

FRAMEWORK TO REDUCE VARIATION PROCESSING TIME IN
PUBLIC PROJECTS

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A thesis submitted in partial fulfillment of the
Requirement for the award of the degree of
Master of Science (Construction Contract Management)

Faculty of Built Environment
Universiti Teknologi Malaysia

JANUARY 2018

DEDICATION

To my beloved “*abah bonda*”

ACKNOWLEDGEMENT

First and foremost, thanks to Allah for the blessings, health and opportunity given to me to complete this research. I would like to express my gratitude to my dedicated supervisor, Dr. Norazam bin Othman for his guidance, patience and understanding throughout the journey to complete this study. I am also indebted to Public Service Department for the scholarship to pursue this study.

I would like to express my gratitude to my “*bonda*” for her prayer, support, understanding and patience towards me throughout my journey as a student. To my ‘*great*’ colleagues, Afiz, Kamarul, Ezlin, KakAida, million thanks for the endless motivations, continuous encouragement and support. Not to forget, to my dearest course mates, Zahier, Siha, Kerk, Zi Yee, Iman and Dayah, thank you for the friendship and assistance throughout my journey back as a student again.

Last but not least, my special appreciation to all my colleagues in Public Works Department for the cooperation that made this study possible.

ABSTRACT

The process of administering variation orders is an integral part of construction project management. This process is time consuming and if not organized or streamlined, may result into delays. According to the Auditor General Report, they have found out, the issue of delay in processing the variation order usually occurred in most of the public projects. Necessary improvement should take place to address this issue holistically. Therefore, this research attempt to develop a framework that able to reduce the variation processing time for public projects. Semi-structured interviews were conducted with construction professionals that involved directly in processing the variation works in public projects to obtained a relevant data. The findings show that there are five (5) main stages in managing the variation in public projects which is identifying the variation, analysing and evaluating the variation, approval, implementation and review. The major improvement can be seen during the approval process in the third stage. During this stage the variation in principal is being introduced to cater the variation works for the critical and urgent activities. Besides that, the financial limits of the existing committee to approve the variation works to be revised and the time limit for variation assessment especially during the cost determination is to be introduce. Lastly the redundancy process in variation assessment should be eliminated. By considering all these factors, the framework to reduce the variation processing time is developed. This framework would be able to streamline and redefine the variation process in public projects and subsequently reduce the variation processing time.

ABSTRAK

Proses mentadbir perubahan kerja adalah sebahagian daripada proses pengurusan projek pembinaan. Proses ini akan mengambil masa yang panjang sekiranya tidak diatur atau diperkemas, boleh menyebabkan kelewatan. Menurut Laporan Ketua Audit Negara, didapati, isu kelewatan dalam memproses perubahan kerja sering berlaku di kebanyakan projek awam. Penambahbaikan perlu dilakukan untuk menangani isu ini secara holistic. Oleh itu, objektif kajian ini adalah untuk membangunkan rangka kerja yang dapat mengurangkan tempoh masa dalam memproses perubahan kerja untuk projek-projek awam. Kajian ini telah dilakukan dengan mengadakan sesi temu bual bersama dengan profesional pembinaan yang telah terlibat secara langsung dalam memproses kerja-kerja yang melibatkan perubahan untuk mendapatkan data yang berkaitan. Berdasarkan kepada penemuan dari sesi temubual yang dijalankan terdapat lima (5) peringkat dan proses utama dalam mengurus perubahan kerja dalam projek awam iaitu peringkat mengenalpasti, menganalisis dan menilai, kelulusan, pelaksanaan dan kajian semula. Penambahbaikan yang ketara dapat dilihat adalah pada proses kelulusan di mana kelulusan kerja secara prinsip diperkenalkan untuk aktiviti-aktiviti yang kritikal. Di samping itu had sedia ada Jawatankuasa yang meluluskan kerja disemak semula dan had masa untuk penilaian perubahan kerja terutamanya semasa penentuan kos diperkenalkan. Akhir sekali, mana-mana proses penilaian yang bertindih semasa dalam proses analisis dan penilaian hendaklah dihapuskan. Dengan mempertimbangkan semua faktor ini, rangka kerja untuk mengurangkan masa perubahan kerja telah dibangunkan. Rangka kerja ini akan dapat menyelaraskan dan mendefinisikan semula proses perubahan kerja dalam projek awam dan seterusnya dapat mengurangkan masa memproses perubahan kerja.

