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JUDUL: CAUSES AND EFFECTS OF DELAYS IN ACEH
CONSTRUCTION INDUSTRY

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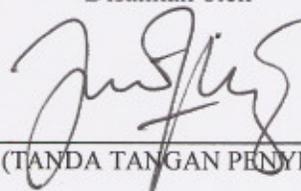
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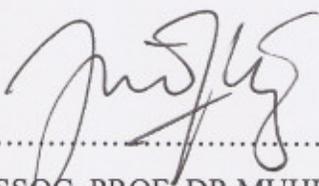
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CAUSES AND EFFECTS OF DELAYS IN ACEH CONSTRUCTION INDUSTRY

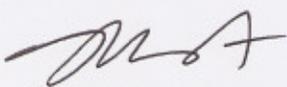
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MAY 2006

I declare that this master's report entitled " Causes and Effects of Delays in Aceh Construction Industry " is the result of my own research except as cited in the references. The master's report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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Especially dedicated to :
my beloved wife, Liza Shalawati;
my dear sons, Muhammad Zhafran and Muhammad Naufal;
my dear daughter, Siti Sarah Shafira.

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Deepest thanks to my family especially my parents, my wife, my sons and daughter for their constant support and prayers throughout the process of producing this project report.

ABSTRACT

One of the most common problems in the construction project is delays. Delays of a construction project can be defined as the late completion of works as compared to the planned schedule or contract schedule. Projects can be delayed due to number of reasons that may be due to the client, the contractor, acts of God, or a third party. They may occur early or later in the project development, alone, or with other delays. Delays can be minimized only when their cause are identified. The objective of this study was to identify the major causes of delays, the effects of delays, and methods of minimizing delays in construction project. This study was carried out based on literature review and a questionnaire survey. A total of fifty seven factors and eight groups that contributed to the causes of delay, the six factors that effects delays and thirty five methods of minimizing construction delays were identified based on literature review. The questionnaire survey was distributed to the targeted respondent in Aceh, Indonesia construction industry. The objectives of the study have been successfully achieved. The top ten most important factors that contributed to the causes of delays, i.e., insufficient numbers of equipment; inaccurate time estimate; monthly payment difficulties; changes orders; inaccurate cost estimate; poor site management and supervision; inadequate modern equipment; shortage of construction materials; incompetent project team; improper project planning and scheduling; and contractor's financial difficulties. Contractor-related delays was ranked the most significant groups that cause delays, followed by equipment-related delay, client-related delays, material-related delays, finance-related delays, consultant-related delays, external-related delays, and labor related delays. Time and cost overrun were the common effects of delays in construction projects. To minimize delays in construction projects it has been identified that the top ten most effective methods of minimizing construction delays includes: ensure adequate and available source of finance until project completion; competent project manager; availability of resources; frequent progress meeting; awarding bids to the

right/experience consultant and contractor; use of experienced subcontractors and suppliers; multidisciplinary/competent project team; accurate initial cost estimates; competent and capable of clients representative; use of appropriate construction methods; performs a preconstruction planning of project task and resources needs; and project management assistance.

ABSTRAK

Salah satu masalah yang paling umum berlaku dalam projek pembinaan adalah kelewatan. Kelewatan projek pembinaan boleh didefinisikan sebagai lewat siap kerja dibandingkan dengan jadual perancangan atau jadual kontrak. Kelewatan projek boleh disebabkan oleh beberapa sebab diantaranya adalah sebab pemilik projek, kontraktor, takdir Allah, dan pihak ketiga. Ini boleh terjadi pada awal atau di akhir pembangunan projek secara tersendiri atau bersamasama dengan kelewatan yang lain. Kelewatan boleh diminimalkan hanya apabila sebabnya dikenal pasti. Objektif kajian ini adalah untuk mengenal pasti sebab utama kelewatan, kesan kelewatan, dan tatacara bagi mengurangkan kelewatan projek pembinaan. Kajian ini dijalankan berdasarkan kajian literatur dan pengumpulan maklumat menggunakan borang borang soal selidik. . Sejumlah lima puluh tujuh faktor dan lapan kumpulan yang telah menyumbang kepada sebab kelewatan, enam jenis kesan kelewatan, dan tiga puluh lima tatacara bagi mengurangkan kelewatan pembinaan telah dikenal pasti berdasarkan kajian ini. Kajian borang soal selidik telah diedarkan kepada sasaran responden pada industri pembinaan di Aceh, Indonesia. Objektif kajian telah diperolehi dengan jayanya. Sepuluh teratas faktor utama yang menyumbang kepada sebab kelewatan adalah: kekurangan bilangan peralatan; ketidaktepatan anggaran masa; kesusahan dalam bayaran bulanan; arahan perubahan; ketidaktepatan anggaran kos; pasukan projek yang tak berkebolehan; perancangan dan penjadualan projek yang salah; dan kesusahan kewangan kontraktor. Kelewatan berkaitan kumpulan kontraktor telah ditarafkan sebagai kumpulan yang paling penting yang menyebabkan kelewatan., diikuti oleh kelewatan berkaitan peralatan, kelewatan berkaitan pemilik projek, kelewatan berkaitan material, kelewatan berkaitan kewangan, kelewatan berkaitan perunding, kelewatan berkaitan faktor luaran, dan kelewatan berkaitan faktor pekerja. Lebihan masa dan kos adalah kesan yang paling

