

MANAGEMENT OF OCCUPATIONAL HAZARDS IN WOOD PROCESSING
FACTORY AT BATU PAHAT

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I hereby declare that the work in this thesis is my own except for quotations and summaries which have been duly acknowledged

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DEDICATION

Alhamdulillah... Thank you to Allah for his merciful

This thesis I dedicated to my beloved parents

Raslan bin Jaan and Misnah bin Tokay

Who have raised me to be the person I am today.

Not forget to my lovely siblings

Nurul Iman, Ainul Yaqin, Fakrur Razi and Nur Alfira Ayuni

Who always give motivation and inspiration to me.

For my friends that help and support me whenever I need especially my housemate

Teratak Kandang Buaya and my wifi TM Keranduthuhu7.

Thank you for everything.

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ABSTRACT

Many workers in the workplace, such as the furniture industry, veneer and plywood industries may be exposed to wood dust levels resulting from wood processing activities that could affect them in carrying out various operations. The purpose of this study is to identify the level of occupational hazards in wood processing factory and aimed to determine the relationship between management and occupational hazards in wood processing factory at Batu Pahat. Workers in wood processing are in risk of lung cancer and diseases caused by exposure to wood dust and other substances during wood processing activities. Workers can also be exposed to dangers ranging from logging operations in the forests is processed into products such as paper, tables and chairs. Simple random sampling is used and a survey had distributed to 150 employees whose work in the wood processing factory at Batu Pahat but only 110 printed questionnaires were received back for this research. The result showed that the moderate average mean level of occupational hazards in the wood processing factory. Therefore, the relationship between management and occupational hazards was weak, except for coordinating had very weak correlating with occupational hazards.

ABSTRAK

Banyak pekerja di tempat kerja, seperti industri perabot, industri venir dan papan lapis mungkin terdedah kepada tahap debu kayu yang disebabkan oleh aktiviti pemprosesan kayu yang boleh menjejaskan mereka dalam menjalankan pelbagai operasi. Tujuan kajian ini adalah untuk mengenalpasti tahap bahaya pekerjaan di kilang pemprosesan kayu dan bertujuan untuk menentukan hubungan antara bahaya pengurusan dan pekerjaan di kilang pemprosesan kayu di Batu Pahat. Pekerja dalam pemprosesan kayu berisiko terkena kanser paru-paru dan penyakit yang disebabkan oleh pendedahan kepada debu kayu dan bahan lain semasa aktiviti pemprosesan kayu. Pekerja juga boleh terdedah kepada bahaya dari operasi pembalakan di hutan yang diproses menjadi produk seperti kertas, meja dan kerusi. Persampelan rawak mudah digunakan dan kaji selidik telah diedarkan kepada 150 orang pekerja yang bekerja di kilang pemprosesan kayu di Batu Pahat tetapi hanya 110 soal selidik yang dicetak telah diterima untuk penyelidikan ini. Hasilnya menunjukkan purata rata-rata purata bahaya pekerjaan dalam kilang pemprosesan kayu. Oleh itu, hubungan antara pengurusan dan bahaya pekerjaan adalah lemah, kecuali untuk menyelaraskan mempunyai hubungan yang sangat lemah dengan bahaya pekerjaan.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

It is very important for workers to protect themselves in the workplace that are exposed to danger and disease. Every year, more than 270 million workers got accidents. From the International Labor Office result of occupational accidents and diseases, over 160 million workers got sick due to workplace hazard and exposures and about 1 million workers die (District et al., 2010). Occupational safety and health (OSH) is generally defined as the science of the anticipation, recognition, evaluation and control of hazards arising in or from the workplace that could impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and the general environment (Benjamin , 2008).

