OCCUPATIONAL SAFETY AND HEALTH (OSH) PRACTICES AND OPERATIONAL PERFORMANCE IN MALAYSIAN MANUFACTURING SECTOR

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OCCUPATIONAL SAFETY AND HEALTH (OSH) PRACTICES AND OPERATIONAL PERFORMANCE IN MALAYSIAN MANUFACTURING SECTOR

by

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DEDICATION

I dedicate this thesis to:

Mohamad Najib bin Ab. Rani and Yasuyoshi Fujimori, the two men who formed most of my characters and will power and made me appreciate myself in this life

My mother,

Hasiah binti Othman, a truly wonderful and perseverant who sacrifices so much herself unconditionally for me;

My father,

Saad bin Abdullah, a man of sincerity and full of love

My beloved brother and sister,

Masri and Marliani for their love and concern

and my kids,

Nazurah Batrisyia Syaurah, Muhammad Danial Haiqal, Muhammad Danish Mu'iz, and Nazurah Qaissara Ajwa, the princes and princesses of my life's happiness. All of you have inspired *mama* throughout this lonely journey.

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LIST OF ABBREVIATIONS

5S	*Seiri* (sorting), *seiton* (simplifying), *seiso* (sweeping), *seiketsu* (standardizing), and *shitsuke* (self-dissipline).
AHD	Analytic Hierarchy Process
ANOVA	Analysis of variance
CEO	Chief Executive Officer
CIMAH	Control of Industrial Major Accident Hazards
COSH	Conference and Exhibition on OSH
CSDS	Chemical Safety Data Sheet
DOSH	Department of Occupational Safety and Health
EMR	Experience Modification Rate
ERT	Emergency Response Training
FMA	Factories and Machinery Act
FMM	Federation of Malaysian Manufacturers
GOC	Government Owned Company
GDP	Gross Domestic Products
HES	Health, Environmental, and Safety
ILO	International Labor Organizãtion
ILO-OSH	International Labor Organization-Occupational Safety and Health
IMO	International Maritime Organization
IRPA	Intensive Research in Priority Areas
ISO	International Organization for Standardization
JICA	Japanese Cooperation Agency
JIT	Just in Time

KMO	Kaiser-Meyer-Olkin
MAI	Michigan OHSMS Assessment Instruments
MHI	Major Hazard Installations
MIDA	Malaysia Industry Development Authority
MNC	Multi-national Corporations
MSA	Measure of sampling adequacy
MSDS	Material Safety Data Sheet
NCOSH	National Council of Occupational Safety and Health
NIOSH	National Institute of Occupational Safety and Health
OSH	Occupational Safety and Health
OHSAS	Occupational Health and Safety Assessment Series
OHSMS	Occupational Health and Safety Management System
OJT	On Job Training
OSHA	Occupational Safety and Health Act
PPE	Personal Protective Equipment
R&D	Research and Development
RCM	Reliability Centered Management
SCQM	Supply Chain Quality Management
SHC	Safety and Health Committee
SHO	Safety and Health Officer
SIRIM	Standards and Industrial Research of Malaysia
SME	Small and Medium Enterprise
SMS	Safety Management System
SOCSO	Social Security Organization
TNA	Training Needs Analysis

TPM	Total Productive Maintenance
TQM	Total Quality Management
TSM	Total Safety Management
UiTM	Universiti Teknologi MARA
UKM	Universiti Kebangsaan Malaysia
UPM	Universiti Putra Malaysia
VPP	Voluntary Protection Programs

LIST OF PUBLICATIONS FROM THE STUDY

Mazni, S., Noorliza, K., & Azizah, O. (2007). *The success and sustainable of economy: Why integrated OHS practices?* Paper presented at the 10th Conference and Exhibition on Occupational Safety & Health.

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AMALAN KESELAMATAN DAN KESIHATAN PEKERJAAN (OSH) DAN PRESTASI OPERASI SEKTOR PERKILANGAN DI MALAYSIA

ABSTRAK

Sektor perkilangan adalah merupakan tunggak utama ekonomi di Malaysia. Punbegitu, statistik kemalangan dalam sektor tersebut menunjukkan tahap bahaya di tempat kerja mungkin telah mengurangkan keupayaan dan keberkesanan operasi sesebuah firma dan seterusnya mencetus kemerosotan prestasi. Sementara itu, Amalan Keselamatan dan Kesihatan Pekerjaan (OSH) telah dikenalpasti sebagai faktor penting dalam mengurangi gangguan kepada pengeluaran dan menghapuskan perkara yang tidak ada nilai-tambah dalam perniagaan. Justeru itu, tiga matlamat utama kajian ini ialah mengenal-pasti amalan-amalan yang membentuk amalan OSH, mengenal-pasti kewujudan amalan OSH dalam firma perkilangan dan mengkaji perhubungan di antara amalan OSH dan prestasi operasi. Didokong oleh teori domino dan socio-technical, amalan OSH di dalam kajian ini adalah dari amalan yang dianggap penting untuk prestasi seperti yang dinyatakan menerusi ulasan karya, garis-panduan dari pihak kerajaan dan temuduga di sektor perkilangan. Oleh itu, amalan tersebut dianggap penting untuk prestasi yang mantap dan memenuhi hasrat pihak kerajaan. Gabungan dua kaedah kualitatif dan kuantitatif yang dijalankan secara serentak telah digunakan dalam pembentukan amalan yang terdiri dari komitmen pengurusan, kawalan bahaya, latihan dan didikan dan penilaian yang berterusan. Amalan OSH dicadangkan sebagai pembolehubah tidak bersandar dan prestasi operasi sebagai pembolehubah bersandar. Kajian ini dijalankan ke atas semua firma perkilangan di seluruh Malaysia. Dari 329 kaji selidik yang dihantar melalui pengurus Sumber Manusia di firma masing-masing, kadar respons yang diterima adalah sebanyak 44%. Sejumlah 143 ketua dari peringkat penyelia sehinggalah ke pihak pengurusan tertinggi yang berhubung-langsung di bahagian pengeluaran

