Effectiveness of Time Planning in Construction Projects

by

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CERTIFICATION OF APPROVAL

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Civil Engineering Programme

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Approved by,

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UNIVERSITI TEKNOLOGI PETRONAS

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CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

_____

(DAYANG NAZARIAH BINTI ABANG MADZHI)

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ABSTRACT

Time planning is one of the keys in achieving a successful project completion apart from cost, resources and quality planning. Poor time planning has continued to hinder many construction projects from gaining profitability and success. The effectiveness of time planning is measured by the impacts of proper time planning to other aspects in a project. Its effectiveness can be measured in terms of overall cost, resources and quality of the project. This research is conducted to recognize the importance and impacts of time planning in construction projects. Problems related to time planning are also identified. The author includes improvement in time planning that can be implemented in construction projects in the future. In order to obtain data, survey questionnaires and interviews are conducted to different management levels in companies involved in construction projects and the Integrity & Engineering Department of PETRONAS Carigali Sdn. Bhd. (Sarawak Operations). In order to determine the effectiveness of time planning in construction projects, a statistical analysis will be carried out, and followed by possible suggestions to mitigate the problems of time planning by interviewing selected respondents. The improvement measures derived from this research are hoped to enhance rate of project success in the construction industry in Malaysia.

Although there were several time planning studies in the past prior to this research, the effectiveness of time planning is diverse, depending on the industries and countries. Therefore, this research of time planning in construction projects in Malaysia is unmatched. In fact, it has a huge importance for an effective construction project management. Finally, the author concludes this research and provides suitable recommendations.

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CHAPTER 1

INTRODUCTION

1.1 Background of Study

Project planning is the key to any successful projects including construction projects. It serves as a base for several important functions such as scheduling, estimating, quality control, resourcing and safety management. A project is defined as "a temporary endeavour undertaken to create a unique product, service, or result" (Project Management Institute, 2008). The term *construction project* brings different definitions to different people. According to Ritz (1994), even though each construction project is unique, it has a common attribute whereby the project works against schedules and budgets to produce a precise result. He also added that the construction project team cuts across many organizational and functional lines that involve practically every department in the company.

"Planning establishes, on the basis of a detailed study of job requirements, what is to be done, how it is to be done, and the order in which it will proceed" (Clough, 1972).

Project planning is defined as "the process of choosing the one method and order of work to be adopted for a project from all the various ways and sequences in which it could be done" (Antill & Woodhead, 1982). Meanwhile, the Project Management Institute (2008) defines project planning as "those process performed to establish the total scope of the effort, define and refine the objectives, and develop the course of action required to attain those objectives". In Fisk's view, planning is simply an application of the thought process that must be entered into before the actual scheduling begins (Fisk, 1978).

The objectives of a project are to create a quality project, completed on time, within budget and in a safe working environment (Newitt, 2009). Time is one of the crucial factors contributing to the success of a project. The goal of time planning is to ensure that a project can be completed successfully within the time frame and achieve the objectives as what Newitt suggested. Both positive and negative impacts can be clearly observed in a construction project depending on how well time is planned, managed and utilized. The focus in this research is the effectiveness time planning in construction projects and how it affects other aspects of the project.

1.2 Problem Statement

1.2.1 Problem Identification

According to Department of Statistics, Malaysia, in year 2010, the construction industry contributed only around 3% to the Gross Domestic Product. However, due to the interaction with other industries such as mechanical engineering and tourism sector, it becomes an important part of the Malaysian economy. Therefore, the construction industry can be classified as a substantial economic drive for Malaysia. Later on, in 2011, the growth of the construction industry increased by 14.7% (2010: 18.9%) and was a major contributor to the growth of domestic-orientated industries. This shows that construction projects play an important role in developing the country's economic growth. It can be classified as a substantial economic drive for Malaysia. 17.3% of government contract projects in Malaysia were considered sick, which means they are delayed by more than three months or abandoned completely. Large construction projects in Malaysia also experience delays in completion. For example, Berjaya Times Square located in Bukit Bintang, which was delayed for four (4) years before it was officially opened in 2003t. Another project is the Miri Crude Oil Terminal (MCOT) Drainage Upgrading Project in Miri which is currently experiencing delay in completion.

The people in the construction industry are aware of the key factors in a successful completion of a project, which one of them is time. In this study, the focus is on time planning in construction projects. The question is, how effective is time planning in construction projects? This research is hoped to determine the effectiveness, as well as the impacts of planning and controlling the project timeline. Any construction projects have a starting point and an ending point where the duration of the project is measured and scheduling is a tool to signify the time planning of a project. An improved time planning is critically needed in order to increase the efficiency and productivity of the construction projects which will lead to a greater economic growth in the construction industry.

1.2.2 Project Significance

Since construction industry plays an important part in Malaysia's economy, it is crucial to improve the efficiency and productivity of the construction projects in Malaysia. Time planning is one of the components of the success criteria in construction projects. By conducting this research, it is hoped that the problems, factors and impacts of effective time planning in construction projects can be identify and discussed. The possible outcome is hoped to aid in increasing the effectiveness of time planning and in return, increase the overall growth of construction industry in Malaysia. The relevancy of this study relates to the Quality, Cost and Time of a project. A project's success is often defined by these three (3) attributes. In order to achieve a project which has an excellent quality, within the budget and is completed on time, PLOC must be implemented. PLOC is the process of Planning, Leadership, Organizing and Controlling.

1.3 Objective

The research focuses on three (3) main objectives, which are:

1. To identify the factors contributing to the effectiveness of time planning.
2. To investigate the problems related to time planning in construction projects.
3. To determine the improvements that can be implemented in the construction industry.

1.4 Scope of Study

This study focuses on the time planning of construction projects in Malaysia and its effectiveness. The key aim is to investigate why time planning fail or succeed and relates to its implementation on site. The research will not only be focused on contractor's point of view but will also include the view of the whole project team as every project team member is involved throughout the duration of a construction project. The study will include the contractors from various companies and also the Integrity & Engineering Department of PETRONAS Carigali Sdn. Bhd. Sarawak Operations. The contents of the study include the time planning identification, the effectiveness of time planning in a construction project, the awareness level of the significance of time planning among the project team members in a construction project.

The questionnaires are prepared to gather data from about 25 respondents voluntarily who are willing to contribute in this study. The target population for this study is people involved in construction projects in Malaysia. In accordance with the objectives and the research hypotheses, two types of multiple choice questions are developed in the questionnaire. They are open and closed-ended questions which are distributed among project managers, functional managers, project team members, contractors, both main-contractors and sub-contractors. In addition, interview with a certain levels of management will be conducted for further analysis.

CHAPTER 2

LITERATURE REVIEW

2.1 Construction projects

Generally, the Malaysian construction industry is categorized into two areas. The first category is the general construction, which comprises residential construction, non-residential construction and civil engineering construction. Special trade works is the second category which includes activities of metal works, plumbing, sewerage and sanitary works, refrigeration and air conditioning works, painting works, carpentry, tiling and flooring works and glass works (Department of Statictics Malaysia). A construction project is a project related to any of these areas in the construction industry. The summary construction industry is shown in Figure 1 below.

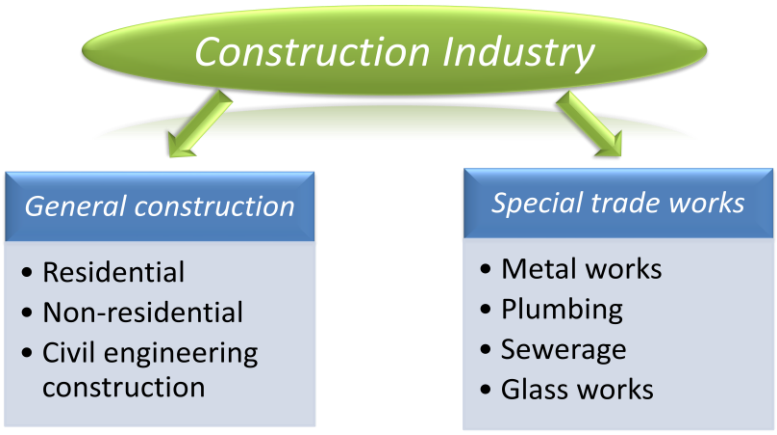


Figure 2.1: The Construction Industry

To separate construction from the service industries, the Bureau of Labor Statistics defines construction as a goods-producing industry. Meanwhile, a project is a human activity that achieves a clear goal against a time scale (Reiss, 1993).

