

THE ANALYSIS OF FACTORS CONTRIBUTED TO DELAY AND METHOD TO
ANALYZE THE DELAY IN CONSTRUCTION PROJECT

MOHAMMAD SOLHI BIN MOHAMMED
AA 06036

A report submitted in partial fulfillment of the
requirements for award of the degree of achieving
Bachelor of Civil Engineering.

FACULTY OF CIVIL ENGINEERING & EARTH RESOURCES
UNIVERSITI MALAYSIA PAHANG

NOVEMBER 2010

ABSTRACT

Delay is one of the major problems in construction industry. Therefore, it is common for construction project to encounter delays. There are various factors identified in the project life cycle that will influence the construction time, thus leading to delay. Analyzing the various causes that contribute to project's delay is an important task to resolve it. Thus, the aim of this study is to identify the contribution factors of delay and highlight a common method for analyzing delay in construction project. Data is gathered from respondents of questionnaire survey who were involved in construction project. Microsoft Excel software was used to analyze the data collected in terms of agreed percentages of respondents and relative index value. From the survey, financial problems were identified as the main factors that lead to the delay in construction projects. As a conclusion, analysis shows that completion of the project on schedule is a difficult task to accomplish due to the complexity, multiparty and dynamic environment of construction. So, various methods have been developed in order to measure the impact of delay. It is established in this study that As-Planned CPM Technique, "But For" Analysis Using As-Planned CPM and Impacted As-Built CPM is the most preferred method of analyzing delay for construction projects.

ABSTRAK

Kelewatan adalah salah satu masalah utama yang sering melanda industri pembinaan. Oleh sebab itu, setiap projek pembinaan perlu berhadapan dengan masalah kewangan. Terdapat beberapa faktor yang telah dikenalpasti dalam mempengaruhi tempoh masa pembinaan semasa kitar hayat projek dan seterusnya menyebabkan kelewatan berlaku. Penganalisan terhadap setiap faktor tersebut adalah sangat penting bagi mengatasi masalah kelewatan ini. Oleh itu, matlamat utama kajian ini adalah untuk mengenalpasti faktor-faktor yang menyumbang kepada kelewatan dan mengenalpasti kaedah-kaedah menganalisis kelewatan yang biasa digunakan dalam projek pembinaan. Pengumpulan data dilakukan dengan mendapatkan maklum balas daripada responden berdasarkan kajian soal selidik yang dijalankan kepada pihak yang terbabit secara langsung dalam projek pembinaan. Perisian Microsoft Excel digunakan untuk menganalisis data yang telah dikumpulkan dengan mendapatkan nilai peratusan setuju responden (kaedah analisis frekuensi) dan juga nilai indeks relatif. Daripada tinjauan kajian, didapati bahawa masalah kewangan merupakan faktor utama yang menyumbang kepada kelewatan dalam projek pembinaan. Sebagai kesimpulan, kajian menunjukkan bahawa penyiapan projek mengikut jadual yang ditetapkan adalah sukar untuk dipenuhi disebabkan oleh ketidaktentuan, kompleksiti, penglibatan banyak pihak dan keadaan persekitaran pembinaan yang dinamik. Oleh itu, beberapa kaedah menganalisis kelewatan dibangunkan untuk mengukur kesan kelewatan. Kaedah Perancangan KKK (As Planned CPM Technique), Kaedah Analisis "But For" menggunakan Perancangan KKK ("But For" Analysis Using As-Planned CPM) dan Kaedah Kesan Pembinaan KKK (Impact As-Built CPM) merupakan kaedah menganalisis kelewatan yang diterima dan biasa digunakan dalam projek pembinaan di Malaysia.

TABLE OF CONTENTS

CHAPTER	ITEM	PAGE
	TITLE	i
	SUPERVISOR DECLARATION	ii
	STUDENT DECLARATION	iii
	DEDICATION	iv
	ACKNOWLEDGEMENT	v
	ABSTRACT	vi
	ABSTRAK	vii
	TABLE OF CONTENT	viii
	LIST OF FIGURE	xiii
	LIST OF TABLE	xiv
1	INTRODUCTION	
	1.1 Introduction	1
	1.2 Background of Research	4
	1.3 Problem Statement of Research	5
	1.4 Objectives of Research	5
	1.5 Scope of Research	6
	1.6 Justification of Research	7