telah turut-serta secara sukarela dalam kajiselidik ini. Skor purata, sisihan piawai, dan analisa statistik deskriptif dalam satu-hala ANOVA telah menunjukkan kewujudan amalan OSH adalah sangat terbukti di kalangan pengamal-pengamalnya tanpa mengira jenis industri, status pemunya firma, jumlah pekerja dan jangka-masa perniagaan. Hasil kajian juga menunjukkan tuntutan minima Akta OSHA 1994 telah dipatuhi oleh sebahagian besar firma perkilangan di Malaysia. Hasil regresi juga telah menunjukkan bahawa amalan OSH di dalam kajian ini mempunyai hubungan signifikan dengan prestasi operasi. Penemuan ini menguatkan lagi andaian teori yang mendasari kerangka kajian yang mana amalan OSH bertindak sebagai alat dan pengantara yang mengharmonikan hubungan di antara manusia dan mesin. Amalan OSH telah terbukti memberi faedah kepada perniagaan. Pembuktian hubungan yang signifikan dalam kajian ini membayangkan yang amalan OSH pada peringkat organisasi juga berpotensi sebagai pemangkin pada penurunan tahap kemalangan dan penyakit yang mendatar (statik). Justeru itu, ia dapat menyokong polisi kerajaan dalam Rancangan Malaysia ke-9. Matlamat polisi ini adalah mempertingkatkan lagi persekitaran pekerjaan yang sihat dan selamat, dan menjana pendapatan yang lebih dari industri perkilangan yang kurang risiko. Kesimpulannya, amalan OSH patut dipertimbangkan sebagai pelaburan yang berupaya memberi pulangan positif kepada firma-firma di Malaysia.

OCCUPATIONAL SAFETY AND HEALTH (OSH) PRACTICES AND OPERATIONAL PERFORMANCE IN MALAYSIAN MANUFACTURING SECTOR

ABSTRACT

The manufacturing sector is the backbone of Malaysia's economy. However, accident statistics for this sector show levels of hazard in the workplace that may reduce the operating ability and efficiency of a firm and consequently lead to a decrease in performance. Meanwhile, OSH practices are acknowledged as an important factor in terms of reducing interruptions to production and eliminating non-added value to business. Thus, the aims of this study are threefold. Firstly it will identify the composition of OSH practices, secondly it will determine the existing OSH practices in manufacturing firms, and thirdly it will examine the relationship between OSH practices and operational performance. Grounded in the domino and socio-technical theories, OSH practices arise from the existing literature, the government's guideline, and the practice review in manufacturing firms. As such they are regarded as critical for optimal performance and for meeting government expectations. A mixed-methods approach was used to construct the composition of OSH practices: management commitment, hazard control, training and education, and continual evaluation. OSH practices are proposed as independent variables and operational performance as the dependent variable. This research was conducted on all the manufacturing firms in Malaysia. Of the 329 questionnaires distributed through the Human Resource managers of each firm, the response rate was 44%. A total of 143 full-time production related leaders from supervisory to top management level voluntarily participated in the survey. The results from the means, standards deviation and one-way ANOVA analyses of descriptive statistics indicated that OSH practices are well established within the manufacturing sector regardless of industry type, ownership status, employment size, and business duration. The minimum requirements of Occupational Safety and Health Acts (OSHA) 1994 are also practiced

by the firms. The regression results indicated OSH practices significantly relate to operational performance. This finding further strengthens the theoretical assumptions underpinning the research framework namely that health and safety practices act as a means to minimize the conflict between man and machine. OSH practices certainly contribute to business advantage. The significance of this relationship is supported by this study and this implies that at an organizational level OSH practices could also be used as the impetus to reduce occupational accidents and rates of illness. Hence, this complements the government policy as mentioned in the 9th Malaysia Plan. This policy is aimed at further enhancing holistic health, creating safer working environments and generating more income from a less hazardous manufacturing industry. In summary OSH practices should be considered as an investment with a potentially positive rate of return for firms in Malaysia.

CHAPTER ONE

INTRODUCTION

"OSH is a performance determinant rather than an end in itself and the insights are revealing. Linking to company performance is certainly worthy of more detailed attention" (C. Smallman & John, 2001).

1.0 Introduction

Being profitable and competitive is always a priority for firms regardless to the size of the business. The quest for productivity and excellence has forced firms to look internally into many factors. At the same time, firms are bound to minimize risks that incur operation costs such as high scraps inventory. For these purposes, the use of Occupational Safety and Health (OSH) practices in manufacturing operations is now recognized as a competitive advantage in eliminating or minimizing the interruptions to the production process in order to enhance firm performance (Abdul Raouf, 2004; Clive Smallman, 2001).

The imperfect relationship between man and machine is one of the major reasons for production interruptions. At organizational level, such interruptions can lead to lost of skilled human lives and create accidents-related costs such as legal fees and fines, compensatory damages, investigation time, lost production, and bad reputation for firms. OSH practices therefore, are designed to prevent such competitive disadvantages and to offer maximum beneficial safety and health practices to workers as well as organizations. The implementation of safe and healthy manufacturing operations should be considered as an investment with a potentially positive rate of return for firms in Malaysia. Thus, emphasis on full management commitment, hazard control, training and education programs, and continual evaluation of OSH practices has to be intensified accordingly. This investment in OHS practices will need to be assessed as a critical factor necessary for the achievement of economic outcomes of firms. This is because dividends from OSH investment are both visible and invisible but extremely significant.

1.1 Research Background

1.1.1 An Overview of OSH in the Industry

Major changes in manufacturing had a profound effect on the socioeconomic and cultural conditions since the Industrial Revolution in the late 18th centuries. The process of change began in Britain, and subsequently spread throughout the world. The process continues in the era of industrialization. The introductions of machinery and technological innovation in many industries have underpinned the dramatic increases in production capacity. The investment of these technologies into manufacturing has also eventually introduced a complicated issue of OSH. The imbalance expansion of the industrialization and rapid employment rate at that time caused the death of many people as well as these who were made permanently disabled due to work-related accidents and diseases. One of the initiatives to OSH problems was the formulation of the Health and Safety at Work Act in 1974 by the "father of OSHA," a name given to Lord Alfred Robens (Mohd Khan, 2004). Since then, well-being of workers continues as the main interest in line with the definition of OSH. OSH has been defined as the protection and promotion of people in workplace and improvement of working conditions and environment (Coppae, 1998; OHSAS 18001:1999, 2002). OSH in general, is a cross-disciplinary area, concerned with protecting the safety, health and welfare of people engaged in work or employment (Wikipedia the free Encyclopaedia, 2008b).