Occupational hazard is a risk of an individual exposed to at the workplace, and during work periods, they may be exposed to biological agents, chemical and physical factors and ergonomic conditions, which predispose the individual to occupational diseases with a variety of health effects (World Health Organization, 1986; Packard, 1989; Aliyu & Shehu, 2006). This appears to affect a considerable number of people in a variety of jobs and indirectly impact on the economy especially in developing countries where individuals take for granted the health and safety concerns associated with work due to lack of awareness and fundamental understanding of the interactions between work and health (Aliyu & Shehu, 2006; Asuzu, 1994; oscano et al, 1996).

The major wood working processes are debarking, sawing, sanding, milling, lathing, drilling, veneer cutting, chipping and mechanical defibrating. From the tree felling stage onwards through the various stages of wood working and manufacturing processes, workers are exposed to airborne dust of different particle sizes, concentrations and compositions. Sawing and sanding both shatter lignified wood cells and break out whole cells and groups of cells (chips) (Hinds, 1988). The more cell shattering that occurs the finer the dust particles that are produced. Sawing and milling are mixed cell shattering and chip forming processes, whereas sanding is almost exclusively cell shattering. In hardwoods, the cells are tightly bound resulting in more shattering and more dust. Similarly, dry wood leads to more dust formation. Softwood particles are more fibrous and usually larger and as a result less capable of becoming airborne (Walker, 1988). Considerably high heat generation during sawing, machining and sanding may change the chemical composition of wood dust (Gulzow, 1975). It has been reported (Thorpe & Brown, 1995), that hardwoods give rise to finer airborne dust at a lower rate during sanding than softwoods, but that the total amount of airborne dust produced depends only on the total mass of wood removed, and not the type of wood.

In processing wood, the raw materials could be tapped directly from the trees. The trees could also be felled and cut into logs, which are transported, to the sawmills or other wood processing industries to undergo both mechanical and chemical processing depending on the means of processing each. In Nigeria, the Sapele plywood industries and the Akwa Ibom paper industries at Oku Iboku are a few of the industries that use wood intensively and employ hundreds of workers (Okorie, 1997). These companies employ people of different occupations such as foremen, salesmen, machine operators, designers, engineers and any other specialized workers for the achievement of the objectives of wood working industries. In wood processing industries, the activities of engineers could include design, research, development, construction and production.

Wood is manufactured and used in many ways (like sawmill operations, furniture manufacturing, paper manufacturing and construction of residential and commercial buildings), but always it is connected with formation of dust of different particle size (Brosseau et al., 2001; Liukkonen et al., 2005; Blumberga et al., 2012). Wood is the hard fibrous substance composing most of the stem and branches of a tree or shrub,

and covered by the bark. The inner core of the wood is called heartwood and the outer layer is called sapwood. For industrial purposes, wood is classified into two types; hardwoods and softwoods (Fengel & Wegner, 1989). Softwoods are derived from coniferous trees (botanically named as Gymnospermae with exposed seeds), whereas hardwoods are from deciduous trees (botanically named as Angiospermae with encapsulated seeds). Dust is fine particles that come from in various sources such as soil, dust lifted by weather (an aeolian process), volcanic eruptions, and pollution. Dust can be produced from handling, grinding, crushing, rapid impact and detonation, such as ore, wood, coal, metal, rocks, and grains.

In Zimbabwe wood and wood products are ranked among the major accident, injuries and diseases industries, and in Manicaland Province they are at the forefront. The Timber Producers Federation of Zimbabwe is using various methods to reduce occupational hazards in the wood sector, but with limited success (NSSA 2009). Parastatals such as NSSA are assisting in the management of occupational hazards in the wood industry. NSSA is assisting with inspections, laws and regulations. In Zimbabwe, laws have been developed to supplement international standards and these laws cover hazards in the mining, industrial and agricultural sectors. Pieces of legislation that relate to the wood-working industries include the Pneumoconiosis Act and the Factories and Works Act and its regulations (Chingofa 2010).

