

UNIVERSITI TEKNOLOGI MALAYSIA**BORANG PENGESAHAN STATUS TESIS***JUDUL: MANAGING ERGONOMICS RISK FACTORS ON CONSTRUCTION SITESSESI PENGAJIAN : 2007/ 2008Saya MICHELLE ZAINAB BAIRD
(HURUF BESAR)

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MANAGING ERGONOMICS RISK FACTORS ON CONSTRUCTION SITES

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A project report submitted in partial fulfillment of
the requirements for the award of the degree of
Master of Science (Construction Management)

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NOVEMBER 2007

I declare that this project report entitled “*Managing Ergonomics Risk Factors on Construction Sites*” is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature :

Name : MICHELLE ZAINAB BAIRD

Date : 21 NOVEMBER 2007

To my beloved mother, siblings, family and friends

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ABSTRACT

Ergonomics Risk Factors (ERF) provide the challenge to the management as they pose problems and difficulties in identification, elimination or reduction and control. The objective of this paper is to identify the Ergonomics Risk Factors (ERF) on construction sites, to analyze the most critical Ergonomics Risk Factors (ERF) on construction sites, to analyze the most hazardous job that contributes to ergonomics injuries and to propose and recommend solution in minimizing ERF on construction sites. This study has looked into ERF on construction sites in Johor Bahru and has been conducted using questionnaire and interviews. The study shows that there are seven ERF that have been identified on construction site that are awkward posture, force, static loading, vibration, repetition, contact stress and extreme temperature. It also shows that the most critical ERF on construction sites is vibration. For the jobs on construction sites, concreting work has been analyzed as the most hazardous or critical job. There are several suggestions on minimizing ERF on construction sites and the most frequent suggestions are have regular breaks to do some body stretching, provide the right equipment for the right work and use the protective appliance to reduce ERF. However, the most important thing that must be taken in to account is the understanding and knowledge on ergonomics itself. By understanding ergonomics, construction workers can perform their duties in proper manner that will end with very minimum injury. Therefore, the management of ERF is essential at construction sites in an effort to curb problems associated to them.

ABSTRAK

Faktor risiko ergonomik (ERF) memberi cabaran kepada organisasi dalam menguruskannya disebabkan kesukaran dalam mengenalpasti, mengurangkan serta menghapuskannya. Objektif kajian ini adalah untuk mengenalpasti faktor risiko ergonomik di tapak bina dan menganalisa faktor risiko ergonomik paling kritikal di tapak bina. Selain daripada itu, objektif kajian ini juga adalah untuk menganalisa kerja tapak bina yang paling bahaya yang menyumbang kepada faktor risiko ergonomik tersebut. Objektif terakhir kajian ini pula adalah untuk mencadangkan penyelesaian kepada pengurangan faktor risiko ergonomik tersebut. Kajian ini dijalankan dengan menggunakan borang kaji selidik serta temuduga yang tertumpu kepada tapak bina di Johor Bahru, Malaysia yang melibatkan Kontraktor Kelas A sahaja. Kajian menunjukkan bahawa terdapat tujuh faktor risiko ergonomik iaitu postur badan yang tidak betul (*awkward posture*), tekanan, beban statik, getaran, pengulangan, tekanan setempat (*contact stress*) serta suhu yang melampau. Berdasarkan analisis, faktor risiko ergonomik yang paling kritikal ialah getaran. Seterusnya, kerja konkrit telah ditemui sebagai kerja tapak bina yang paling berbahaya. Terdapat beberapa cadangan dalam penyelesaian kepada pengurangan faktor risiko ergonomik ini dan diantaranya ialah rehat seketika untuk melakukan regangan badan, menyediakan peralatan yang sesuai untuk kerja yang sesuai, serta menggunakan peralatan perlindungan bagi mengurangkan faktor risiko ergonomik. Namun begitu, perkara utama yang perlu dititikberatkan ialah pemahaman serta pengetahuan tentang ergonomik itu sendiri. Dengan memahani ergonomik, pekerja tapak bina dapat melaksanakan kerja serta tanggungjawab mereka dengan berkesan yang mana dapat mengurangkan kecederaan. Oleh itu, pengurusan faktor risiko ergonomik di tapak bina adalah penting dalam mengurangkan risiko serta masalah ergonomik ini.

