

## Occupational Hazards in the Workplace: A Case of an Electronic Company in Sama Jaya, Kuching, Sarawak, Malaysia

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### Abstract

This article attempts to examine the state of occupational hazards and other forms of risks in a Japanese electronic company in Sama Jaya Industrial Zone in Kuching in the East Malaysian state of Sarawak. It also attempts to gauge whether the employees serving in the company frequently used any form of personal protective equipment while performing their jobs at the workplace. In this regard respondents were asked to respond to a self-administered questionnaire. The findings show that less than one third of the employees wear their personal protective equipments. Employees in this company are exposed to different form of occupational hazards which includes noise pollution, ergonomic and workers are also exposed to chemicals which are used to mix raw materials to form the slurry.

**Keywords:** Occupational Hazards, pollutions in the workplace, occupational health and safety, electronic company.

### Introduction

This study seeks to examine the level of compliance to Safety and Health Procedures in an Electronic Company in Sarawak. Environment safety and health is an important issue in workplace. It has socio-economic impact on the workers, the employers, and the economy of the country as a whole. There are several parameters that determine the successful compliance of the Occupational Safety and Health (OSH) Procedures in an organization. Health and safety of employees in the working environment is a major concern of the not only government but also trade union and employers. For the past several years numbers affirmative actions have been taken to address the issue of occupational and safety. The government has been working together with workers and union in various industries in addressing pertinent issues concerning health and safety at in the workplace. This is because working environment has become increasing unendurable and more and more workers are constantly exposed

to all form of stress, noise, dusts, poisonous chemicals which are hazardous to workers health. Yet occupational health and safety is not a top priority among employers.

The National Institute of Occupational Safety and Health Malaysia (2004) which quotes the data from the International Labour Organization (ILO) in 1999, showed an alarming rate of work-related mortality. The ILO estimated about 1.1.million mortalities per year (based on 1990-95 data- source ILO 1999). Of this 25% were due to injuries, 15% cardiovascular, 21 % chronic respiratory diseases, 5% due to cancer and 34% others. On the other hand, the World Health Organization (WHO) Report 1997 on Occupational Health also reported a similar trend in workers mortality. There were 120 million occupational accidents reported with 220,000 ended in deaths, 160 million reported with occupational illness (30-40 million may lead to chronic diseases & 10% to permanent disability). What makes it more alarming problem is that only 5-10% of workers in developing countries and 20-50% in industrialized countries have access to adequate occupational service. A number of implications can be drawn based on the above problems. First it either implies that there is not much emphasis given on the importance of implementing OSH policies. Or secondly, even with the implementation of OSH policies, the level of compliance by the industries may be relatively low.

The dynamics of accidents and illnesses at the work place can be understood from some basic concepts namely: relationship between work and health; the worker with his pre-existent health status enters into a work place. Factors that influence around him while at work are hazards which are physical, chemical, biological and ergonomic in nature. The workers protective mechanism that is available is the relevant regulations and relevant policies that are in place; with this in mind the focus of occupational health becomes three pronged; health promotion and maintenance of the highest degree of physical, mental and social well being of all workers; prevention of adverse health effects due to work; and, improving working environment and work to become conducive to health and safety.

Taking the cue from the above, a study to asses the types of occupational hazards was carried out in an electronic company at Samajaya Industrial Zone. This electronic company is a Japanese-based Electronic Manufacturing company operating in Kuching, the state capital of the east Malaysian state of Sarawak. It has an established Safety and Health Committee and implements the Occupational Safety and Health Management system to comply with the Occupational, Safety, and Health Act (OSHA) 1994. This electronic company manufactures multi-layered capacitors for electronic uses for various electronic gadgets. The capacitors functions as an energy source in electrical appliances and to sieve unwanted waves within the circuit.

The factory is located within an Industrial site in Sama Jaya Industrial Zone in Kuching, Sarawak. It is approximately three kilometers away from residential area of Muara Tabuan. Road access is convenient. The company has a built up area on a 16 hectare land. The compound is well-landscaped, adequate spaces for car parks; a resting area for cigarette smokers is made available. As of August 2006, the company employs 3,638 employees in various capacities. There is a staff cafeteria which caters

for free meals for the all the workers. The company also provides lockers for all the employees to store their personal belongings while they are on duty.

