

**UNIVERSITI TEKNOLOGI MARA**

**ERGONOMICS PARTICIPATORY  
OPPORTUNITIES FOR OCCUPATIONAL  
HEALTH ENHANCEMENT IN MALAYSIAN SMIs**

**ISA HALIM**

**Thesis submitted in fulfillment of the requirements  
for the degree of  
Master of Science**

**Faculty of Mechanical Engineering**

**September 2006**

## PREFACE

The thesis consists of seven chapters represents a total of two years of effort. This thesis begins with an introductory chapter about Malaysian Small and Medium Industries (SMIs) and the roles of ergonomics participatory approach to enhance occupational health in this sector. After an introductory chapter, a critical literature review on ergonomics participatory approach is provided in the second chapter. Chapter three has been devoted to the essential detail of methodology and procedures undertaken in this research. A large number of well-labelled illustrations associated with clear explanation are provided to give the necessary insight of case study in chapter four. Chapter five presents the outcomes of the research together with the effectiveness of introduced solution. The summarization and conclusion of carried out research are rendered in chapter six. Finally, chapter seven suggests a few recommendations in order to make occupational health in Malaysian SMIs become more feasible. References along with published papers are provided at the end of thesis which should be useful for those interested in studying further into specific aspects.

Valuable suggestions and constructive criticism from numerous parties at various institutions have led to the preparation of this thesis. I am particularly thankful to Associate Professor Ir Dr Abdul Rahman Omar for having taken the pains to review major portions of the thesis and for giving useful suggestions for improvements. I am indebted to the authorities of ExtraBuilt Sdn Bhd, Shah Alam and Universiti Teknologi MARA, Shah Alam for having allowed me to undertake this activity and provided the necessary information and facilities.

I am open to criticism and would welcome any helpful suggestions for improvement in future study.

## TABLE OF CONTENTS

Preface	
Abstract	ii
Acknowledgements	iii
Table of Contents	iv
List of Tables	viii
List of Figures	ix
List of Plates	xii

### CHAPTER ONE: INTRODUCTION

1.1	Background and Problems	1
1.2	Research Requirements	5
1.3	Potential Benefits from the Research	6
1.4	Scope and Limitations of Research	7
1.5	Research Outline	8
1.6	Structure of the Thesis	9

### CHAPTER TWO: LITERATURE REVIEW

2.1	Ergonomics Participatory and Applications	11
2.2	The Impact of Occupational Diseases to Industry	13
2.3	The Opportunities of Applying Ergonomics Participatory to Counter Occupational Diseases in Malaysian SMI's	14
2.4	Ergonomics Participatory Tools for Occupational Health Assessment	19
2.4.1	Observation Method	19
2.4.2	Direct Measurement Method	26
2.4.3	Summary of Ergonomics Participatory Tools for Occupational Health Assessment	29

### CHAPTER THREE: RESEARCH METHODOLOGY AND PROCEDURES

3.1	Phase 1: Identification of Occupational Risk Factors	32
3.1.1	Development of ISA Risk Factors Reporting Form for Identification of Occupational Risk Factors	34
3.2	Phase 2: Measurement and Analyses of Workers' Physiology	36
3.2.1	Measurement of Working Posture	36

# CHAPTER ONE

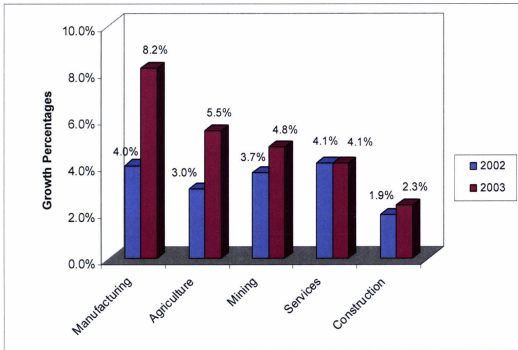
## INTRODUCTION

This chapter is intended to provide comprehensive background information, and it is organized to disclose the originality of the research. It renders aspects both of evolution and issues in Malaysian Small and Medium Industries (SMIs) and statements justifying this research. Descriptive information is also given on: background and problems, research requirements, potential benefits from the research, research outline and structure of the thesis.

### 1.1 Background and Problems

Today, manufacturing sector forms the largest single component of Malaysia's economy. The sales value of the manufacturing sector had increased by 11.8% or RM 4.1 billion to 38.7 billion in July, 2005 compared to RM 34.6 billion registered in the comparative period a year ago (DOS, 2005). The demand on manufacturing sector has increased consistently due to the effort of Malaysia to be an industrialized country in 2020. As mentioned by Tan Sri Dr. Zeti Akhtar Aziz, the Governor of the Central Bank of Malaysia, manufacturing sector has recorded the highest growth of 8.2% followed by agriculture (5.5%), mining (4.8%), services (4.1%) and construction (1.9%) (Zeti, 2004). These statistics showed that the manufacturing sector has high potential in developing Malaysia's economy. Small and Medium Industries (SMIs) is one of the parties which contributed to the growth of the manufacturing sector. Currently, the SMIs constitute approximately 84% of the manufacturing establishments in Malaysia (Ayob Johari, et al., 2005).

According to Small and Medium Industries Development Corporation (SMIDEC), majority of the SMIs are involved mainly in several industrial sectors such as manufacturing, agriculture, mining, services and construction (SMIDEC, 2002). Manufacturing sector has been identified as the largest sector in Malaysian SMIs. SMIDEC also reported that the growth of manufacturing sector in Malaysian SMIs was 4.0% in 2002 and increased to 8.2% in 2003 (SMIDEC, 2005). Figure 1.1 shows the growth percentages of the manufacturing and other sectors in Malaysian SMIs for the year 2002 and 2003.



Source:

SMIDEC, 2005

Figure 1.1: Growth Percentages of Industrial Sectors in Malaysian SMIs for the Year 2002 and 2003

Although Malaysian SMIs growth are rapid and their expansion is fast, they still face challenges that influence their competitiveness. The companies under Malaysian SMIs have limitation in term of occupational health awareness. Lack of materials handling equipments and improper workstation design are some of the challenges that have to be improved by Malaysian SMIs. A study (Isa Halim et al., 2005) had shown that appropriate materials handling equipments are not often provided in Malaysian SMIs. This is due, among others; limited space and capital, and the needs for the equipments are not understood by the owners of the industries and thus not given priority. As a consequence of this, the workers have to handle the materials and goods manually. This practice may lead to occupational diseases.

Workstation design plays an important role to ensure the workers practiced safe working posture and thus prevent occupational diseases. The postures adopted