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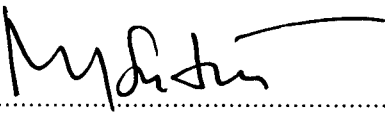
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PRODUCTIVITY OF CONCRETING WORK IN
JABATAN KERJA RAYA BUILDING PROJECTS


ARNITA SOFIA BINTI OSMAN

A capstone project report submitted in partial fulfilment of the
requirements for the award of the degree of
Master Project Management

Faculty of Civil Engineering
Universiti Teknologi Malaysia

May, 2011

I declare that this project report entitled "*Productivity of Concreting Work In Jabatan Kerja Raya Building Projects*" is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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ABSTRACT

Productivity of the construction activities has strong influence towards achieving the timely completion of a project. It can assist in developing more practical project schedule for construction projects. However, despite of JKR experience in delivering construction projects for decades, the department still does not have any records on productivity rates of construction activities even though it has more than adequate data to develop such guideline. This situation has motivated the study to determine the productivity on concrete work for JKR building projects to be undertaken. Apart from that, factors affecting productivity rate of concreting work and problems faced during concreting were also identified using questionnaire survey method. In determining the productivity rate of concreting, a work study method has been conducted. The concrete pouring time for structures of columns, beams, beam and slabs were collected from building construction projects of less than four storeys height. The findings of the analysis on the questionnaire survey indicates the three most influencing factors affecting productivity rate of concreting work are weather, schedule not well planned and dispute between structural and architectural drawings. As for the problem faced during concreting work, category of Management Factors (poor planning by the contractor, contractor and subcontractor not performing) ranked at the top. The concrete pouring data were analysed using single regression analysis. From this analysis, regression model on relationship between duration and volume of concrete pours observed has been developed. It is hope that the findings of this study can be used to assist JKR in developing a comprehensive scheduling guideline for the benefit of the department in executing government building projects.

ABSTRAK

Produktiviti aktiviti pembinaan mempunyai pengaruh besar terhadap masa penyiapan sesuatu projek pembinaan. Ia boleh membantu dalam membangunkan penjadualan projek pembinaan yang lebih praktikal. Walaupun JKR mempunyai pengalaman dalam pembinaan projek sejak seabad yang lalu, jabatan ini masih tidak mempunyai rekod kadar produktiviti sesuatu aktiviti pembinaan sedangkan data yang banyak mudah diperolehi untuk membangunkan garis panduan penjadualan. Situasi ini menyebabkan kajian untuk menentukan produktiviti kerja konkrit untuk projek bangunan yang dikendalikan dilaksanakan. Selain daripada itu, kajian ini juga mengenalpasti faktor-faktor yang mempengaruhi kadar produktiviti kerja konkrit dan masalah-masalah yang dihadapi semasa kerja konkrit dijalankan menggunakan kaedah kajian borang soalselidik. Bagi menentukan kadar produktiviti kerja konkrit, kaedah '*work study*' telah digunakan. Masa penuangan konkrit kepada struktur tiang, rasuk serta rasuk dan papak di rekod daripada tapak projek bangunan yang mempunyai ketinggian kurang daripada empat tingkat. Keputusan daripada analisa borang soal selidik mendapati tiga faktor utama yang mempengaruhi kadar produktiviti kerja konkrit ialah cuaca, jadual kerja yang tidak dirancang dengan baik dan percanggahan antara lukisan struktur dan lukisan arkitek. Bagi masalah yang dihadapi semasa kerja konkrit dijalankan adalah kategori Faktor Pengurusan (perancangan lemah oleh kontraktor, kontraktor dan subkontraktor tidak menunjukkan prestasi yang baik). Data daripada penuangan konkrit dianalisa menggunakan kaedah Analisis Regresi yang telah membangunkan satu model regresi yang boleh digunakan oleh JKR dalam membangunkan garis panduan penjadualan kerja yang boleh memberi faedah kepada jabatan dalam pelaksanaan projek-projek bangunan kerajaan.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	THESIS TITLE	i
	DECLARATION	ii
	DEDICATION	iii
	ACKNOWLEDGEMENT	iv
	ABSTRACT	v
	ABSTRAK	vi
	TABLE OF CONTENTS	vii
	LIST OF TABLES	xii
	LIST OF FIGURES	xiv
	LIST OF ABBREVIATIONS	xv
	LIST OF APPENDICES	xvi
1	INTRODUCTION	
	1.1 Introduction	1
	1.2 Problem Statement	2
	1.3 Aim of the Study	3
	1.4 Objective of the Study	3
	1.5 Scope and Limitations of the Study	3
	1.6 Brief Research Methodology	4
	1.7 List of Chapters	6