2	LITERATURE REVIEW	
2.1	Delays in Construction Projects	8
2.2	Definition of Delays in Construction Projects	10
2.3	Classification of Project Delays	11
2.3.1	Classification based on Delay Sources	12
2.3.2	Classification based on Delay Time Period	14
2.3.3	Compensability	16
2.4	Conclusion for Delays in Construction Projects	20
2.5	Method of Analyzing Delay in Construction Projects	21
2.6	Project Planning and Scheduling	21
2.6.1	Scheduling Techniques	22
2.6.2	Critical Path Method (CPM)	23
2.6.3	Process Planning and Scheduling Project	24
2.7	Introduction to the Schedule Delays	25
2.8	Method of Analyzing Delay	26
2.9	Analyzing Delay Procedures	30
3.0	Conclusion	33

3 METHODOLOGY

3.1	Introduction	34
3.2	Research Methods	35
3.2.1	Literature Review	35
3.2.2	Empirical Study	36
3.3	Questionnaire Method	37
3.3.1	Questionnaire Survey Procedure	37
3.3.2	Study Population Survey	38
3.3.3	Questionnaire Form Design	38
3.3.4	Questionnaire Distribution	41
3.4	Data collection	42
3.4.1	Data collection problems	42
3.5	Data analysis	43
3.5.1	Frequency Analysis	43
3.5.2	Relative Index	45
3.6	Conclusions	46

4	DATA ANALYSIS AND DISCUSSION	
4.1	Introduction	47
4.2	Data Analysis	48
4.3	Analysis Part B (1): General Information	48
4.3.1	Analysis on Distribution of Feedback Questionnaire	48
4.3.2	Analysis of Company Background	49
4.3.3	Analysis of Project Background	51
4.4	Analysis Part B (2): The First Objective Analysis	54
4.4.1	Analysis of Delay Factors	54
4.4.2	Discussion of Delay Factors	59
4.5	Analysis Part B (3): The Second Objectives Analysis	65
4.5.1	Analysis of Method Analyzing Delay	65
4.6	Conclusion	69
5	CONCLUSION AND RECOMMENDATION	
5.1	Introduction	70
5.2	Conclusion of The Objective	71
5.2.1	To Identify The Factors That Contributes to Delay in Construction Project	71
5.2.2	To Identify Methods of Analyzing the Delay in Construction Projects	73
5.3	Research Contribution	74
5.4	Recommendation	75
5.5	Final Conclusion	77

REFERENCES	78
APPENDIX	80

LIST OF FIGURES

FIGURE	TITLE	PAGE
2.1	Classifications of Project Delay	11
2.2	The Process of Planning and Scheduling Projects	24
3.1	Relative Index	45
4.1	Percentage of The Returned Forms Distribution	49
4.2	Percentage of Company's Role	50
4.3	Percentage of Project's Development	51
4.4	Percentage of Project Delays	52
4.5	Percentage of Stage of Project Delay	53
4.6	Graph of Relative Index- Factors of Delay in Construction Project	57
4.7	Percentage Agree Graph - Factors of delay in construction projects	59
4.8	Graph of Relative Index - The methods to analyze the delays in construction projects	67
4.9	Graph Percent Agree - Method of analyzing delay in construction projects	68

LIST OF TABLE

TABLE	TITLE	PAGE
3.1	Classification of Likert Scale for Part 2	40
3.2	Classification of Likert Scale for Part 3	40
3.3	Scores five-level Likert scale to three levels	44
4.1	Factors that contribute to delay in construction project in accordance with the relative index	55
4.2	The factors that contributed to delays in construction projects according to agreed percentages	58
4.3	Methods to analyze the delays in construction projects in accordance with the relative index	66
4.4	Methods to analyze the delays in construction projects according to agreed percentages	68

CHAPTER 1

INTRODUCTION

1.1 Introduction

In reality, the construction sector is one of the most important and serves as a prime mover in economic development and growth of the country. In developing countries, the construction sector contributed the highest percentage. For example, in 2005, the construction industry has been delegated to a rate of 5.5% of Gross Domestic Product (GDP) of 9.5% and the need for the workforce to upgrade the country towards a modern developed nation status.

Following advances in science and technology, the construction becomes more systematic and complex. Sophisticated approach is necessary to plan and manage construction project activities. In between the rapid development, there are still got weaknesses in the management of a project implementation that hit the construction industry. The most significant problem faced by the construction project is delays.