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LIST OF ABBREVIATIONS

| | | |
|------|---|---|
| BCPE | - | Board of Certification for Professional Ergonomists |
| BLS | - | Bureau of Labor Statistics |
| CIDB | - | Construction Industrial Development Board |
| CPWR | - | Center to Protect Worker's Right |
| CTD | - | Cumulative Trauma Disorder |
| CTS | - | Carpal Tunnel Syndrome |
| ERF | - | Ergonomics Risk Factors |
| ILO | - | International Labor Office |
| LBP | - | Low Back Pain |
| MSD | - | Musculoskeletal Disorder |
| OSHA | - | Organizational Safety and Health Act |
| PKK | - | Pusat Khidmat Kontraktor |
| SPSS | - | Statistical Package for Social Sciences Software |
| UTM | - | University Teknologi Malaysia |
| WHO | - | World Health Organization |

CHAPTER I

INTRODUCTION

1.1 Background

Ergonomics is derived from two Greek words which are 'ergon' and 'nomos'. 'Ergon' means work meanwhile 'nomos' means principles of laws. These combinations give us the phrase ergonomics, which mean the science of work. Ergonomics is not a new science, although the term has become more common lately. The phrase was first coined in 1857. Its fundamental importance is recognized in the International Labor Organization (ILO), which defines ergonomics as the application of the human biological sciences in conjunction with the engineering sciences to the worker and which at the same time enhances productivity.

Occupational Safety and Health Act 1994 (OSHA 1994) has defines ergonomics as the science of "designing the job to fit the worker, instead of forcing the worker to fit the job". However, generally ergonomics is defines as fitting the job (tools, tasks, and environment) to the employee, instead of forcing the worker to fit the job. This definition emphasizes the important triad of ergonomics elements namely comfort, health and productivity. Ideally, ergonomics makes the job safer by preventing injury and illness, makes the job easier by adjusting the job to the worker, makes the job more pleasant by reducing physical and mental stress and in the same time it saves money. Thus, ergonomics seeks to adapt work to human physical and psychological capabilities and limitations. In seeking this goal, it draws on many

disciplines including anatomy, physiology, psychology, sociology, physics and engineering.

Construction works require handling heavy materials and equipment, use of body forces, repetitive works, working in awkward or cramped positions, standing or seating for long duration, reaching away from the body and overhead, exposure to vibration and noise, climbing and descending, etc. Prolonged exposure to these conditions could pose the workers to the ergonomics risk. Risk can be defined as the chance of something happening because of a hazard or threat that will affect business activity or planned event. Risk can contribute to injuries meanwhile ergonomics risk factors are those circumstances or situations that exist or created intentionally or unintentionally that might contribute to results contravene or against the principles or philosophy of ergonomics that might prove harmful to the health and well-being of workers or users at work or after work. Ergonomics risk factors such as repetition, force, awkward postures, excessive pressure, vibration and temperature have to be identify, eliminate or reduce and control.

1.2 Problem Statement

According to the International Labor Organization (ILO), musculoskeletal disorder account up to 40 illnesses and drop in productivity in most of the countries all over the world (Jalaluddin B. Dahalan, 2003). Musculoskeletal injuries are the most common problem in the construction industry. They are over one third of lost workday injuries and produce about half of all compensation claims. Besides that, a lot of workers are suffering from low back pain, and compensation costs are growing (Seung-Houn La et al., 2004).

Construction laborers perform many physically demanding tasks including cleaning and preparing construction sites, digging trenches, operating power tools, tending machines, loading and unloading building materials, and mixing and placing concrete. These activities expose workers to ergonomic risk factors such as awkward

postures, frequent heavy lifting, repetitive motions, and hand/arm and whole body vibration (Everett, 1997). Consistent with this, in construction strains and sprains are the most common type of work-related, nonfatal injury, accounting for over 37 percent of all injuries resulting in days away from work (CPWR, 2002).