To date, the OSH issue remains a topic for debate among OSH experts. Complex systems involve man-machine interaction formed the socio-technical systems theory to provide premise of designated practices needed to harmonize the transformation of inputs into outputs for firm performance purposes. The use of socio-technical approach is the science of studying how tools and equipment can be adapted to human use (Hodge & Anthony, 1988). On the other hand, the domino theory of accident causation has to be taken into consideration. Removing any of the dominoes will eliminate or reduce numbers of accidents, injuries, and

illnesses. The two theories include organizational and managerial factors as well as the technical aspects focusing on a joint system of man-machine interactions to achieve firm performance.

1.1.2 The Malaysian Scenario

According to Department of Occupational Safety and Health (DOSH) (2006), OSH in Malaysia commenced in 1878 where machinery safety had been the focus of legislators at that time. Similar to global industry, the transition from commodity based economic to industrial based, especially the high concentration on manufacturing sector, in 1970 has given enormous impact on both national economy and workers safety and health. In order to promote the safety and health in the industries, the government then developed the Occupational Safety and Health Act (OSHA) 1994 and gazetted the Act in February, 1994. The Act covers all economic industries except for on board ships and the armed forces (Department of Occupational Safety and Health, 2006; Lam Thye, 2006). OSHA (1994) is aimed at facilitating the handling of OSH problems in the various economic sectors; which a coverage of 90% of the total national workforce in Malaysia, and complement the Factories and Machinery Act (FMA), 1967 (Department of Occupational Safety and Health, 2006). To date, the enforcement of statutory inspection on certificated machinery continues. The Act require employers to be accountable for and have a duty to conform to OSH practices in their organizations by taking all practical means and measures to ensure the best safety and health.

The OSHA (1994) emphasizes the establishment of a national tripartite advisory body; a clear definition of employers to protect their employees; responsibilities of manufacturers, importers, and suppliers of a plant; establishment of safety and health committees (SHC), and requirement of safety and health officers (SHO). DOSH under the Ministry of Human Resources currently enforced OSHA (1994). In addition, National Council of Occupational Safety and Health (NCOSH) was set up as an advisory council to the ministry on matters

related to OSH. As the OSHA (1994) calls for self-regulated, the Malaysian government also encourages other proactive approaches including the adoption of international standard such as OHSAS 18001 and MS1722 to form OSH practices in workplaces. The Ministry of Human Resource also established National Institute of Occupational Safety and Health (NIOSH) as a training center and Social Security Organization (SOCSO) to provide social security protection to all workers.

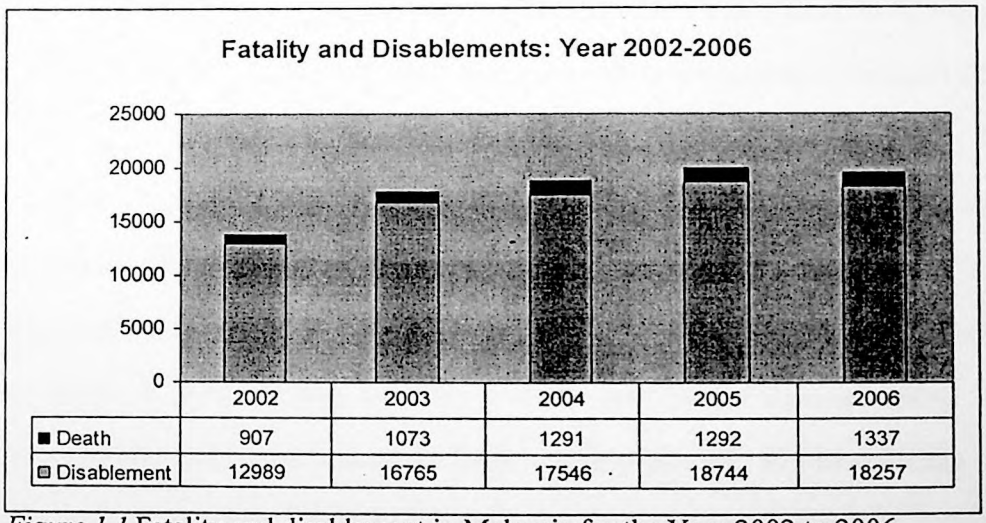
The law requires the employers to implement safety and health at work. In the Malaysian industry, the OSHA (1994) and FMA (1967) constitute the primary legislation that governs safety and health of all employees in the industry. The legislation do not impose specific duties on the duty holder to manage safety and health at the workplaces, but impose the legal duty on the occupiers or employers to practice OSH management system; Policy, Organization, Planning and Implementation, Evaluation, and Action and Improvement. OSHA (1994) provide these five most important elements relating to the employer's duty in section 15(2), 15(2)(c), 16, 29, 30, 31, and 48(1). In summary, the OSHA (1994) requires all firms to have a system features as defined in the act to deal with OSH. The specific and substantive standards of machine related safety is defined under FMA (1967). Within these minimum structures, the firms can organize the OSH practices.

1.1.3 OSH in the Manufacturing Sector

OSH practices in manufacturing firms are important because manufacturing sector is the major contributor in boosting Malaysia's economy. The country's exports grew at 13.5% per annum in the period of 1991-2005, placing the country as the 19th biggest trading nation in the world (MIDA, 2007; The Star, 2006). In 2006, the economy grew by 5.9% and 6.3% in the following year (Bank Negara Malaysia Annual Report 2006, 2007; Laporan ekonomi 2008-2009, 2008b) and the manufacturing sector continues to be the primary focus in the Ninth Malaysia Plan (9MP) for enhancing competitiveness (The Star, 2006). In submitting the

Malaysian 2009 Budget, Datuk Seri Abdullah Ahmad Badawi reported that the gross domestic product (GDP) grew by 6.7% for the first half of 2008 (thestar online, 2008). Manufacturing sector's GDP growth increased from 3.1% in 2007 to 4.7% in first half of 2008 (Laporan Ekonomi 2008-2009, 2008a). The positive sign of the economic growth has included the manufacturing sectors in the largest budget of RM27.8 billion for Development Expendicture of 2009.

In recognition of the substantial improvement in the Malaysian economy, manufacturers continue to internationalize their manufacturing operations. Thus, the advent of new technologies in manufacturing processes helps the success to the sectors. However, unsafe practices such as lack of management control and appropriate skills in the technologies often allow work hazards among the workers. To date, Malaysian has an average of 14 work-related deaths per 100,000 workers when compared to an average of three in industrialised countries such as Japan, Canada, and Australia (Najib, 2006; The Star, 2006). Figure 1.1 depicts the latest five consecutive years of fatal and disablement trend in Malaysia. As shown by the figure, number of fatality and disablement is still on the rise in Malaysia.