Delay is an issue that is often raised in almost every construction project. This construction project includes the participation of numerous parties, processes, procedures, different phases of the work and information from the public and private sector including the contractual, design, construct and complete. Thus, the ability of a construction project assessed the quality of management, soundness of financial resources, strengthening the organizational structure, coordinating all field work and systematic cooperation between the workers who will determine the success of a project. But the delays occurring which will impact negatively on the overall operations and project management.

By the case, it is the responsibility of all parties to study, analyze, identify problems and find solutions in the latest renewal of methods and strategies for planning and implementation of projects to control the delay in the project. This indirectly contributes to productivity growth in the construction industry.

In practice, the construction industry will involve the full cooperation of all parties such as developers or referred clients, consultants, contractors, suppliers of construction materials, labor, financial organizations and authorities. All these parties directly or indirectly involved in the overall construction project. Efficiency and productivity in the construction industry can be seen through the cooperation that exists between all parties if all parties together to meet responsibilities in implementing the tasks efficiently in accordance with specifications. With this, delays are often encountered in implementing the project can be reduced.

Apart from the responsibilities of the parties involved, the development of the construction sector should be in line with the latest technology to ensure that this sector is not lagging behind. Thus, technically as well as project delays can be resolved easily and quickly via the method for analyzing the delays in the project refers to the network using software like *Microsoft Project* and *Primavera*.

Thus, to make Malaysia a competitive nation in terms of development and construction, the steps of the existing process improvement should be implemented. All parties should join hands in ensuring that all problems can be addressed in comprehensive, especially the delay in the project is critical. Thus, the expected performance of the construction industry in the years to come will continue to increase global economic situation looks more positive. Therefore, all parties involved in the construction industry should move to plan and promote their respective sectors towards a more effective productivity.

1.2 Background of Research

The delay is a phenomenon that is often encountered in the construction sector and the trend seems to be synonymous in the industry and construction. If this problem persists and there is no mechanism to search for methods of settlement, it can give a big complication to the development of projects and can hinder national development plan economics. Ability to complete the project within the planned period is focused on planning and effective time management in the project.

This is because this issue is often raised in the Cabinet as a result of press reports on the concerns of many government infrastructure projects delayed. A great impact can be seen that the discontent of the people to get comfortable life. As we know, the people are the most important asset for the country. In addition, construction companies lost their credibility as the corporate management of the tap is not successfully completed within the prescribed time delay that occurs when reduced to zero if a flexible management system created by the construction. This means that the expected delay can be analyzed quantitatively by using network analysis systems such as Microsoft Project and others. This is to ensure that the parties involved, especially the contractor to develop the work and planning ahead to create a flexible management system.

In face of these problems, an understanding of the issue of delay should be disclosed to organizations involved in identifying the various ways or methods to reduce delays. Thus, not only the delay should be studied and understood, but methodology is appropriate and effective solutions must also be emphasized because of the delay analysis of certain quantitative methods can help give early and clear expectations about the delay in a project in the future

1.3 Problem Statement of Research

In practice the delay in construction projects in Malaysia is a problem often encountered in implementing the project. Typically, the delay caused by a variety of causes and reasons beyond the contractor or the client's expectations. When the unfortunate problem happens, then the contractor got problems due to delays in completing the work. Therefore, in reducing the delay in completion of the project, there are few alternatives to enable the project to be completed in the agreed time the construction contract. Among them are the use of methods to analyze the delay in project planning and scheduling. With this, the purpose of this study was to identify and analyze the various methods used to analyze the delays in construction projects in Malaysia and the prevalence of their use in controlling the delay in the project.

1.4 Objective of Research

The main goal of this study is to investigate and identify methods to analyze the delays in construction projects and the prevalence of use of the construction project. In achieving the following objectives are identified to facilitate the execution of study and researches goals can be focused between the objectives outlined are:

- i. Identifying factors that contribute to delays in construction projects.
- ii. Reviewing and identifying methods to analyze the delay in construction projects.

1.5 Scope of Research

The scope of the study was intended to narrow the field of research that studies will be planned and implemented effectively. The focused on the study is focused on all activities in connection with the delay in the construction of the building and management. Limitations of the study are:

- i. The study area was involved construction companies selected in Kuantan.
- ii. Construction companies are selected as the respondent is made up of contractors and developers.
- iii. This study is to identify methods used to analyze the delay and the practice adopted in the current construction project and details on procedure rather than the method works.
- iv. Information and data are based on literature review and survey conducted.

