UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF SCHEDULE WASTE MANAGEMENT SYSTEM FOR A MANUFACTURING COMPANY

This report is submitted in accordance with requirement of the University Teknikal Malaysia Melaka (UTeM) for Bachelor Degree of Manufacturing Engineering (Hons.)

by

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APPROVAL

This report is submitted to the Faculty of Manufacturing Engineering of Universiti Teknikal Malaysia Melaka as a partial fulfilment of the requirement for Degree of Manufacturing Engineering (Hons). The member of the supervisory committee is as follow:

.....

(Dr Nik Mohd Farid Bin Che Zainal Abidin)

ABSTRAK

Secara semula jadi, Sisa Berjadual yang dihasilkan oleh industri pembuatan adalah sangat toksik dan berbahaya bagi kesihatan manusia dan persekitaran jika ditangani dengan cara yang tidak betul. Terdapat empat isu utama yang perlu dipertimbangkan untuk mengaitkan perbincangan pengurusan Sisa Berjadual dengan pihak industri, iaitu istilah 'membelanjakan wang' oleh industri, kurangnya kesedaran tentang pembuangan haram, pembaziran sering dalam pelbagai bentuk dan masalah pemantauan oleh pemerintahan. Tujuan dan objektif kajian ini adalah untuk menyediakan penjana sampah yang berpengetahuan dan berkemahiran sebagai pelaksanaan prosedur untuk mempunyai pengurusan Sisa Berjadual yang selamat dan betul. Kajian ini dilakukan dengan mengumpulkan data Sisa Berjadual melalui kunjungan ke Syarikat Pembuatan Suntikan Plastik di Selangor. Berdasarkan Jadual Pertama Peraturan Kualiti Alam Sekeliling (Sisa Berjadual) 2005, kajian mendapati Syarikat wujud lima sisa jadual dari Kumpulan 3 dan 4 (SW 306, SW 322, SW 409, SW 410, dan SW 416) dihasilkan dari empat jabatan. Oleh itu, 36% dari jenis Sisa Berjadual dihasilkan oleh Jabatan Penyemburan. Kajian menunjukkan aliran proses setiap SW dengan falsafah 3R (Reduce, Reused and Recycle) dalam menangani sisa. Kajian ini juga merancang dalam pengembangan Kawasan Penyimpanan Sisa Berjadual Sementara dan Baru berdasarkan Pedoman Pembungkusan, Pelabelan dan Penyimpanan Sisa Berjadual di Malaysia. Laporan ini menunjukkan perbandingan antara pengembangan Kawasan Penyimpanan Sementara dan perancangan Kawasan Penyimpanan Baru untuk menangani Sisa Berjadual yang mengikuti kehendak dan panduan JAS.

ABSTRACT

Through nature, Schedule Waste generated by manufacturing industry is an extremely toxic and dangerous to human health and environment if handle with improper way. There are four main issues to consider discussion association of Schedule Waste management with industry, which is the term of 'spending money' by industry, the lack awareness of illegal dumping, the waste often in various form and the monitoring issues by the governance. The aim and objective of this study are to prepare much knowledgeable and skilled to waste generator as the implementation of the procedure to have safe and proper management of Schedule Waste. The study was conducted by gathering data schedule waste through the site visit the Plastic Injection Manufacturing Company at Selangor. Based on the First Schedule of the Environment Quality (Scheduled Waste) Regulation 2005, the study found in the Company that five schedule waste from Group 3 and 4 (SW 306, SW 322, SW 409, SW 410, and SW 416) was generated from the four departments. As, 36% of type Scheduled Waste generated by the Spray Department. The study shows the process flow of each SW with 3R philosophy (Reduce, Reused and Recycle) in handling the wastes. The study also planning in the development of the Temporary and New Scheduled Waste Storage Area based on the Guidelines for Packaging, Labelling and Storage of Scheduled Wastes in Malaysia. The report shows the comparison between the development of Temporary Storage Area and planning for New Storage Area for handling Schedule waste that follow the DOE requirement and guidelines.

DEDICATION

I dedicate this work to my father Mr Md Rahim, my mother Mrs Asni, and my sibling who has encouraged me all the way and whose encouragement has made sure that I give all it takes to finish that which I have stared.