1.2 Research background

Malaysia is an emerging industrial country with a rapid rise in Occupational Diseases (OD) which has proved to be a major problem among workers. A report from the Occupational health division (OHD) has shown a 100% rise in the number of cases, that is from 791 in 2009 to 1426 cases in 2010 (Department occupational Safety and Health Malaysia, 2013). This rise may be due to the initiatives by Occupational Health Division's dialogue sessions to reporting especially in the health sector (Department occupational Safety and Health Malaysia, 2013). There were about 204 cases of Occupational Diseases reported in 2001 (0.09 cases in every 10,000 workers). However, this numbers have increased drastically to 1221 cases of Occupational Diseases in 2010 (2.26 cases in every 10,000 workers).

The wood manufacturing industry has emerged as one of the fastest growing industrial sectors in Malaysia, Thailand, Indonesia and Vietnam and its socioeconomic importance, both in terms of workforce employment and foreign exchange earnings has increased significantly over the years. In 2009, the sector contributed US\$ 7.6 billion in export earnings, while employing almost 679,000 workers (Ratnasingam & Bennet, 2009). Nevertheless, the prevailing risky work environment in the furniture industry, which is regarded as dirty, dangerous and degenerative, i.e. “3D environment”, is not deemed attractive to the local workforce. Hence, migrant contractual workers, usually from rural areas and also an increasing proportion from neighboring countries are increasingly employed within the wooden manufacturing industry (Ratnasingam & Bennet, 2009). Whether the use of migrant contractual workers’ increases occupational accidents is highly debatable (Ratnasingam et al., 2010), but published statistics on accidents in by the National Institute of Occupational Safety and Health (NIOSH) of Malaysia, suggest that occupational accidents in the wood industry is above the national average of the manufacturing sector, and often resulted in huge compensation payouts, emphasizing that studies into this subject is warranted (NIOSH, 2009). Further, the impact of accident on workers on the overall industrial productivity is a matter of national and international interests, especially when industrial productivity dictates the competitiveness of the wooden furniture industry (Guldenmund, 2000; Clarke, 2006; Pousette et al., 2008; Wu et al., 2008; Gyekye & Salminen, 2009).

1.3 Problem Statement

Research on occupational exposures in the wood industry and related industries has suggested that workers in sawmills, lumber mills, plywood and particle board factories, and veneer plants are at high risk of developing lower respiratory diseases, allergenic disorders, cancer, and lung diseases (Amedofu, 2003). Furniture factory is an organization that use forest products to produce a variety of wood products such as plywood, chairs, tables, and paper for human consumption. Timber industry is one industry that is at high risk for workers as they deal with powerful machines. There is some very dangerous operation that could lead workers to lose fingers, limbs and

sometimes death using the machine in a variety of wood processing activities (Amedofu, 2003).

Many workers in the workplace, such as the furniture industry, veneer and plywood industries may be exposed to wood dust levels resulting from wood processing activities that could affect them in carrying out various operations. Workers in the wood processing industry such as sawmills are in risk of lung cancer and diseases caused by exposure to wood dust and other substances during wood processing activities. Workers can also be exposed to dangers ranging from logging operations in the forests is processed into products such as paper, tables and chairs. In addition, workers in the industry have less knowledge about occupational health and safety, leading to low compliance of safety practices even though workers are being exposed to many harmful substances such as dusts, fumes, toxic chemicals and biological hazards such as acute and chronic infections, parasites and physical hazards including noise, heat, cold, vibration, inflammable materials and compressed air (Acquah-Moses, 2002). Employee exposure to toxic chemicals or dangerous levels of noise or radiation can occur together with routine work and also by accidents in the wood processing industry.

1.4 Research questions

The questionnaire in this study is designed to investigate:

1. What is the level of occupational hazards in the wood processing factory?
2. What are the relationship between management and occupational hazards in wood processing factory?

1.5 Research Objective

The specific objectives of the study were:

1. To identify the level of occupational hazards in wood processing factory.
2. To Determine the relationship between management and occupational hazards in wood processing factory.