Construction industry in considered as fragmented industry, whereby policy, implementation guideline and practice within this industry are inconsistent among the players involved (CIDB, 2003).

According to Assaf and Al-Heiji (2006), only 30% of construction projects were completed within the scheduled completion dates and the average time overrun was between 10% and 30%.

Looking into the Malaysian construction projects, it is found that there is a significant growth in the construction industry throughout the years. According to Market Watch Report 2012, the construction sector strengthened further by 6.3% during the first half of 2010 (January – June 2009: 2.9%). The expansion was largely due to increased civil engineering and non-residential activities. The prompt implementation of construction projects under the Ninth Malaysian Plan (9MP) and the stimulus package provided by the government contributed largely in this expansion. Later on in 2011, the construction sector expanded further by 3.5% (2010: 5.1%). The growth was driven by the residential and civil engineering sub-sectors (MGCC, 2012).

The types of construction activity in Q1 2012 in Malaysia are summarized by the Department of Statistics Malaysia as in the figure below.

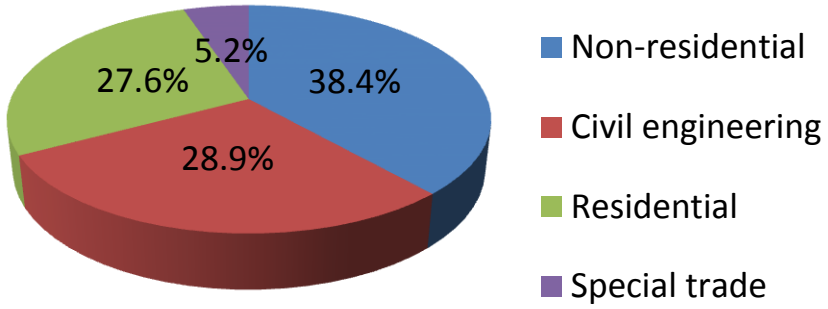


Figure 2.2: Types of construction activity in Q1 2012 in Malaysia

Meanwhile, the performance of construction sector for Q1 2011 –Q1 2012 is summarized as shown in the Table 2.2 below:

Quarter	No. of projects	Value of construction work done (RM '000)	Percentage change (%)	
			(QoQ)	(YoY)
Q1 / 2012	**8,585**	**17,725,906**	**0.4**	**14.2**
Q4 / 2011	8,781	17,661,141	10.1	12.9
Q3 / 2011	8,259	16,037,213	6.6	7.7
Q2 / 2011	7,648	15,040,543	-3.1	-6.0
Q1 / 2011	7,766	15,519,448	-0.8	8.8

QoQ - Quarter-on-quarter
YoY - Year-on-year

Table 2.3: Performance of construction sector Q1 2011 –Q1 2012

In general, the significance of construction projects in Malaysia is huge in the development and economic growth of the country. All these projects are similar in the sense that successful construction projects have a proper planning of time, money and resources before any construction work begins.

2.2 Time Planning

Planning is a precaution where we the unwanted effects or unexpected happenings can be lessen and therefore eliminate waste, confusion and loss of efficiency (Ritz, 1994). Ritz's definition of planning cites the advantages of increased productivity by planning before the start of work. Meanwhile, Kerzner (2003) defined planning as establishing a predetermined course of action within a forecasted environment.

A *time plan* is the itemized working plan for the implementation of the project, which in turn, will produce a detailed and systematic construction schedule. Normally, a work breakdown structure (WBS) will be made by breaking down the

project scope into major work activities and the planned completion date is assigned for each scope of work (Ritz, 1994).

The terms *planning* and *scheduling* are often mistaken to be synonymous when in fact, scheduling is a part of planning process. Planning is the process of considering options and methods to complete a specific task or project. Planning creates a systematic sequence of events, defines the principles to be followed in executing the plan, and describes the ultimate disposition of the results (Clough, 1972).

According to Clough (1972), date calculation is the element to separate scheduling from planning. But scheduling is a component of time planning. He stated that "Project planning is only concerned with dividing the job into its elemental parts or activities and specifying the sequential order in which they are to be done. At this stage (scheduling), a new element is introduced into the planning process: time."

Improper time planning will cause a delay in any construction projects. Delay is defined as a situation where a contractor and the project owner jointly or severally contribute to the non-completion of the project within the original or the stipulated or agreed contract period (Aibinu and Jagboro, 2002).

The effects of delay due to poor time planning are:

i. *Cost Overrun*
ii. *Extension of Time*
iii. *Late payment*
iv. *Rescheduling*
v. *Damage to the company's reputation*
vi. *Loss of productivity and efficiency*

In reality, a schedule is in fact a projection of the planning of time. Scheduling is actually a tool to represent time planning in construction projects and it is essential

to the successful execution of the project. In scheduling, the detailed operational plan is put on time scale in line with the strategic objectives of the project. Fundamentally, planning and scheduling are interrelated.

2.3 Scheduling

Antil & Woodhead (1982) defines scheduling as the determination of timing of operations comprising the project and their assembling to give the overall completion time. Scheduling can be done only after a particular project plan has been defined and modeled in such a way that it can be committed to paper in the form of a network diagram. Meanwhile, in Mubarak's view, scheduling is the determination of the timing and sequence of operations in the project and their assembly to give the overall completion time (Mubarak, 2010). Scheduling can also be described as a plan showing when individual or group activities or accomplishments will be started and/or completed (Kerzner, 2003).

Hinze (2004) concluded that an effective schedule has these attributes:

i. *How the job is constructed is precisely reflected in the schedule.*
ii. *It must be sufficiently flexible to accommodate changes and to predict future implications.*
iii. *Corrections as and when needed are allowed in order to keep the schedule up to date.*

A construction project team benefits from an effective project scheduling. According to Newitt (2009), schedule is used to control various important elements of a project such as cost. The following are a group of reasons for why scheduling is needed:

i. ***Reduce Total Construction Time***

Even though rework is always necessary because mistakes will are often made, excessive causes major delays. Rework due to inadequate advanced planning and scheduling can be avoided by planning the project in advance.

ii. ***Reduce Costs of Labour, Overhead, Interests on Loans, and Capital***

The overhead cost and the interest cost of the project will reduce significantly when the project is completed early. Organizing labour at maximum productivity results in cost saving as well.

iii. ***Provide a Continuous Work Flow***

A continuous work flow can be achieved by a well-thought schedule. A well-scheduled project should experience uniform activity during the entire project, with no critical crisis at the end.

iv. ***Increase Productivity***

Productivity increases with a well-planned schedule as every project team member has an idea of how the project is sequenced. The uniform and orderly process ensures people to know what, when and where to do a specific task or activity.

v. ***Improve Company Image***

A formal schedule, in a long run, improves the image of a company and sets the company apart as a professional organization.

2.4 Scheduling Methods

2.4.1 Bar (Gantt) Chart

According to Popescu & Charoeenngam (1995), a bar chart is "a graphic representation of project activities, shown in a time-scale bar line with no links

shown between activities". The bar chart or alternatively known as the Gantt Chart was originally developed by Henry L. Gantt in 1917. It became popular especially in the construction industry due to its ability to graphically represent the activities of a project on a time scale.

2.4.2 Critical Path Method (CPM)

The Critical Path Method (CPM) was developed in early 1950s and later on was adapted and improved to manage the Polaris Missile Project in late 1950s (Prensa, 2002). CPM is a mathematically based algorithm for scheduling a set of project activities. It is commonly used in all types of projects, including construction projects. This method of scheduling is applicable to any projects with interdependent activities.