umum berlaku daripada kelewatan di projek pembinaan. Bagi mengurangkan kelewatan di projek pembinaan, telah dikenal pasti sepuluh tatacara yang paling berkesan iaitu: memastikan kecukupan dan perolehan sumber kewangan sehingga siap projek; pengurus projek yang berkebolehan; terdapatnya/perolehan sumber; mensyuarat kemajuan kerja yang kerap; pemberian tender kepada kontraktor dan perunding yang berpengalaman; subkontraktor dan pembekal yang berpengalaman; pasukan projek yang berkebolehan; anggaran kos permulaan yang tepat; wakil pemilik projek yang berkebolehan dan berpengetahuan; penggunaan tatacara pembinaan yang betul; menjalankan perancangan pra pembinaan projek bagi aktiviti kerja dan keperluan sumber, dan bantuan pengurusan projek.

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LIST OF SYMBOLS

I	-	Relative Importance Index
W_i	-	Weight assigned to i th response.
X_i	-	Frequency of the i th response given as percentage of the total responses for each factors.
i	-	Response category index = 1,2,3,4,5.
\sum	-	Sum of
r_s	-	The Spearman's rank correlation coefficient
d	-	The difference in ranking between the contractors and consultants
N	-	The number of variables.
Z	-	Significant value
H_0	-	The null hypothesis
H_1	-	Alternative hypothesis

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CHAPTER 1

INTRODUCTION

1.1. Introduction

A construction project is commonly acknowledged as successful, when it is completed on time, within budget, in accordance with the specifications and to stakeholders' satisfaction. Functionality, profitability to contractors, absence of claims and court proceeding and "fitness for purpose" for occupiers have also been used as measures of project success.

One of the most important problems in the construction project is delays. Delays occur in every construction project and the magnitude of these delays varies considerably from project to project. Some projects are only a few days behind the schedule: some are delayed over a year. So it is essential to define the actual causes of delays in order to minimize and avoid the delays in any construction projects.

Delay is a situation when the contractor, consultant, and client jointly or severally contribute to the non-completion of the project within the original or the stipulated or agreed contract period. Delays give rise to disruption of work and loss of productivity, late completion of project, increased time related cost, and third party claims and abandonment or termination of contract. It is important that general management keep track of project progress to minimize the possibility of delay occurrence or identify it at early stages.

1.2. Background of the Study

Numerous researchers have also examined and identified the causes of delays in construction project. Assaf, et al. (1995), for example, studied the causes of delays in large building construction projects in Saudi Arabia. They identified that the most important causes of delay included are the approval of shop drawings, delays in payment to contractors and the resulting cash problems during construction, design changes, conflicts in work schedules of subcontractors, slow decision making and executive bureaucracy in owner's organizations, design errors, labor shortage and inadequate labor skills. Ogunlana, et al. (1996) studied the delays in building project in Thailand, as an example of problem faced by the developing economies. They concluded that the problems of the construction industry in developing economies can be nested in three layers: problem of shortages or inadequacies in industry infrastructure, mainly supply of resources; problems caused by clients and consultants; and problems caused by incompetence of contractors.

Chan and Kumaraswamy (1996) surveyed and classified the causes of construction delays in Hongkong as seen by clients, contractor and consultants, and examined the factors affecting productivity. The results of their research indicate that the five principal and common causes of delays are: poor site management and supervision; unforeseen ground condition; low speed of decision making involving all projects team; client initiated variations; and necessary variation of works. Mezher and Tawil (1998) conducted the 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 relationship the most important, while consultants considered project management issues to be the most important causes of delays.

