

A STUDY TO ENHANCE RISK MANAGEMENT PRACTICE IN
JABATAN KERJA RAYA PROJECTS

YUVABALAN A/L GOVINDASAMY

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

Faculty of Civil Engineering
Universiti Teknologi Malaysia

JANUARY 2015

To my beloved wife, family and friends

ACKNOWLEDGEMENT

First of all, I would like to express my sincere appreciation to my research project supervisor, Dr. Norazli Othman from UTM Razak School, Universiti Teknologi Malaysia Kuala Lumpur for her generous advice, patience, guidance and encouragement during the tenure of my study. Special thanks are also dedicated to Dean of Civil Engineering Faculty (FKA) and Dean of UTM Razak School on their involvement in academic affairs of post graduate studies.

I am also most thankful to my family and friends for their support and encouragement given to me unconditionally in taking this project report. Without the contribution of all those mentioned above, this work would not have been possible. Lastly, I would like to express my gratitude to all respondents of the questionnaire survey conducted for their time and effort undertaken in it. Thanks again.

ABSTRACT

Jabatan Kerja Raya (JKR) Malaysia has recognized the need to effectively manage risks in order to achieve project objectives in the context of time, cost and quality. Despite practicing risk management based on established policies and guidelines, cost overrun and project delay due to risks still remain a major concern for JKR. Therefore, the aim of this study is to investigate weakness in current risk management practice for JKR projects and establish improvement methods to enhance the practice. Objectives identified to achieve the aim of this study are identify perception and awareness on risk management practice by JKR project team, evaluate weakness in current practice and propose improvement methods to enhance practice. This study was conducted using research methodologies such as literature review, interview with experts and questionnaire survey in order to achieve the objectives identified. A total of 97 questionnaires were collected and analysed using SPSS software to obtain the reliability, average index and relative importance index of the factors established. Findings revealed majority project team have positive perception but low awareness on risk management practice. Among the weakness in current risk management practice are JKR project team lacking in understanding and knowledge, risk management not implemented in the planning phase of project, absence of proper risk monitoring and reporting and sufficient resources and budget not provided to JKR project team. Several improvement methods established including giving emphasis on continuous training program, risk management must be applied in the planning phase of project life cycle, JKR top management to provide more support for risk management and developing an automated systematic risk management tool to improve existing practice. Outcome of this study can be used to help JKR project teams to effectively manage risks in their projects thus being able to reduce delays and cost overrun in projects due to risks.

ABSTRAK

Jabatan Kerja Raya (JKR) Malaysia mendapati terdapat keperluan untuk menguruskan risiko secara efektif bagi mencapai objektif projek dalam konteks masa, kos dan kualiti. Walaupun pengurusan risiko diaplikasi kepada projek berdasarkan polisi dan garis panduan yang telah dirangka, kenaikan kos dan kelewatan projek disebabkan risiko tetap menjadi keresahan utama bagi JKR. Matlamat kajian ini adalah untuk menyiasat kelemahan sediaada dan mengenalpasti kaedah penambahbaikan pada amalan pengurusan risiko semasa. Objektif yang telah ditetapkan pula adalah mengenalpasti persepsi dan kesedaran pasukan projek terhadap pengurusan risiko, menilai kelemahan pada amalan semasa dan mencadangkan langkah untuk menambahbaikan amalan pengurusan risiko. Kajian ini telah dijalankan menggunakan kaedah kajian literatur, temubual dengan pakar dan borang soal selidik untuk mencapai objektif yang telah ditetapkan. Sejumlah 97 borang soal selidik telah dikumpul dan dianalisa menggunakan perisian SPSS bagi mendapatkan *reliability*, *average index* dan *relative importance index* bagi factor terlibat. Secara kesimpulan, kajian mendapati pasukan projek mempunyai persepsi yang positif tetapi kurang kesedaran tentang amalan pengurusan risiko. Di antara kelemahan yang didapati adalah kekurangan pengetahuan dan pemahaman, pengurusan risiko kurang diaplikasi pada peringkat perancangan projek, ketidakcekapan dalam proses pemantauan serta sumber dan bajet yang mencukupi tidak disediakan. Kaedah penambahbaikan yang dikenalpasti merangkumi penekanan kepada latihan yang berterusan, pengurusan risiko mesti diaplikasi pada fasa perancangan projek, pengurusan atasan memberi penekanan kepada pemantauan dan pelaporan risiko dan membangunkan sistem pengurusan risiko yang automatik. Hasil kajian ini dapat digunakan bagi meningkatkan amalan pengurusan risiko semasa disamping mengurangkan kelewatan dan kenaikan kos projek disebabkan risiko.

