



CRITICAL FACTORS EFFECTTING ON DELAY TIME IN RESIDENTIAL CONSTRUCTION PROJECTS

By

DALIA AHMED EL-BADAWY MAHMOUD KSHAF

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
STRUCTURAL ENGINEERING

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Title of Thesis:

Critical Factors Effecting On Delay Time In Residential Construction Projects

Key Words:

Construction delays, Analyze, Interview, Kruskal-Wallis

Summary:

Time is considered one of the most powerful factors that leads to the success of any projects, sometimes leads to legal disputes between parties. Therefore, it is essential to study and analyze causes of construction delay to determine the party which is responsible for the delay or if the reasons are beyond the control of any of the parties.

This research presents a list of the most important construction delay causes according to interviews. Statistical analysis is carried out using analysis of variance (Kruskal-wallis) method to test delay causes, obtained from interviews. In the end a road map that includes the reasons for the delay, according to their importance and proposals of the parties (The owner – The contractor – The consultant) were made to avoid delays in the project , or at least to reduce them.

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Dedication

To my Father Mr. Ahmed El-Badawy Kshaf my greatest example of what a brave man is .

To my mother Mrs. Kawther Ibrahim El-Sayed my greatest example of what a good women is

To my uncle Dr. Ahmed Ibrahim El-Sayed whom I love, I know you are in the better place and happy.

To everyone who is a hero and a different...you are treasure.

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Abstract

Time is considered one of the most powerful factors that leads to the success of any project, therefore any delay for any reason, sometimes leads to legal disputes between the parties of the project (The owner – the Contractor – the Consultant) and cause delays in the delivery of many projects, so throughout this research the most important factors have been reclassified in terms of repetition, impact and importance to determine the party which is responsible for the delay or if the reasons are beyond the control of any of the parties.

The factors which cause the delay in construction projects in Egypt had been collected from previous studies and experts' opinions in the field of construction on these causes. Interviews on 61 reasons divided into 8 groups which are as follows: (owner, consultant, contractor, material, design, labor and equipment, project, external)-related causes, have been conducted, using mathematical equations to calculate frequency, severity, and importance of each. The reasons were arranged according to the values of the 3 indicators, they were arranged based on the viewpoints of all three parties (the owner, the contractor & the consultant) together, and also individually.

Using (Kruskal–Wallis) test which is a statistical test that calculates the degree of agreement and disagreement between the parties (The owner – The contractor–The consultant) for the reasons of the delay, The test defines the levels of agreement, and disagreement on the delay causes. Agreements were mainly because of financial issues for contractor and owner, besides difficulty of supplying materials, and prices change. A comparison between ranking of delay causes in (2008-2012-2015), illustrates effecting causes on the time and budget to contractors supplied from the state for projects and how it is also influenced by the source of funding for the owners to finance the projects. In the end a roadmap that includes the reasons for the delay, according to their importance and proposals of the parties to the contract (The owner –Contractor – Consultant) were made to avoid delays in the projects, or at least to reduce them.

CHAPTER (1)

Introduction

1.1 General

Delay is one of the most serious problems in the construction industry. The construction industry is one of the most important industries in Egypt .Delay in construction can be defined as exceeding the due date set for the completion of the project in the contract.

Delaying factors in construction projects result in increasing the overall cost for the contractor .This price increase is a consequence of many reasons like , long work duration , high cost of materials and employment.

Also , it causes problems for the owner because of the loss of revenue, the high cost of investment , interest during construction ,and these delays always cause disputes which need legal consultation and need resolution.

1.2 Problem statement

Causes of time delay are very important to the profitability of most construction and building projects. In the literature, these problems have been identified as causes that affect the delay in residential projects and in return impact company's performance as well as the overall economy of the country. The delay in residential projects is caused by reasons which are usually connected to the performance, quality, cost ,and time. This research ranks the causes of delay in residential construction projects in Egypt and identifies them by using statistical techniques. Delays are caused by (owner, consultant , contractor, material , labor and equipment , design , project and external).

1.3 Research objectives

The aim of this research is to investigate delay factors in residential construction projects, categorize them into major categories by determining the (frequency, severity and importance) indices according to the score for each cause.

Using (Kruskal–Wallis) test for statistical analysis of delay causes ,then make suggestions in order to decrease or control delays in residential construction projects.

1.4 Research Methodology

◆ Collecting data that is related to each of the research objectives, by searching through literature, relevant academic researches, and by finding out the view points of the 3 main parties (contractor – owner – consultant).

◆ Interviews involved experienced construction experts including project managers, site managers, procurement managers, technical office engineers, technical consultants, contractors and subcontractors.

◆Determination of delays causes using the frequency of and degree of severity of each delay causes, and analyzing the data using mathematical formula to determine the importance of delay causes, then determine the top ten delay causes according to the most severity , frequency and the importance index.

◆Linking my research objectives to the aforementioned collected data in order to reach logical results .