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LIST OF ABBREVIATIONS

PWD	- Public Works Department
S.O	- Superintending Officer
S.O Rep.	- Superintending Officer Representatives
HODT	- Head of Design Team
HOPT	- Head of Project Team
KPK	- <i>Kelulusan Perubahan kerja</i>
APK	- <i>Arahan Perubahan Kerja</i>
PHK	- <i>Pelarasan Harga Kontrak</i>
AP	- <i>Arahan Perbendaharaan</i>
CIPAA	- Construction Industry Payment Adjudication Act
CII	- Construction Industry Institution
CIRIA	- Construction Industry Research and Information Association
CKUB	- <i>Cawangan Kontrak dan Ukur Bahan</i>
ATDA	- As Tendered Detailed Abstract
QS	- Quantity Surveyor
SAKPKR	- <i>Surat Arahan Ketua Pengarah Kerja Raya</i>
KPI	- Key Performance Index

CHAPTER 1

INTRODUCTION

1.1 Background of Study

In construction practice, variation frequently encountered in all type of construction projects (Arain and Low, 2005; Oladapo, 2007). It is difficult for the client and his team to foresee every possibility of the project. Besides, it is almost impossible to construct the project that is totally identical to the original design used for tender even if the project that are carefully planned in their initial stage (Moghaddam, 2012). This is because the construction process was influenced by many factors. Those factors including the performance of the contractual parties, different stages of work and complex operations which cannot be accurately determined in advance (Nachatar *et al.*, 2010; Sutrisna and Potts, 2002). Therefore, variation works has become almost unavoidable in many construction projects (Du *et al.*, 2016).

Variation involves the alteration or changes of the original scope of work which can either be in the form of substitution or addition. All these changes in the original contract need an instruction. In construction contract,

this instruction is named as variation order. One of the major issue discussed previously in variation order is in the manner it is proposed, submitted and resolved which can be very complex and contentious as it involve many processes and parties that is usually resulted to additional cost and times in most of construction projects (Sidney, 2006).

In the context of construction industry, the frequency of variation is varied from one project to another (Arain and Low, 2005). Variation may occur from different sources, at any stage and may have some considerable effects. It is accepted that whenever work varies, there will be financial or time implications or a combination of both (Rajoo and Harbans, 2012). In a construction contract, variations are also known as the common source of disputes among contractual parties especially the client and contractor (Kumaraswamy and Yogeswaran 1998). Usually, these disputes occur when variation orders are not being managed carefully (Charoenngam, *et al.*, 2003).

The variation order process can be one of the most difficult aspects of the entire construction undertaking. It is time consuming and if not organized or streamlined, it may result in delay (Fisk, 2005). Due to this, the inefficient stages during the approval process should be taken out in processing the variations to optimize the variation processing time (Terwiesch and Loch, 1999). The procedure must also make clear to all parties during the early stage of the construction to avoid any conflicts (Mokhtar, 2000). Sun *et al.* (2006) mentioned in their study that at present, there is a lack of industrial standards for project variation management procedures in construction practice. They further added that this situation often results in variations being poorly managed by project teams during execution of the construction projects.

Therefore, managing and administering the variations is considered as an essential part of project management (Sun *et al.*, 2006). A successful construction management should not be on whether the project was free of

variation, but rather, if variation orders were resolved in a timely manner and gives benefit to all the construction parties and the project in term of cost and time (Arain and Low, 2005). Due to this, the key to the successful management of variation is to provide a simplified procedure in a systematic way to improve the management of variations in construction projects.

1.2 Problem Statements

Variation to client requirements are a constant source of problems. They are one of the most frequent causes of claims and will often lead to litigious disputes (Murdoch and Hughes, 2006). Employer must accept that no construction is to be free from variation. This is because variation will occur in most of the projects due to the uncertainty and the inherent nature of construction projects (Al-Suliman, 2014). It had become the greatest problem in contract administration (Hibberd, 1986). One of the problem resulted from the variation is the disputes between the contractual parties due to the delay in processing the variation works (Mechanda, 2005; Randa *et al.*, 2009; Ndiokubwayo and Haupt, 2009; Kwok, 2009; Zakaria, 2014; Nayan *et al.*, 2017).