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	DECLARATION	ii
	DEDICATION	iii
	ACKNOWLEDGEMENT	iv
	ABSTRACT	v
	ABSTRAK	vi
	TABLE OF CONTENTS	vii
	LIST OF TABLES	x
	LIST OF FIGURES	xii
	LIST OF ABBREVIATIONS	xiii
	LIST OF APPENDICES	xiv
1	INTRODUCTION	
	1.1 Introduction	1
	1.2 Problem Statement	3
	1.3 Aim and Objectives of Study	4
	1.4 Scope of Study	4
	1.5 Significance of the Study	5
2	LITERATURE REVIEW	
	2.1 Introduction	6
	2.2 Definition of Risk Management	7
	2.3 Benefits of Risk Management	8

2.4	Project Implementation In JKR	8
2.5	JKR Risk Management Framework	10
2.6	Risk Management Stages In JKR's Project Life Cycle	11
2.7	Risk Management Process For JKR Projects	13
2.7.1	Communicate and Consult	16
2.7.2	Establishing The Context	17
2.7.3	Risk Identification	19
2.7.4	Risk Analysis	22
2.7.5	Risk Evaluation	27
2.7.6	Risk Treatment	28
2.7.7	Monitor and Review	32
2.8	Recording and Documenting the Risk Management Process	34
2.9	Roles and Responsibility in Risk Management	35
2.10	The Common Principles of Risk Management Process	37
2.11	Outcome of Risk Management Practice for JKR Projects	39
3	RESEARCH METHODOLOGY	
3.1	Introduction	42
3.2	Literature Review	44
3.3	Interview the Experts	44
3.4	Questionnaire Survey	44
3.5	Data Analysis	46
3.6	Findings	48
3.7	Limitation of the Study	48
4	DATA COLLECTION AND ANALYSIS	
4.1	Introduction	49
4.2	Respondents	50
4.3	Reliability Testing	50
4.4	General Background of Respondents	51
4.4.1	Gender of the Respondents	51
4.4.2	Discipline	52
4.4.3	Highest Qualification	54

4.4.4	Working Experience	55
4.4.5	Current Position in JKR	56
4.4.6	Professional Involvement in Projects	57
4.4.7	Involvement in Risk Management Process	58
4.5	Perception and Awareness on Risk Management Practice	59
4.5.5	Perception on Risk Management Practice	59
4.5.6	Awareness on Risk Management Practice	62
4.6	Weakness in Current Risk Management Practice	63
4.6.5	Weakness in Understanding and Knowledge	64
4.6.6	Weakness in Processes and Practices	66
4.6.7	Weakness in JKR Management and Organization	69
4.7	Improvement Method to Enhance Risk Management Practice	71
4.7.1	Improvement Method in Understanding and Knowledge	71
4.7.2	Improvement Method in Processes and Practices	73
4.7.3	Improvement Method in JKR Management and Organization	75
5	DISCUSSION	
5.1	Discussion	78
5.2	Proposal to Enhance Risk Management Practice For JKR Projects	83
6	CONCLUSION AND RECOMMENDATIONS	
6.1	Conclusions	88
6.2	Recommendation for Further Study	89
	REFERENCES	90
	APPENDICES A - E	94

LIST OF TABLES

TABLE NO.	TITLE	PAGE
2.1	Differences between Qualitative and Quantitative Risk Analysis	24
2.2	Recommended Actions for Ratings of Risks	26
2.3	Examples of Projects with Established RMP That Suffers From Delay and Cost Overrun	41
3.1	Likert Scale In Questionnaire Survey	45
4.1	Summary of Questionnaire Developed	50
4.2	Summary of Reliability Testing	51
4.3	Breakdown of Respondents Gender	52
4.4	Breakdown of Respondents Discipline	53
4.5	Breakdown of Respondents Qualification	54
4.6	Breakdown of Respondents Working Experience	55
4.7	Breakdown of Respondents Current Position In JKR	56
4.8	Breakdown of Respondents Professional Involvement in Projects	57
4.9	Breakdown of Respondents Involvement in Risk Management Process	58
4.10	Average Index Based on Likert Scale and Rating for Perception on Risk Management Practice	61
4.11	Average Index Based on Likert Scale and Rating for Awareness on Risk Management Practice	63
4.12	Average Index Based on Likert Scale and Rating for Weakness in Understanding and Knowledge	65