In 2000 construction laborers ranked fourth among all occupational groups in the number of work-related musculoskeletal injuries involving time away from work and first in lost workdays; construction laborers had a median of 10 days away from work compared to a median of 7 days for all industries (BLS, 2000). Twenty-two percent of lost-time injuries among laborers are due to overexertion, and construction laborer is the highest risk occupation for work-related back pain (Ringen and Seegal, 1995; Guo et al., 1995).

Despite the high prevalence of ergonomics problems, research in the Malaysia construction industry regarding this issue has been very limited. Applying ergonomics to construction site can reduce the potential for accidents, injury and ill health and improve performance and productivity. Failure to observe ergonomics principle may have serious repercussions, for not only individuals, but also whole organizations.

1.3 Aim and Objectives

The aim of this study is to investigate the seriousness of Ergonomics Risk Factors (ERF) on construction sites. To achieve the above aim, the following objectives have been list.

- i. To identify the Ergonomics Risk Factors (ERF) on construction sites.
- ii. To analyze the most critical Ergonomics Risk Factor (ERF) on construction sites.
- iii. To analyze the most hazardous job that contributes to Ergonomics Risk Factors (ERF).

- iv. To propose and recommend solution in minimizing ERF on construction sites.

1.4 Scope of Study

This study focused on Ergonomics Risk Factors (ERF) on construction sites in the states of Johor Bahru, Malaysia. The construction sites that have been considered in this research are those that relate to building construction. Methods that have been used in data collection are questionnaire and interviews. The target respondent in this study are persons who are very well verse about the work in progress at sites such as safety officer, project managers, site supervisors, site engineers and site coordinator. Mainly those respondents are the Class A Contractors. Data that have been collected were analyzed using Statistical Package for Social Sciences Software (SPSS).

1.5 Research Significance

There are several valuable benefits expected by implementing this study. One of it is to increase awareness among the project participant to deliver a project responsibly by also focusing into ergonomics risk factors. This can be achieved by applying theoretical concepts that have been discussed in many literatures into practice in real projects. It can ensure good practice of project management in an effort to avoid common injuries that are related to poor ergonomics practise. Applying ergonomics in construction can reduce the potential of accident, injuries and illness beside it can improve the performance and productivity of the project.

1.6 Research Methodology

For the purpose of this study, the research methodology is use in order to collect data, analysis data and report on findings and results. For data collection, the methods used are literature reviews, followed by open interviews and distributing questionnaire surveys to the Class A contractors.

For data analysis purposes in this study, methods used are analyzing using SPSS, reporting, elaboration, and discussions. Figures 1.1 shows the research methodology flow chart as used for this study.

1.7 Chapters Organization

The followings are the summary of each chapter on this research project paper. This project paper contains six (6) chapters as follows:

a) Chapter I : Introduction

The first chapter of this research project report is on background of the study and it comprises of introduction, problem statements, aim and objectives, scope of study, research significance, research methodology and the chapters organisation.

b) Chapter II : Literature Review

This chapter is base on literature reviews on the related topic for this study. Mainly the literature reviews are from books, journals, articles, magazines, and internet. The topics in this chapter include definition of ergonomics and Ergonomics Risk Factor (ERF), history of ergonomics, Ergonomics Risk Factors (ERF), risk management, and ergonomics injuries.

c) Chapter III : Research Methodology

This chapter concentrate on the methodologies used to carry out this study. The subheadings are literature review, open-ended interview, develop questionnaire, data collection, and analysis data that are in frequency analysis and average index analysis.

d) Chapter IV : Data Collections and Preliminary Analysis

This chapter is on the data that have been collected and the preliminary analysis on several data.

e) Chapter V : Findings and Discussions

This chapter focuses on analysing collected data and discussing the findings. Various suitable techniques and methodologies are used in analysing the data gathered appropriate with the information needed and the types of data collected. Analysis and discussion in this chapter is carried out with regards to fulfilling the objectives of the research.

f) Chapter VI : Conclusion and Recommendations

This chapter is on the conclusions and summary of the study. There are also several recommendation discussed in this chapter regarding the study. Beside that, the limitation and problems that exists during the study are also stated in this chapter.