	2002	2003	2004	2005	2006
■ Death	907	1073	1291	1292	1337
▨ Disablement	12989	16765	17546	18744	18257

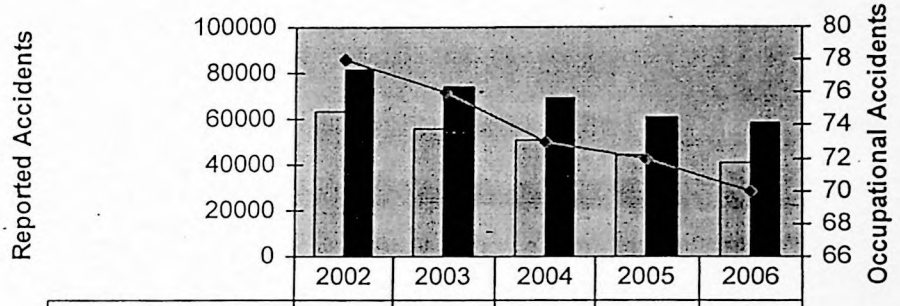
Figure 1.1 Fatality and disablement in Malaysia for the Year 2002 to 2006. Adapted from MOHR Labour and Human Resources Statistics 2006.

An accident is an unwanted event that may happen in any place, due to unexpected causes. The existing hazard and industrial accident rates continue to be among the most discussed current issues (Abudayyeh, Fredericks, Butt, & Shaar, 2006; Barling & Hutchinson, 2000; Law, Chan, & Pun, 2006; Schulte, 2006). For most of the countries in the Asia-Pacific region, the survey of OSH current problems reported that the major causes of accidents are heat, heavy metals, organic solvents, pesticides, carcinogens, dusts, reproductive hazards, biological hazards, and psychosocial problems, including work stress (Phoon, 1997). Among these, the technology that produces noise and vibrations is reported as the most prevalent occupational problem in Malaysia. According to Phoon (1997), exposure over a long period to noise and vibration was significantly affecting the noise-induced deafness in Singapore. In relation to this, metalworking machine was identified as the most hazard-causing agent with 2,820 cases while indoor working environment caused of 15,670 accident cases in Malaysia (SOCSO, 2006). This covers areas such as floors, confined quarters, stairs, other traffic and working surfaces, floor and wall openings and environmental factors such as lighting, ventilation, temperature, and noise.

At the global level, the International Labour Organisation (ILO) reported that the total costs of poor practices of OSH were estimated at four percent of world's GDP, a loss of which is "equivalent to 20 times all official development aid put together." The loss was measured from the cost of injury, death and diseases through absence from work, sickness treatment, disability, and survivor benefits (Somavia, 2005). Similarly in Malaysia, the government had spent RM890 million in 2005 on workers's social benefits, which was an increment of RM50 million from the previous year (Abdul Rahman, 2006). The amount increased again by nine percent in 2006, totalling RM969, 975.84 (SOCSO, 2006). The government also allocated RM13.7 billion to provide free health and services in 2009 (thestar online, 2008). This allocation is meant to support the enhancement of health services that include health facilities, and provide equipments, increase supply of medicines, intensify

enforcement activities, and to build more hospitals and clinics. Although the expenses reports are not specifically on OSH, the reports indicate a great loss and burden to the nation.

A major challenge facing Malaysia is to reduce the occupational accidents and incidents' rates in hazardous industries. Over a decade, Malaysia saw a clear progress in the reduction of the total number of reported industrial accidents by approximately 60% (thestar online, 2007). However, the statistic of five consecutive years as shown in Figure 1.2 suggests that the accident's rate in Malaysia has reached a plateau. The industrial accidents' rates have remained about 70% of overall reported accidents to SOCSO (SOCSO, 2006).



	2002	2003	2004	2005	2006
Occupational Accidents	63423	56249	50803	43885	40617
Total Reported Accidents	81810	73858	69132	61182	58321
%	78	76	73	72	70

Figure 1.2. Industrial accidents in Malaysia for the year 2002 to 2006.

Adapted from "Accidents and industrial accidents," 2006, SOCSO Annual Report, p. 107.

On closer examination, Figure 1.3 and Figure 1.4 reveal the actual pattern of the hazardous environment of manufacturing sector in the first and last five consecutive years of 1992 to 1996 and 2002 to 2006. In spite of significant reduction of total reported occupational accidents to SOCSO, the fact is that there is no improvement in manufacturing sectors in terms of the proportion of accidents according to sector categories. Figure 1.3 and Figure 1.4 affirm the 'plateau stage' of accidents rate as described by DOSH Annual Report (2004).

With approximately 53% accident rate annually, manufacturing takes the lead in Malaysia as the most hazardous sector since 1992 (refer Appendix A for details).

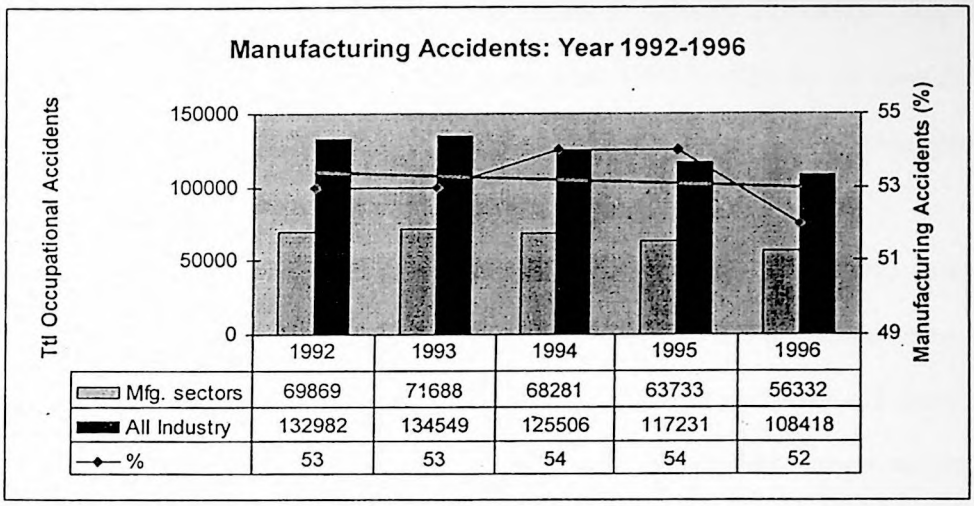


Figure 1.3. Manufacturing accidents in Malaysia for the year 1992 to 1996.