1.6 Research scope

This study is more focus to identify the level of occupational hazards in wood processing factory among the employees at Batu Pahat. Besides that, it is to determine the relationship between management and occupational hazards in wood processing factory. To make sure this research more effective and manageable, the research scope of this study focuses on: Firstly, this study is to identify the hazards in the wood processing factory at Batu Pahat, Johor. Secondly, the respondents targeted in this research study are the workers in factory which are manager, engineer, designer, and supervisor. Thirdly, the data are collected by using the questionnaire and then proceed with quantitative data analysis.

1.7 Significance of Study

This study is aimed to identify the level of occupational hazards among the employees in wood processing factory as well as to determine the relationship between management and occupational hazards in wood processing factory at Batu Pahat. By understanding the occupational hazards in wood processing factory, it will provide the employees to take seriously about safety at the workplace and make the organization more productive. Therefore, this study may help the management levels such as managers, engineers, and foremen to integrate hazards reduction measures into everyday activity during the planning of wood processing activities. This study may help on the organization of wood processing factory to eliminate hazards may be a significant effort in promoting good work environment. The findings may be benefit to the workers in wood processing industries when they employ measures for organization of wood processing industries to eliminate hazards. Finally, it is also anticipated that the result of this study will help to provide guidance and information for future research in this area.

1.7 Chapter summary

According to this study, the researcher can identify level of occupational hazards in wood processing factory at Batu Pahat. The researcher finds that the management related to occupational hazards in wood processing activities. Understanding their relationship can affect the quality of production and further improve the overall performance of the safety in organization. The researcher can find the way to reduce the occupational hazards in wood processing factory. Therefore, researcher knows the problems that had in the wood processing factory that always give trouble to factory likes health workers, workplace environment, lack of production and workers satisfaction.

CHAPTER 2

LITERATURE REVIEW

2.1 Concept of management

Management is the process by which a co-operative group directs actions and common goals (Olorunsola, 2007). In wood processing industries, actions can be directed by the managers to ensure effective management of hazards. Ibukun (2005), viewed management as the process of planning, organizing, and controlling an organization's operations in order to achieve a coordination of human and material resources essential in the effective and efficient attainment of objectives. This implies that any act of using both human and material resources by any organization for the accomplishment of its objectives can be described as management.

Management is generally viewed as a professional discipline that assembles and uses resources in terms of human resources, financial resources, physical resources and time to accomplish objectives (Olowu, 2000). This implies that management involves the use of human resources through the process of planning, organizing and controlling of products in the industries in order to meet the customer requirements. Management entails strategic and innovation activities for the attainment of any organizational set up. In wood processing industries, management could be viewed as the function of individual workers for the attainment of the objectives. The functions of individual workers in wood processing industries include planning, organizing, coordination of human and material resources in order to eliminate hazards.

2.2 Occupational hazard

Occupational hazards refer to working conditions of a job that are prone to accidents; some of the accidents could lead to death or injury. Crowther (1995) stated that an occupational hazard is a risk or danger connected with a particular job such as sawing activities in sawmills industries. Occupational hazards could also involve the danger or risk inherent in certain employments or work places. These could also entail the danger to health, limb or life that is inherent in or associated with a particular occupation, industry or work environment such as wood processing industries .Occupational hazards refer to potential risks to health of the workers in various occupations in wood processing industries .Occupational hazards could include the risk of accident and of contracting occupational diseases such as nasal carcinoma which can be induced by wood dust .In wood processing industries; occupational diseases could be attributed to many factors such as the use of creosote for the treatment of telephone poles and other wood products. Occupational hazards could involve the risk that is peculiar to a particular type of employment or work place and which arises as a natural incident of such employment or employment in such a place.