The contractor encounters a problem when there is a lengthy approval of variation work process by the client (Ndiokubwayo and Haupt, 2009). It happens when there is a delay in time that passes when a proposed contract adjustment is announced and when the matter is finally approved as a variation (Fisk, 2005). Many factors have contributed to the long response time of many variation orders. The overly rigid procedure, ineffective steps of approval process and management requirement has resulted to inefficient variation administration especially in large organization (Loch and Terwiesch, 1999; Mechanda, 2005; Randa *et al.*, 2009; Alnuami *et al.*, 2010). This situation occurs when the employers and contract administrators in local contracts pay

little or no attention to this important stage of the variation process in construction (Harbans and Kandan, 2004).

According to Charoenngam *et al.* (2003), an effective variation order management can be developed by understanding the variation order process or workflow. The time periods for response by the Superintendent and the Contractor are a critical part of effective management of variations. In a study conducted by Al-Suliman (2014) indicated that the process of initiating a variation order takes a substantial amount of time before getting approval due to the correspondence between the construction parties involved in the project.

In the context of Malaysian construction industry, a study by Aftab *et al.* (2014) found that variations are also a norm in any public projects. In 2016, it was being recorded in *SKALA* (Project Monitoring System of the Public Works Department of Malaysia) that most of the projects appear to have variations. The occurrence of the variation often led to many issues and dissatisfactions among the parties involved in construction projects including issues of delay in processing the varied works (Nayan *et al.*, 2017).

Zakaria *et al.* (2015) have recorded that the late evaluation and approval of the variation works as a prime cause of delay in settlement of final account in many public projects. The slow processing and delay in finalizing of variation has become the main contributor for late and under payment (Nayan *et al.*, 2017). It is important for the client to appreciate that the contractor has incurred expenses in doing the construction work and any delay in settlement of variations means delay in payment to the contractor. Due to this, contractor is financially burdened with negative net cash flows until the very end of construction when the final payment is received. This is one of the issue that led the government to introduce CIPAA in 2012 (Ismail *et al.*, 2014). Under this legislative framework, any payment default including payment for variation is covered under this act. Due to this, the slow processing and the difficulties in reaching settlement of variations are no longer a valid reason for denying payments to the contractor.

The Auditor General Report by National Audit Department has also identified the weakness of variation administration in the public projects. They have found out that a total of 61 out of 122 variation applications with addition in value worth RM5.44 million were submitted to the Ministry between 41 days to 550 days after the Certificate of Practical Completion (CPC) issued and the total of 81 out of 122 variation orders with addition in value worth RM9.29 million were approved by the Variation Order Technical Committee between 11 to 1,100 days from the date of application. This situation shows that there is a weakness in administering and managing the variation in public projects. Due to this, the audits had suggested that the current practice of variation administration to be improved.

According to the foregoing discussion, the main issue that is pointed out is on the delay in evaluation and processing of the variation order and a necessary improvement should take place to address the issue effectively. As mentioned above, this issue had affected the contractor in many ways. Although this issue was highlighted in many studies, there is not much effort made to improve and streamline the current practice of variation administration in public projects. On top of that, there was not many attempt have been made to map a process, analyse it and redefine it using the conclusions from the previous audit reports.

Past studies mostly concentrated on the impact of the design changes towards the project performance (Arain and Low, 2005; Sun *et al.*, 2009; Alnuami *et al.*, 2010). Others has mainly focussed in developing the toolkits for modelling the change management. These range from simple process models to more elaborate and advanced systems such as the web based application. The examples of such research include a best practice guide for the effective management of change on projects (CIRIA, 2001), an advanced project change management system (Ibbs *et al.*, 2001), web based systems that is developed for managing the changes in construction (Charoenngam *et al.*,

2003, Motawa, 2007) and a decision support system for effective management of variation in the educational building (Arain, 2007). Following the similar line of thought, Othman (2015) has developed a framework for decision making process for variation works to analyse impacts caused by factors influencing decisions.