2	PRODUCTIVITY RATE OF CONCRETING WORK	
2.1	Introduction – Productivity in Construction Industry	7
2.2	Definition of Productivity in Construction	8
2.3	Productivity in Construction Project Scheduling	10
2.4	Productivity of Concrete Work in Construction Project	12
2.5	Factors Affecting the Productivity of Construction Work	13
2.6	Factors Affecting Concrete Placing Activity	16
3	CONCRETING WORK IN JKR BUILDING PROJECT	
3.1	Introduction	19
3.2	Process of Concreting Work Using Ready Mixed Concrete (RMC) in JKR Building Project	19
3.2.1	Acceptance of Concrete Materials	21
3.2.2	Delivering the RMC	21
3.2.3	Placing the RMC to the Formwork	22
3.2.4	Curing Process	22
3.2.5	Removal of Formwork	22
3.2.6	Inspection and Making Good	23
3.3	Summary	26
4	RESEARCH METHODOLOGY	
4.1	Introduction	27
4.2	Preliminary Study	27
4.3	Questionnaire Survey Form	28
4.3.1	Analysis of Questionnaire Survey Forms	29
4.3.1.1	Reliability Test - Cronbach's Alpha	29
4.3.1.2	Frequency Analysis	30
4.3.1.3	Normality Test	30
4.3.1.4	Relative Importance Index (RII)	31
4.3.1.5	Non Parametric Test – Mann Whitney U-Test and Kruskal-Wallis Test	32

4.4	Data Sampling Technique on Project Site	33
4.4.1	Work Study Method	33
4.4.2	Analysis of Data Sampling – Single Regression Analysis	34
4.5	Discussions and Results and Research Writing	35
4.6	Summary	36

5 DATA COLLECTION AND ANALYSIS

5.1	Introduction	37
5.2	Questionnaire Survey – Data Collection	37
5.2.1	Section A – Analysis of Respondents’ Background	38
5.2.2	Pilot Study – Reliability Test Using Cronbach’s Alpha	40
5.2.3	Analysis of Section B and C	41
5.2.3.1	Normality Test	41
5.2.3.2	Relative Importance Index (RII)	42
5.2.3.3	Comparison of Perception Between Groups of Respondents – Non Parametric Test	53
5.2.3.4	Mann Whitney Test for Comparison of Perception between JKR and Non- JKR	53
5.2.3.5	Kruskal-Wallis Test for Comparison of Perceptions Among Respondents with Different Position	55
5.2.3.6	Kruskal-Wallis Test for Comparison of Perception among Respondents with Different Level of Experience	56
5.3	Data Collection Using Work Study Method	57
5.3.1	Single Regression Analysis	59
5.3.1.1	Data for All Pours Observed (Column, Beam, Beam and Slab)	59