4.13	Average Index Based on Likert Scale and Rating for Weakness in Processes and Practices	68
4.14	Average Index Based on Likert Scale and Rating for Weakness in JKR Management and Organization	70
4.15	Relative Importance Index and Ranking for Improvement Method In Understanding and Knowledge	72
4.16	Relative Importance Index and Ranking for Improvement Method In Processes and Practices	74
4.17	Relative Importance Index and Ranking for Improvement Method in JKR Management and Organization	77

LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
2.1	Organization chart of Jabatan Kerja Raya (JKR)	10
2.2	JKR Risk Management Framework	11
2.3	Risk Management Stages in JKR's Project Life Cycle	13
2.4	JKR's Risk Management Process Model	15
2.5	Classification of Risk for Construction Projects	21
2.6	Risk Matrix for Risk Rating	25
2.7	Monitoring and Review Workflow for JKR Projects	34
2.8	Common Principles of Risk Management Process	38
3.1	Schematic of Research Methodology	43
4.1	Breakdown of Respondents Gender	52
4.2	Breakdown of Respondents Discipline	53
4.3	Breakdown of Respondents Qualification	54
4.4	Percentage Frequency of Respondents Working Experience	55
4.5	Percentage Frequency of Respondents Current Position In JKR	56
4.6	Percentage Frequency of Respondents Professional Involvement In Projects	57
4.7	Percentage Frequency of Respondents Involvement In Risk Management Process For Projects	59

LIST OF ABBREVIATIONS

ARMS	Automated Risk Management System
CPM	Certified Project Manager
EPU	Economic Planning Unit
ERM	Enterprise Risk Management
HOPT	Head of Project Team
HODT	Head of Design Team
JKR	Jabatan Kerja Raya Malaysia
KKR	Kementerian Kerja Raya
PROKOM	Complex Project Management Division
RII	Relative Importance Index
RM	Risk Management
RMP	Risk Management Plan
SKALA	Project Monitoring System in JKR
SPSS	Statistical Packages for Social Science

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
A	Risk Register Template	94
B	Risk Analysis Template	96
C	Risk Status Report Template	98
D	Final Risk Management Report	101
E	Questionnaire Survey	105

CHAPTER 1

INTRODUCTION

1.1 Introduction

The construction industry is widely associated with a high degree of risk and uncertainty due to the nature of its operating environment (Akintoye and Macleod, 1997). Risk management is a major project management tool used by many organizations to effectively manage levels of risk in construction industry to ensure successful completion of projects (Wood and Ellis, 2003). Managing risks in construction projects has been recognized as a very important process in achieving project objectives in terms of time, cost, quality, and safety (Zou et al., 2007). In recent years, intensive research and development has been done in the area of project risk management. According to the Project Management Institute, (2004) risk management is one of the nine most critical parts of project commissioning. Risk management is also described as the most difficult area within construction management and its application is promoted throughout project life cycle to minimize or avoid negative consequences (Potts, 2008).

Jabatan Kerja Raya (JKR) being the biggest technical agency in Malaysia is entrusted to plan, design and construct infrastructure projects in Malaysia besides

providing technical consultancy services to the government. In order to deliver projects effectively, JKR has recognized the need to improve capacity and competency in dealing with risk and uncertainty in construction. To achieve this, JKR through Complex Project Management Division (PROKOM) has established a Generic JKR Project Risk document in 2008 to identify common risk occurred in every project phase from planning until handing over. The main purpose of this document is to facilitate JKR project managers in identifying and managing risks.

From there, risk management has gained increasing recognition as an important area of project management in JKR. PROKOM has also developed a Risk Management Facilitation Guideline in year 2008 based on Australian & New Zealand, Risk Management Standard (2004) to enhance JKR's risk management process. This guideline provides guidance to JKR project teams and stakeholders on the application of the standard project risk management process in JKR. Risk management process proposed in this guideline comprises establish the context, risk identification, risk analysis, risk evaluation, risk treatment, communication and consultation as well as risk monitoring and review.

