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**IMPROVING SAFETY CONTROL OF PWD PROJECT THROUGH THE  
INCLUSION OF SAFETY REQUIREMENT IN  
THE BILL OF QUANTITY**

NORMAN BIN MD. RABANI

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

Faculty of Civil Engineering  
Universiti Teknologi Malaysia

December, 2010

I declare that this project report entitled **“Improving Safety Control of PWD Project through the Inclusion of Safety Requirement in the Bill of Quantity”** 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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Name : NORMAN BIN MD. RABANI

Date : 6 DECEMBER, 2010

To my beloved parents and wife

## ACKNOWLEDGEMENT

First and foremost I would like to appreciate the God for giving me the opportunity to pursue my master's degree in Project Management at the University of Technology Malaysia. I also would like to express my sincere appreciation to my project supervisor, Ir. Dr. Rosli Mohamad Zin of the Faculty of Civil Engineering, University Technology Malaysia, for his generous advice, patience, guidance and encouragement during the years of my study.

This capstone project would not have been possible without the contribution of many people and organisations. Special thanks to the experts providing me with highly informative information during the interview sessions. Other than that, I would like to express my sincere thanks to the Safety Officer in-charge who generously spent their precious time to participate in the interview for the data collection of my project and sincerely giving feedbacks of my work. Their ideas and feedbacks are very useful indeed.

Finally, I am most grateful and indebted to my parents and my beloved wife called Mrs. Aniza Hj. Wamin and family for their support and encouragement given to me consistently during the period of my study for the Master of Project Management until I have successfully completed the project report.

Without the contribution of all the people mentioned above, this work could not have been successfully produced.

## **ABSTRACT**

Public Work Department (PWD) is the leading implementer of Government project in Malaysia. One of the common issues during the project implementation that has been highlighted by various parties is the inadequate of safety standard at the construction site. In view of this problem, this study is carried out with the aim to improve the safety standard of the PWD projects through the inclusion of safety requirement in the bill of quantity. The study was carried out in three phases. Phase 1 involved determination of the aim, objectives and literature review; phase 2 consisted of data collection through document study and interviews while phase 3: is comprised of analysis, discussion, conclusions and recommendations. The data collected through the interview was analysed using content analysis. The findings from this document study indicate that the safety items in the specification and Bill of Quantities are not comprehensive, not well-organised and inconsistent where it would cause inconvenience to the contractor during the construction stage. Ultimately the weaknesses lead to the contractor absorbing the extra cost of safety. Through the interview exercise, several recommendations of safety elements to be considered in construction project were established. This has enabled a safety elements checklist to be developed and verified by the experts. Based on the safety elements checklist, a sample of Bill of Quantities that is more safety sensitive has been formulated.

## ABSTRAK

Jabatan Kerja Raya (JKR) merupakan agensi pelaksana utama bagi projek-projek Kerajaan di Malaysia. Salah satu isu umum sepanjang tempoh pelaksanaan projek yang telah dibangkit oleh pelbagai pihak adalah tahap keselamatan kurang memuaskan yang berpunca daripada ketidakcukupan keperluan keselamatan di tapak pembinaan. Berhubung dengan permasalahan ini maka satu kajian dilakukan bertujuan untuk meningkatkan tahap keselamatan projek JKR dengan memasukkan keperluan keselamatan dalam senarai kuantiti. Kajian ini dilakukan dalam tiga tahap. Tahap 1: mengenalpasti tujuan, objektif dan bahan bacaan; tahap 2: pengumpulan data melalui kajian dokumen-dokumen dan temuduga; fasa 3: analisis, perbincangan, kesimpulan dan cadangan. Maklumat- maklumat yang diperolehi daripada temuduga dikumpulkan dan dianalisa menggunakan kaedah Analisa Kandungan. Penemuan-penemuan daripada kajian dokumen menunjukkan bahawa keperluan keselamatan dalam spesifikasi dan senarai kuantiti tidak menyeluruh, tidak disusunatur dan tidak seimbang dimana ia akan menyebabkan ketidakselesaan kepada kontraktor di sepanjang tempoh pembinaan. Dengan wujudnya kelemahan ini maka kontraktor terpaksa menanggung kos tambahan berhubung isu keselamatan. Dengan melakukan sesi temuduga bersama- sama pegawai keselamatan yang berdaftar dengan DOSH, maka masalah sebenar di tapak dapat ketahu dan akhirnya cadangan- cadangan penambahbaikan ke atas isu keselamatan dapat dibentuk. Seterusnya senarai unsur-unsur keselamatan yang terbina disemak dan disahkan oleh beberapa pakar dalam bidang tersebut yang terdiri daripada pegawai JKR. Maka dengan ini senarai semak unsur- unsur keselamatan yang merangkumi semua bidang kerja di JKR dapat wujudkan.



## TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	<b>THESIS TITLE</b>	i
	<b>DECLARATION</b>	ii
	<b>DEDICATION</b>	iii
	<b>ACKNOWLEDGEMENT</b>	iv
	<b>ABSTRACT</b>	v
	<b>ABSTRAK</b>	vi
	<b>TABLE OF CONTENTS</b>	vii
	<b>LIST OF TABLES</b>	xiv
	<b>LIST OF FIGURES</b>	xv
	<b>LIST OF APPENDICES</b>	xvi
<b>1</b>	<b>INTRODUCTION</b>	
	1.1 Introduction	1
	1.2 Problem Statement	2
	1.3 The Aim	4
	1.4 The Objectives	4
	1.5 Scope of Study	5
	1.6 Methodology of Study	5
	1.6.1 Phase 1: Determination of the Aim, Objectives and Literature Review.	5
	1.6.2 Phase 2: Data Collection.	6

1.6.3	Phase 3: Data Analysis	6
1.7	Expected Findings	6

## **2 LITERATURE REVIEW**

2.1	Introduction	7
2.2	Definitions	7
2.2.1	Safety	8
2.2.2	Incident	8
2.2.3	Accident	9
2.2.4	Near Miss	9
2.2.5	Unsafe Conditions	10
2.2.6	Unsafe Act	10
2.2.7	Hazard	10
2.2.8	Danger	10
2.2.9	Risk	11
2.3	Safety Standards and Regulations	11
2.3.1	Occupational Safety and Health Act 154 (OSHA)	11
2.3.2	Factories and Machinery Act, 1967 (FMA)	12
2.4	Safety Policy	12
2.5	Contract Document	13
2.6	Safety Culture	15
2.7	Site Safety Management Plan	16
2.8	Employment of Safety Officer	17
2.9	Site Safety Meeting	18
2.10	Toolbox Meeting	18
2.11	Site Safety Audit	18
2.12	Training and Awareness	19
2.13	First Aid	20
2.14	Risk Management	21
2.15	Emergency Response Plan and Recovery Measure	22
2.16	Personnel Protective Equipment (PPE)	23
2.17	Temporary Facilities	23

2.18	Construction Safety Zone	24
2.19	Supervision of the Site	24
2.20	Safety Management in Design and Integral Assessment	24
2.21	Extensive Use Of Foreign Employees	25
2.22	Extensive Use of Subcontractors	25
2.23	Site Safety Inspection	26

### **3 RESEARCH METHODOLOGY**

3.1	Introduction	27
3.2	Phase 1: Determination of The Aim, Objectives and Literature Review	29
3.2.1	Determine the Aim and Objectives	29
3.2.2	Literature Review	29
3.3	Phase 2: Data Collection	30
3.3.1	Document Study	30
3.3.2	Interview	31
3.3.3	Discussion with Expertise	32
3.4	Phase 3: Data Analysis	32
3.4.1	Content Analysis	33
3.4.2	Document Study	33
3.4.3	Interview	33
3.4.4	Discussion with Expertise	34
3.5	Conclusion and Recommendations	35

### **4 DATA COLLECTION AND ANALYSIS**

4.1	Introduction	35
4.2	Project Information	35
4.2.1	Project A: Building Project	
4.2.1.1	Introduction	36
4.2.1.2	Scope of project	37