Thank you for the support, and my love for you all can never be quantified.

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LIST OF ABBREVIATIONS

3R	-	Reduction, Reuse or Recycling
4R	-	Reuse, reduce, recycle, replace
5R	-	Reduce, reuse, recycle, replace, replant
CEPA	-	Communication, Education and Public Awareness
DOE	-	Department of Environment
EPT	-	Ethylene Propylene diene Terpolymer
EQR	-	Environmental Quality Report
FIBC	-	Flexible Intermediate Bulk Container
JAS	-	Jabatan Alam Sekitar
LLL	-	Life-Long Learning
MSW	-	Municipal Solid Waste
PIC	-	Person in charge
PS	-	Paint Sludge
SW	-	Schedule Waste

LIST OF SYMBOL

b	-	Base width
cm	-	Centimetre
d	-	height of dike, cm
H	-	Height
kg	-	Kilogram
L	-	Length
L/l	-	Litre
m	-	Meter
S	-	Slope
T	-	width of crown, cm
W	-	Width
z	-	horizontal value of side slope

CHAPTER 1
INTRODUCTION

1.1 Background

Malaysia 2020 ensures that toxic chemicals manufactured are used in ways that reduce risks and bad impact on environmental and human health. Malaysia has undergone a rather rapid manufacturing industry since the beginning of the twentieth century and resulted in the development of a more manufacturing environment. More focus indicates that industrial activities boost the lifestyle of humans towards improvement. Nevertheless, the effect of many industrial practices is the degradation of the atmosphere and natural resources (Gandhi et al., 2006).

Industrialization showing effort in the role meeting the needs of humans. Industrial operations generate goods that are essential to the survival of humans. Moving to a greater emphasis implies changing the lifestyle of the person from rural to urbanization. Nevertheless, the consequence of many industrial practices is the degradation of the atmosphere and natural resources. In a recent view, it has been noted that Malaysia's growing economy leads to the environmental burden of high use of power or energy and high generated waste. The waste generated also categorized on the level of hazardous exposure (Fazeli et al., 2016).

Based on Department of Environment (DOE) to define waste, "waste is including any substance prescribed to be a scheduled waste or any matter whether in a solid, semi-solid or liquid form or in the form of gas or vapour which is emitted, discharged or deposited in the environment in such volume, composition or manner as to cause pollution" EQA, 2006). Scheduled wastes are defined as the categories of waste listed in the First Schedule of the Environmental Quality (Scheduled Wastes) Regulations 2005 (Appendix A).

Hazardous waste due to toxic and nature for such waste have been classified as some of the categories on the scheduled waste.

Through nature, schedule waste is extremely toxic and dangerous. Improper in handling or manage such waste would result in severe environmental and ecosystem contamination as well as in immediate or long term impact on human health. When handling scheduled wastes, management needs an exceptional understanding of the list of waste, waste properties, waste management concept, and regulatory structure of schedule waste.

The primary sources of hazardous waste are from the industrial sector, the agricultural sector, the health sector, and households. Industrial waste poses a potentially serious environmental hazard as the majority of industrial processes use chemical or synthetic products. Agricultural waste such as pesticides, insecticides, and herbicides produce many of these contaminants go into the soil and wastewater, and any residual products are considered hazardous waste. Animal waste also contains high nitrates that can flow into groundwater and contaminate wells of drinking water (Obi et al., 2016). Medical waste involves the disposal of blood and tissue-infected clinics, expired pharmaceutical products, unused and used drugs that are not adequately handled, pose a risk to the general public. They pose a high risk to health care staff as a result of the spread of micro-organisms from health care facilities to the community. (Windfeld and Brooks, 2015). Hazardous waste generates in the home, such as the toxic of paints, other flammable chemicals, unused medication is generated based on meeting the desirable lifestyle of people (Fauziah and Agamuthu, 2008).

When population increases and productivity rises, waste increases. It needs waste management and mitigation to minimize the negative environmental and human impacts of waste. A complete waste collection, storage, disposal, and recycling/reuse program is designed and implemented to handle the management process. Avoidance waste is better than manage waste.