## Literature Review

Occupational hazards in the workplace have always been the prime concern for policy makers, stakeholders and researchers. Occupational hazards occur in all sectors of employment be in agriculture, construction, manufacturing, and service industry. In the agriculture sector, Kanniah (1984) argues that occupational hazards are prevalent among farmers who are exposed to hazardous pesticides and its effects on the agricultural workers. He found out that farmers who use pesticides suffer from skin irritations, and workers who were involved in mixing of chemicals using their bare hand, and were not provided with any personal protective equipment (PPE), except cotton mask. He also reports that Malaysian farmers who had used pesticides complained of experiencing some form of illness such as drowsiness, headaches, skin irritation and breathing difficulties. While Jamilah Arifin (1984) studies the health and safety problem among women workers in the manufacturing industries. She found out that women workers are engaged in routine fragmented repetitive work and they are exposed to three types of hazards namely chemical, radiation, eye-strained, headache and eye-diseases.

Ramachandran (1984) discusses different types of occupational hazards experienced by workers in the textile industry. He found out that workers are exposed to chemical hazards such as sulphuric acid and hydrochloric acid, caustic soda, dichlorobenzene, and pentachlorophenol. In addition, workers are also exposed to heat and humidity because certain processes of production in a textile factory require high temperature and humidity. Most of the process need temperature above the accepted upper safe limits and thus workers are faced with health problem.

There are a number of behavioral influences on the occurrence of accidents and injuries in the workplace (Petersen, 1984). The first concerns the role of specific acts or tasks that occur in the process of completing or performing ones prescribed duties. A typical example is the act of placing one's hand in the way of a press or a blade to remove an obstruction and in the process suffering a cut or other injury. Similarly, the act of using a seat belt is considered a safe act that reduces the risk of serious injury following a collision. These and other acts or procedures engaged in while carrying out job duties are considered *behavioral* influences on the occurrences of accidents or injuries. Peterson (1984) further argues that construction workers are highly exposed to occupational hazard than any other workers. Workers in highway and road construction suffer from allergies, cancer damage to the central nervous system and physical stress. While workers in the piling and foundation works suffer from impaired hearing, pulmonary disease, and physical stress. Hazardous environment at construction sites also give rise to accidents which are often fatal.

Lee (2007) suggests that the formulation and implementation of good occupational safety and health (OSH) management system by employers is the best answer to reduce accidents as well as to enhance safety and health at the work place. One of the conditions for the success in the implementation of OSH Act 1994 was the setting up

of an OSH management system. The responsibility of OSH in the workplace rested equally on those created the risk as well as those who have to work with the risk.

Workers must be assured of their right to a safe and healthy work environment. Lee (2007) also suggests that there is a need to provide workers with information, education and training so that they would know best how to protect themselves. Through the implementation of safe work procedures and usage of personal protective equipments (PPE), workers would be prevented from accidents. Making the workplace safe is a joint responsibility of both the employers and the workers. Safety should be a key issue at every workplace. Safety training for employees is the key to achieving a successful safety program and management must invest in safety. Lee (2007) stresses that it is the responsibility of management to ensure that safety must be a culture of the organization, not just a priority.

Surveys conducted by *Sahabat Alam Malaysia* or Friend of the Earth Malaysia shown that occupational hazards in electronic industries include accidents, chemical poisoning, lung disorder, dermatitis, locomotors, noise, stress and mental problems. Poor eye sight is just one of the many minor problems. Exposed to over a hundred of chemicals, many of them toxic-like benzene, formaldehyde, cadmium, arsenic and zinc, the workers are prone to headache. The more serious long term effects could cause convulsion, diarrhea, pneumonia, kidney damage, bone marrow damage, violent shivering, cancer related diseases and even death (Sahabat Alam, 1984: 192). Workers who are employed in electronic company are mostly women. They are engaged in fragmented, repetitive work which is essentially boring. Electronic companies which engaged workers insist on a 20-20 vision and workers would peer through microscope between six to seven hours a day. All these showed that occupational hazards really occur in the workplace.

## **Methodology**

This study employs a descriptive research design using a combination of both qualitative and quantitative methods. To execute the quantitative design the study utilized the survey method to collect the quantitative data. The population of this study comprises of employees of a company in Sarawak which currently employs about 3,638 persons. Since it is not feasible to for all employees to be selected as respondents, this study have selected workers who are exposed to various hazards are identified as the population of the study. Thus this study only chooses 8.25 % (300 employees) of the total population as the sample of the study.

A quota sampling technique for data collection from the respondents was used. The purpose of employing a quota sampling technique enables the researcher to collect the data from the employees employed by the company at the First Selection Unit, the Electrical Characteristic Selection Unit, Second Selection Unit, Packaging and Shipping Units within the company.