Adapted from "My Reflections on OSH," 2006, Lam Thye, p. 49.

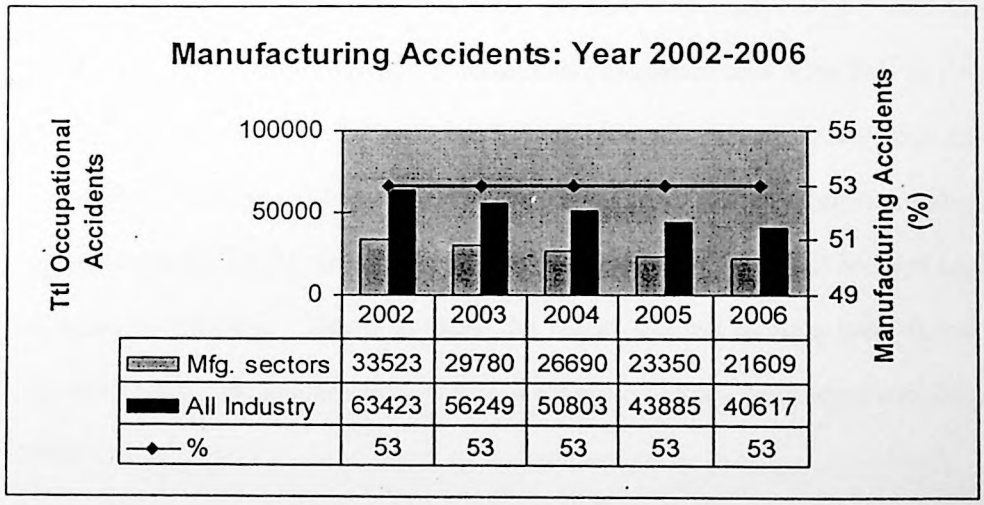


Figure 1.4. Manufacturing accidents in Malaysia for the year 2002 to 2006.

Adapted from "Accidents in manufacturing sectors," SOCSO statistics," 2008, as reported by Ahmad Fuad on 13 March 2008.

In the manufacturing sector, metal, machinery, and equipment industry is the most hazardous category (25.11%), followed by wood and wood products industry, including furniture category (16.31%), and the chemical industry (13.68%). Appendix A and B indicates detail statistics of: (1) accidents from 1993 to 2006 in the manufacturing industry and (2) occupational illnesses since year 2001, as recorded by *Cawangan Perancangan, Penyelidikan and Pembangunan*, SOCSO.

Occupational diseases, on the other hand, were reported at 263 cases in 2006 (refer Appendix B). The total case is an increment of 36% from the reported cases in 2005. About 64% of the occupational diseases were due to the handling of plant and machinery, which led to the loss of hearing, muscle, and bone problems. Meanwhile, cancer caused by exposure to quarry or mining work comprised 11% of the reported cases to SOCSO in the same year. Within the same period, 7,602 invalidity cases and 6,137 occupational related diseases survivors were recorded. The statistics thus, reveals some significant health impacts on Malaysian industries. In recent interview, SOCSO's executive officer said that work-related disease cases caused by exposure to hazardous substances take from five to fifteen years to be realized by the victims. In the industrialized countries unfortunately, this has been proven, when many who have become victims of past exposures to hazardous substances are now dying (Somavia, 2005). It is expected that the actual figure of OSH is much higher than it was reported by SOCSO. This is because the report did not include local firms who were not registered with the organization as well as foreign workers, both legal and illegal (Lam Thye, 2006).

According to the ILO reports, hazardous substances, such as asbestos and silica dust were killing about 438,000 workers annually, due to skin cancers, which is responsible for 10% of total work-related disease. The fact is, although occupational diseases were only minimally reported to SOCSO as compared to occupational accidents, the figure is rising annually (Ahmad Fuad, personal communication, 13 March 2008). The manufacturing

poor OSH practices often allow to the existence of causes of accidents. As shown in Appendix A, the rate of occupational accidents, fatal and nonfatal injuries and illnesses in the Malaysian industry, specifically in the manufacturing sector are still relatively high until 2006. To date, work-related death rates in Malaysia are also far higher than other industrialized countries. Though the specific loss amount is not determinable in the present study, the increase of SOCSO's expenditure to finance OSH is the evidence of tremendous hazards suffered by the industry. Particularly, the work hazard in manufacturing sectors may have reduced firms' ability and efficiency in their operations and thus lead to a decrease in performance. It is suggested in this study that for a country that is moving forward to being a fully developed nation in the near future, with much dependence on the income generated by the manufacturing sector, it should look into the key practices in OSH to improve firm performance. This could be achieved by optimizing the boundary between man and machines system, and by commitment from management to support OSH activities. The latter can be demonstrated by practicing prevention actions in manufacturing operations, by facilitating the understanding and awareness of the workers, and by periodically reviewing and monitoring the OSH at the organizational level.

Furthermore, the informal interview with several safety and health officer SHO revealed that although firms meet basic requirements of OSH, some of them feel that these firms are just meeting the OSHA (1994) regulations, rather than focusing on the effectiveness of these practices. One of the examples they quoted was the accidents and incidents recordkeeping. The record is maintained mainly for reporting to DOSH. Besides, being excessively focused on workers' well being and compliance, without relating OSH practices on firm performance may not be the right approach to get the attention of the top management level. Top managements are the actual driving force to many decisions. Shifting management's focus to non-competitive criteria in a way has blocked managers' interest in utilizing the prevention activities.

As safety and health has the benefit of being underpinned by statutory legislation, minimum OSH practices build on what already exists. OSH practices are a proactive process for improving the operational of machinery, equipment, processes and other activities. Occupational accidents and fatalities cause not only personal suffering to the injured worker and his family but also great economic loss to the firm in terms of compensation and other costs, increase defects and scraps, and production delay. Thus, OSH are very significant players in achieving firm's operational effectiveness. However, employers treat OSH as separate and independent sets of activities, which they prioritize the avoidance of accidents to comply with health and safety regulations. While OSH is beneficial, the linking of the OSH practices to firm performance is crucial. Thus, it is important to show the manufacturing firms that their traditional priorities – that of making profit and staying competitive – are highly related to the implementations of OSH practices in their operations. In other words, the conventional wisdom is that in order to stay competitive, firms have to reduce costs, produce quantity without sacrificing safety and quality, and being innovative in creating better production layouts.