Mubarak (2010), states that the preparation of a CPM schedule includes the following four (4) steps:

i. *Determine the work activities by using Work Breakdown Structure (WBS)*
ii. *Determine the durations of the project activities*
iii. *Determine the logical relationships*
iv. *Draw the logic network and perform CPM calculations*

2.4.3 Primavera Project Planner (P3)

Primavera Project Planner or better known as P3 is an extremely popular project management software created by Primavera Systems, Inc. which is used by major construction firms. This software used to create, organize and update the project schedule, tabular and graphic reports.

2.4.4 Microsoft Project

Microsoft Project is a project management software used by project managers from all sorts of background, including the construction industry. The software,

created by Microsoft Corporation is used to create, organize and update the schedule of a project. Reports such as tabular report and bar chart report can also be produced by using this software.

CHAPTER 3

METHODOLOGY

In order to achieve the objectives of this study, some research methodologies and processes are taken into consideration. The suitable methods are implemented in order to obtain the data needed. The data is then analyzed to gain the expected result.

3.1 Project Activities

There are six (6) main activities in performing this study, which comprises of:

1. Background study: Analyze related journals, research studies, technical papers or articles
2. Develop questionnaires for respondents
3. Collect primary and secondary data
4. Analyze the data obtained from the respondents
5. Conclude the result and discussion based on the data findings
6. Thesis writing

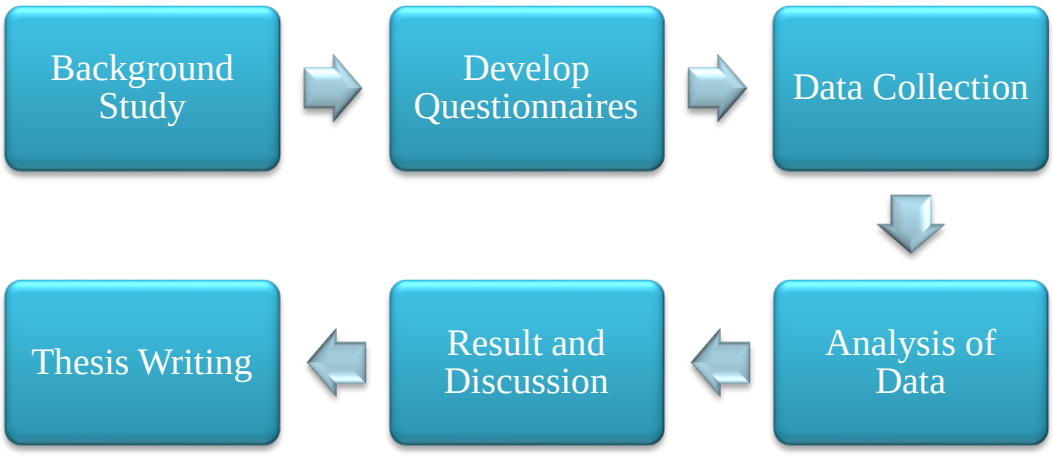


Figure 3.1: Project Activities

3.2 Tools Required

In performing this study, the tools needed to acquire data are as follows:

1. Questionnaires form
2. Interview questions form

3.3 Data Collection

The data used for this study is classified into primary and secondary data. While the primary data is acquired by questionnaires and interviews with certain people in different management levels, the secondary data is collected from resources such as journals, previous paperwork and thesis.

3.3.1 Primary Data

The primary data is collected by distributing **questionnaires** and conducting **interviews** with the people involved in construction projects. In order to get a sample of 20-25 respondents for this study, a list of companies involved in construction project is obtained from Construction Industry Development Board (CIDB). Probabilistic sampling technique (simple random sampling) was used to select the respondents. The main principle of this method is that each individual or sampling unit should have an equal chance of being sampled. The sampling units are therefore selected at random using a table of random numbers. The questionnaire is then distributed to the companies in order to obtain up to 25 responses.

i. Questionnaires

Based on the extensive literature review, the questionnaires are prepared and given to 20-25 respondents ***(Refer Appendix A)***. There are three (3) sections in the questionnaire, as follow:

1. **Section A** consists of the general information of the respondents, the companies and their construction projects.
2. **Section B** focuses on the impact, effectiveness and all important aspects of a proper time planning in construction projects.
3. **Section C** focuses on the respondents' opinion on the problems and issues arising from the time planning practice in the construction industry.

This survey is conducted manually and also via online survey application (distributed by email).

ii. Interviews

It is believed that a deeper and more detailed quality of information could be obtained with interviews, opted as a methodology instrument whereas questionnaires survey could cover a broad range of the study in fulfilling both objectives. In-depth interviews with selected respondents who participated in the questionnaires survey are conducted. The interviewees may come from different management levels in a construction project. The aim of this interview is to determine the effectiveness of time planning and how to improve time planning in a project. This is interview is a semi-structured interview where the interview is flexible, allowing new questions to be brought up during the interview.

3.3.2 Secondary Data

Some of the journals, past paperwork, technical papers and thesis related to this study are referred. These materials are largely obtained from UTP's Information Resource Centre (IRC), library and e-Resources. Besides that, reports from Petronas Carigali Sdn. Bhd. are also attempted to be obtained for the data collection of this research.

3.4 Data Analysis Method

Data obtained from the literature review, survey questionnaire and interviews will be analyzed. For survey questionnaires, data is analyzed by using The Average Index Formula method. This methodology will include charts, tables, and textual write-ups of data. These methods are designed to refine the data so that readers can glean interesting information without needing to sort through all of the data on their own.

In order to determine effectiveness of time planning in construction projects in the company, a qualitative measurement or ranking system is used in the analysis of this study. From the reasoning answers obtained from the respondents, a value of Average Index will be obtained by using the rating for the questionnaire, as follow:
1 – Never; **2 – Rarely**; **3 – Sometimes**; **4 – Often**; **5 – Very Often.**

The Average Index Formula:

$$\textbf{Average Index (AI)} = \sum (ß \times n)/N$$

Where, ß is weighing given to each risk factor by respondents
n is the frequency of the respondents
N is the total number of respondents

With the rating scale (Majid & McCaffer, 1997), as shown below:

- 1 = Never/Strongly disagree (1.00 < Average Index < 1.50)
- 2 = Rarely/disagree (1.50 < Average Index < 2.50)
- 3 = Sometimes/Neutral (2.50 < Average Index < 3.50)
- 4 = Often/agree (3.50 < Average Index < 4.50)
- 5 = Very often/strongly agree (4.50 < Average Index < 5.00)

The factor of effectiveness of time planning with highest Average Index score means that the factor is the most often to occur in construction projects.

Subsequently, the lower Average Index score indicates the time planning which is less often to be effective.

3.5 Result and Discussion

The author will conclude all the results obtained from respondents and literature review. Then, the data is analyzed. The findings and recommendations will be made based on the analysis of the data.

3.6 Report

The report includes the result and discussion from the data obtained. In this report, the literature review, data collection, analysis of data, recommendations, improvements and all issues related to the topic of study are included. Then, the author concludes the study.

3.7 Limitation of Study

There are some limitations from study that cannot be avoided. The problem occurs when the data collection process take place. Some companies or respondents may not give full cooperation when the survey or interview takes place. This may happen due to the company's policy of confidentiality, which prevents the respondents to reveal the information to the public. From their point of view, some information is private and confidential. Other than that, the information obtained from interviews cannot be fully relied upon without any official documents and evidence. Data obtained from the respondents may be edited and altered whether intentionally or not. The process of rectification is conducted in order to solve this problem. Figure 3.2 illustrates the research methodology flow chart.

