

ACHIEVING SUSTAINABLE SAFETY AND HEALTH ASPECT IN SOLID WASTE MANAGEMENT

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Abstract—The objective of this concept paper is to discuss about safety and health aspect in Municipal Solid Waste Management (MSWM) in Malaysia. The basic situation is low safety and health practice and ergonomic problem related with physical health, psychology and social health, non-occupational related health, and occupational related health. In order to achieving sustainable safety and health is dependent upon three parties; the employer, the government and the employees. Enforcement of policy, legislation and standard play an important role in ensuring the three parties undertake their responsibility and strive for higher standard of safety and health

Keywords— Health, MSWM, Safety

I. Introduction

The problems of municipal solid waste management in Malaysia are becoming a major issue as well as in many developing countries in the world. It is facing greater challenges in order to keep all of the waste in proper management. Municipal solid waste management constitutes a growing problem and has gained practical awareness over recent year in our country. This is due to the steadily increasing of total waste produce. Due to growing population and increasing in consumer consumption in our country, the amount of solid waste generated in Malaysia went up from 20 500.00 tons per day in 2010 to 28 565.32 tons per day in 2012. In Johor only, the solid waste generated is from 2 600.00 tons per day in 2010 to 3 004.95 tons per day in 2012 It increase 404.95 tons in two year.

As the solid waste increase, so does the number of landfill for disposal. The more landfill operating, the more municipal solid waste management workers needed. In March 2010 there is 177 sites that operating, and number of terminated site is 114, but in September 2012, operating site is 165 and the number terminated site is 131. The increase of terminate site increase about 17 sites. The more waste produce, the more number of terminated site. In the year of 2010, number of operating site increase from 13 site to 14

site in 2012; number of terminated site from 21 in 2010 to 23 in 2012. The more waste produce by us, the more landfill has to be open to support all the waste.

II. Background of Study

Human activities always generates waste such as house hold waste, industrial waste, construction waste, commercial waste, institutional waste, public waste, import and current waste. The major types of MSW are food wastes, appear, plastics, rags, metal and glass, with some hazardous household wastes such as electric light bulbs, batteries, discarded medicines and automotive parts (UNEP, 2005; UNEP, 2004).

The wastes that produced everyday needed proper management in term of collecting it. The municipal solid waste workers is the person that playing the role in collecting and to ensure our living areas and compound are free from rubbish or waste that may harm us. But, the waste management in developing countries are associated with occupational safety and health risks. It is because waste management practices differ for differ for developed and developing countries nations, for urban and rural areas and for residential and industrial producers (Magutu and Onsongo, 2011). Plus the lack of clear definition and delineation of the different waste types, makes an assessment of current waste management practices in most countries difficult (UNEP, 2005).

The wastes collector, the driver and helper, they collecting refuse and wastes, as known they job most deadly occupation and to be dirty strenuous work. Level of safety and health of this worker mostly debated internationally, but in our country, this issue did not get any attention since the perception of community that ignoring the right of municipal solid waste worker to have a better treatment. They have an adverse social perception due to inherent nature of work. Few studies have been conducted to examine exposure risk of waste industry worker.

Then, the impact is on the municipal solid waste management workers, especially during the collecting refuse and waste and at the landfill. Even though the method of collecting waste either thru door to door or using containers or communal bins (Magutu and Onsongo, 2011) but accident and risk of getting hurt during working are higher among the municipal solid waste management workers. Almost all workers expose to infective or toxic material originates as dusts, aerosols and vapors, which either inhaled or inhaled.

OHS Management System

Applicable Occupational Health and Safety (OH & S) policy must be implemented in order to achieving sustainable safety and health. Organizing for safety and health in the organization need both management and employees to be actively involve and committed to the policy. There is numbers of occupational health and safety management system such as BS OHSAS 18001:2007 (based on the BS EN ISO 14001) and ILO-OSH 2001 that applicable in these studies. This policy overall regarding in the prevent injury and ill-health in the industrial.

In BS OHSAS 18001:2007, there is a model that should be follow to ensure its continuing sustainability, adequate and effective, starting from Planning, Implementation and Operation, Checking and Corrective Action and Management Review in order to striking for "Continual Improvement". The third British Standard in OH & S Management Systems is BS OHSAS 18004:2008, "Guide to achieving effective health and safety performance", which is bases on BS OHSAS 18001. In the Royal Society OF Chemistry (2009) notes mentioning about the number of annexes in BS OHSAS 18004, such as occupational health, worker involvement, emergency preparedness and response and incident investigation.

In ILO-OSH 2001, there is model that based on ILO approach, starting with Policy (covers both the occupational safety and health policy and worker participation), Organizing, Planning and Implementation, Evaluation (covers performance monitoring and measurement, investigation of work-related injuries, ill health, diseases and incident) and lastly Action for Improvement.

iii. Statement of The Problem

The municipal solid waste workers face with many threats during working especially physical effect, health effect, and social and psychological health problem. Drudi (1999) state that refuse collectors were identify as holding one of the most dangerous jobs. He also mention that the collecting refuse has long been known to be dirty strenuous work, less well known is that it is also among the most deadly occupation. Regarding this statement, the waste collectors are not easy job to be done as it done manually in

our country. Workers may be exposed to the same potential hazards as the general population, although the amount of expose and risk may differ (Rushton L, 2003).