All this research is beneficial in order to improve the identification, controlling and the evaluation of project changes. However, neither of these previous studies paid attention in improving the current variation management process that is able to reduce time in processing variation. On top of that, all these studies were lacks of features which highlight the current workflow of variation process that can be adapted in the context of Malaysia public projects.

In order to overcome this problem, it is essential to review and refine the common procedures and requirements of variation administration in public projects. Therefore, this study attempts to streamline the variation administration process by developing the framework that may act as a guide to the project team in administering the variation and subsequently able to reduce delay in evaluation and processing of the variation. This is because, framework is one system or workflow that can assist in streamlining the process and it can be used as a reference by the construction parties. Besides that, by developing the framework it would able to solve the problem holistically not just by simplifying the approval process.

1.3 Research Question

The discussion and statement of problem above highlighted the important question read as follow:

How to improve the variation administration in public projects that is able to reduce its processing time?

1.4 Research Aim and Objective

To develop a framework to reduce the variation processing time in public projects.

1.5 Scope of Study

The scope of this study will be confined to the following areas:

- a) Standard form of contract is limited to PWD Form203A (Rev. 1/2010).
- b) Documents and manuals related to variation process use for public projects.

1.6 Significance of Study

Currently there is no formalised approach to reduce the process time of variation in Malaysian public projects. Through this study, the researcher has attempt to develop a framework that serves as the guideline to all the parties in administering the variations. This framework is developed to improve the current practice of variation administration in government projects. Besides that, this study will provide the solution which aims to reduce the processing time of variation orders in public projects in a form of the framework. The framework is selected because it is the best technique to link the sequence of works in a more simplified way. The outcome from this study would provide the guidelines for the best practice in managing the variation process in public projects.

1.7 Research Methodology

The outline of research methodology for this study is divided into four (4) different phase which is the preliminary study, data collection, data analysis and lastly on the conclusion and recommendations. The brief explanation on the outline of the research design for this study is as follows:

a) Phase One: Preliminary Study and Research Proposal

The first phase involves a preliminary study to develop the research proposal. There are two (2) approaches that has been applied during this phase which is conducted through the critical review on the secondary data and through the expert interviews. The idea of this study is obtained after the research area is being narrow down. In the final phase, the aim, objective and

scope of this study were determined after the problem statements and issues in the research area is identified.

b) Phase Two: Data Collection

The main source of the data collection for this study is by conducting the semi-structured interviews in the field studies with the local practitioners that involved directly with the variation administration in public projects.

c) Phase Three: Data Analysis

All the data collected in second phase will be analyse using qualitative analysis to form a framework.

d) Phase Four: Conclusion and Recommendations

The output of the analysis attained through the third phase is used to formulate conclusion and recommendations.