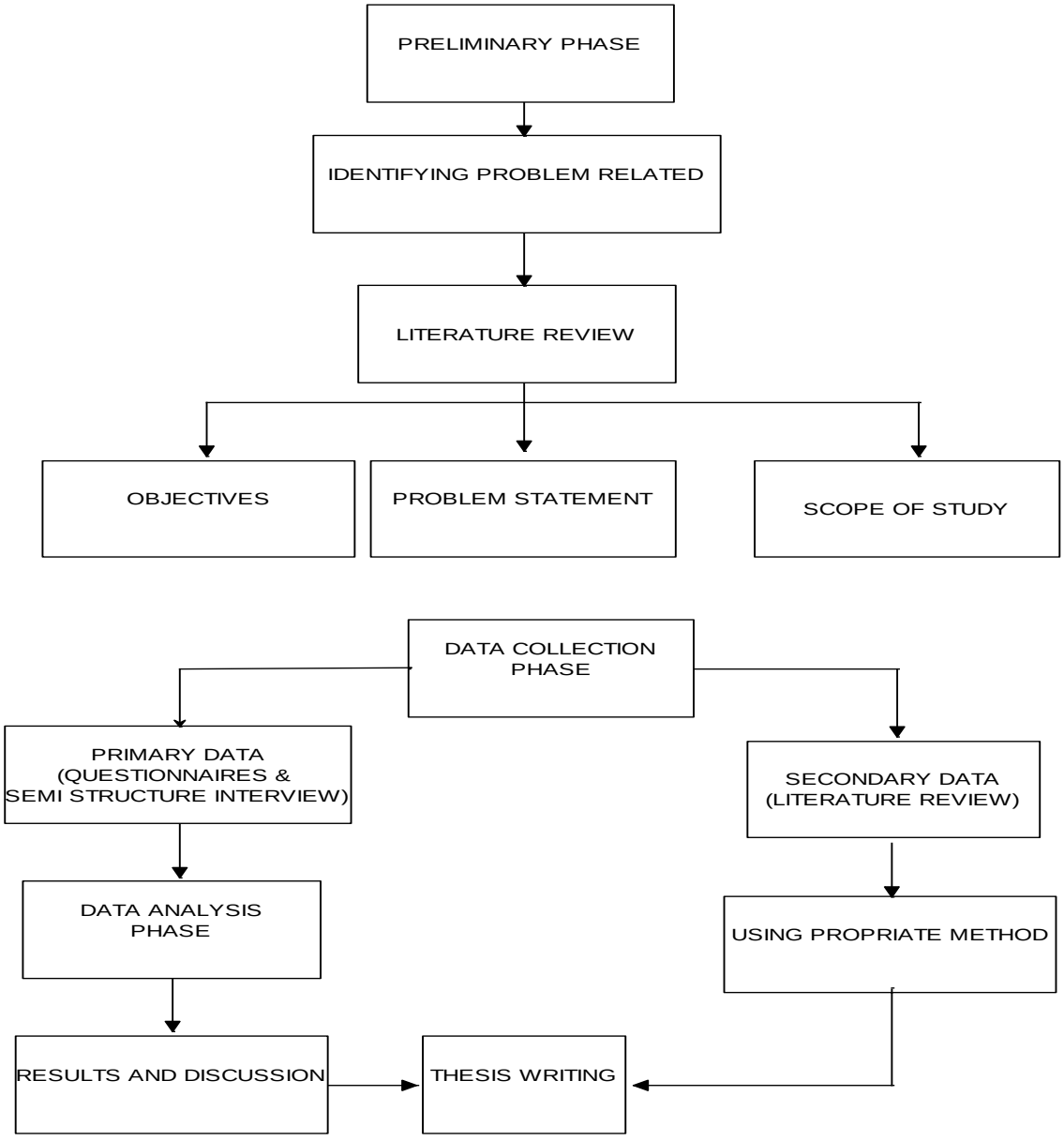


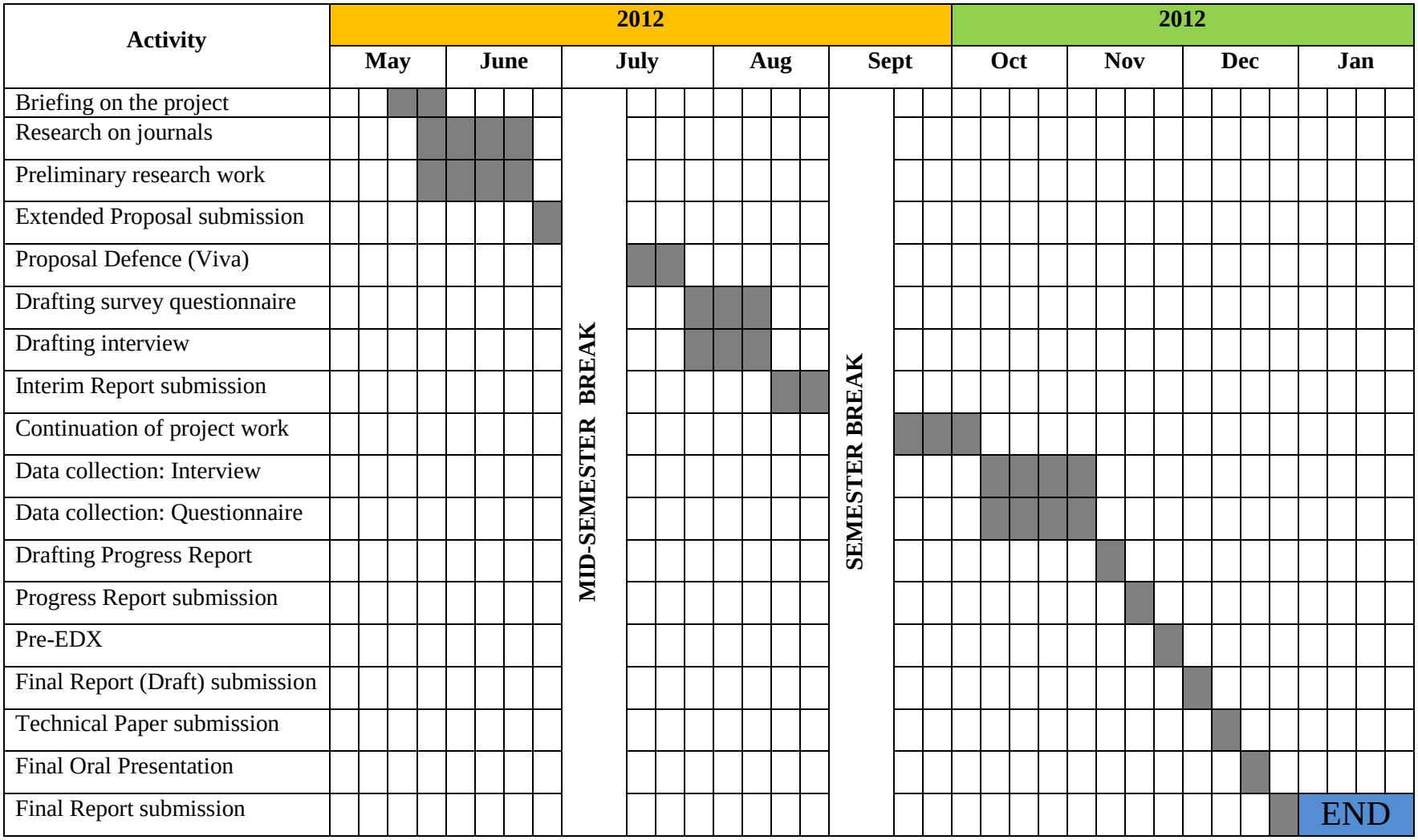
Figure 3.2: Research Methodology Flow Chart

3.8 Key Milestone

The Key Milestone for Final Year Project

No	Activity	FYP	Date (Week)
1.	Selection of project topic	**1**	25 May 2012 (Week 1)
2.	Submission of extended proposal		29 May 2012 (Week 6)
3.	Proposal defence presentation (Viva)		20 July 2012 (Week 9)
4.	Literature review studies and questionnaires development		10 August 2012 (Week 12)
5.	Submission of interim report draft		17 August 2012 (Week 13)
6.	Submission of interim report		24 August 2012 (Week 14)
7.	Distribution of survey questionnaires and interview process	**2**	28 September 2012 (Week 2)
8.	Analysis of data and result		26 October 2012 (Week 6)
9.	Submission of progress report		9 November 2012 (Week 8)
10.	Pre-EDX		30 November 2012 (Week 11)
11.	Submission of final report draft		7 December 2012 (Week 12)
12.	Submission of technical paper		14 December 2012 (Week 13)
13.	Oral presentation		21 December 2012 (Week 14)
14.	Submission of project dissertation		28 December 2012 (Week 15)

3.9 Gantt Chart



CHAPTER 4

RESULT AND DISCUSSION

4.1 Overview

The data collected from the respondents formed the basis for the analysis of the study. The three (3) objectives of the study which are stated as below were to be analyzed based on the data collected from the survey and interview.