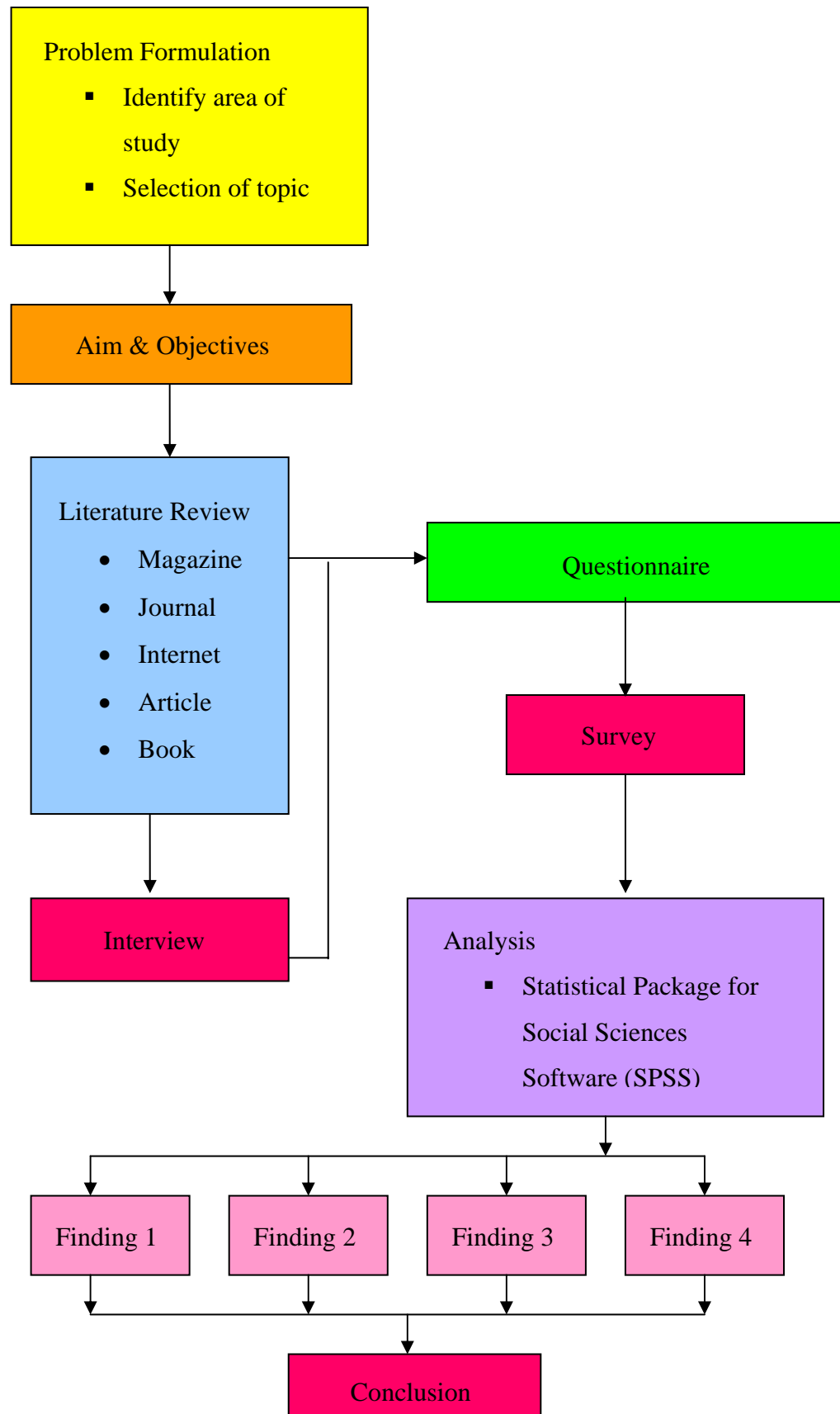


Figure 1.1: Research Methodology Flow Chart