To date, there are very few studies on OSH relating to performance. To the understanding of the researcher, there is no empirical study on relationship between OSH practices and demanded criteria of performance; namely quality, cost, delivery, and process innovation. The linkage of OSH practices to economic outcomes literally has begun in the West recently such as Smallman and John (2001), but it is little understood in Malaysia. OSH practices, in providing safe and healthy manufacturing operations as theorized by the socio-technical systems are able to increase firms' operational effectiveness. Hence, the ability of capitalizing on prevention through OSH practices is crucial.

1.3 Objectives of the Study

The aim of this study is to investigate OSH practices in the manufacturing operations with the objectives of reducing production interruptions and eliminating activities that do not add value to the business. Thus, the objectives of this study are three-fold:

1. to identify the composition of OSH practices.
2. to determine the existing OSH practices in manufacturing firms.
3. to examine the relationship of OSH practices and firm performance.

1.4 Research Questions

Based on the objectives above, this study attempts to answer the following research questions:

1. what is the composition of OSH practices?
2. what are the existing OSH practices in manufacturing firms?
3. do the OSH practices relate to firm performance?

1.5 Scope of the Study

This research intends to identify OSH practices, the existing OSH practices in the manufacturing operations in Malaysia, as well as to understand the relationship of the practices on firm performance. The research covers all manufacturing sectors in Federation of Malaysian Manufacturers (FMM) directory in year 2007. Then, the sectors are categorized according to SOCSO annual report (2006), which consist of: food, beverage, and tobacco; textile, wearing apparel, and leather industries; manufacture of wood and wood products, including furniture; manufacture of paper products, printing, and publishing; manufacturing of chemicals; non-metallic industry; metal, machinery, and equipment industry; and others. Manufacturing sectors consist of 798 types of industrial category and thus representing the largest population as listed in SOCSO annual report of 2006.

The study was conducted in the manufacturing sector as it has the highest accident rate (SOCSO, 2006). It is also an important subject since the manufacturing businesses are responsible for making Malaysia the 19th biggest trading nation in the world (Bank Negara Malaysia Annual Report 2006, 2007). Manufacturing industry is an important factor in the Malaysia economy because its' exports have been increasing from year to year (The Star, 2006; thestar online, 2008). Thus, it is crucial to sustain our economic status by helping the manufacturing firms to perform at the optimum level.

This study focuses on OSH practices in manufacturing operations that include management commitment, hazard control, training and education, and continual evaluation as it is believed that they have direct impact on firm performances. As for the criterion variables, items that form common competitive priorities are such as quality enhancement, cost reduction, on-time delivery, and process innovation for better production layouts, measure the firm performances.

1.6 Significance of the Study

This study hopes to provide significant theoretical and practical contributions in the area of firm performance. The contribution of OSH practices would offer commercial value as other manufacturing practices that have an impact on firm performance (Cooper, Dominic, Phillips, & Robin, 1997).

From the theoretical perspective, this study is to provide a pioneer empirical result relating OSH practices to firm performance criteria. The outcome of this study will help the understanding of OSH practices in Malaysia. Besides, this study also provides empirical support of the domino effects; and in a way will help to break the "plateau statistics rate" in OSH accidents and injuries.

The operationalized variables for OSH practices are significant. The composition of OSH practices is tied from the review of manufacturing practices and the expectation from the

government; and which literatures considered them as critical practices for performance. Based on the mixed-methods approaches and the practice-performance framework, this study encompasses man-machine elements in domino and socio-technical system aspects in the theoretical framework building and hypotheses testing. As theorized by socio-technical system, it is important to harmonize the conflict of man-machine operations in manufacturing setting (Qureshi, 2006). In light of this view, the consideration of how OSH practices might benefit the underlined criteria seems a worthy endeavour.

The empirical study will also add to the existing manufacturing practices' literature by expanding the realm of firm performance explained by OSH practices. This study is also aimed at closing the literature gaps that exist in several empirical studies relating OHS to performance. The scant numbers of evidence include productivity and stakeholder satisfaction; conducted on small number of manufacturing firms and at individual level; from the perspective of OSH management systems or regulations implementation; and used single methodology. Evidence for the relationship was largely theoretical.

Furthermore, this study is also intended to propose valid and reliable new measurement since the measurement for some of the construct are limited at present. As such, this study would construct the measurement items based on qualitative findings and supported by concepts and variables connected to OSH and manufacturing literatures. Ideally, the measurement items must tie the common practices that exist in both manufacturing operations and the government's safety and health standards.

From the practical perspective, the outcome of the study will provide an alternative approach for government in addition to the focus on workers' benefits and the importance of compliance to OSH rules and regulations. Besides, this study is also to provide employers with knowledge of OSH applications. The effort is meant to improve their understanding to implement OHS practices in manufacturing operations. This study proposes that it will assist both parties (government and employers) in achieving their interests: OSH practices might be

significant and are directly related to firm performance and at the same time ensuring the safety and health of workers. Taking it a step further, this study would like to generalize the results findings to all hazardous sectors.

The study is also significant as the findings would be used to build knowledge in several ways. The result is expected to inspire better efforts from the management and workers as a team. Practically, a safer and healthier production environment through total involvement by all the functional departments in firms is expected to grow. In addition to this, the designed OSH practices will show that the activities are a value-added for performance, when their policies and objectives are aligned to business interests. Thus, the result of this study is hoped to add knowledge than the "ordinary" perception of the managers regarding OSH in the application of prevention practices. As a whole, this study sought to contribute evidence that by broadening the scope of OSH practices through their importance at the organizational level, it would reveal the benefits to the firms. OSH practices are seen able to act as a driving factor to influence the performance for firms. It begins with the empirical study of possible significant relationship between OSH practices and firm performance.

1.7 Definitions of Key Terms

Definitions and descriptions of key terms used in the study are presented as follows:

Occupational Safety and Health: OSH refers to conditions and factors that influence the well-being of workers, temporary workers, contractor personnel, visitors, and any other person in the workplace (OHSAS 18001:1999, 2002). OSH is also alternatively used as Occupational Health and Safety (OHS).

Firm Operational Performance: Following Cua et al. (2001, 2006) and Myers et al. (1996), firm performance is an operational performance. Firm performance is defined as an achievement of general priorities demanded by industries such as quality enhancement, cost reduction, on-time delivery, and being innovative in creating conducive production layout.