A comprehensive classification of causes of construction delays has also been recommended by Abd. Majid and McCaffer (1998). They studied factors of non-excusable delays that influence contractors' performance. The classification the main

causes of non-excusable delays according to the sources of occurrence, then identified the factors contributing to those causes. It is assumed that the client has more control over the compensable delays and can take action to prevent them. The contractor is expected to have control over the non-excusable delays and, presumably, do more prevent them. Al-Momani (2000) 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 causes of delays. The researcher concluded that the main causes of delays in construction projects relate to designers, user changes, weather, site conditions, late deliveries, economic conditions, and increase in quantities.

Odeh and Battaineh (2002) studied causes of construction delay in Jordan. In their study presents the results of the survey which indicate that contractors and consultants have agreed that the 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. Frimpong, et al. (2003) studied the factors contributing to delay and cost overruns in Ghana groundwater construction projects. The results of the study revealed the main causes of delay and cost overrun in construction of groundwater projects includes: monthly payment difficulties from agencies; poor contractor management; material procurement; poor technical performances; and escalation of material prices. Long, et al (2004), studied the problems on large construction projects in developing countries, a case study from Vietnam. They revealed that the problems could be grouped under five major factors; incompetent designers/contractors; poor estimation and change management; social and technological issues; site related issues; and improper techniques and tools.

Koushki, et al. (2005) conducted a survey of the time-delay and cost-increase associated with the construction of private residential projects in the state of Kuwait. They identified three main causes of time-delays includes: changing orders; owners' financial constraints; and owners' lack of experience in the construction business.

Regarding cost overruns, the three main causes were identified as contractor related problems, material-related problems, and owners' financial constraints. Wiguna and Scott (2005) studied on the risks affecting construction delays and cost overruns in building projects in Surabaya and Denpasar, Indonesia. They identified the most critical factors are: high inflation/increased material price; design change by client; defective design; weather conditions; delayed payment on contracts and defective construction work.

Studies the effects of delays in construction projects have been undertaken by numerous researchers. Aibinu and Jagboro (2002) identified the six effects of delays were time overrun, cost overrun, dispute, arbitration, total abandonment, and litigation. The results of their studied about the effects of construction delays on project delivery in Nigerian construction industry, shows time overrun and cost overrun were the frequent effects of delays in construction projects. Koushki and Kartam (2004) studied on the impact of construction materials in construction project in Kuwait. They obtained that time and cost overrun were the impact of the material selection time, their availability in the local market, and the presence of the supervising engineer.

Several studies have been studied and recommended the methods of minimizing delays in construction projects. Nguyen, et al (2004), identified five critical success factors could be applied to reduce the effects of delays includes: competent project manager; adequate funding until project completion; multidisciplinary/competent project team; commitment to projects; and availability of resources. Aibinu and Jagboro (2002) in their study also identified two methods to reduce or if possible eliminate time overrun were acceleration of site activities, and contingency allowance.

A comprehensive study to improve the situation of construction project also has been recommended by Odeh and Battaineh (2002). They recommended four methods includes: developing human resources in the construction industry through proper training and classification of craftsman; adopting a new approach to contract

award procedure by giving less weight to prices and more weight to the capabilities and past performance of contractors; and adopting new approaches to contracting, such as design-build and construction management (CM) type of contracts.

1.3 Problem Statement

Construction projects can be delayed for a large number of reasons. Differences categories of delays and different types of delays found on construction projects. Delay has significant effect on completion cost and time of construction project. Delays can be minimized when their causes are identified. Knowing the cause of any particular delay in a construction project would help avoiding the same.

Although various studies have been undertaken to identify the factors affecting the causes of delays, since the problems are rather contextual, the studies need to focus on specific geographical area, country or region. A major criticism of the Aceh, Indonesia construction industry is due to the growing rate of delays in project delivery. In Aceh, Indonesia most public work projects, including any construction projects under government authority or under state owned companies, are awarded on a competitive basis using the traditional approach. The consultants and contractors are engaged in separate contracts. The contractors usually would be involved until the designs have been completed.

1.4 Aim and Objective of the Study

This research was therefore, aimed at identifying the major causes of delays, effects of delays and methods of minimizing delays in construction projects in Aceh, Indonesia construction industry. To achieve this aims the following objectives have been identified:

- To identify the major causes of delays in construction project;
- To identify the effects of delays in construction project; and
- To identify the methods of minimizing construction delays.

1.5 Scope of the Study

The scope of the research was mainly focus on literature review and a questionnaire survey. Projects investigated in this research included office and administration buildings, school building, medical center, communication facilities and civil engineering projects. The survey was conducted in Aceh, Indonesia.