Statistically, significant relationship also has been found between management support for risk management processes and reported project success (Voetsch et al., 2004). In year 2009, JKR's risk management policy has been officially endorsed by the top management where JKR shall adopt risk management as an integral function of the project management process to deliver project objectives effectively. Top management's support and commitment to this effect is essential for risk management to establish itself as one of the management tools to improve project delivery. From 2012 onwards, Risk Management Plan (RMP) also must be developed for all JKR projects cost more than RM 50.0 million. Implementation of risk management is expected to contribute to better governance and improvements of project delivery in JKR.

The problem currently faced by JKR is that risk management being not effectively used to manage project risks and many staffs still wonder how helpful it is in improving project delivery. Implementation of risk management also seems not achieving the intended outcome as expected by the top management. Project delivery in JKR continues to suffer as a result of cost overrun and time delay due to foreseen risks like land acquisition problems, utility relocation problems, changes in scope and design problems. Therefore, the top management feels there may be some weaknesses in current risk management practice in JKR which needs to be identified for improvements.

1.2 Problem Statement

Cost overrun and schedule delays in most construction projects were mainly caused by risks (Mills; 2001). JKR has adopted risk management practice in their project life cycle in order to deliver project effectively within stipulated time, cost and quality. Risk management practice by JKR involves identification, analysis and evaluation of the risk presented by the construction project and its activities and the development of cost-effective treatments for the risks.

Even with the application of risk management for its projects, cost overrun and project delays still remains a major concern for JKR. These delays and cost overrun were caused by many risks which occurred throughout the project life cycle where most risks were already foreseen or identified. Risk management framework used by JKR also involves various processes that need to be fully understood and complied in order to achieve desired results. Most of the JKR project teams have failed to fully comply with the established risk management framework which contributed to the failure of the project to achieve the desired objectives. Besides this, many JKR officers also do not clearly understand about the processes and procedures involved in risk management and its importance.

Risk Management Plan (RMP) is a document produced during the risk management workshop. The document contains information like risk identification, analysis and treatment and acts as a guideline which can be used to assess and mitigate events that might adversely impact a project. A common problem in JKR is that this RMP is not reviewed and fully utilized in all project phases. Some of the projects teams also seem do not take action to the risk identified in the RMP.

The problem highlighted shows there are some weaknesses to the current risk management practice for JKR projects. Therefore, there is a need to investigate the weakness in risk management practice for JKR projects in order to improve their effectiveness.

1.3 Aim and Objectives of the Study

The aim of this study is to investigate weaknesses in current risk management practice for JKR projects and establish improvement methods to enhance the practice. To achieve this aim, the following objectives are identified:

- a) To identify the perception and awareness on risk management practice by JKR project team;
- b) To evaluate weakness in current risk management practice in JKR projects; and
- c) To propose improvements methods to enhance risk management practice in JKR projects.

1.4 Scope of the Study

The study will focus on project team personnel namely the Head of Project Teams (HOPT), Head of Design Teams (HODT) and site supervision team from JKR headquarters that involves in the project risk management practice. Current weakness and improvement method in risk management practice will be investigated through questionnaire survey to project team personals from JKR headquarters and by interviewing the experts to achieve the study objectives.

This study covers risk management processes in JKR projects involving whole project life cycle phases which includes planning, design, procurement, construction and handing over stage based on the established Project Risk Management Facilitation Guidelines.

1.5 Significance of the Study

The significance of this study is to ascertain the weakness in current risk management practice and propose improvement methods to enhance the practice. The outcome of this study will be presented to PROKOM as the custodian of risk management and can be used to help JKR project team members to effectively manage risk and uncertainty in their project in order to achieve the intended objectives. Overall, this study is also expected to contribute to improve predictability and maximize potential to meet deadlines and prevent additional costs overruns due to risks and uncertainty.