(i) To identify the factors contributing to the effectiveness of time planning.

(ii) To investigate the problems related to time planning in construction projects.

(iii) To determine the improvements that can be implemented in the construction industry.

The main data analyzed from this survey is the The Likelihood of Time Planning Effectiveness Factor to Occur in construction projects. The effectiveness factors are categorized by Natural Environment, Government and Policy, Communication & Planning Skills, Economic and Human. Each category is further divided into four (4) to six (6) effectiveness factors (EF).

4.2 Profile of Respondents

The first section in the questionnaire contained the respondent's profile. The information to be provided by the respondents consisted of respondent's:

1. Name, gender and age
2. Working experience in construction industry
3. Job position
4. Highest education
5. Type of construction project

Study was performed towards the construction projects in Malaysia, with a total of twenty-one (21) respondents, who are currently working in different companies. PETRONAS Carigali Sdn. Bhd. Sarawak Operations (PCSB-SKO) is among the companies involved in this survey. While the respondents are from various departments in PCSB-SKO, most of the respondents are from Pipelines & Structural Section, under Integrity & Engineering Department. Another company that participated in this survey is a construction company, Impian Zaman Sdn. Bhd., based in Kuching, Sarawak.

Based on the survey, fifteen (15) out of twenty-one (21) respondents are male. This means the majority of respondents are male which accounts for 72% of the overall respondents. The age of the respondents varies from 25 years old to over 50 years old. The summary of the respondents of different age group is shown in the Figure 4.1.

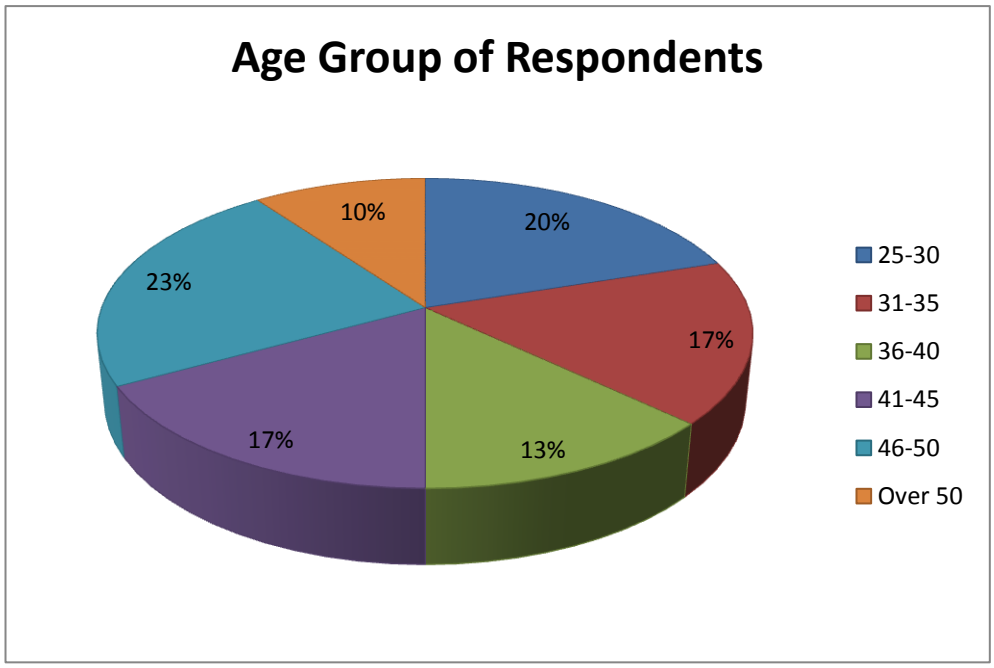


Figure 4.1: Age Group of Respondents

Meanwhile, most of the respondents in the survey have less than ten (10) years of experience of working in the current company. The survey was distributed to various departments and also to different levels of management involved in construction projects. The survey was distributed in such way to obtain an accurate data which covers different working levels and backgrounds involved in a construction project. This includes project engineers, consultants, contractors and also sub-contractors as in Figure 4.2.

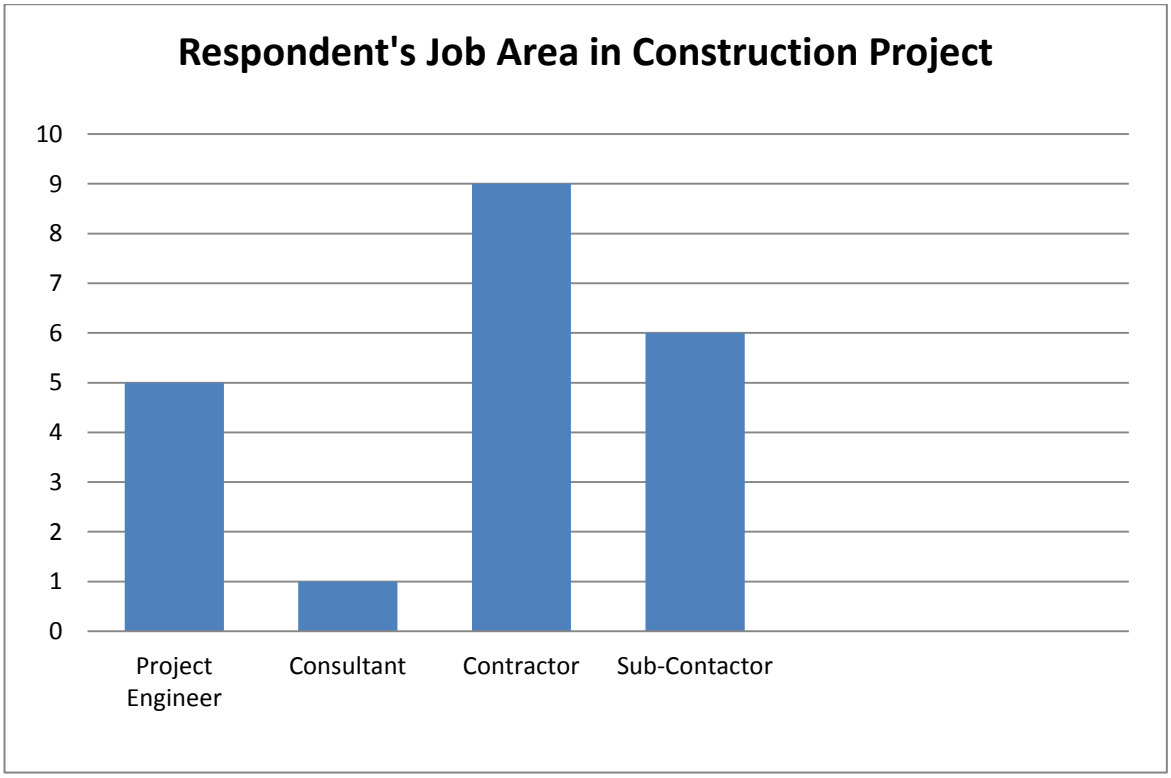


Figure 4.2 Respondent's Job Area in Construction Project

From the survey, eleven (11) respondents working in construction projects have Bachelor's Degree. Two (2) respondents have Master's Degree and only one (1) respondent has Ph.D. as their highest education. Meanwhile the rest have other lower qualifications such as Sijil Pelajaran Malaysia (SPM), Technical Certificate or Diploma as their highest education. The summary is shown in Figure 4.3.