These units were chosen because these groups of workers are constantly exposed to all short of hazards in the workplace in the organization. In addition, all workers who take more than 50 per cent of their working time in these processes units will be

considered as respondents. The sampling size was 300 respondents. This makes the confidence interval of 95 per cent. A written consent from each worker is obtained before each respondent answers the questionnaires. Table1 shows the total number of respondents which had been assigned to fill up the study questionnaires.

**Table 1: Total Number of respondents according to Units**

<b>Name of Unit</b>	<b>No. of respondents</b>	<b>Percent</b>
First Selection Unit	60	20 %
Electrical Characteristic Selection Unit	60	20 %
Second Selection Unit	60	20 %
Packaging	60	20 %
Shipping	60	20 %
Total	300	100 %

To execute the qualitative design, this study chooses to conduct a review of the OSH Procedures at the company. It was followed by a survey, and other subsequent visits to observe work pattern, behavior of the respondents. Respondents were also asked of their opinions of the job, and attitudes towards OSH at their workplace. Self-administered questioners were given to the OSH officer for his distribution to respondents. During the first visits there was a briefing on the company itself and some aspects of the Safety and Health managements practice were given as information. The subjective risk assessment of hazard was done during the site visit to the factory. The assessment was carried out during the site visit.

During the site visit the authors were briefed by the management of the company of their OSH Management Systems. Apart from that workers were observed at their workplace on whether they use their PPE. In addition we were getting relevant information on OSH compliance from them. Next we identified the various types of hazards found at the work place. This was done by examining the practices of Health and Safety by the workers and examining the Materials and Chemical Safety Data Sheet (MSDS) found at the factory.

The purpose was to identify the types of hazard faced by the respondents. After the subjective risk assessment of hazard was also carried out at the workplace, a review of the existing health surveillance program was also undertaken. The purpose was to see whether the management and employees comply with the OSH management systems. In assessing the hazard level, there are several factors being considered. These factors include, the type of hazard, the effect on health status of the respondents, existing control measures, persons at risk; employer, employee, supplier, visitor.

## **Findings and Discussions**

Generally the working environment of the workers in the company is clean and tidy. Signage of Safety and Health policy are seen in the workplaces and instructions on

these are clear. The lighting was good, the work environment is well lighted; Ventilation was good with air outlet vent; there is significant noise level from the sorting machines. It was informed the noise level was less 80dc. None of the staff were wearing any ear protection device. It was also found out that there was also no noise isolation barrier at the workplace.

Worker working in any electronic industry are often exposed to various types of risks in their work place. In this study, the respondents were asked to name the types of risks while they were employed by the company. The findings are shown in Table 2 below.

**Table 2: Respondents responses on exposure to risks in the workplace**

<b>Types of risks</b>	<b>Frequency (n)</b>	<b>Percent (%)</b>
Heat stress	6	2.6
Noise pollution	70	30.4
Lifting heavy objects	14	6.1
Working with awkward positions	9	3.9
Exposure to chemicals	6	2.6
Handling heavy machinery	5	2.2
Working with moving objects	15	6.5
All of the above	105	45.6

The findings of this study showed that 45.6% of the respondents are exposed to combination of risks types namely heat stress, noise pollution, lifting of heavy objects, working with awkward positions, exposure to chemicals, handling of heavy machineries and working with moving objects such as trolleys. In addition, 2.6 percent are exposed to heat stress, 30.4 percent exposed to noise pollution. Noise pollution is sometime derived from the factory's machineries. There were also 6.1 percent who were exposed to the risk of lifting heavy objects, while another 6.5 percent are exposed to risks when working with moving objects such as driving the forklifts. Most of those who were exposed to lifting heavy objects and moving objects are those employed in the packaging unit.

### **Health conditions of the respondents**

There were mixed responses received from the respondents when they were asked to respond to their health conditions. A small minority (7.4 %) claimed that they have suffered from burns, 13 percent suffered from noise induced hearing loss. Some (8.3 %) suffered from lower back pain. Others (5.7 %) were subjected to dust allergy. A small percentage (8.3 %) suffered from burns and loss of hearing, 6.1 percent suffered from burns and dust allergy, and another 2.6 percent suffer from hearing loss and lower back pain. There were two respondents have had suffered from some form of acute sickness. One suffered from asthma and the other tuberculosis. Table 3 shows the present health status of the respondents.

