleading. First, they included causes which are limited to those for which contractors are entitled to time extension. The analysis does not cover causes of delay for which the contractor is responsible, such as those related to labor and equipment, planning and site management, construction methods, adequacy and capability of contractor. Second, they are based on the reported number of time extensions not on the extent of delay attributed to the different causes of delay. Despite the moderate weather in Jordan, for example, it was figured among the major causes of delay because a time extension was granted for all public projects under construction in the winter of 1991 as a result of an unprecedented severe storm that had a very low probability of occurrence. Third, they are drawn from records of public building projects and one would question their validity to other types of construction projects such as industrial facilities, water collection treatment and distribution, and highway construction.

3. Research design and objectives

The objective of this research is to identify the major causes of delay in the construction industry and to assess the relative importance of these causes for the traditional adversarial type of contracts from the viewpoint of construction contractors and consultants. First, a survey questionnaire was developed to assess the perceptions of contractors and consultants of the relative importance of construction delay causes. Second, the questionnaire was distributed to a random sample of contractors and consultants working on large projects in Jordan. Responses to the questionnaire were then collected and analyzed. The analysis included ranking the different causes according to the relative importance indexes for both contractors and consultants responses. The Spearman's rank correlation coefficient was then used to test association between the contractors and consultants ranking.

4. Causes of delay

The survey is based on 28 well recognized causes of delay to which participants were asked to indicate their level of importance of each cause. These causes were categorized into the following 8 major groups:

1. Client related factors include finance and payments of completed work, owner interference, slow decision making and unrealistic contract duration imposed by owners.
2. Contractor related factors include site management, improper planning, inadequate contractor

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