REFERENCES

- Abd. Majid, M.Z., and Mc Caffer, R. (1997). Assessment of Work Performance of Maintenance Contractors in Saudi Arabia, *Journal of Management in Engineering*, ASCE, Vol. 17 No. 1:91
- Ahmed, S.M., Ahmed, R., and De Saram, D.D, (1999). Risk management trends in the Hong Kong construction industry: a comparison of contractors and owners perception. *Engineering, Construction and Architectural Management* 6/3, pp 225-234.
- Ahmed S., Azhar S. and Ahmed I., (2001). Evaluation of Florida General Contractors' Risk Management Practices, Florida International University.
- Akintoye S and Malcolm J MacLeod (1997). Risk Analysis And Management In Construction. *International Journal Of Project Management Vol. 15, No. 1*, pp. 31-38
- Anna Klemetti (2006). Risk Management in Construction Project Networks. Labrotory of Industrial Management Report 2006/2.
- Chapman, C. (1997). "Project Risk Analysis and Management—PRAM the generic process." *Int. J. Proj. Mgmt.*, 15(5), 273–281.
- Chapman, C., Ward, S., (2004). Why risk efficiency is a key aspect of best practice projects, *International Journal of Project Management*, Vol. 22, pp. 619-632

- Chapman RJ, (1998). The effectiveness of working group risk identification and assessment techniques, *International Journal of Project Management* 16, pp 333-343.
- Council of Standards Australia & New Zealand (2004). AS/NZS 4360:2004, *Risk Management Standard*
- Department of Standards Malaysia, (2010). MS ISO 31000:2009, IDT, Risk Management – Principles and Guidelines
- Dembo R. & Freeman A., (1998). *The rules of risk; A guide for investors*, John Wiley & Sons inc.
- Dariusz Skorupka (2003). Risk Management In Building Projects. *AACE International Transactions* : RI191-RI195.
- Enshassi A. & Mayer P., (2001). Managing risks in construction projects, 18th Internationales Deutsches Projekt Management Forum, Ludwig burg, Germany.
- Flanagan, R., and Norman, G. (1993). *Risk management and construction*, Blackwell Scientific, Oxford, U.K.
- Forbes, D., Smith, S., and Horner, M. (2008). “Tools for selecting appropriate risk management techniques in the built environment.” *Constr. Manage. Econ.*, 26(11), 1241–1250.
- Jabatan Kerja Raya Malaysia, Cawangan Projek Kompleks (PROKOM), (2008). *Generic Risk in JKR Projects*.
- Jabatan Kerja Raya Malaysia, Cawangan Projek Kompleks (PROKOM), (2008). *Project Risk Management Facilitation Guideline*.

- Jabatan Kerja Raya Malaysia, Cawangan Projek Kompleks (PROKOM), (2011). *Risk Management Manual*.
- Lyons, T., and Skitmore, M. (2004). "Project risk management in the Queensland engineering construction industry: A survey." *Int. J. Proj. Manage.*, 22(1), 51–61.
- Mark, K., Linda, W., Dan, T., Gayle, D.R., Urban, N. (1998). "An investigation of risk perception and risk propensity on the decision to continue a software development project", *The Journal of Systems and Software* 53 (2000) 145-157.
- Mills, A., (2001). A systematic approach to risk management for construction, *Structural Survey*, Vol. 19, No. 5, pp. 245-252
- NSW Government, (2011). "Project Risk Management Guideline". NSW Department of Finance and Services, Australia. Version 3.3.
- Project Risk Management Handbook, (2007), Office of Statewide Project Management Improvement, OSPMI, Second Edition, Rev 0.
- Parkin, J. (1996) *Management decisions for engineers*. Thomas Telford. London.
- Project Management Institute (2004). *A Guide To The Project Management Body Of Knowledge (PMBOK Guide) Third Edition*.
- Potts, K., (2008). *Construction cost management, learning from case studies*. Abingdon: Taylor Francis.
- Raz T., Michael E., (2001). Use and benefits of tools for project risk management, *International Journal of Project Management* 19, pp. 9-17.
- Royer, P.S.,(2000). Risk Management: The Undiscovered Dimension of Project Management, *Project Management Journal*, Vol.31, No.1, pp. 6-13

Voetsch, R.J., Cioffi, D.F., Anbari, F.T., (2004). *Project Risk Management Practices and their Association with Reported Project Success.*

Wood, G. D., and Ellis, R. C. T. (2003). "Risk management practices of leading UK cost consults." *Eng., Constr., Archit. Manage.*, 10_4_, 254–262.

Zou, P. X. W., Zhang, G. M., and Wang, J. (2007). "Understanding the key risks in construction projects in China." *Int. J. Proj. Manage.*, 25(6), 601–614.