4.2.1.3	Summary of project	37
4.2.2	Project B: Building Project	
4.2.2.1	Introduction	37
4.2.2.2	The scope of work	38
4.2.2.3	Summary of project	39
4.2.3	Project C: Building Project	
4.2.3.1	Introduction	39
4.2.3.2	Scope of project	40
4.2.3.3	Summary of project	40
4.2.4	Project D: Road Project	
4.2.4.1	Introduction	40
4.2.4.2	Scope of project	41
4.2.4.3	Summary of project	42
4.2.5	Project E: Road Project	
4.2.5.1	Introduction	42
4.2.5.2	Scope of project	43
4.2.5.3	Summary of project	43
4.3	Current Practice in the Document Study	43
4.3.1	Specification	
4.3.1.1	Project A: Building Project	44
4.3.1.2	Project B: Building Project	45
4.3.1.3	Project C: Building Project	48
4.3.1.4	Project D: Road Project	54
4.3.1.5	Project E: Road Project	55
4.3.1.6	Summary of specification of Contract Document	56
4.3.2	Bill of Quantities	
4.3.2.1	Project A: Building Project	57
4.3.2.2	Project B: Building Project	58
4.3.2.3	Project C: Building Project	59
4.3.2.4	Project D: Road Project	59
4.3.2.5	Project E: Road Project	59
4.3.2.6	Summary of Bill of Quantities of Contract Document	60

4.3.3	Monthly Safety Report	
4.3.3.1	Project A: Building Project	61
4.3.3.2	Project B: Building Project	62
4.3.3.3	Project C: Building Project	65
4.3.3.4	Project D: Road Project	65
4.3.3.5	Project E: Road Project	66
4.3.3.6	Summary of Monthly Safety Report of Document Study	66
4.3.4	Cost	
4.3.4.1	Project A: Building Project	68
4.3.4.2	Project B: Building Project	69
4.3.4.3	Project C: Building Project	70
4.3.4.4	Project D: Road Project	71
4.3.4.5	Project E: Road Project	72
4.3.4.6	Summary of Cost of Contract Document	72
4.4	Findings of Safety Issues in Current Practice	73
4.4.1	Specification	
4.4.1.1	Project A: Building Project	73
4.4.1.2	Project B: Building Project	74
4.4.1.3	Project C: Building Project	75
4.4.1.4	Project D: Road Project	75
4.4.1.5	Project E: Road Project	76
4.4.2	Bill of Quantities	
4.4.2.1	Project A: Building Project	76
4.4.2.2	Project B: Building Project	78
4.4.2.3	Project C: Building Project	78
4.4.2.4	Project D: Road Project	79
4.4.2.5	Project E: Road Project	79
4.4.3	Monthly Safety Report	
4.4.3.1	Project A: Building Project	79
4.4.3.2	Project B: Building Project	80
4.4.3.3	Project C: Building Project	81
4.4.3.4	Project D: Road Project and	

Project E: Road Project	81
4.4.4 Cost	81
4.5 Development of Safety Element Checklist.	82
4.5.1 Recommendations Bill of Quantities by Interviewer	82
4.5.2 Interview and Expert Panel Discussion	87
4.5.3 Development of a Safety-Sensitive Bill of Quantities	89
4.5.3.1 Safety Management Plan	93
4.5.3.1.1 Safety and Health Policy	94
4.5.3.1.2 Hazard Identification Risk Assessment Risk Control (HIRARC)	95
4.5.3.1.3 Job Safety Analysis (JSA)	96
4.5.3.1.4 Emergency Response Plan (ERP)	97
4.5.3.1.5 Chemical Safety Data Sheet (CSDS)	98
4.5.3.2 Safety Officer	100
4.5.3.3 Report	
4.5.3.3.1 Safety and Health Committee (SHC)	102
4.5.3.3.2 Monthly Safety Report	104
4.5.3.3.3 Auditing	105
4.5.3.3.4 Site Safety Inspection	109
4.5.3.4 Personal Protective Equipment (PPE)	111
4.5.3.5 Equipment for Site Office	112
4.5.3.6 Signages	114
4.5.3.7 Scaffolding Works	114
4.5.3.8 Confined Space	116
4.5.3.9 Training and Awareness	118
4.6 Strategies to Improve Safety in Construction Workplace	119
4.7 Advantage of Safety Management Plan	120