**Table 3: Respondents' responses on awareness of health conditions**

<b>Types of health conditions</b>	<b>Frequency (n)</b>	<b>Percent (%)</b>
Burns	17	7.4
Noise induced hearing loss	32	13.0
Lower back pain	19	8.3
Neck Stiffness	2	0.9
Hand arm vibration syndrome	2	0.9
Asthma	1	0.4
Tuberculosis	1	0.4
Dust allergy	13	5.7
Burns and hearing loss	19	8.3
Noise and lower back pain	6	2.6

The findings of the survey in Table 4 show that less than one third (29.1%) wear gloves. Those who wear gloves are technicians who handle hazardous chemicals. The findings also found out only a small minority (2.6%) wear ear plug, 20.0 percent use protective goggles, 31.7% wear nose cover and 19.1 percent wear safety boots. From this finding we can infer that majority of the workers do not practice safety precaution as far as the use of PPE are concerned. Based on the finding it was found that the majority of the employees do not wear their PPE in spite the fact that it is mandatory for them to wear PPP as require by the OSHA. Thus it can be conclude that most of the workers in this electronic company are exposed to occupational hazard in the workplace.

**Table 4: Types of Personal Protective Equipment Used in the Factory**

<b>Types of PPE</b>	<b>Frequency</b>	<b>Percent</b>
Gloves	67	29.1
Ear Plug	6	2.6
Protective goggles	46	20.0
Nose cover	73	31.7
Safety boots	44	19.1

### **Exposure to hazards**

The major findings of this study show that the workers in this electronic company are exposed to different types of hazard at the workplace. These groups are highly skilled technicians, whose responsibilities are to ensure that the final products are of quality before it finally ends up in packaging. All the work processes are full computerized and mechanized. The multi-layered capacitor chips are screened by machines which run with significant noise levels.

The manufacturing processes require the workers to examine the parts in the machine counters, standing and walking most of the time and occasionally sitting for final check up to the collecting tray. These groups are the most exposed to noise pollution as they in direct contact with the quality sorting machines. Their long exposure to noise may cause hearing impairment. During the observation it was found that the

company has already established a permanent Occupational Safety and Health Committee. This committee is responsible for the formulation and implementation of the OSH Policy. The committee is also actively monitoring workers compliance towards the company's OSH rules and regulations.

The findings from the inspection revealed that some of the technicians work with computers which are not ergonomically suitable. The chairs are too were found to be un-ergonomic. Exposure to such working environment makes them susceptible to musculo-skeletal disease (MSD). The technician also use microscope to examine parts. This itself is another ergonomic factor which can cause strain to the eyes and musculo-skeletal body parts.

Apart from the above, a qualitative risk assessment was also carried out. The purpose is for determining the working hours of each work unit and the exposure to risk. An assessment was also carried out to measure the exposure level by means of instrument measurement such as thermometer for heat, noise mapping using noise dosimeter. Qualitative risk assessment were confined to: The sequence of basic job step in the work processes; hazard identification; hazard and effects; current control measure instituted in the department; risk assessment assessed through the following criteria; recommended control measure; recommended Health Surveillance to the department; and, law and regulation and code of practice associated occupational hazard in the workplace.

Result of risk assessment indicated that the respondents to extent are being exposed to hazard at their workplace. Table 5 shows four main sources of hazard in this electronic company. Employees from the Electrical Characteristic Selection (ECS) whose job are to ensure that the parts have the correct electrical capabilities, are subject to noise from the compression. This is a physical form of hazard which the ears are susceptible to noise levels. Workers who work in these stations do not use their earmuffs. There was no signage instruction for them to do so. They admit that it is cumbersome to put on earmuffs each time the test is conducted.

**Table 5: Source and Classification of Hazard**

<b>Type</b>	<b>Source of hazard</b>	<b>Hazard classification</b>
Hazard 1	Noise from compression chamber	Physical
Hazard 2	Chair is stiff and not adjustable	Ergonomic
Hazard 3	Microscope	Ergonomic
Hazard 4	Chemicals	Physical and environmental

On the site inspections made show that some of the workers are exposed to noise. High noise levels can cause hearing impairment. When the noise mapping was done using the management and noise levels were found at 65dB at the Electrical Characteristic Selection (ECS) machine area, 50 dB at the computer booths area at the recording workstations. The computer booth area is about 10 meters away from the ECS. There was no barrier wall dividing the computer booth ad the ECS machine area. Under the First Schedule of the Factories and Machine Act (FMA), 1967 (Permissible Exposure Limits), hearing impairment can occur if the exposure to



noise level of more than 85 dB persist (more than 16hours-FMA) At 65 dB hearing may occur if the exposure time prolong for years. The workers near to the ECS machine, and those who use the ECS machine were told to use earmuffs.