In Malaysia the municipal solid waste workers rarely complain about the injuries that they get during working especially physical effect such as musculoskeletal, slip and trip, struck or hit by vehicles and falling. According to the research by Drudi (1999) the refuse collection invariably involves jumping off and on trucks, carrying trash containers and walking on streets, alleys and parking lots. Jumping off and on the trucks causing the municipal solid waste workers have bad effect upon their muscle. Result from the study by Hala et al (2012) state that the percentage of musculoskeletal complaints during the past 12 months was higher among municipal solid waste collectors (60.8%) than the comparison group (43.6%). Low back was the most frequently affected body region among municipal solid waste collectors. According to the research done by Alan et al (2011) show that among 24 workers that being interview only two has consulted doctors owing to the neck problem, three workers sought medical help because of back problem and no employee has seen doctors or health providers for any musculoskeletal treatment. Rushton, L (2003) also mention "the work of waste collectors involves considerable heavy lifting as well as other manual handling of containers, increasing the risk of musculoskeletal problems".

Sometime the municipal solid waste workers being hit or run over by other vehicle or by the waste truck. This job requires the municipal solid waste workers to collecting waste from the rubbish bins in briskly often causing the worker getting injured. This statement support by Drudi (1999), refuse collectors often have to collect from both sides of a street; they work in close proximity to large collection vehicle that stop and start frequently. Sometimes they being run over by the refuse truck or struck by a passing vehicle, sometimes after falling from the truck. Drudi (1999) also mention that most of these fatalities were the result of workers being struck by object or caught in equipment, being exposed to harmful substances or from assaults and violent acts.

The municipal solid waste workers are very high risk occupation which related with respiratory diseases, skin diseases, hepatitis and needle punctures and coronary heart diseases. Volatile organic compounds (VOCs) emissions include higher amounts of alkanes and alkenes, cycloalkanes and cycloalkenes, aromatic, cyclic aromatic and polycyclic aromatics hydrocarbons and derivatives, aldehydes, alcohols, ketones, esters, organohalogens and organosulphur compounds (Chiriac et al, 2007) are the gases that being exposed everyday by the municipal solid waste workers as long as methane and carbon dioxide. Those gases produce during degradable of waste by microorganism and it causing greenhouse effect. Domingo et al (2009) also state that concerning the adverse health effects of VOCs, an especial emphasis on the following compounds must be done: benzene and 1,3-butadiene, as potentially inductive agents of leukaemia; formaldehyde, as a nasal carcinogen potential; certain PAHs as compounds potentially inductive of cancer and the carcinogenic PCDD/Fs. Regarding this

emission of gases causing adverse effect of VOCs, the bad odours must be also included, as can be cause diverse indirect health effect such as nausea and vomits, reactions of hypersensitivity and even alterations in the respiratory model (Domingo et al, 2009). It has been suggested that increased exposure to bio-aerosols and volatile compounds may lead to elevated incidence of work-related respiratory gastrointestinal and skin problems in waste collections compared to the general workforce (Rushton L, 2003). Indirect health effects due to the contribution of greenhouse gases from waste disposal activities could be significant. Rising temperatures (and low level ozone levels) due to climate change would affect old people with cardiovascular problems and both old and young people with respiratory problems such as asthma (Giusti L, 2009)

As the municipal solid waste workers dealing with untreated waste daily, they are totally exposed with organic dust. As Domingo et al (2009) state that “the biological agents that mean a potential threat infectious are the following: bacteria and/or endotoxins produced by them, allergenic fungi, and parasitic protozoa. Most fungi detected in the previous activities are allergenic agents that can lead to occupational disease”. So the longer the workers exposed to the organic dust, so they chances of get disease from contact with waste are higher. This statement were support by Domingo et al (2009), long periods of exposure to municipal solid waste combined with elevated temperatures, provide excellent conditions for the bacteria development, reason why a number of people implied in the composting process can be sensitized to microorganisms through inhalation of bacteria and spores of fungi.

Rushton L (2003) states that reproductive effect associated with landfill sites have been extensively research and include low birth weight (less than 2500g), foetus and infant mortality, spontaneous abortions, and the occurrence of birth defects. So, the chances of municipal solid waste workers getting reproductive effect, low birth weight babies and neonatal deaths are higher.

iv. Purpose of the Study

This study is to achieving sustainable safety and health aspect in solid waste management. To achieve the above mention aim, the following objectives were forwarded:

- i. To find out the level of safety and health practice among municipal solid waste management institutions.
- ii. To identify occupationally related health problems among municipal solid waste management in the context of physical, mental and social health.
- iii. To proffer measures for sustainable management in safety and health aspect

v. Scope of Study

This research is to study the current safety and health practice among municipal solid waste management workers at Johor. Specifically this research want to conscientious know and identify occupationally related health problem

among solid waste management workers in the context of physical, mental and social health. This research also wants to know what elements that related to safety and health among municipal solid waste management workers. In same time, this research wants to study the relation among the elements. Lastly in order to achieve sustainable management in safety and health aspect, this research want to know what kind of effort taken by the stakeholder. This research also study the influence of demographic differences among solid waste management workers such as age, sex, level of education , occupational experience and location of respondent live.

