RISK ASSESSMENT PRACTICES IN PROJECT SCHEDULING TO REDUCE POTENTIAL DELAYS

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DEDICATION

Especially for

My loving Mother and Wife

Chandthavathy and Thevakee,

"Thanks for always been there for me".

My beloved sibling

"Thank you for everything".

Supervisor and Friends,

"Thank you for your support and encouragement".

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ABSTRACT

Project delays are getting common nowadays. Project delays are happening in all industries whether it's simple or complex projects. The implication of project delay is impact both owner and contractor. The owner will face delay in operating the facility which will cause loss of expected profit on daily basis. The contractor will have cost overrun and can be faced with liquidated damages or other penalties for finishing late. Therefore, it's important to study potential delays at initial stage of project. Risk assessment is a technique can apply in project scheduling to identify potential risks and opportunities which affect the project schedule. But how efficiently the risk assessment in project scheduling is being practice in Malaysia. The objectives of this study are to identify the level of awareness of risk assessment in project schedule among project managers, evaluate feasibility of implementation of risk assessment on project scheduling, and to demonstrate risk assessment in project scheduling for a selected project. Thirty four (34) questionnaires sets using five-point Likert scale method were collected among project managers from construction, oil & gas, manufacturing and IT industries in Johor, Malaysia to answer the objective 1 and 2. While, objective 3 was answered through a case study on a sample project scheduling. The results of the study shows that knowledge level of the project managers is mostly agreed and feasibility of implementation is moderately agreed by respondent. Therefore, we can conclude that the feasibility of implementation is still lacking and improvements are required to allow the implementation of risk assessment in scheduling. Risk assessment was performed in scheduling for the selected project, total activities in critical path are 21 and 4 of them was identified as medium risk and recommended actions or mitigations for the medium risk were suggested.

ABSTRAK

Kelewatan projek semakin popular pada masa kini. Kelewatan projek berlaku di semua industri sama ada dalam projek yang mudah atau rumit. Implikasi kelewatan projek memberi kesan kepada kedua-dua pihak iaitu pemilik dan kontraktor. Pemilik akan menghadapi kelewatan dalam mengendalikan fasiliti yang dijangka akan mengalami kerugian keuntungan pada setiap hari. Kontraktor akan menanggung lebihan kos dan boleh dikenakan ganti rugi atau penalti lain kerana kelewatan menamatkan projek. Oleh itu, penting untuk mengkaji kemungkinan kelewatan pada peringkat permulaan projek. Penilaian risiko adalah teknik yang boleh digunakan dalam penjadualan projek untuk mengenal pasti potensi risiko dan peluang yang mempengaruhi jadual projek. Tetapi sejauh manakah penilaian risiko dalam penjadualan projek diamalkan di Malaysia. Objektif kajian ini adalah untuk mengenal pasti tahap kesedaran mengenai penilaian risiko dalam penjadualan projek di kalangan pengurus projek, menilai kebolehlaksanaan pelaksanaan penilaian risiko dalam penjadualan projek, dan untuk menunjukkan penilaian risiko dalam penjadualan projek untuk projek yang terpilih. Sebanyak tiga puluh empat (34) set borang soal selidik yang menggunakan kaedah lima tahap skala Likert dikumpulkan di kalangan pengurus projek dari industri pembinaan, minyak & gas, pembuatan dan IT di Johor, Malaysia untuk menjawap objektif 1 and 2. Manakala, objektif 3 dijawap melalui kajian kes ke atas sampel perjadualan projek. Hasil kajian, menunjukkan bahawa tahap pengetahuan para pengurus projek kebanyakannya dipersetujui dan kemungkinan pelaksanaannya disetujui secara sederhana oleh responden. Oleh itu, kita dapat menyimpulkan bahawa kemungkinan pelaksanaan masih kurang dan penambahbaikan diperlukan untuk membolehkan pelaksanaan penilaian risiko dalam penjadualan. Penilaian risiko telah dijalankan ke atas penjadualan untuk projek yang dipilih, jumlah aktiviti dalam tahap kritikal adalah 21 dan 4 antaranya dikenal pasti mempunyai risiko sederhana dan tindakan yang sewajarnya telah dicadangkan untuk mengatasi risiko tersebut.