### Exposure to Chemicals

Employees of this factory were found to be exposed to different types of chemicals only six different types of the chemicals analyzed by using the Chemical Health Risk Assessment. The format used was based on the guidelines in the Department of Occupational Safety and Health (DOSH) handbook. The six chemicals that were analyzed using the CHRA were menthol, nickel conductive paste, ammonia solution, AP -1 (alcohol), toluene, and hydrochloric acid. Table 6 shows some of the processes which involve chemicals. Methanol is used for drying and cleaning of product as well as to clean the engine. It is widely used in the Plating, Manufacturing Department of the factory. Nickel conductive paste is used in the Printing Section and the Terminal Electrode process. It is use to dilute and stabilize nickel. Ammonia solution is used in the Plating Section. It is a pH adjustment for product quality. While AP-1 (Alcohol) is used in the Mixing, Compressing Printing processes. It is sometimes mixed with the other solvent to produce slurry and also cleaning of the factory's equipments. Toulene is used in the printing process and mixed with other chemicals to produce slurry. Lastly, hydrochloric acid is used in the Plating Section for water treatment.

**Table 6: Works Process in the Factory Involves Chemicals**

Chemical Name	Section / Process	Remarks (usage)
Methanol	Plating	Drying and cleaning of product
	Manufacturing	machine cleaning
	Engineering	
Nickel Conductive Paste	Insatsu (Printing)	use to dilute and stabilize the nickel amount
	Gaiden (Terminal Electrode)	use to dilute and stabilize the nickel amount
Ammonia Solution	Plating	pH adjustment for product quality
	Haigou (Mixing)	Mixed with other solvent to produce slurry
AP-1 (Alcohol)		Cleaning process / Equipment
	Atchaku (Compressing)	cleaning equipment
	Insatsu	cleaning equipment
Toulene	Haigou( Printing)	Mixed with other solvent to produce slurry
Hydrochloric Acid	Plating	Regeneration of DI water (Treatment)

### Ergonomics Hazard

This study also found out that the employees are also exposed to ergonomics hazards. Workers are found sitting for long hours with bent back while they were examining parts and the chairs doe not give them mobility. If this situation persists for a long

period of time the workers are susceptible to injury. Their back muscles are strained and the staffs are at risk of having Musculo-Skeletal Disease (MSD). This is caused by poor sitting position. As such the workers have to correct their sitting position. In view of this, the workers were advised to sit correctly and the management was also advised to change the chairs to fit the workers ergonomically.

Employees who scrutinize parts using microscope are also exposed to ergonomics hazard. Long hours peering into the microscope can cause neck stiffness, eye strain and other MSD. The points of injury are the eyes and the musculo-skeletal system. The consequences of this are that it causes headaches which may cause poor concentration and MSD. As a control measure, a proper ergonomic chair for the workers used is deemed desirable. Apart from that, workers exposed to this type of hazard need to adequately rest their eye balls.

When investigations were done by using the Chemical Hazard Risk Assessment (CHRA) technique, there were 180 different types of chemicals used by the company. The quantities are relatively small. In addition the company MSDS and it is available to all workers. About 2.6 percent of the respondents were exposed to chemicals. Chemicals Safety Data Sheet (CSDS) was available within the factory for easy reference. All labeling were according to regulations.

## Conclusions

From the findings of this study we can infer that employees of this electronic company are exposed to various forms of hazards at their workplace. To ascertain whether the workers of the factors are exposed to some form of occupational hazards, they were asked if the workers wear their protection equipments (PPE) such as helmet, gloves, ear plug, goggles, nose cover, protective overcoats and safety boots. From the responses we gathered it is clear that only a small percentage of the employees wear their PPE. In addition, workers in this electronic company are also exposed to ergonomics hazard. Those workers who are exposed to ergonomic hazard are those who have to sit for long hours in chairs which inhibit their mobility and those who have to scrutinize parts by peeping in the microscope. Technicians are also exposed to chemical hazard. Chemical used by the factory is also a major source of both physical and environmental hazard. Chemical can be a physical hazard when it accidentally spills on the workers body. Chemicals can also cause environmental hazards when the residues are not being disposed of properly by the workers.

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