Continual Evaluation: Following Redinger and Levine (1998) and OHSAS 18001, continual evaluation is defined as periodical and consistent closing of loops for the whole activities of OSH. The activities include investigation, records, and reports of the root causes of the accidents or near-miss accidents, injuries and illnesses; provide counter measures in the form of corrective and preventive actions, and continuous follow up actions.

Hazard: The inherent potential to cause injury or damage to people's health (ILO-OSH, 2001).

Hazard Control: Following Oloyede (2005) and ILO-OSH (2001), hazard control in this study is conceptualized as the prevention activities in controlling the harmful results in production processes.

Incident: An unsafe occurrence arising out of or in the course of work where no personal injury is caused (ILO-OSH, 2001).

Management Commitment: Following Hansson et al. (2002), Jha and Iyer (2007), and Rodriguez et al. (2008), management commitment is conceptualized as an involvement and support from management in any OSH activities.

OSH Practices: Following McKone et al. (2001) and socio-technical theory, this study conceptualized OSH practices as investments of tools, devices, and techniques, targeted in manufacturing operations' setting to improve the capability of firms.

Training and Education: Following Tharenou et al. (2007), Latham (1988), and Goldstein (1980), training and education is conceptualized as formal and informal preventive programs in predicting potential work hazards, understanding hazard consequences, and taking proper hazard-control actions.

Workers: Any person who performs work, either regularly or temporarily for an employer (ILO-OSH, 2001).

1.8 Organization of the Thesis

The thesis is organized into six chapters. The flow chart in Figure 1.5 demonstrates the sequence of the chapters. Chapter One provides the introduction, research background, problem statement, objectives, research questions, scope, significance of the study, and definitions of key terms. There are two stages of interviews in this thesis. Chapter Two presents the preliminary interviews (practice review) and findings to identify the composition of OSH practices from government and managers perspectives. The second stage of interviews is discussed in Chapter Five. Chapter Three discusses literature relevant to OSH practices and firm performance and underlying theories. Both Chapter Two and Three include compositions that make up the theoretical framework and hypotheses mentioned in this study. Chapter Four explains the methodology used in the study. It includes a description of the research approach, design, and plans for statistical analyses for both qualitative and quantitative methods to be used in analyzing the data. Chapter Five presents the data from the quantitative and qualitative (second stage of interviews) analyses and results and testing of the hypotheses. In this chapter, the interviews findings validate and add credence to the findings of the quantitative analysis on the presence of OSH practices and the relationship between these practices and firm performance criteria. Finally, Chapter Six recaps the study's findings from the data analysis, discusses the implication of research, limitations, and directions for future research, and thus concludes the whole research.

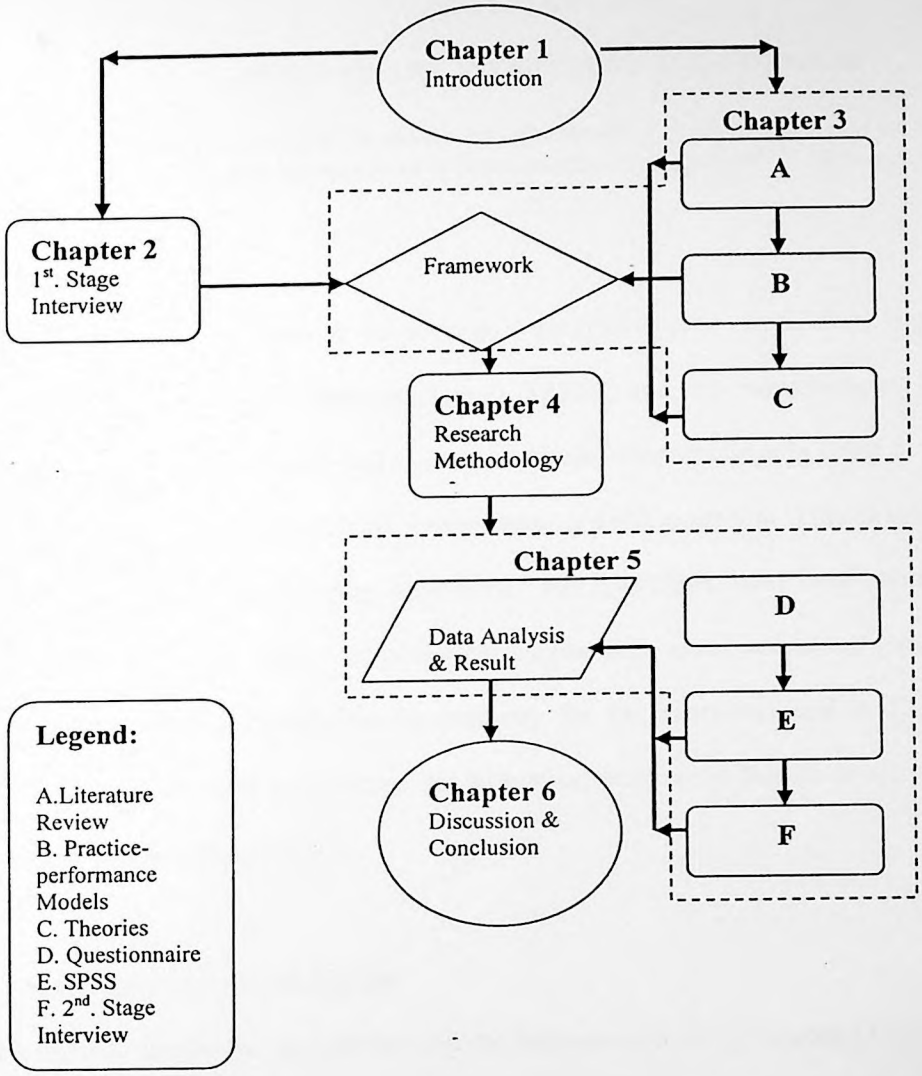


Figure 1.5. Flow chart for six chapters.

CHAPTER TWO

PRELIMINARY INTERVIEWS AND FINDINGS

"If managed properly to its fullest extent, therefore, both in spirit and as required by law, de factor, "Total safety management is total quality management."" (Cooper et al., 1997)

2.0 Introduction

The purpose of Chapter Two is to perform a practice review from three organizations; Department of Occupational Safety and Health (DOSH) and two manufacturing firms. The preliminary interviews are conducted to support the literature findings in order to achieve the first research objective: to identify the composition of OSH practices. This chapter discusses the data gathered from face-to-face interviews. All interviews were conducted between 7 April 2006 and 27 May 2008. This chapter begins with simultaneous or parallel design, followed by concluding remarks as the summary for the interviews and its findings. The emergent themes are used to construct the theoretical framework that is developed from the literature review in Chapter Three.