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LIST OF ABBREVIATIONS

AACE	-	American Association of Cost Engineer
CPM	-	Critical Path Method
IPMA	-	International Project Management Association
ISO	-	International Organization for Standardization
IT	-	Information technology
PERT	-	Program Evaluation Review Technique
PM	-	Project Manager
PMBOK	-	Project Management Body of Knowledge
PMI	-	Project Management Institute
PMP	-	Project Management Professional
PMO	-	Project Management Office
SWOT	-	Strengths, Weaknesses, Opportunities and Threats
UTM	-	Universiti Teknologi Malaysia
WBS	-	Work Breakdown Structure

LIST OF SYMBOLS

a_i	-	Index of a Class
x_i	-	Frequency of Response
AI	-	Average Index
NR	-	Number of Respondent
PR	-	Percentage of Respondent

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CHAPTER 1

INTRODUCTION

1.1 Study Background

A project is a unique, transient endeavour, undertaken to achieve planned objectives, which could be defined in terms of outputs, outcomes or benefits. A project is usually deemed to be a success if it achieves the objectives according to their acceptance criteria, within an agreed timescale and budget. Project management is the application of knowledge, skills, tools, and techniques to project activities to meet the project requirements.

Project planning is very important to project to meet the project objectives. The result of planning effort are the project management plan and project documents that will guide the execution and control the project. Every team member will able to get clear understanding and guidance throughout the project if proper plan was made.

Malaysia is booming and number of projects are increasing on every year. Especially, Malaysia's mega infrastructure projects are expected to boost the country's economy by more than 50% to RM 2 trillion in the next seven to eight years. The projects include the High Speed Rail, the Pan Borneo Highway, East Coast Rail Link, Bandar Malaysia and Vision Valley. Malaysia also wisely investing in several sectors as Manufacturing, Oil & Gas, Agriculture, IT and etc. So, number of projects in Malaysia are increasing yearly.

A study shows that time over run is more critical where only 20.5% projects completes on time in public sector and 33.35% in private sector projects (Endult *et al*. 2009).

Complete the projects on time and on budget is a very challenging task. Whatever the size of the project which is large or small, the project manager is to be highly skilled to execute the project. Remember that, giving importance or focus on the project scope, schedule, cost and resources will increase the chances of the project success and the ability to identify and manage the risk will equally contribute to the success of the project.

Triple constrain is a term that originally referred to the three competing project constraints (Cost, Time and Scope) within which the projects are performed. If we change one, it will affect another. Example, if the project duration increases, it would lead to increase the project cost as well. So, time is the one of the most important factor for project success.

A nature of experience project manager is to perform the risk management in early stage of the project. The experience project manager will identify the potential risk in advance by performing brainstorming together with the project team and continue to produce a plan to face any risk at many situations. We able to minimize the negatives impacts during the risks occurs by effectively identifying them and prepare in advance for the risks. During at planning stage which is at beginning of project, it's very important for the project manager to evaluate whether the stakeholders are prepare for contingency reserve to increase of budgeted cost, time and resources when the risk occurs.

Risk management has been one of the major concerns of executives and professionals involved with projects today, especially after the financial crisis that shook the world in 2008. The results of ex-post assessments of project or even verification of loss business opportunities for companies are clear signals that this evidence has become more intense.

Risk management can be treated as an essential element for creating value to a project and improving project performance in terms of cost, time and quality. However, systematic risk management is not implemented in most of industries in

Malaysia. Consequently, this situation can ultimately lead to project failure in terms of cost overruns, schedule delays and poor quality performances.

1.2 Problem Statement

Number of projects delay in Malaysia is increasing drastically. One of the cause for project delayed found in research by Hamzah *et al.* (2011) is inadequate planning and scheduling. So, scheduling is playing major role in preventing of time overrun. The project schedule help project managers to bring their projects on time.