1.6 Justification of Research

The study will be undertaken to meet several important visits of interest to serve as a guideline and reference by the parties directly involved in construction projects, especially the contractors. Among the interests are as follows:

- i. Identifying factors that contribute to the delay of construction projects to help the parties involved to coordinate the project management and supervision system and how things work, so order early to ensure that the delay in a construction project can be reduced and subsequently to zero.
- ii. Improving the performance of the construction industry from the perspective of management, supervision, planning and the work efficiency in handling a project together with the competitive ability of international companies in obtaining construction contracts.

CHAPTER 2

LITERITURE REVIEW

2.1 Delays in Construction Projects

The construction sector is one sector which is the backbone to generate economic development. According to the statement, the development of the construction industry is a responsibility that is needed by the country to achieve developed nation status in the near future. Execution by parties and professional organizations involved should be made to realize the vision of the country to achieve developed nation status. Thus, each plan should be implemented with a smart, efficient and timely manner.

Continuation of that, time is one of the most important elements in a construction project. Typically, the period of time is specified as the contractual period in a construction project. Therefore, the term of the contract, the contractor should be responsible for executing and completing the project properly within the time allocated

and agreed upon in the contract. If the contractor fails to complete the project within the stipulated time, the delays can occur. Project delays may occur due to inefficient time management or of the many things that are not anticipated during project implementation.

Thus, common in a construction project to minimize and control the delay or suspension of work. Delays occurred, would indirectly impact on the completion of the project and increase the overall cost of construction operations. Consequently, in the construction industry, a deep understanding of the delay is to be done to ensure early preventive measures can be taken to delay the construction project at the lowest level. Because the delay is said to be in critical condition and often hit the construction industry.

2.2 Definition of Delay in Construction Projects

In general, the word "*late*" or "*delay*" can be defined as an act of delay, delay or postpone the time of the execution of a job. Delays also are acts that are not properly implemented within the stipulated period of time beyond that allocated.

According to the dictionary of the Board, Third Edition (2000), "*Project*" means a work plan or development activities to be performed or in progress. While "*construction*", connotes a physical activity carried out in a project according to plans and specifications. "*Construction*" includes the involvement of many stakeholders, processes, procedures and the different work phases.

Referring to the context of the delay in the construction industry and of the interpretation given, it can be said that the delay in a construction project as a failure to prepare a schedule of planned work from the schedule contract and failure to complete a project with the specifications set by the period of time agreed by the two parties involved in the project refers to the client and the contractor. Eventually lead to a plan of work activity cannot be implemented properly. Through this literature review, concluded that delays in construction projects is an extension of time or time in excess of contractual or exceed the critical date is delayed due to various unforeseen circumstances.

2.3 Classification of Project Delays

In the construction sector, the delay in the project could be existed in various forms and types of its own. Here it can be stated that the delay in the project can be classified according to the source or origin of the delay and the time and compensability. The figure 2.1 below shows a summary of the project depends on the type of delay in each classification.