The respondent of this study is the stakeholder and the solid waste management workers. Stakeholder consists of Ministry of Housing and Local Government, National Solid Waste Management Department, Solid Waste and Public Cleansing Management Corporation, local authorities, concessionary companies, collector and manufacture, non-government organization, private residents association, educational institution and private waste recycle

vi. Literature Review

Oviasogie et al (2010) state that after waste is generated, waste workers collect and dispose such waste along road-side, around residential area or in a government approved dumpsite. During waste collection and disposal most workers in developing countries hardly use protective device. Since the municipal solid waste workers not using proper personal protective equipment so it make them vulnerable to serious safety and health problem.

In health practice among municipal solid waste management workers, this study will discuss about physical health, psychology and social health, non occupational related health problem, occupational related health problem in detail. According to the research paper by Mudalige, O.M.D.C.S & Dharmathilake, A.D. (year not stated), psychology and social health problem that might arise in this study such as alcohol consumption, smoking, gambling, betel chewing, family problem and financial problem. The non-occupational related health problem that might occur such as diabetes mellitus, hypertension, heart disease or other chronic diseases. All of this non-occupational related health problem cannot be use in this study because of certain factor that might affect it, such as genetically, food consumption and other factors. In this study, according to the occupational related health problem divided into two, respiratory disease and skin disease. In respiratory disease it, sickness such as asthmatics, respiratory problem could affect the workers because of the odours. In skin disease, sickness such as irritation of skin, irritation of nose, irritation of eyes and allergic could occurs.

Sustainable Solid Waste Management

The Waste Framework Directive set out five step (the waste hierarchy) for dealing with waste as illustrated in Figure 1

(DEFRA, 2011). The Waste Framework Directive is needed to achieve sustainable safety and health in solid waste management. The bottom line is prevention. With the waste hierarchy for specific waste streams in order to deliver the best environmental outcome.

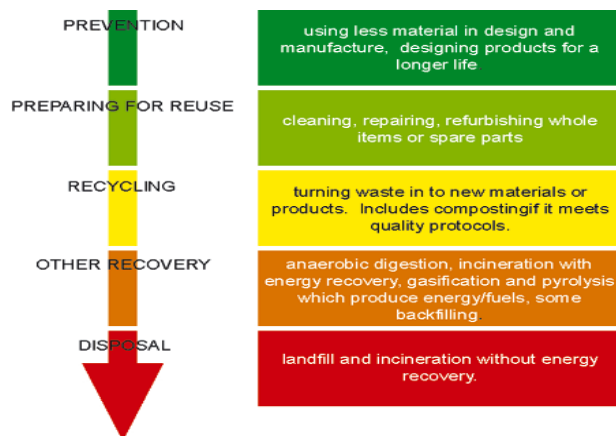


Figure 1: Waste Hierarchy

Step	Description
Prevention	avoidance, reduction and re-use; using less hazardous materials. Avoidance includes buying fewer items, reducing process waste or using less material per unit in design and manufacture. Reduction covers keeping products for longer, designing them so they last longer. Re-use includes selling and buying used items, donating them for free, exchanging them etc
Preparing for re-use	checking, cleaning, refurbishing, repairing whole items or spare parts.
Recycling	turning waste into a new substance or product. Includes composting if it meets quality protocols
Other recovery	anaerobic digestion, incineration with energy recovery, gasification and pyrolysis which produce energy (fuels, heat and power) and materials from waste. Some backfilling operations.
Disposal	landfill and incineration without energy recovery. The revised Waste Framework Directive sets an energy efficiency threshold above which municipal waste incinerators can be classified as recovery facilities, and below which they continue to be classified as disposal facilities.

VII. Research Methodology

There are four important parts in the methodology of this study, namely (i) the design of the study, (ii) sample, (iii) the method of data collection, and (iv) the method of data analysis. The four aspects of above it is important to ensure that research can be carried out smoothly and systematically and produce high quality research. Researchers explain about the design of a study conducted to identify safety and health practices among solid waste management workers. Sample in the study is a description of the sample used in this study. Researchers explain that there are population and sample size for the study. Data collection methods to be use in this study are quantitative and qualitative methods. The instruments to be used by researcher to obtain the necessary data are questionnaire, interview and observation. Method of data analysis is a method used to analyze the data in order to achieving the objectives of the study.

VIII. Conclusion

The effectiveness of safety and health practice depend upon the upper management and the employee. Mostly the waste workers in Malaysia live and work under extremely precarious conditions. So it is importance for them to be aware about their safety and health. Sometimes they are often driven by poverty to work as municipal solid waste management worker.

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