A recent study from Zidane & Andersen (2018) described the top ten common factors of delay in construction projects. The author identify ten common factors of delay which are: changes in design during project execution; client delaying payment to contractors; lack of planning and poor scheduling; inadequate management and supervision at site; improper or incomplete engineering design; contractor has poor experience in construction methods and approaches; financial problems facing by contractors; financial problem facing by client/sponsor/owner; shortages of resources such as equipment's, machinery, manpower and etc; and unskilled labors and poor productivity. A recent study too shows that poor planning and scheduling is one of the factor for the delay.

Haron *et al.* (2017) has studied on project management practice and its effects on project success in Malaysian construction industry. The outcome of the study showed that minimum practice of the project management practices, preferred an ad hoc approaches because of high cost, absence of knowledge in project management and find troubles in real world modelling. The respondents are identify the widely using tools and techniques in project management are Gantt Chart, Critical Path Method and Cost Benefit Analysis because these are simple and user friendly to use. Also shows very lease practice in risk assessment.

Refer to the study Gebrehiwet & Luo (2017), has confirmed that ineffective project planning and scheduling is one of the cause for project delay and categorized under top 10 list. The same study also explain that the construction projects experienced 70% of time overruns.

As we can see, some recent studies are shows that the project delay is cause by poor project scheduling and limited use of PM practices include risk assessments. Important is project managers should focus on project scheduling from initial of the project to avoid delays. One of the way for the project manager to ensure their project scheduling is adequate and efficient by performing a risk assessment in project schedule.

A risk assessment in project schedule will help the project manager - Hulett (1995);

- verify the schedule duration determined by the CPM approach
- Quantify the likelihood of overrunning the project schedule
- Highlight the likelihood of large potential overruns
- Review competing bids for feasibility in meeting required dates
- Establish a contingency to reduce risk to an acceptable level
- Identify the source of potential schedule overrun problems
- Examine the benefit of risk management actions
- Monitor the changing risk in the project at routine status updates

Do Project Managers understood the importance of risk assessment? Paying attention to uncertainties during the project, making use of the risk management techniques and deeply understand the project environment are critical success factors of the project. Failure of risk assessment in project during initial stage can bring great impact to the project. Especially risk assessment during preparation of project schedule. One of the important and key tool in in project management is project scheduling which is used in project planning, effective execution, monitoring and reporting. Can obtain some level of confident by having an effective project schedule.

Project managers' awareness on project schedule risk assessment is very important and equally important is how effectively they are practicing it.

Do the Project Managers practice the risk assessment on project schedule at planning stage? Do they aware of the importance of risk assessment at planning stage? These questions will be answered by approaching the project managers on field to get feedback on their awareness of risk assessment and how effectively they are implementing it in project scheduling. This assessment is valuable to project manager because its provide overview of importance of risk assessment in project schedule. According to the author's review, this study was not discussed by the researchers before. Therefore, it is timely for this kind of topic to be conducted by the author. This study is also significant to assist the project manager in all industries to identify the feasibility of implementation of risk assessment in scheduling and broadens their responsibility on implementations.

1.3 Aim and Objectives of Study

This research aim is to assess the current practice of risk assessment on project schedule in Malaysian. Objectives of this research as listed below;

I. Identify the level of awareness of risk assessment in project schedule among project managers
II. Evaluate feasibility of implementation of risk assessment on project scheduling
III. Demonstrate risk assessment in project scheduling for a selected project

1.4 Scope of Study

This research study focused on practices of risk assessment in Project Schedule during initial stage. The research will conduct in Peninsular Malaysia. Discussion of this study will look into level of awareness of project managers in project scheduling risk

assessment; feasibility of implementation of risk assessment in project scheduling, evaluate the awareness of project manager & feasibility of implementation and demonstrate risk assessment in project scheduling. The data will collect for this study is limit to Johor area due to the availability of good number of projects.