2.1 Simultaneous/Parallel Design

Over a decade, despite the improvement in the business and the highlighted OSH statistics in Chapter One, little is known about what constitutes the domain of OSH practices within the manufacturing operations' routine. To have the insight of OSH practices pertaining to the Malaysian context, sequential strategies in the mixed method able to explore and explain OSH practice phenomenon (Creswell, 2003; Morgan, 1998). However, this study decided that both practice review (in this Chapter) and literature review (in Chapter Three) are simultaneously performed to meet the first research objective: to identify the composition of OSH practices. Simultaneous or parallel design of mixing can be done using information gained to make decisions in mixed-methods research (Rocco, Bliss, Gallagher, & Perez-Prado, 2003).

2.2 Demographic Profiles

The informants in the interviews involved OSH experts and manufacturing firms. The respondents in this study were those who have knowledge in OSH and are familiar with production related activities.

2.2.1 Department of Occupational Safety and Health

The purpose of interview with Department of Occupational Safety and Health (DOSH) was to bring the OSH practices to the surface. Full interview transcript with DOSH is in Appendix D. The interview session with DOSH in Penang involved its Senior Director. The Director was asked about the mission and vision of DOSH, their current objectives towards OSH, and the latest strategic plan. This study also asked about the scenario of OSH in Malaysia and the main constraints in their tasks during the implementation or enforcement of OSH in firms.

As the "ultimate champion for OSH," the DOSH plays a major role in ensuring the workers' safety, health, and welfare. The tasks involve standard setting, enforcements of relevant legislations and promotional and publicity programmes. As for the expectation of practices from the manufacturing sector, the director of DOSH highlighted criteria of practices in the programme of National Awards of Excellence. The researcher was asked to get an approval from DOSH headquarters to quote the practices in this study. The official letter sent to DOSH headquarters is shown in Appendix C. The researcher also made several telephone calls to DOSH in Penang and its headquarters to clarify some information of expected practices in the industries.

2.3 Firm Profile

The study aims to obtain the information on OSH practices that manufacturing firms have routinely exercised. In order to do this, the study was carried out in two Japanese-owned manufacturing firms located in Penang. The first firm had been recognized and awarded

prizes for OSH activities and was strongly suggested by DOSH in Penang. The second firm was considerably exercising OSH practices as the firm has competent Safety and Health Officer (SHO) who is qualified and registered with the DOSH. The researcher wrote formal letters and made subsequent telephone calls to the firms to set for the interview date.

The interview was conducted to focus on these main points;

1. to discover the motivation for OSH practices in the firm.
2. to observe how the firm superior officers communicate and disseminate the practices to all workers and how the firm made the most of the practices in terms of the management support, controls, and monitoring activities.
3. to find the compositions for OSH practices based on motivations.

The researcher also requested for related documentations to support the information obtained provided by the firms. In addition to this, the researcher also had the opportunity to observe evidences of OSH practices from the factory-tour provided by them. The interviewed firms also provided the researcher of their company profiles. The two firms were named Company A and Company B. The reason of the choice of these two firms is to see the similarities and differences of OSH practices and if the practices are in line with the expectations from DOSH.

2.3.1 Company A

Company A was founded in 1990 and is currently employing 96 workers. It belongs to a various kinds of metal sheet precision processor factory in Prai Industrial Estate, Penang. Company A mainly has male workers in the production operation. All the interviewees; including the Director of the company stated that they are active participants in all OSH activities in the firm. The researcher had the opportunity to have a factory tour to observe the production process.

2.3.2 Company B

Company B is located in Prai Industrial Trade Zone, Prai which is also in Penang. The firm was set up in 1988 and is currently employing 482 workers in two manufacturing plants. This firm is an electronic appliance products manufacturer. The interviewed production Section Manager also holds a position as a competent SHO for the firm. The Chairman of Safety and Health Committee (SHC) who is the Human Resource Director has also given his view in the discussion.

2.3.3 Comparison of Company A and Company B

The two manufacturing firms were selected to identify the routine practices in their firms. The interview method was able to provide insights of the interrelation and impacts of the practices (Murillo & Lozano, 2006; Steyaert, 1997). Company A and B are located in the state of Penang. Company A is a metal sheet precision processor factory and Company B is an electronic appliance products manufacturer. The size of employment in Company A is smaller than Company B; in which company A has mainly recruited foreigners while Company B has 100% local workers. Both are Japanese-owned firms and have not adopted any OSH International Certification, but both have other certifications such as ISO9001 and ISO14001. Besides, both interviewees are production manager cum Secretary to their SHC. However, the production manager of Company B is a competent SHO who is registered with DOSH.

2.4 Analysis

Stake (1995) was cited by Okpara and Wynn (2008) to justify that direct interpretation is considered as among the approaches for qualitative data analysis. Following Stake (1995) and Okpara and Wynn (2008), this study also used direct interpretation to explore the compositions of OSH practices.

2.4.1 Feedback from Department of Occupational Safety and Health

The qualitative investigation with DOSH has enabled this study to tap on the critical OSH practices within the government expectations. Basically, DOSH's main concerns in the OSH practices from the industries are based on the requirements of OSHA (1994). The best practices are (1) management of OSH, (2) hazard control, (3) training, information dissemination, and promotional program, (4) accidents, dangerous occurrences and occupational diseases, (5) welfare arrangement, (6) major hazards, and (7) electrical and radioactive safety (DOSH Director, personal communication, 23 June 2006). Items (6) and (7) are only applicable to certain industries that are highly involved in hazardous installation in their business. According to the Director, item (5) is usually combined with item (1) in the firms' practice.

The expected OSH practices from the government are now being promoted in the "hottest" program organized by the National Council for OSH (NCOSH) for all firms in Malaysia. In regard to the program, the DOSH Director (personal communication, 23 June 2006) mentioned that:

> This (National Excellence Awards program) is the most highlighted event as of now. The firms participation in the National Excellence Awards will level up their prestige for business purposes, and to DOSH, it shows that the firms have a good system.

The expectations are evident in the programs, which are called National Excellent Awards to boost standards-based OSH practices among Malaysian industries. According to the Senior Director, the seven practices is the result of DOSH's vision and mission to balance new challenges and introduce corporate values as an approach in their delivery of services.