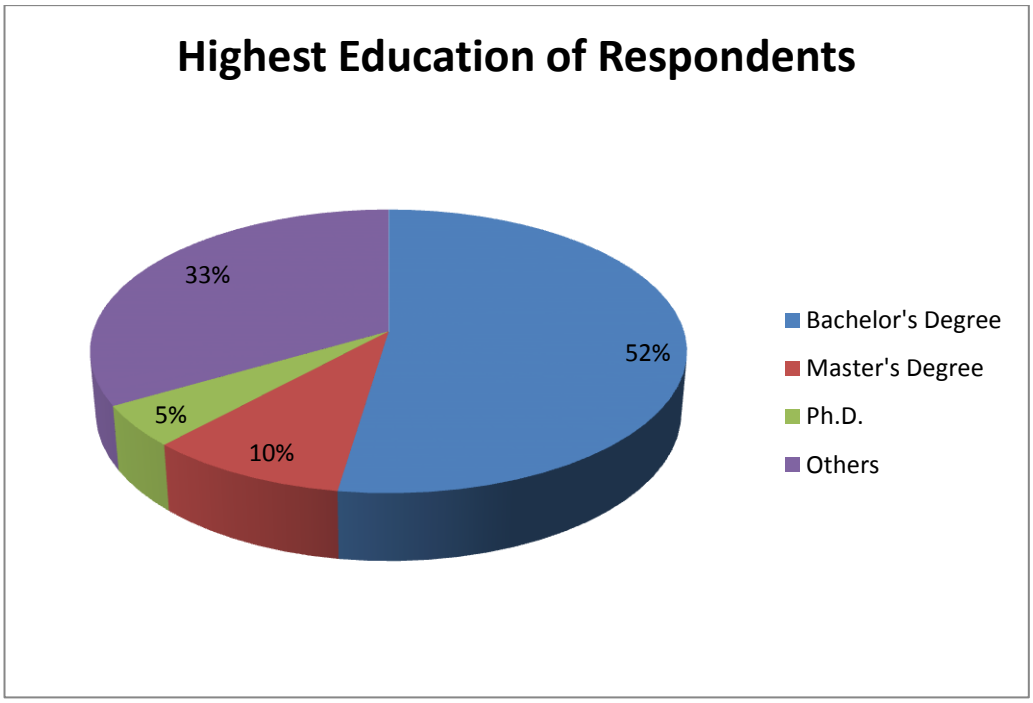


Figure 4.3: Highest Education of Respondents

As for the types of construction project the respondents are involved in their current company, the survey shown different types of construction project. The types of construction project as indicated in Questionnaire Form are as follows:

i. Residential
ii. Office building
iii. School/University building
iv. Shopping mall
v. Bridge
vi. Road
vii. Drainage
viii. Offshore structure
ix. Others

4.3 Summary of Time Planning Effectiveness Factor

According to the survey, the top effectiveness factor falls to Improperly Planned Schedule (EF-13), ranking at 1, which belongs to Communication category. Whereas the rest of the Top 10 Most Occurring Time Planning Effectiveness Factors are as follows:

Rank	Effectiveness Factor	Average Index
1	Improperly Planned Schedule **(EF-13)**	4.11
2	Planners Lack Experience in Handling Construction Project **(EF-11)**	3.97
3	Economic and Financial Crisis **(EF-18)**	3.85
4	Conflicts between Parties Involved in Construction Project **(EF-25)**	3.66
5	Long Bureaucratic Project Approval Process **(EF-5)**	3.42
6	Faulty Machineries **(EF-20)**	3.31
7	Low Credibility of Financier **(EF-19)**	3.25
8	Unusual Weather **(EF-1)**	3.16
9	Inadequate Coordination among Contractors **(EF-10)**	3.08
10	Poor Performance of Contactors/Workers **(EF-21)**	2.94

Table 4.4: Summary of Top 10 Effectiveness Factors

The summary of Top 10 Most Occurring Effectiveness Factors according to the survey is shown in Table 4.4 where they factors come from all different categories. In the next section, the Top 5 Time Planning Effectiveness Factors will be analyzed and discussed further.

4.4 Analysis of Top 5 Time Planning Effectiveness Factors

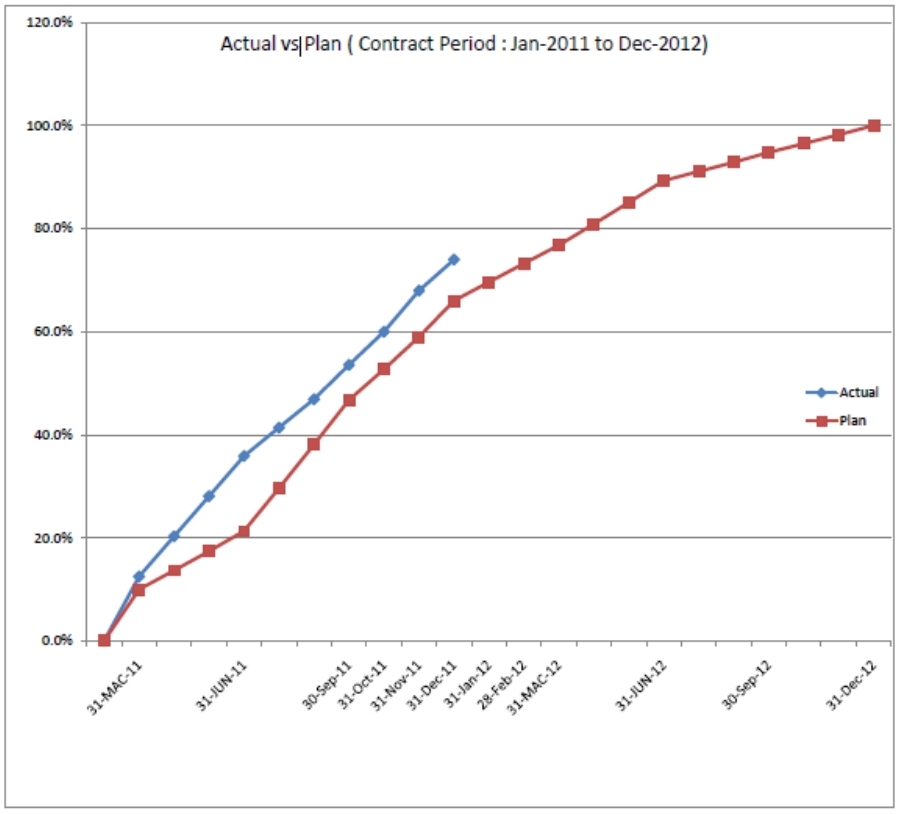
4.4.1 Improperly Planned Schedule (EF-13)

Based on the survey conducted, the effectiveness factor most likely to occur is Improperly Planned Schedule (EF-13) with average index of 4.11. A proper scheduling is the most crucial part in this study. Time planning is one of the key elements in contributing to the success of construction project. When an accurate schedule is failed to be produced, it affects the overall progress of the project. When the schedule produced is not relevant to the actual time needed to do a certain activity in the project, the project will be experiencing delay according to the planned schedule. Thus, the scheduling must take the average actual time needed for a particular activity in construction project into account (i.e. Preliminary Design Stage, Detailed Design Stage, Construction, etc.).

However, a poorly planned schedule cannot be the only reason behind the delay of the construction project. Sometimes, even when an excellent schedule is produced, time the planning is still not effective due to the failure to implement the planned activities. Therefore, this factor affects the construction project largely but in order for time planning to be effective, the project implementation must adhere to the properly planned schedule. An excellent schedule affects the time planning effectiveness to facilitate the flow of the project. Figure 4.5 shows an example a properly planned schedule, which is the S-Curve of the actual progress vs. planned schedule of MCOT Shoreline Protection Project under PETRONAS Carigali Sdn. Bhd. Sarawak Operations.