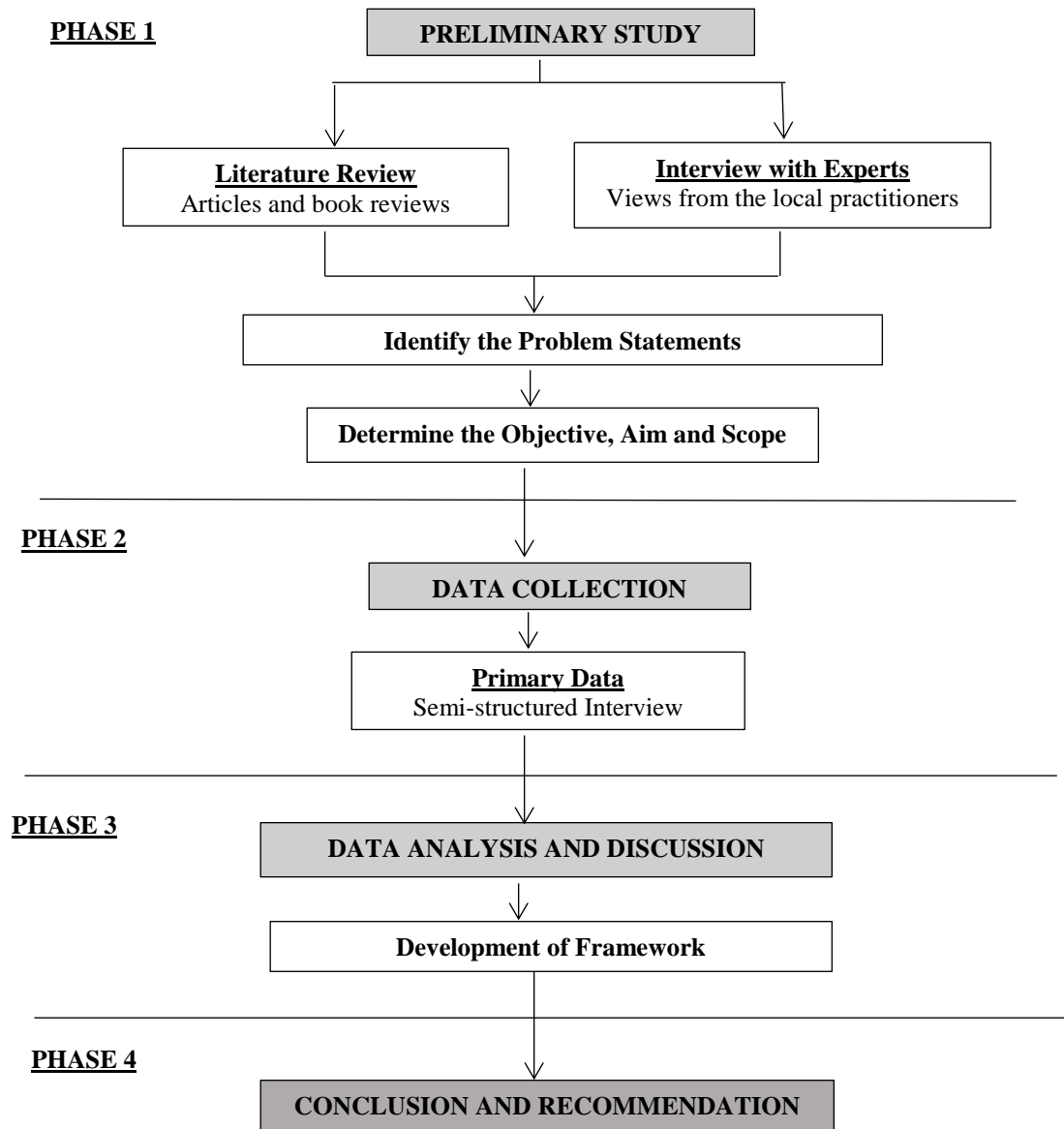


Figure 1.1: Research Methodology Flowchart

1.8 Research Structure

This thesis consists of five (5) chapters. The brief introduction for each chapter are discussed as follows:

a) Chapter One: Introduction

The chapter provides general information about the research. This chapter contains on the research proposal for this study. It explained on the background of the study, problem statement, research aim and question, the objective of the research, scope and limitation of the research, significance of the research and the research structure of this study. This chapter also highlighted on the issue of delay in administering the variations process in public projects.

b) Chapter Two: Variation in Construction Industry

This chapter provides the literature review on the variation in construction industry. It explained on the terminologies of variations, causes, impacts and duties of contract administrator in administering the variation. In addition, this chapter also explained on the variation management process in construction and the standard process of variation administration that is carry out in public projects. Issues affecting the delay in variation process were also presented in this chapter.

c) Chapter Three: Research Methodology

This chapter will provide all the required information on the method to achieve the aim and objective of this study. It will discuss on the research methodology that has been applied in this research with the explanations on the reasons behind the selected methodology for the purpose to collect and analyse the data.

d) Chapter Four: Data Collection, Analysis, and Discussion

This chapter will be concentrating on the data analysis and will discuss on the findings from this study. All the data obtained from the semi-structured interviews with the local practitioners that involved in the variation administration were analyse in this chapter. These analyse data is use to develop the framework to reduce the variation order processing time in public projects as the end result for this study.

e) Chapter Five: Conclusion and Recommendations

This chapter will draw relevant conclusion from the findings as its relate to the objectives of this study. It also presents necessary recommendations for further studies. This chapter will also highlight the limitation of the study, which may affect the outcome of this research.

1.9 Summary

This chapter outlines the introduction of the subject matter and overview of this study. It consists of the aim, objective, scope, significance of study and organization of chapters. In the next chapter, the literature review related to the area of this study will be presented to get a better understanding on the variation management process and procedure for the purpose of developing framework that able to reduce the variation processing time in public projects.

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