<b>5</b>	<b>CONCLUSIONS AND RECOMMENDATIONS</b>	
5.1	Introduction	123
5.2	Conclusions	124
5.2.1	Objective (i): To Evaluate the Current Practice of Contract Document Preparation In Relation To Safety	124
5.2.2	Objective (ii): To Establish A Checklist of Safety Elements in the Contract Document	125
5.2.3	Objective (iii): To Establish Standard Bill of Quantity Based on the Established Checklist	125
5.3	Recommendation for Further Study	126
	<b>REFERENCES</b>	128
	<b>APPENDICES A – F</b>	130 - 135

**LIST OF TABLES**

<b>TABLE NO.</b>	<b>TITLE</b>	<b>PAGE</b>
1	Summary of Specification of Contract Document	57
2	Summary of Bill of Quantity of Contract Document	60
3	Summary of Monthly Safety Report of Contract Document	67
4	Summary of Safety Cost of Project A	68
5	Summary of Safety Cost of Project B	69
6	Summary of Safety Cost of Project C	70
7	Summary of Safety Cost of Project D	71
8	Summary of Safety Cost of Project E	72
9	Summary of Safety Cost of Projects	73
10	Summary of Recommendation Safety Elements	84
11	Safety Element Checklist	88
12	Safety-Sensitive Bill of Quantities	90



**LIST OF FIGURES**

<b>FIGURE NO.</b>	<b>TITLE</b>	<b>PAGE</b>
1	Flow Chart of Study Methodology	5, 28
2	Risk Process of Risk Management	96
3	Workplace Inspection Process	103

**LIST OF APPENDICES**

<b>APPENDIX</b>	<b>TITLE</b>	<b>PAGE</b>
A	Occupational Accident by Sector for the Category of Death in 2008	2
B	Occupational Accident by Sector for the Category of Death in 2009	2
C	Bill of Quantity of Project A	57
D	Bill of Quantity of Project D	59
E	HIRARC	95
F	Job Safety Analysis	96

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

In general, the development of a country is measured in terms of infrastructure development. The construction industry in Malaysia is the most important industry where it has contributed to the economic growth and advancement. Malaysia still pays attention to the construction sector in achieving Vision 2020 and the developing countries. However with the rapid development will lead to increased rates of accidents in the construction industry if not addressed properly.

Public Work Department (PWD) is the leading implementer agency in Malaysia has been charged with implementing government projects should play a vital role in addressing safety problems in construction site. PWD not only to implement and complete a project, but it has to ensure the involvement of all parties to address safety problems at the workplace as it is very important and each must strive to reduce the accident rate. Thus the level of safety in the workplace seems can be improved much.

According to Teo et al. (2004), construction sites are a complex area because it involves the use of sophisticated equipment, modern methods of construction, a variety of disciplines and task workforce. Therefore, an employer should be sensitive to issues of safety on construction sites to ensure the working place is safe and

comfortable at all times. We should have in our mind that safety is important and should be given more attention and there is no compromise in that matter.

Today, people are eager to find out the level of construction accidents that is increasing from day-to-day. Everyone knows that the construction project, whether building or road project will be exposed to risks such as risk of falling from high places, slipped and few others which were resulted from operational activities at height, using a lot of heavy equipment, machinery, equipment and etc. Indirectly, employees or other person in the vicinity will also be exposed to the hazards and risk.

## **1.2 Problem Statement**

The construction industry is one of industries that is growing rapidly. However, referring to the Occupational Accident by Sector for the Category of Death in 2008 (Investigated) (Appendix 1) and Occupational Accident by Sector for the Category of Death until October 2009 (Investigated) (Appendix 2), it is found that the accident at the construction is increasing from day to day. To help address these problems, government bodies such as the Department of Occupational Safety and Health (DOSH) and National Institute for Occupational Safety and Health (NIOSH) were established to help address the problem of safety, health and welfare of employees at the site. Various efforts have been made by NIOSH and DOSH, but unfortunately accidents still occur. So the question often discussed on this issue is the reasons on why accidents are still occurring despite the efforts and measures that have been already undertaken.