Project Title : PROVISION FOR MIRI CRUDE OIL TERMINAL (MCOT) SHORLINE PROTECTION
Contract No : SKO/2009/BRE2/971

Date	Actual	Plan
	0.0%	0.0%
31-MAC-11	12.5%	10.0%
	20.3%	13.7%
	28.1%	17.4%
31-JUN-11	35.9%	21.3%
	41.4%	29.6%
	46.9%	38.1%
30-Sep-11	53.6%	46.7%
31-Oct-11	60.0%	52.7%
31-Nov-11	68.0%	59.0%
31-Dec-11	74.0%	66.0%
31-Jan-12		69.6%
28-Feb-12		73.2%
31-MAC-12		76.8%
		80.9%
		85.1%
31-JUN-12		89.3%
		91.1%
		92.9%
30-Sep-12		94.8%
		96.5%
		98.2%
31-Dec-12		100.0%



The Figures for the PLAN Completion are based on the WORK SCHEDULE - 2 YEARS CONTRACT PERIOD (Completion : 30-DEC-2011)

Figure 4.5 Actual Progress vs Planned Schedule

4.4.2 Planners Lack Experience in Handling Construction Project (EF-11)

The second factor most likely to occur is Planners Lack Experience in Handling Construction Project (EF-11). Similar to the first factor most likely to occur, this factor affects the overall progress of the project in terms of optimization of time. Based on the survey, a new engineer/planner/manager who has little experience in handling construction project will find difficulties in planning the project. Due to lack of experience and knowledge, the planner cannot oversee the problems that might arise during the completion of the construction project. The planner will also have difficulties in estimating or allocating time for all activities in the construction project. Therefore, the time planning is not as effectiveness as how a

person with more experience would plan. Planners with more experience can foresee the problems that may arise and can plan the schedule well. Besides that, experienced planners are able to tackle problems quickly as they have dealt with similar situations before, as oppose to new, less experienced planners who have inadequate project management skills.

Project manager and construction manager are involved greatly in this effectiveness factor. These two positions differ in their job scope, whereby in planning a construction project, both positions are critical. Project manager generally has the ultimate power to plan the overall project, monitor the progress and make decisions for the projects construction manager monitor all progress related to construction of the project. The construction manager plans the schedule of the construction phase of the project from start to finish. Therefore, careful appointment of skilled managers to plan the construction project is crucial to accommodate the changes of the schedule and to deal with the time planning accordingly. According to the Project Engineer in Impian Zaman Sdn. Bhd., the effectiveness factor Planners Lack Experience in Handling Construction Project (EF-11) can be observed through the late delivery of the project, which is typical in the construction industry. Kerzner (1989) states that "The major factor for the successful implementation of project management is that the project manager and team become the focal point of integrative responsibility."

4.4.3 Economic and Financial Crisis (EF-18)

Economic and Financial Crisis (EF-18) ranks at 3 among the all other top Time Planning Effectiveness Factors. Economic/Financial factor is critical in any projects. Although the project may have been planned perfectly, it is not as effective as it is supposed to due to economic/financial crisis in the project, both internally or externally. Based on the findings from the survey, the financial crisis occurring in construction project hinder the progress of the project and it is reflected in the planned schedule, whereby the delay will show poor performance and credibility of the parties involved in the project. One of the scenarios showing this situation is when the financier face difficulties in providing the

funding of the construction project, usually a massive scale project. When funding is unavailable, most of the time, we cannot proceed to the next phase of activities planned according to the schedule. Another example related to this effectiveness factor is when the payment by the client to the contractor or consultant is not fulfilled accordingly. In the survey, Mr. Nazrul Hayat, the Project Engineer of a contractor's company addressed this matter as he has been dealing with financial crisis in the company from time to time. According to him, this problem burdens the company because without sufficient fund in the company, the contractor is unable to continue with the next phase of construction activity.

Usually, the late payment from the client forces the project to stop temporarily until the payment is completed. Since the economic aspect has already been allocated to their respective activity in their own time plan, it is crucial that the payment is to be completed to the consultant or contractor according to the planned schedule before proceeding to the next stage in the construction project. Even though the project has a very good schedule, it is not effective if the monetary aspect of the project is not satisfied as it will hinder the project from commencing according to planned schedule.

4.4.4 Conflicts between Parties Involved in Construction Project (EF-25)

In construction projects, both small and large scale, there are several parties involved in making the project a success. Typically, the client, contractor, consultant, sub-contractor and service provider are among the components of people forming the structure of the project. These parties have different roles in completion of the project, where the design stage is handled by the consultant and the contractor is in charge of construction under the Project Manager's instruction. The completion of a project requires input from a variety of groups including the client, the project team, the parent organization, the producer and the end user. Each party has a role in defining and determining success of a project. They all have specific tasks and responsibilities that they must fulfill in order to achieve success (Kumar, 1989).

Conflicts are inevitable as there are numerous parties from clients to contractors, involved in construction project. Conflicts may arise in certain time of the project regarding different issues. As an example, the client does not agree with the proposed design provided by the consultant even after several proposals have been presented, leading to more time consumption in the design stage of the project. The actual time spent on the design stage is more than the planned time allocated, thus time planning is not effective due to conflicts arising in the project. There is also a case where the contractor and client cannot coordinate well. For example, the contractor is unable to build or construct as per detailed design provided by the consultant. Thus, time planning is not effective due to inability for these parties to resolve the issues and consuming more time than what is planned in the schedule.

4.4.5 Long Bureaucratic Project Approval Process (EF-5)

With the average index score of 3.42, the effectiveness factor which is most likely to occur in time planning in construction industry in Malaysia is Long Bureaucratic Project Approval Process (EF-5). According to the interviewed engineer, who is working in PETRONAS Carigali Sdn. Bhd. Sarawak Operations, the approval from the relevant authorities require a long waiting time. In his case, the approval for the acquisition of land from Sarawak Land and Survey Department for a construction project under PETRONAS Carigali Sdn. Bhd Sarawak Operations. The application and approval to lease the land involved many stages of procedures and many levels of authority. When the application is not approved and negotiation is needed, the project experience delay because the process causes the project to go beyond the allocated time frame and not according to schedule. Thus, this factor causes time planning to not be effective.

Long bureaucracy in performing any project could invite bribes and corruptions to come from any individuals or groups who desire to speed up the procedures or their applications. Not only can this reduce the effectiveness of a company in term of budget (because they have to provide extra money in order to achieve their target within time frame), this also can be vital for the country Malaysia

itself if they are to build A good image of the country which is “corruption free” in attracting the infestation.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

From the result of survey as presented in the previous chapter, it can be concluded that the most occurring time planning effectiveness factor in construction projects in Malaysia from rank 1 to 5 are "Improperly Planned Schedule", "Planners Lack Experience in Handling Construction Project", "Economic and Financial Crisis", "Conflicts between Parties Involved in Construction Project" and "Long Bureaucratic Project Approval Process" respectively.

Besides that, factors such as "Faulty Machineries", "Low Credibility of Financier", "Unusual Weather", "Inadequate Coordination among Contractors" and "Poor Performance of Contractors/Workers" are also among the Top 10 Most Occurring Time Planning Effectiveness Factors.

Based on the summary of survey result, the Top 3 out of Top 5 Effectiveness Factors analysis are categorized under "Communication & Planning Skills" and "Economic", showing there is a sense of importance to improve these sectors in construction industry in Malaysia.

Some possible mitigation strategies are developed to be implemented by the participating companies in this study. The summary of time planning mitigation strategies is shown in Table 5.1. The strategies are built not to diminish the factors hindering the effectiveness and feasibility of time planning entirely, but instead to minimize the chance of delays in construction projects experienced in PETRONAS Carigali Sdn. Bhd. Sarawak Operations, Impian Zaman Sdn. Bhd. and other participating companies. It is hoped to reduce the occurrence of these factors that will cause the construction project to experience lag and in the end resulting more difficulties in terms of budget and quality. The impacts of ineffectiveness of time planning in construction projects in Malaysia can be reduced significantly.