The scope of the study focused on Project Managers who are directly involves in projects from several industries. The scopes of data collection in this study will focused on the Construction, Oil & Gas, Manufacturing and IT industry.

1.5. Significance of the Study

In view of evidence in the study Rabechini & Monteiro (2013), the results demonstrate that adopting risk management practices has a significant positive impact on project success. Therefore, the essence of this study is to understand the project manager awareness and feasibility of implementation of risk assessment in project schedule.

This assessment is valuable to project manager because its provide overview of importance of risk assessment in project schedule. This study is also significant to assist the project manager in all industries to identify the feasibility of implementation of risk assessment in scheduling and broadens their responsibility on implementations

Throughout this study, the Project Managers can raise their awareness on risk assessment in scheduling and hence increasing the understanding of implementing good project scheduling techniques. Consequently, this study can be used as the guideline for future development to reduce the risk of delayed project in all industries.

This research also aims to serve as basic study for the Project Manager in industries to understand where is the lacking of scheduling risk assessment implementation, is this due to Project Managers awareness or feasibility of implementation. In addition, it is hoped that the finding from this survey will provide some indications to the Project Managers.

1.6 Methodology

1.6.1 Developing Problem Statement, Aim and Objectives of study

The problem statement of this study needs to be developed to set out an idea of the purpose of the study as well as giving the reader of expectation of this study. The problem statement to be supported by previous studies as an evident that the problem is still exist. The aim is to describe the overall purpose of the study which the study going to achieve. Objectives are subsidiary to aims, emphasize how aims are to be accomplished. The objectives must be sensible, precisely described and should read as an 'individual' statement to convey intentions of the study.

1.6.2 Overview of Methodology

In this study, the following methodology has been adopted in order to achieve the objective of the study and the methodology of study is illustrated as shown in Figure 1 which will be carry out in five (5) stages.

i. The first and second objective will be achieved through a review of the literature, then prepare questionnaire and distribute to project managers in Malaysia in order to identify the level of awareness of risk assessment in project schedule and identify feasibility of implementation of risk assessment on project scheduling

ii. The third objective will be achieved by conducting a risk assessment in project scheduling. A real project will be selected, then prepare schedule using MS project, identify critical path and perform risk assessment on the activities fall under critical path.