The definition of hazard is to expose to chance of injury or loss, venture on, and accept the chance of. Hazard can be very important determinant of risk that not deemed to be same with risk. The relationship between hazard and risk must be treated very cautiously because there is much more probability to chance event and expressed in risk. The risk of contracting diseases and other occupational hazards could be managed by various categories of workers in wood processing industries. Hazards such as wood dust, noise and heat could occur in different occupations in wood processing industries. There are many hazards that emanate from various operations that are carried out in wood processing industries due to the exposure of workers to wood dust and other related substances. Hazards are dangers whose avoidance is necessary for the purpose of living in safety (Ezedun, 2001).

Occupational hazards are divided into five groups according to their nature; 1) physical risks, related to exposure to noise, ionizing radiation, and temperature; 2) chemical risks, related to exposure to gases, vapors, fumes, and chemicals; 3) biological risks that include exposure to viruses, bacteria, blood and blood products;

4) ergonomic risks, relate to the requirement of improper posture, monotony, repetitiveness, work shifts, and situations causing stress; and 4) risks of accident that include arrangement of inappropriate work environment, insufficient lighting, potential accidents with electricity and fire (Gestal, 1987).

In Libreville, Gabon, the majority of formal employees are in the wood processing in which logs of wood are transformed into various finished products. Wood processing in Gabon is a dangerous occupation and it involves more than 30% of the active population. Out of 825 injuries, wood processing constituted 24.2% of wood workers injured in 2007 and 19.3% in 2008. During the 2007 and 2008 period accidents involving contacts with equipment exceeded all other events accounting for 64.1% of traumatic occupational accidents in wood processing (Colman et al. 2007). Industries could also contain many hazards, which can lead to accidents resulting in burns, punctures, cuts and electrocution. According to Geneva (1998), hazards related to automobile mechanic work are accident hazards, physical hazards, noise hazards, electrical hazards, chemical hazards, biological hazards, and ergonomic hazards.

2.2.1 Accident hazards

Accident hazards can be defined as the storage or use of hazardous substances, where in the major accident and release toxic, explosive or flammable materials. The Health and Safety Executive (HSE) and other government bodies identified the local people and the nearby environment could be seriously affected. In Europe, some authorities have proposed the use of risk acceptance criteria in relation to major accident hazards. One of the most referred approaches has been the TOR framework, proposed by HSE in United Kingdom (UK) (HSE, 2001). This approach aims to define the criteria, specifying the safety goals, however, it does not define the way of achieving them. The TOR is represented as an inverted triangle, establishing three regions of risk: broadly acceptable, tolerable and unacceptable, separated by two risk limits as shown in Figure 2.1 (HSE, 2001).

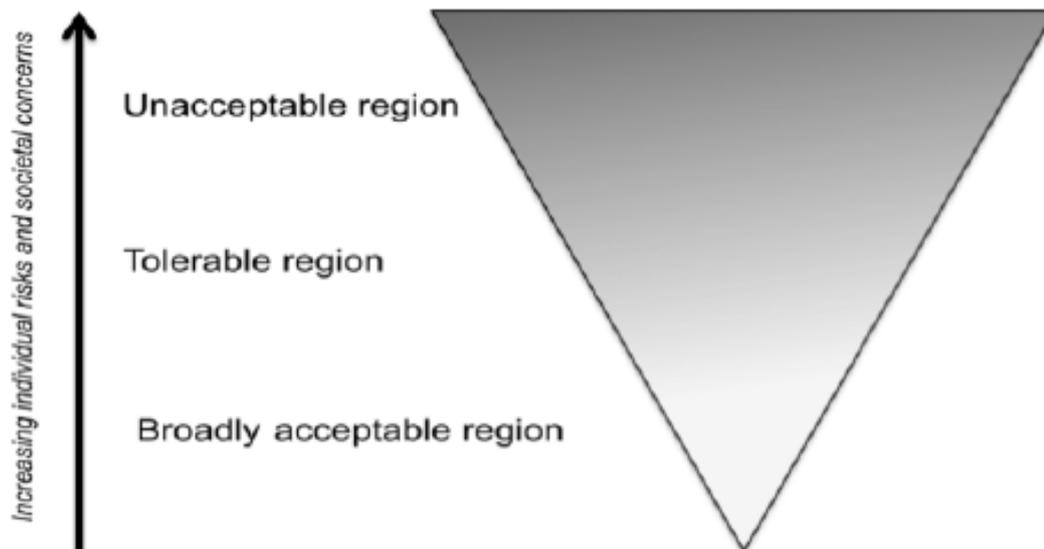


Figure 2.1 - HSE framework for the tolerability of risk (HSE, 2001).