◆The collected data was statistically analyzed using (kruskal –wallis) test, to determine the most essential delay factors and categorize them.

1.5 Thesis Organization

Chapter 2:

Reviewing the construction delay causes from pervious researches and identifying delay factors.

Chapter 3:

Analyzing delay causes obtained from feedback from experts throughinterviews and determining the frequency, severity and importance of these causes based on a set index.

Chapter 4:

Development of the(Kruskal–Wallis) test for statistical analysis of delay causes according to the feedback of the owner ,the consultant and the contractor representatives to calculate the mean and the coefficient of variance .

Chapter 5:

Comparing 3 research results conducted in 2008, 2012, 2015,that were based on prioritizing the top ten delay factors in construction.

Chapter 6:

This chapter presents the conclusion and recommendations for the future research.

CHAPTER (2)

Literature Review

2.1 General:

This chapter comprises a background for construction delay. It presents identification of construction delays and its causes.

2.2 Construction delays:

Construction delay is time overrun either beyond the contract date or beyond the date that the participants have agreed upon for the delivery of the project. In all cases, delay is usually costing. It was also defined as an act which extends required time to perform a complete work of the contract manifests itself as additional days of work.

V.Luu defines the delay in projects, that causes financial losses for projects. He used Bayesian belief network to identify the probability of project delay in Vietnam .

166 experts were deployed and questionnaires which were prepared on sixteen factors of delay, as result (financial difficulties of owners and contractors, contractor's inadequate experience, and shortage of materials) are the main causes of delay on construction projects in Vietnam.

A case study was prepared based on the causes that was identified, in addition to (owner's financial difficulties of contractors , shortage of material , slow site hand over , inappropriate construction methods, defective works and rework , and lack management capacity by owners \project managers) that caused delay . The case included two projects, Briefing was prepared and that led to the conclusion of the previously stated factors, were the most important, and main causes of delay[1] .

Tarek I .EL-Rasas said that Construction delays are common problems in projects in Egypt. He mentioned that problems occur frequently within project life time leading to disputes and litigation. A contract was signed between the contractor and the owner to construct 16 residential buildings including utilities in 6th of October City. The case study was analyzed and the delay factors were put into comparison, then statistical analysis using ANOVA was performed to test delay causes .Prioritizing the causes was based on their importance on a scale of 5 levels (very high , high , medium , low and very low) [2].

T.Doran studied project management in the third world countries. The cost overruns and causes of delay are inspected by examining data relating to construction and building projects. Analysis of a completed high way project in Nigeria was performed. These points to essential cost variations relevant to the initial contract, and extravagant project overruns, for neither of which there is much explanation in status reporting. The most

considerable factors: finance and payment arrangements, poor contract management, material shortage and price fluctuations [3] .

S.Ogunlana said that Construction delays affect the cost and time of projects. A survey of the delays experienced in high rise building projects in Bangkok, Thailand, was undertaken and the result compared with other studies around the world to determine whether there are special problems that create delays for construction in developing economies. Resource supply problems were to some extent the most critical problems. The results of the study support: (a) problems of shortages or inadequacies in industry infrastructure (b) problems caused by clients and consultants (c) problems caused by contractor incompetence/inadequacies .

A study of the causes of delay in 12 high rise building projects in Bangkok, Thailand has been prepared. Resource supply problems were, to some extent, the most critical problems. Projects suffered delays because materials, especially cement, in short supply, technical personnel were over- stretched, had to do so much so soon in their career. Demands from construction owners for frequent changes also generated design and coordination problems for field crew. The result was that many projects were poorly managed and exceeded deadline. [4] .

A.AL-momanisaid that Avoiding construction claims and disputes demands an understanding of the contractual terms. A survey of 130 projects specified that poor design and negligence of the owner, change orders, weather condition, site condition, late delivery, economic conditions, and increase in quantities are the main factors of delay. In line, the current investigation provides confirmation of the effect of defined parameters on construction delays [5] .

G.O.Jogboro said that Construction delay has become common in Nigeria. It is necessary to develop awareness of the extent to which delays can negatively affect project delivery. This evaluates and through experimental method assesses the effects of construction delays. The results indicated that time and cost overruns were frequent effects of delay. Delay had considerable effect on completion time and cost of 61 construction and building projects studied. Acceleration of site activities with improved clients' project management steps, and insertion of appropriate emergency allowance in precontract estimate should ease the adverse effect of construction delay. The study inspects, questionnaire survey of construction parties, the effects of construction delay on project execution and by experimental method, the effects of delay on completion cost and time. Two areas of how the effects of delays can be decreased were also inspected. The conclusions of the study are as follows :

1. Cost overrun and time overrun (elongation of project duration) were the two most frequent effects of delay in Nigerian construction industry
2. Delay had significant effects on actual project duration
3. Loss and expense claims arising from delay and fluctuation claims during the delay period had significant effect on cost overrun .