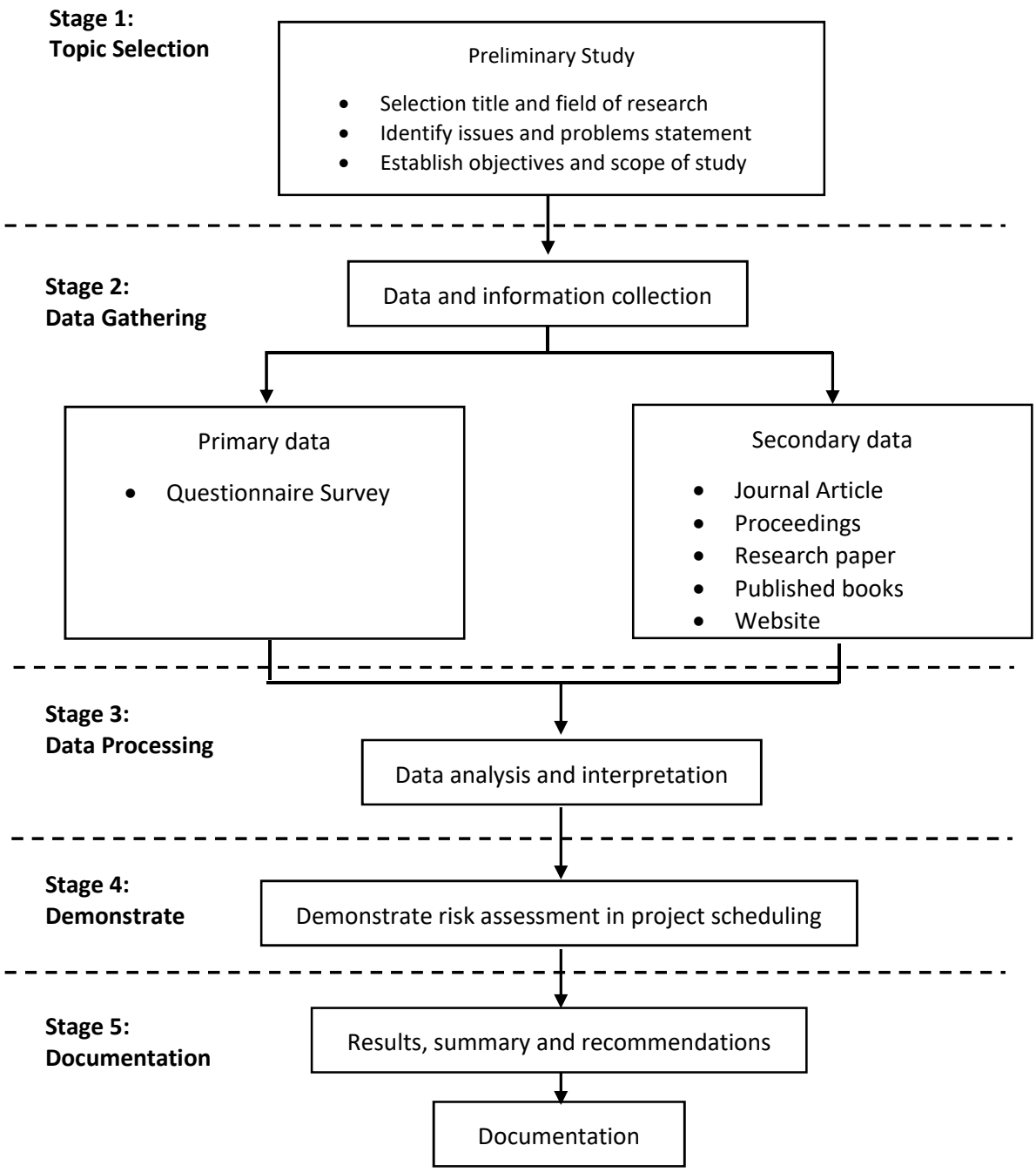

Figure 1.1 Methodology flow chart

1.6.3 Data Collection

Primary data will be collect from questionnaire survey. Questionnaire will be designed base on literature review. The questionnaire will consist of 3 sections;

Respondent background, level of awareness of risk assessment and feasibility of implementation of risk assessment. Questionnaire will be distribute to Project Manager in industries.

Secondary data will gather through Secondary data Journal Article, Proceedings, Research paper, Published books & Website.

1.6.4 Analysing the Data

The primary data will be analysed through quantitative and qualitative approaches after considering the types of data and the research objectives.

The result for data analysis and interpretation will use to provide conclusions and recommendations. This research report will be ended with an overview conclusion for the thesis by answering the research aims and objectives together with constructive recommendations for the future research.

1.7 Arrangement of the Report

This study will consist of 5 chapters as listed below:

a) Chapter 1 : Introduction of the study. It includes the background of study, problem statement, aims and objectives, scope of study, significance of study and brief methodology. This chapter will explain the overview of the study.

b) Chapter 2 : Describes the definition, practice of project management, project schedule, project delays & risk assessments which was gathered from various sources such as books, journal paper and journal conference.

c) Chapter 3 : Consist of methodology of the overall study. In this chapter will methodology that have been used to gather the information, the method of analysis and format for presenting the findings.

d) Chapter 4 : This chapter focuses on the analysis of the data collected from the questionnaire survey and the findings are reported in this chapter. The data will be analyze using both qualitative and quantitative methods. The findings and result will be presented in tables, histogram, pie charts and others for easy interpretation and understanding.

e) Chapter 5 : This chapter will provide the recommendations and conclusions to this study. This includes the discussion on the results of the finding and some recommendations and suggestions for future research. As a recommendation, will demonstrate risk assessment for selected project.

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