5.3.1.2 Data for Beam, Beam and Slab Pours Observed	61
5.3.1.3 Data for Column Pours Observed	64
5.4 Summary	66

6 DISCUSSION OF RESULTS

6.1 Introduction	67
6.2 Factors Affecting Productivity Rate of Concreting Work in JKR Building Projects by Ranking of RII	67
6.2.1 Weather	68
6.2.2 Schedule Not Well Planned	69
6.2.3 Dispute between Structural and Architectural Drawings	69
6.2.4 Unskilled Workers	69
6.2.5 Supervisor Lack of Knowledge / Incompetent	70
6.2.6 Drawing Not Complete/ Insufficient	70
6.2.7 Absenteeism	71
6.3 Problems Faced During Concreting Work in JKR Building Projects	71
6.4 Comparison of Perception between Groups of Respondents	74
6.4.1 Perception between JKR and Non JKR	74
6.4.2 Different Opinion Based on Position of Respondents	75
6.4.3 Different Opinion Based on Different Level of Experience	75

6.5	Productivity Analysis of Concrete Pouring in JKR Building Projects	76
6.5.1	Actual Productivity Rate of Concrete Pouring	77
6.5.2	Predicting Productivity by Single Regression Analysis	79
6.6	Summary	80
7	CONCLUSION AND RECOMMENDATION	
7.1	Introduction	81
7.2	Objective 1: To determine in the Factors Affecting the Productivity Rate of Concreting Work in JKR Building Projects	81
7.3	Objective 2: To determine The Problems Faced During Concreting Work in JKR Building Projects	82
7.4	Objective 3: To develop A Model of Relationship for the Duration and Volume of Concrete Pouring for Beam, Column and Slab	82
7.5	Recommendation for Future Study	83
7.6	Summary	83
	REFERENCES	84
	APPENDICES	89

LIST OF TABLES

TABLE NO.	TITLE	PAGE
4.1	Cronbach's Alpha reliability coefficient	30
5.1	Breakdown of respondents' position	39
5.2	Experience of the respondents	40
5.3	Cronbach's Alpha Value for category of questions in Section B	41
5.4	Cronbach's Alpha Value for category of questions in Section C	41
5.5	Results of Normality Test for Section B	42
5.6	Results of Normality Test for Section C	42
5.7	The rank of factors in Section B by RII for overall respondents	43
5.8	Average RII based on category of factors for overall respondents	44
5.9	The rank of factors in Section B by RII of JKR staff only	45
5.10	Average RII based on category of factors for JKR staff only	46
5.11	The rank of factors in Section B by RII of non JKR	46
5.12	Average RII based on category of factors for non JKR	47
5.13	The rank of factors in Section C by RII for overall respondents	48
5.14	Ranking of category of problems based on average RII for overall respondents	49
5.15	The rank of problems in Section C by RII of JKR staff only	49
5.16	Ranking of category of problems based on average RII for JKR staff	51
5.17	The rank of problems in Section C by RII of non- JKR	51
5.18	Ranking of category of problems based on average RII for non- JKR	53

5.19	Mann Whitney Test result with p less than 0.05 for Section B	54
5.20	Mann Whitney Test result with p less than 0.05 for Section C	54
5.21	Kruskal-Wallis Test result with p less than 0.05 for Different Position - Section B	55
5.22	Kruskal-Wallis Test result with p less than 0.05 for Different Position - Section C	56
5.23	Kruskal-Wallis Test result with p less than 0.05 for Different Level of Experience - Section C	57
5.24	Data collected for quantity of concrete volume in cubic meter (m ³) and durations in minutes (mins)	58
5.25	Model summary for all concrete pouring data	59
5.26	ANOVA table for all concrete pouring data	60
5.27	Coefficients table for all concrete pouring data	60
5.28	Model summary for beam, beam and slab concrete pouring data	62
5.29	ANOVA table for beam, beam and slab concrete pouring data	62
5.30	Coefficients table for beam, beam and slab concrete pouring data	62
5.31	Model summary for column concrete pouring data	64
5.32	ANOVA table for column concrete pouring data	64
5.33	Coefficients table for column concrete pouring data	65
6.1	Comparison of ranking for overall respondents with RII analysis for, JKR staff and non JKR – Section B	68
6.2	Comparison on ranking of problems for overall respondents with RII analysis for JKR staff and non JKR – Section C	73
6.3	Comparison of category of problems for overall respondents JKR and non JKR– Section C	74
6.4	Summary of pours observed	77
6.5	The mean measured actual productivities for overall concrete pours	78
6.6	Total mean measured actual productivities for all structures	79