The PWD has taken note of the Current practice to deal with safety problems in the implementation of the project, and it has been implemented on the site. However, efforts to improve safety at the workplace should be improved. In order to increase the level of safety, there are some weaknesses and deficiencies that need to be corrected and overcome. Among the things that need attention and improvement are as follows:

1. Currently, several initiatives have been made to address safety issues in the PWD project, such as inserting the safety issues to the Bill of Quantities of the Contract Documents. However, most of the items added to the Bill of Quantity are too general with ambiguous requirements. In some cases the Bill of Quantity does not clearly explain the work activities and safety requirement that should be provided by employers. In other cases the safety items are being put as Lump Sum such as provision to provide safety and health officer for twenty-four (24) months and preparation of health and safety reports for twenty-four (24) months. Thus, if things were not stated and price for then the contractor should bear the costs. The problems arise when the contractor refused to provide what is contained or stipulated in the contract documents. Accordingly, the PWD has been facing difficulties to implement the safety requirement on site. This matter can be resolved by submitting a detailed Bill of Quantity, taking into account all safety requirements in the contract documents.

2. Under OSHA Act 514, Clause 3(b): Class or description of industries required to employ safety and health officer which any employer of any work of engineering construction where the total contract price of the project exceeds twenty million ringgit. From the statement, it clearly shows that the contractor should provide a safety officer. Unfortunately, with regards to the appointment of safety officers for a project, many contractors are not aware and ignore -the need to appoint a safety officer. Currently, many projects under the government are not emphasising the importance of appointing a safety officer for safety at construction sites. But instead, this rule applies only to projects in the private sector such as Petronas projects, -where safety issues are highlighted in all their daily activities.

3. According to Kartam et al (2000)., government, consultants and contractors were aware that the safety at construction sites is important, but until now they could not maximise the effectiveness of the implementation of the safety. Among the factors that effectiveness cannot be achieved is due to the contractor that has many sub-contractors to perform work on site such as drainage works, pipe works, mechanical, electrical and others. Indirect employee's of sub-contractors is under the supervision and responsibility of the main contractor. The number of sub-contractors

will cause more difficult to control the main contractor employees. Without strict control and close monitoring, the likelihood of an accident to occur is higher and more frequent. On the other hand, contractors are working to get more profit by reducing production costs and expenses as much as possible. For them, safety is usually regarded as the second most important priority in budget spending plan.

The statement of the problems mentioned above showed that the current practice of preparation of Bill of Quantity should be improved. Therefore, a comprehensive study should be conducted to overcome this problem.

### **1.3 The Aim**

The aim of this study is to improve safety control at JKR construction site through the inclusion of a comprehensive safety requirement in the bill of quantity.

### **1.4 The Objectives**

The specific objectives of this study are to:

1. evaluate the current practice of Contract Document preparation in relation to safety,
2. establish a checklist of safety elements to be included in the Contract Document,
3. establish standard Bill of Quantity based on the established safety elements checklist.

## **1.5 Scope of Study**

The scope of work for this study will be focused on projects under supervision of PWD only. Project that will be used as a study has been identified and are all under construction. Those selected project will be studied based on safety requirement in other part of contract document other than Bill of Quantity which have not been covered.

## **1.6 Methodology of Study**

In order to achieve the objectives of this study, the flow chart as shown in Figure 1: Flow Chart of the Methodology of the study illustrates the main steps in the methodology of this study. Generally this study consists of three phases which are:

Phase 1 - determination of the aim, objectives and literature review,

Phase 2 - collection of data through a document study and interviews,

Phase 3 - analysis, discussion, conclusions and recommendations.

### **1.6.1 Phase 1: Determination of the Aim, Objectives and Literature Review.**

This phase involves the need to determine the aim, objective and the scope of study through the extensive readings that need to be done from the document study and literature review related to safety issues at the construction site. The main purpose of conducting literature review is to accomplish better understanding of safety issues and the effective control measures from Malaysian's perspective. The literature review can be obtained through books, journals, working papers, conference papers, theses and on-line reading materials through the internet.