Rank	Effectiveness Factor	Strategy
1.	Improperly Planned Schedule (EF-13)	• Prepare a good relevant schedule according to the suitable allocation of time prior to the start of the project.
2.	Planners Lack Experience in Handling Construction Project (EF-11)	• Enhancing the empowerment of PETRONAS's managers in construction projects. • Thorough selection and appointment of planners, managers and team members.
3.	Economic and Financial Crisis (EF-18)	• Thorough selection of financier with high credibility. • Ensure Milestone Payment is completed to the contractors/consultants on time.
4.	Conflicts between Parties Involved in Construction Project (EF-25)	• Organize frequent progress meetings between team members to share ideas, to discuss arising issues and ways to overcome the problems from time to time.
5.	Long Bureaucratic Project Approval Process (EF-5)	• Reformation in the government's administration procedure to increase efficiency. • Establish good working relationship between PETRONAS and its partners with the higher authorities. • To be familiar with the system by understanding the laws and regulations. • Introduction of One Stop Centre for all applications to various government departments, for both online and offline applications.

Table 5.1: Summary of Time Planning Mitigation Strategies

5.2 Recommendation

In order to overcome the problems in time planning in construction projects in Malaysia and to optimize its effectiveness, the author has produced the recommendations for the overall study based on the result and data analysis.

The recommendations are suggested for the benefits of this study such as ways to improve how the research is conducted to increase the accuracy of the data as well as the steps that can be implemented by the participating companies in the construction industry.

5.2.1 Expand the number of respondents

To obtain more accurate result in the future, it is highly recommended to expand the number of respondents by having people from various companies with varying scope of work who have different perspectives of the construction industry. To achieve such, as mentioned in the scope of study, questionnaires are to be distributed to various companies, including contractors and consultants. Moreover, PETRONAS Carigali Sdn. Bhd. Sarawak Operations is also targeted as part of the respondents as they represent the client in the construction industry in Malaysia. In addition to produce a more accurate result for future research, the survey should be conducted towards projects which are owned by major companies involved in construction projects such as Sunway Group, YTL Corporation and SP Setia Bhd. Group.

5.2.2 Further data analysis

Further and deeper analysis should be conducted on how to mitigate the effectiveness of time planning in construction projects. This can be done by conducting extensive interview with selected respondents who are willing to share their knowledge and experience on the subject matter. Besides that a more advanced and widespread research is to be conducted in the future to obtain more accurate result. The fact that this research is considered “too general” can be recovered by performing potential

research with smaller and more specific scope of study of a recently completed large construction project. The target respondents are the people who are working on the project and the chances for the respondents to have fresh memories of the overall project progress are higher. For future research, the target respondents may consist from the top management (e.g. Project Managers, Project Directors) to the lower management (e.g. Subcontractor Workers, Surveyors).

5.2.3 Improvements in the construction industry

Based on the analysis of data for this research, there are several improvements that can be implemented by the companies involved in the construction industry. As the objectives of this study are referred, the factors contributing to effectiveness of time planning are identified as well as the problems related to time planning. The major problems of time planning effectiveness are mostly related to scheduling, economic and financial, human resource and lastly communication factor.

These problems can be reduced when suitable measures are taken. Examples of the recommendation that may benefit the effectiveness of time planning are:

- Proper scheduling is prepared before the start of the project.
- Appointment of personnel/group to monitor the progress of the project and to investigate the problems causing the ineffectiveness of time planning.
- Selection of a reliable financier for construction projects.
- On time Milestone Payment from the client to the contractors or consultants to avoid delay in progressing to the next phase of activities.
- Implementation of One Stop Centre (OSC) for requisition of approval for various applications. Applicants do not need to move from one department to another in order to acquire application approvals.

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Appendices

APPENDIX A: Questionnaire Form

QUESTIONNAIRE

"Effectiveness of Time Planning in Construction Projects"

Objectives:

4. To identify the factors contributing to the effectiveness of time planning.
5. To investigate the problems related to time planning in construction projects.
6. To determine the improvements that can be implemented in the construction industry.

Instructions:

1. Please fill in the space available and tick (✓) in the respective box.
2. All information will be treated as CONFIDENTIAL and shall be used for academic purposes only.
3. All the data information will be on aggregated basis and no individual data will be published.
4. Please be considerate and honest in answering each question.

SECTION A: DETAILS OF RESPONDENT

Instruction: Please write or place a tick (✓) at the space/box provided below

1. Name: ……

2. Gender: [1] Male [2] Female

3. Age (years old): [1] 25-30 [2] 31-35 [3] 36-40 [4] 41-45 [5] 46-50 [6] Over 50

4. Working duration in the current company: [1] Less than 10 years [2] 10 years or more

5. Job position: [1] Project Engineer [2] Consultant [2] Contractor [3] Others (*specify*: ……....)

6. Highest education: [1] Bachelor [2] Master [3] Ph.D.

7. Type of construction project: [1] Residential [2] Office building [3] School/University building [4] Shopping mall [5] Bridge [6] Road [7] Drainage [8] Offshore structure [9] Others (*specify*: …….....…….……)

SECTION B: LIKELIHOOD OF TIME PLANNING EFFECTIVENESS FACTOR TO OCCUR

Instruction: <u>Based on your experience in undergoing projects at your current company</u>, please indicate the Frequency Level of Occurrence of respective time planning effectiveness factor to the statements below by ticking (✓) at the provided box.

Never (N)	Rarely (R)	Sometimes (S)	Often (O)	Very Often (VO)
1	2	3	4	5

I. Natural Environment

		N	R	S	O	VO
No.	**Effectiveness Factor**	**1**	**2**	**3**	**4**	**5**
1.	Unusual weather (heavy rain, draught, etc)					
2.	Natural disaster (flood, earthquake, etc)					
3.	Natural damage to work by third party or sub-contactor					
4.	Environmental protection pressure from other groups/bodies					

II. Governmental and Policy

		N	R	S	O	VO
No.	**Effectiveness Factor**	**1**	**2**	**3**	**4**	**5**
5.	Long bureaucratic project approval process					
6.	Inefficiency of legal process					
7.	Changes in construction policies, laws and regulations					
8.	Government interference					
9.	Corruption/Bribery					

III. Communication & Planning Skills

		N	R	S	O	VO
No.	**Effectiveness Factor**	**1**	**2**	**3**	**4**	**5**
10.	Inadequate coordination among contractors					
11.	Planners lack experience in handling the construction project					
12.	Ineffective method of communication (phone calls, SMS, etc)					
13.	Improperly planned schedule					
14.	Workers do not adhere to the time plan					

IV. Economic

		N	R	S	O	VO
No.	**Effectiveness Factor**	**1**	**2**	**3**	**4**	**5**
15.	Increase of labour cost					
16.	Increase of material cost					
17.	Increase of equipment cost					
18.	Economic and financial crisis					
19.	Low credibility of financier					
20.	Faulty machineries					

V. Human

		N	R	S	O	VO
No.	**Risk Factor**	**1**	**2**	**3**	**4**	**5**
21.	Poor performance of contractors/workers					
22.	Labour strike					
23.	Lack of commitment of workers					
24.	Accidents at workplace/construction site					
25.	Conflicts between parties involved in the construction project					
26.	Dispute with local residents around project site					

SECTION C: CURRENT PRACTICE OF TIME PLANNING

Instruction: Please specify your answers at the space provided below.

1. How does your company manage the effectiveness of time planning as mentioned?

   ……...

   ……..…….

   ……...

   ……...

2. What do you think about the current practice of time planning in your company?

   ……...

   ……...

   ……...

   ……...

3. How to improve the efficiency of time planning in construction projects in your company?

   ……..

   .…….

   ..……

   ……..

-End of questionnaire-