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
1.1	The Research Methodology	5
2.1	Work – time model – Breakdown of Total Operation Time Source: Drewin (1982)	16
3.1	The typical flow of concreting process in JKR building Construction	20
3.2	Truck Mixer transport concrete to project site	23
3.3	Wet concrete were poured out for slump test	23
3.4	Slump test for concrete workability	24
3.5	Concrete ready to proceed with placement using bucket	24
3.6	RMC being transported to the upper floor of the building	24
3.7	Placement on RMC to ready slab and beam formwork	25
3.8a	The vibrating of wet concrete to the slab and beam formwork (A)	25
3.8b	The vibrating of wet concrete to the slab and beam formwork (B)	25
5.1	Age group of respondent by percentage	38
5.2	The organisation of respondent	39
5.3	Relationship between pour duration and volume for all pours	61
5.4	Relationship between pour duration and volume for beam and slab pours	63
5.5	Relationship between pour duration and volume for column pours	65

LIST OF ABBREVIATIONS

ACCE	Association for the Advancement of Cost Engineering
JKR	Jabatan Kerja Raya
RII	Relative Importance Index
RMC	Ready Mixed Concrete
SKALA	Sistem Kawal dan Lapor
S.O.	Superintendent Officer

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	Sample Questionnaire Survey Form	90
B	Sample of Study of Productivity of Concrete Work Form for JKR Building Project	96
C	Graph of Normality Test for Category of Factors in Section B	98
D	Graph of Normality Test for Category of Factors in Section C	100
E	Data of Mann Whitney U - Test – Comparing Perception between JKR and Non JKR (Section B)	102
F	Data of Mann Whitney U - Test – Comparing Perception between JKR and Non JKR (Section C)	104
G	Data of Kruskal-Wallis Test – Comparing Perception of Respondents with Different Position (Section B)	107
H	Data of Kruskal-Wallis Test – Comparing Perception of Respondents with Different Position (Section C)	111
I	Data on Kruskal-Wallis Test – Comparing Perception of Respondents With Different Experience (Section B)	115
J	Data of Kruskal-Wallis Test – Comparing Perception of Respondents With Different Experience (Section C)	118
K	Data on Concrete Pour of Beam	121
L	Data on Concrete Pour of Beam and Slab	122
M	Data on Concrete Pour of Column	123

CHAPTER 1

INTRODUCTION

1.1 Introduction

Time, cost and quality are the three factors that determine the success or failure of a construction project (Hoffman *et al.*, 2007). Repeated delays and cost overruns are the characteristic of the construction industry (Kaming *et al.*, 1997). In order to minimize delays and cost overruns, project team should be practicing project management tool in managing their projects. Project scheduling is one of the important tools in project time and cost management. It is to be used by the project team members for a constant controlling and monitoring of project performance.

To develop a project schedule, among the essential data needed is the productivity rate of an individual activity. In the construction industry, productivity has always been very difficult to measure and control (Motwani *et al.*, 1995). Productivity rates rank amongst the most essential data needed in the study of construction productivity. It is crucial to determine the direct relationships between the accuracy of productivity rates and subjects such as estimating, cost control, scheduling, and resource management (Herbsman and Ellis, 1990). The intermediate step between establishing the work to be performed for a construction project and establishing the cost of performing that work is by having an accurate evaluation of productivity (Adrian, 1993). Many studies have been done by researchers on productivity in construction industry and the factors affecting it. Herbsman and Ellis (1990) have classified the critical success factors affecting construction productivity as technological and organizational influence factors.

In the construction industry today, concrete is one of the most popular building material being used (Arioz *et al.*, 2005). Concreting process consist of concrete mixing, transporting and placing. By determining the productivity rate of concrete work, project performance can constantly be controlled, monitored and improved.