### **1.6.2 Phase 2 : Data Collection.**

This phase involves data collection through a document study, interviews and discussion with experts. The document study, a structured interview is used to collect detailed information about the current practice of safety implementation in PWD projects. A number of respondents from various discipline, task and position were identified to accommodate this study.

### **1.6.3 Phase 3 : Data Analysis**

Finally, all the information and data obtained through document study and interviews will be analyzed to produce safety element checklist and standard bill of quantity. A more detailed description of the methodology of this study will be explained further in Chapter 3.

## **1.7 Expected Findings**

From this study, the expected findings based on the objectives are as follows:

1. The study will provide benefits and profits to the PWD and contractors in the implementation of safety in construction projects,
2. Establishment of checklist of safety element for inclusion in the contract document and standard Bill of Quantity based on the establish checklist,
3. Awareness to the department and the contractor is self-importance of addressing safety issues in all projects PWD,
4. Bill of Quantity produced will become part of the contract document and applicable to all projects.



## **CHAPTER 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

According to Elbeltagi and Hegazy (2002), the construction industry involves many operations that can be risky, dangerous and unhealthy. The number of injuries, accident, and work related illness will contribute to additional costs and delays on projects.

According to Kartam et al. (2000), management in government, owners and contractors all recognize the importance of safety in construction, but cannot be fully implemented and effective. It was observed that the problem arise due to: (1) disorganized labor; (2) poor accident record keeping and reporting system; (3) extensive use of foreign labors; (4) extensive use of subcontractors; (5) lack of safety regulations and legislation; (6) the low priority given to safety; (7) the small size of most construction firms; and (8) competitive tendering.

#### **2.2 Definition**

The following are the definition for some of the common term used in this study

### **2.2.1 Safety**

Safety is a condition of being safe which absence from danger or risk, of injury, or loss to personnel and/or property, whether caused deliberately or by accident.

### **2.2.2 Incident**

Incident is an unexpected, unplanned event in a sequence of events that occurs through a combination of cause which result in physical harm such as injury, ill, health or disease to an individual, damage to property, a near miss, a loss or any combination of these effects.

Incident does not necessarily mean an event that cause immediate injury or damage to equipment or property; for example someone falling off a ladder and breaking his back or a forklift dropping load causing equipment or goods breakages. An incident can also cause long- term injuries which may or may not be detected immediately. An example is hearing loss or an illness resulting from exposure to chemicals or mineral dust.

These are some of the reasons why we need to prevent an incident:

i. Legal reasons

OSHA 1994 specifically requires employers to prevent accident and ill – health in the workplace.

ii. Moral issue

Incidents will cause suffering not only for the individual workers involved but also to their families. Employers should not willingly cause suffering to its workers and also the community from where it gets its income from. Today workers and the public are aware of their right and may not allow employers to exploit them as they did before. Many nations are not happy with organizations that do not look after the welfare of their employees.

iii. Business reason

Incidents lower the productivity and therefore profitability of an organization. Incident can involve organization with litigation which may not only cost the organization its profit but also its image.

### **2.2.3 Accident**

An accident is an unplanned, undesired event which may or may not result in injury or property damage, which interferes with the completion of an assigned task.

### **2.2.4 Near Miss**

An unplanned event that did not result in injury, illness, or damage but had the potential to do so. Only a break in the chain of events prevented an injury, fatality or damage. Other familiar terms for these events is a "close call", or in the case of moving objects, "near collision".

### **2.2.5 Unsafe conditions**

Unsafe conditions are hazardous conditions or circumstances that could lead directly to an accident.

### **2.2.6 Unsafe act**

An action occurs when a worker ignores or is not aware of a standard operating procedure or safe work practice designed to protect the worker and prevent accidents.

### **2.2.7 Hazard**

The term “hazard” in reference to Oxford Advanced English Dictionary (Fourth Edition) means danger or risk. A hazard in this study shall be defined as a source or situation with a potential for harm in terms of human injury or ill-health, damage to property, damage to the environment or a combination of these.

### **2.2.8 Danger**

Relative exposure to hazard.