The questionnaire survey was designed based on factors identified from literature review that contributed to causes of delays, effects of delays and methods to minimize delays. A questionnaire was developed to assess the perceptions of contractors and consultants of the relative importance of the causes and the effects of construction delays. The developed survey questionnaire was distributed to the targeted respondent in Aceh, Indonesia.

1.6 Research Methodology

The methodology of this study started from identifying the problem statement, literature review, collecting data, analysis of results, discussion of results, conclusions and recommendations. Figure 1.1 shows a flowchart of the research methodology in order to achieve the objectives of the study.

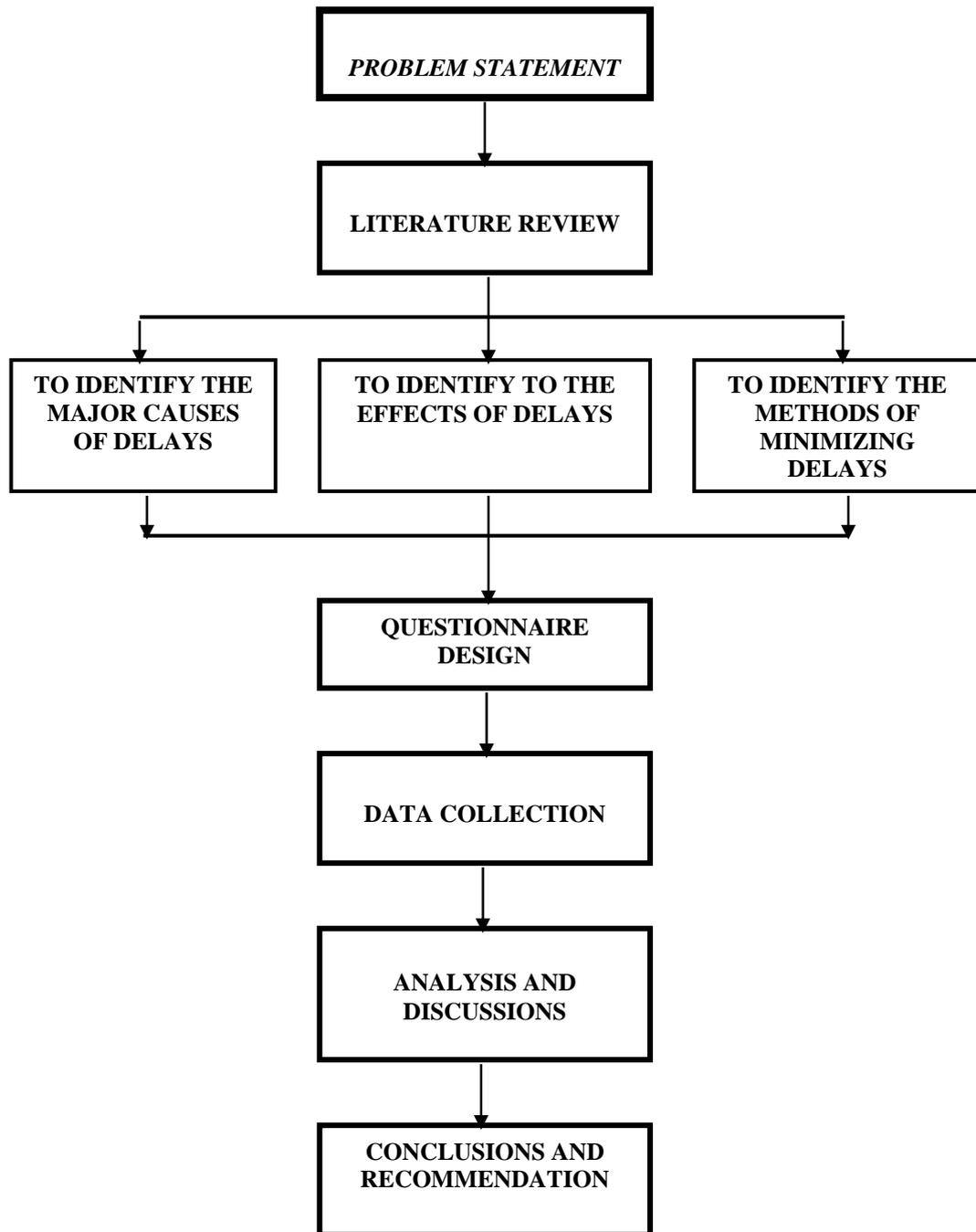


Figure 1.1 Flowchart of Research Methodology