1.2 Problem Statement

JKR has been in existence since 1872 and thousands of building projects has been supervised by JKR but sad to mention that there is no data on productivity rates of works being recorded and analyzed for project controlling, monitoring and scheduling purposes. Currently JKR has no guidelines and data on productivity rates of construction activity works to evaluate and approve a project work schedule submitted by the appointed contractors which prepared the work schedule informally based on past experience.

As a result, moving forward, Cawangan Projek Kompleks (PROKOM) JKR Malaysia has a task to develop a template work schedule for building and road projects to be used as a guideline by project manager and project team to plan, monitor and control the timely execution of work. As part of developing this template, collection of data on productivity of work is very useful to estimate activity duration of each work to be performed as well as be able to accurately assess work schedule submitted by contractors.

Since concreting work is one of the most important activities in JKR building projects, this study is very beneficial to produce data on productivity rate of concreting work for developing a fine JKR guideline and work schedule template.

1.3 Aim of the Study

The main aim of the study is to determine the factors affecting productivity rate of concreting work and to develop a model to predict productivity rate of concreting work in JKR building projects for project scheduling and controlling purposes.

1.4 Objectives of the Study

The objectives of the study:

1. To determine the factors affecting the productivity rate of concreting work in JKR building projects
2. To determine the problems faced during concreting work in JKR building projects.
3. To develop a model of relationship between the duration and volume of concrete pouring for beam, slab and column.

1.5 Scope and Limitations of the Study

In conducting this study, there were limitations of the scope of this study to ensure that it can be completed in the stipulated time. The data on questionnaire survey conducted for the factors affecting productivity and problems faced on concreting work were gathered from the targeted respondents from the from the Engineers from Project Site, Engineers from the Design Office, Project Managers, JKR Site Staff inclusive of Technical Assistants and the Technicians, Clerk of Works from the Consultants' firm and Site Supervisors from the Contractors' firm and other project site personnel who were located in the Klang Valley. These respondents chosen for the sample of the study were those with experience in construction of JKR building projects.

The data using the Work Study method were limited to concrete pouring for column, beam and slab. These data were collected from JKR building project sites located in the districts of Selangor namely JKR Petaling, JKR Klang, JKR Kuala Langat, JKR Kuala Selangor and JKR Wilayah Persekutuan Kuala Lumpur. The under construction buildings involves were limited to building which is less than four storey of height.

As most of the building projects in JKR were using the conventional type of construction method therefore this study was limited to the used of Ready Mixed Concrete pouring activities and the method of placement is via crane and bucket. The process of concreting work was based from the perspective of JKR.

Work Study method adopted for this study recorded the time taken when the concrete pouring activities started where the fresh concrete was being poured out of the truck mixer to the ready formwork. Finish time recorded was when the last pour of concrete ended.

1.6 Brief Research Methodology

This study was implemented in four phases as illustrated in Figure 1.1 below. Phase 1 of the study focused on the literature review and preliminary site observation, followed by Phase 2 of data collection which consist of two methods, the Work Study Method and the structured Questionnaire Survey. Data collected were analysed in Phase 3 and as for the discussion and conclusion were in Phase 4.