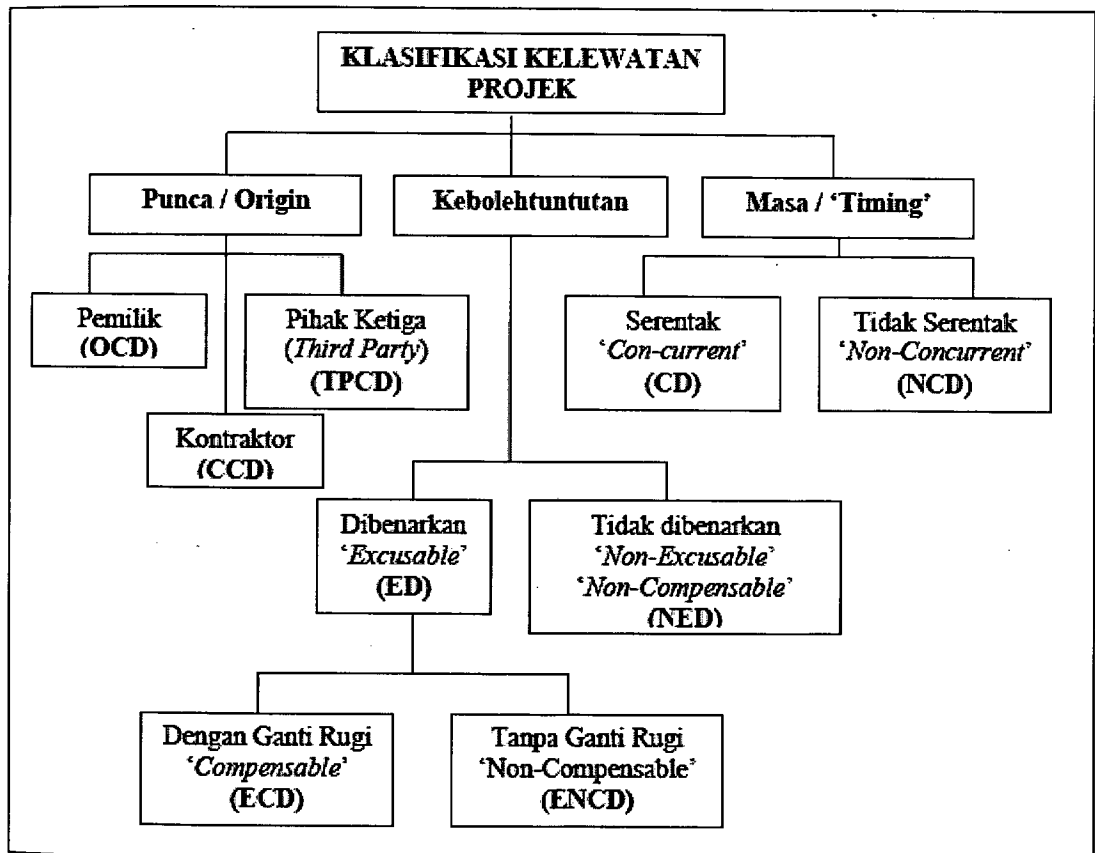


Figure 2.1: Classifications of Project Delay

2.3.1 Classification Based on Delay Source

Project delays can be generated by various causes and reasons origin. Typically, the delay may be due to the responsibility of the client or the owner (Owner Caused Delays), contractor (Contractor Caused Delays) and the third party (Third Party Caused Delays). The third party is another party that is involved directly or indirectly in carrying out construction other than the owner and the contractor such as sub-contractors, designers, suppliers, laborers and others.

2.3.1.1 Factors Delay Caused By Owner.

The owner or the practice is called the developer is building between the parties involved in the influencing factors to delay the project. Among the factors that caused the delay by the owner or client can be divided into four main categories:

- Delays resulting from failure to meet contractual obligations.
- Delays due to changes in the scope of work under a construction contract provisions.
- Delays caused by interference and intervention on the responsibility of the owner of the contractor.
- Delay due to failure to coordinate all activities undertaken by the contractor or sub-contractors, especially for projects involving multiple contractors.

However, it can be concluded that the client or the owner responsible for the provisions contained in the contract. Among them is the owner's responsibility to equip the contractor with site preparation, approval and approval of all relevant travel

documentation, the owner of the obligation to provide financial resources, the owner of responsibility towards these design specifications and contract administration, change of work done and coordinate all activities of the main contractor.

2.3.1.2 Factors Delay Caused By Contractor

The contractor is one of the parties involved in contributing to the delay in the project. Normally the delay is caused by the contractor has a contractor brier efficiency and low skills and lack of experience in implementing a construction project. Here it can be stated that the delay caused by the contractor consists of five main reasons as outlined:

- Failure to assess the site or design specifications
- Contractor management problems
- Lack of resources such as finance, construction materials and labor.
- The efficiency of low-skill and contractors.
- Failures and delays by nominated sub-contractor.

2.3.1.3 Factors Delay Caused By Third Parties

Third party is involved in the project other than the contractor and the owner of such building material suppliers, designers and others. Delay the project as well not only because of man, but one major factor that delays are bad weather conditions as well as causing delayed construction work.

For example in Malaysia, the monsoon season in late cause continuous rain. Therefore, the construction may be delayed as concrete work, painting work and so forth. In addition, due to project delays can also be seized at the shortage of workers is not planned. Extension of time granted to the contractor if the delay in an activity affecting the whole project period.

Among other sources of delay caused by third parties are difficult to obtain loans from financial institutions, poor weather and unusual, such as floods, errors in the plans specifications, labor strikes, public protests, the economic crisis, government policies and acts, force majeure and others.

2.3.2 Classification Based on Delay Time Period

Project construction period is an element that can create a kind of delay in construction projects. Therefore, the relationship of factors and the type of delay can be broken down into two categories of Delay Series or the simultaneous (Serial / concurrent delay) and delay or Not Simultaneous Independent (Independent / Non-Concurrent Delay)