2.2.2 Physical hazards

Exposure to woodsmoke has been associated with various pulmonary effects including lung function decline, increases in asthma and other respiratory symptoms, upper respiratory tract illnesses, chronic bronchitis, and chronic obstructive pulmonary disease (COPD) (Naeher et al., 2007; Orozco-Levi et al., 2006; Kurmi et al., 2010; Sood et al., 2010). Fine particles are thought to be the best indicator of the health effects of exposure to emissions from most combustion sources (Naeher et al., 2007). In general, the induction of toxicity by particulate matter (PM) is believed to involve oxidative stress (Schins et al., 2004; Li et al., 2002). Woodsmoke particles contain free radicals and other substances capable of generating reactive oxygen species (ROS) within the cells. These substances include metals, polycyclic aromatic hydrocarbons (PAHs), and other organic compounds. Woodsmoke particles and woodsmoke extracts possess the ability to generate ROS (Danielsen et al., 2011; Leonard et al., 2000; Leonard et al., 2007; Liu et al., 2005). Dry woodsmoke particles contain carbon-centered radical species (Leonard et al., 2000; Leonard et al., 2007). Woodsmoke particles in aqueous solution can also generate hydroxyl and superoxide anion radicals likely through Fenton chemistry and redox cycling (Danielsen et al., 2011).

Exposure to excessive heat or cold especially in open garages or during roadwork (the use of improvised heating may cause fire. Wikipedia (2009) identified the following as the common work place hazard groups. Machines pose various types of hazards, and exposure to these hazards can result in injury or death. Different types of machinery hazards are listed in ISO, 2010; CSA, 2014 ; American National Standards Association, 2000, and Bluff (2014). They may be structural (e.g. sharp edges, projections), mechanical (e.g. entanglement, crushing, cutting), physical (e.g. electricity, pressurized content, noise and vibration, hot or cold temperatures), ergonomic (awkward working positions, manual handling, repetitive movements), slips/trips/falls (e.g. poor walkways, railings), chemical (e.g. gases, fumes, liquids), end-use conditions (e.g. location, impact on workplace layout) and biological (e.g. bacteria, mold) (Bluff, 2014). Since workers intervene on machinery in all phases of its life cycle (i.e. installation, operation, maintenance, troubleshooting, repairs, adjustments, set-up, production disruptions, cleaning and dismantling), they are exposed to hazards. Many accidents involve machinery, with sawmills accounting for a large number of them in Quebec, Canada (Chinniah, 2015). Sawmills are dangerous workplaces since they have many hazardous machines such as chain conveyors, circular saws, vertical saws, hydraulic equipment, mobile machinery and edgers. According to Quebec's worker compensation board (Occupational Health and Safety Commission, 2012), sawmills pose a high degree of occupational risk. Accidents that involve workers being caught or crushed account for 18.8% of the accidents reported in sawmills; those involving being hit by an object account for 10.7%. Table 1 provides an overview of 10 accidents for which data were rapidly extracted from the OHSC database to illustrate these types of accidents.

2.2.3 Noise hazards

Workers at pallet manufacturers are exposed to noise from equipment, including forklifts, saws, air compressors, pallet stackers, and nail guns. At the sites visited, equipment noise levels were measured at levels up to 104 dBA on a notcher and impulsive noise levels up to 136 dBA on nail guns. Noise monitoring data from the surveys are presented in Table 2.1. The noise from the nail gun was impulsive noise. The sound level would rapidly rise when the gun was fired and then fall to baseline.