



ORIGINAL ARTICLE

Ranking of delay factors in construction projects after Egyptian revolution

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Abstract Time is one of the major considerations throughout project management life cycle and can be regarded as one of the most important parameters of a project and the driving force of project success. Time delay is a very frequent phenomenon and is almost associated with nearly all constructing projects. However, little effort has been made to curtail the phenomenon, this research work attempts to identify, investigate, and rank factors perceived to affect delays in the Egyptian construction projects with respect to their relative importance so as to proffer possible ways of coping with this phenomenon. To achieve this objective, researcher invited practitioners and experts, comprising a statistically representative sample to participate in a structured questionnaire survey. Brain storming was taken into consideration, through which a number of delay factors were identified in construction projects. Totally, ninety-nine (99) factors were short-listed to be made part of the questionnaire survey and were identified and categorized into nine (9) major categories. The survey was conducted with experts and representatives from private, public, and local general construction firms. The data were analyzed using **Relative Importance Index (RII)**, ranking and simple percentages. Ranking of factors and categories was demonstrated according to their importance level on delay, especially after 25/1/2011 (Egyptian revolution). According to the case study results, the most contributing factors and categories (those need attention) to delays were discussed, and some recommendations were made in order to minimize and control delays in construction projects. Also, this paper can serve as a guide for all construction parties with effective management in construction projects to achieve a competitive level of quality and a time effective project.

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1. Introduction

In most countries, experience and the literature revealed that successful construction projects should be completed before project due dates and within budget. Therefore, causes of time delay are of critical importance to the profitability of most construction projects. Many researchers, in the literature, have identified these problems as factors that affect the delay in

construction projects and will affect company's performance and overall economy of the country as well. The delay in construction projects by many factors is usually linked to the performance of time, cost, and quality. Meanwhile, identification and evaluating factors causing delay in construction projects have been carried out in the last decade; however, a deeper understanding is still needed to improve that. A construction project is commonly acknowledged as successful when it is completed on time, within budget, in accordance with specifications and to stakeholders' satisfaction [1]. In construction industry, contractors tend to maximize their profit for market growth. To achieve this aim, it is crucial for contractors to carefully identify the factors that affect the success of project and estimate their impacts before bidding stage. Construction projects may differ in size, duration, objectives, uncertainty, complexity, pace, and some other dimensions. Delay means non-completion of project within the specified duration agreed upon in contract. It is widely accepted that construction project schedule plays a key role in project management due to its influence on project success [2]. Delays are common in various construction projects and cause considerable losses to project parties. The common results of delays are as follows: (1) Late completion of project; (2) Increased cost; (3) Disruption of work; (4) Loss of productivity; (5) Third party claims; (6) Disputes; and (7) Abandonment or termination of contracts. Therefore, delays in construction projects give rise to dissatisfaction to all involved parties [1]. Most correspondents agreed that financial difficulties faced by the contractor and too many change orders by the owner are the leading causes of construction delay. Severe weather conditions and changes in government regulations and laws ranked among the least important causes [3]. Therefore, the objective of this research is to identify and rank the relative importance of factors perceived by owners, consultants, managers, engineers, and contractors to cause delay in construction projects in Egypt. The outcomes can be used by not only local, but also international industry practitioners, who may be further interested in venturing into potential mega scale projects, but possess no prior practical knowledge of the construction industry specially construction firms in Egypt. The outcomes can help all practitioners to develop wider and deeper perspective of factors causing delay in construction projects and provide guidance to projects and construction managers for efficient solutions. The literature has identified several factors causing delay in construction projects that the researcher has explored in this study. This research ranks the factors causing delay in construction projects in Egypt and explores them by using statistical methods. The following sections present the literature review, research methodology, results with discussions, and conclusions with recommendations.

2. Literature review

Construction industry has a very poor reputation in coping with delays. Delay analysis is either ignored or done subjectively by simply adding a contingency. As a result, many major projects fail to meet schedule deadlines [4]. In Indonesia, Trigunaryah [5] identified that only 47% of the projects were completed within the schedule, 15% ahead of schedule, and 38% were behind schedule. As the process of construction project is very complicated with combination of various parties' endeavors, many stages of work carrying a long period till

the completion [6]; there are many factors that contribute with delay causes in construction projects. Sambasivan and Soon [7] investigated the causes and effects of delays facing in the Malaysian construction industry. A questionnaire was designed and distributed among the three major groups of participants (Owners, Consultants, and Contractors). They identified main causes of delay and ten (10) most important causes were as follows: (1) Contractor's improper planning; (2) Contractor's poor site management; (3) Inadequate contractor experience; (4) Inadequate owner's finance and payments for completed work; (5) Problems with subcontractors; (6) Shortage in material; (7) Labor supply; (8) Equipment availability and failure; (9) Lack of communication between parties; and (10) Mistakes during the construction stage. They identified main effects of delay and they were as follows: (1) Time overrun; (2) Cost overrun; (3) Disputes; (4) Arbitration; (5) Litigation; and (6) Total abandonment. As an important contribution, they also studied the empirical relationships between the causes and the effects of delays. Various researchers have examined and identified delay causes in construction projects. Some of these studies in the literature were presented below. Baldwin and Manthei [8] investigated the reasons for delays in building projects in the United States. They indicated seventeen (17) delay factors. Their study concluded that weather, labor supply, and the subcontractors are the three major causes of construction delays. Arditi et al. [9] studied the reasons of delays in publicly funded construction projects within the period 1970–1980 in Turkey. They concluded twenty-three (23) reasons for construction delays. Their findings indicated that the delays were due to the following: (1) Shortage of materials; (2) Difficulty in receiving payments from agencies; (3) Contractor's difficulties; and (4) Organizational characteristics of construction companies and public agencies. Gunduz et al. [10] identified the delay factors in construction projects, since delays are considered to be a serious problem in the construction industry. Through detailed interview with experts from Turkish construction industry, a total of eighty-three (83) different delay factors were identified. The identified delay factors were categorized into nine (9) groups. The demonstration of these groups of delay factors was achieved by utilizing the Ishikawa (Fish Bone) diagram as it is capable of showing factors, interrelations between different groups of factors, and consequences affected from factors. They quantified relative importances of delay factors and demonstrated the ranking of the factors and groups according to their importance level on delay. According to the computed relative importance indices (RIIs), all factors and groups were ranked, and they addressed the most significant factors and groups to cause delays. Ubaid [11] discussed the performance of contractors as one of the major delay causes. He related thirteen (13) major delay factors to contractor resources and capabilities. The delay causes and cost overrun were studied by Mansfield et al. [12] in construction projects in Nigeria. They identified sixteen (16) major factors. According to their findings, the most significant factors were as follows: (1) Financing and payment for completed works; (2) Poor contract management; (3) Changes in site conditions; and (4) Shortage of materials and improper planning. In their study, Assaf et al. [13] studied the delay causes in large building construction projects in Saudi Arabia. They identified fifty-six (56) delay causes and grouped them into nine (9) major categories. They concluded that the most significant delay factors were as follows: (1) Approval of shop

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