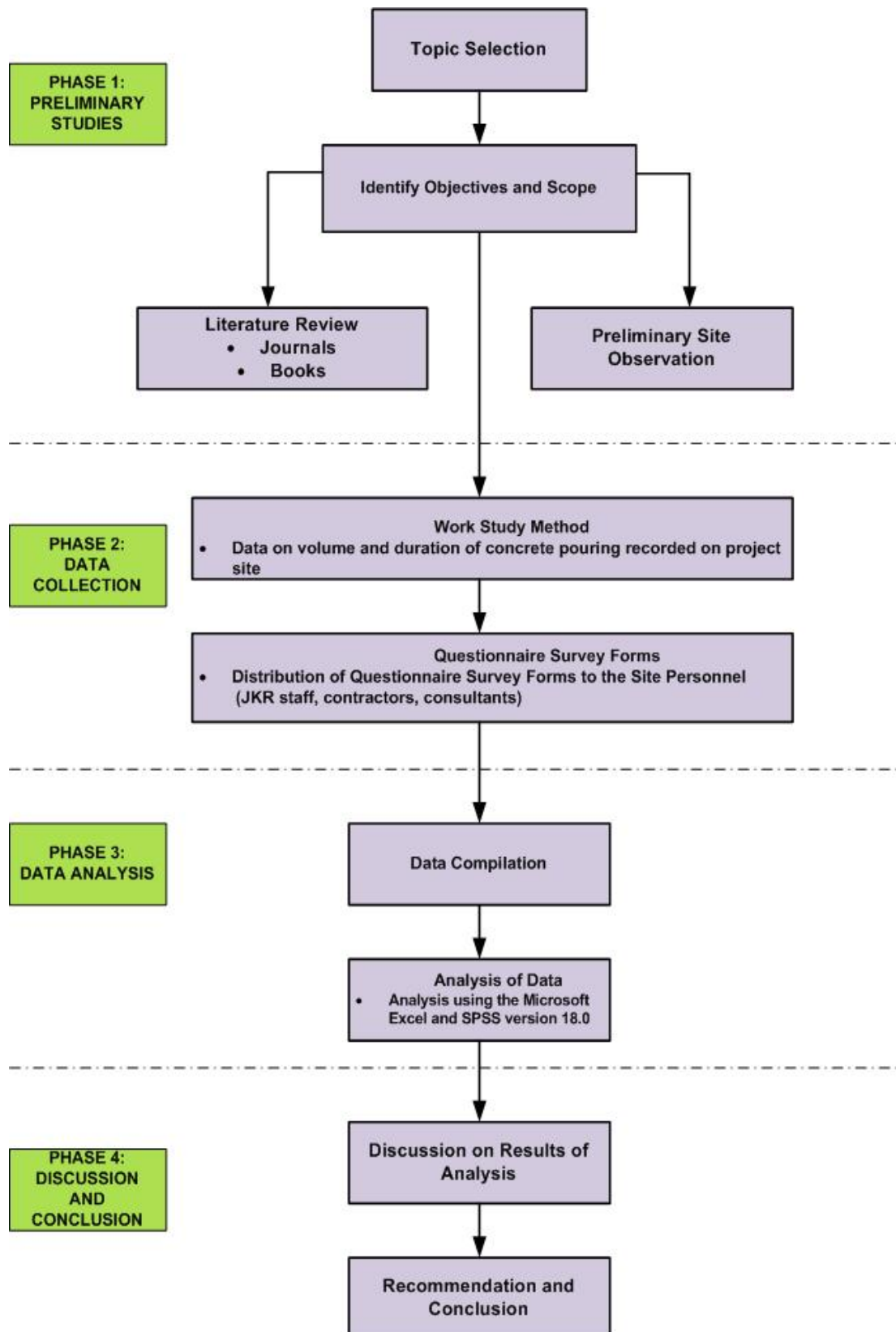


Figure 1.1 : The Research Methodology

1.7 List of Chapters

This study consists of seven chapters. Chapter 1 is the introduction of the study where the aim, objectives, scope and limitations and a brief of the research methodology were discussed briefly. Chapter 2 and Chapter 3 were the literature review of the study where in Chapter 2 was a general review on the topic of productivity rate of concreting work and Chapter 3 was an overview of concreting work process in JKR building projects.

In Chapter 4, detailed discussions on the research methodology were laid out in a structured manner based on the objectives of the study. Chapter 5 presents the data collection and analysis based on the methodologies used. All the data collected were presented in this chapter.

Chapter 6 was developed for the discussion of the analysis and findings presented in Chapter 5. In Chapter 7, the conclusion was presented based on the objectives that have been achieved. The recommendation for future study was suggested at the last paragraph of this chapter.