1.2 Problem Statement

Industry manufacturing is a problem associated with the schedule waste management because of moderate comprehension and awareness of effect in management schedule waste to the industry. As the problem of illegal dumping still exists by some of the industry that lacks sustainability awareness. The involvement of relevant stakeholders needs to take action to monitor and prevent the industry that illegal handling waste that affects the environment. The Main effect of improper handling schedule waste is the effects of the pollutes watercourses, groundwater, atmosphere, and land. Another effect is toxic to humans, plants and other organisms. Affect to humans can cause cancer, damage to the skin, and body tissues. Landfill disposal easy to fire outbreaks at the dumping site, which can release toxic materials hazardous to the environment.

1.3 Aim and Objective

The aim of this project is to prepare much needed knowledgeable and skilled to the waste generator to have safe and proper management on scheduled wastes. The objective of this project is as follows:

(a) To identify, classified and categorize the type of Schedule Waste generated by the company,
(b) To Prepare procedure to manage Schedule Waste generated by the company,
(c) To implement the procedure and effective of schedule waste practice to the company.

1.5 Scope

The scope of this project is the guidance and countermeasure of proper schedules waste management by manufacturing company:

(a) Identification of the Scheduled Waste in the Company,
(b) Development of procedure schedule waste,

(c) Provide information on hazards associated with the Scheduled Waste,

(d) Guidance on proper handling of schedule waste generated by a company,

(e) Guidance for proper packaging, labelling storage of scheduled waste,

(f) Planning a temporary or immediate countermeasure of schedule waste to the company.

1.6 Project Significance

Scheduling waste management aims to lead to economic benefits and protection of the environment. Currently, there are growing trends in the amount of scheduled waste generated by Malaysia's manufacturing industries and inappropriate handling by the industry. The research would enable the Environmental Impact Assessment Consultant, stakeholders, private and government sectors to develop an incentive in produce proper management of scheduled waste processes as listed in the Environmental Quality (Scheduled Wastes) Regulations 2005.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

Waste management in the industry is a crucial area for the country's economic status and the lifestyle of its people. It is the legal and moral obligation of all sector industries to minimize the amount of waste produced and disposal. In that manner, the waste has a minimum effect on the environment. Growth in increasing population and pollution has contributed to the fast effect of natural resources and deterioration of the ecosystem. Human health and environment need protection by monitoring the handling of waste. Landfill dumping is the most common waste management used in Malaysia. About 95% of wastes or 10.4 mil tonnes a year transported to landfill sites, most of which are disposed of in open areas without proper control (Nathan, 2018).

Accidents with toxic or hazardous can cause illness or threat to humans or the environment when improper handling procedure setup. Jun 2019, incident at Pasir Gudang were 15 schools had their lessons disrupted from the pollution on Monday class, the 75 students have been referred to Sultan Ismail Hospital for further treatment (Mohd, 2019). This unprepared incident may lead to more life taken if precaution safety is delayed. The radioactive poisoning in Bukit Merah is one of the hot topics in the improper handling of toxic or hazardous substances. Rare earth metals can be harmful, but threats can be avoided. It was recorded that 8 cases of leukaemia and 7 deaths were associated with the processing of radioactive materials at Bukit Merah (Malaysiakini, 2011).

The hierarchy of waste management is a philosophy that encourages waste reduction before reuse and disposal. The hierarchy also called as reduce, reuse and recycle or 3R. The 3R is often used as education programs, becoming a well-recognized term for waste

management and resource recovery. In the phraseology of waste management, the 3R was adopted as one of the used appropriate strategies for sustainable development of waste management worldwide. Other terms, 4R is for incorporating on recovery and 5R for incorporating with Respect and Rethink have also been added, the main of 3R reduce, reuse and recycle have always been the basis in the hierarchy of waste management (Agamuthu and Fauziah, 2014).

The Waste Management Hierarchy focuses on the minimization amount of waste from entering the landfill or dumpsites (Sreenivasan et al., 2012). The main goal of the hierarchy management is to improve the strategy and control of waste minimization—modern waste management shifts to a more flexible concept of waste hierarchy policies. The government also takes the initiative to strengthen waste management in the implementation of the 3R program and implementation of waste separation to reduce waste at source and to prevent indiscriminate waste disposal (11th Malaysia Plan, 2015).

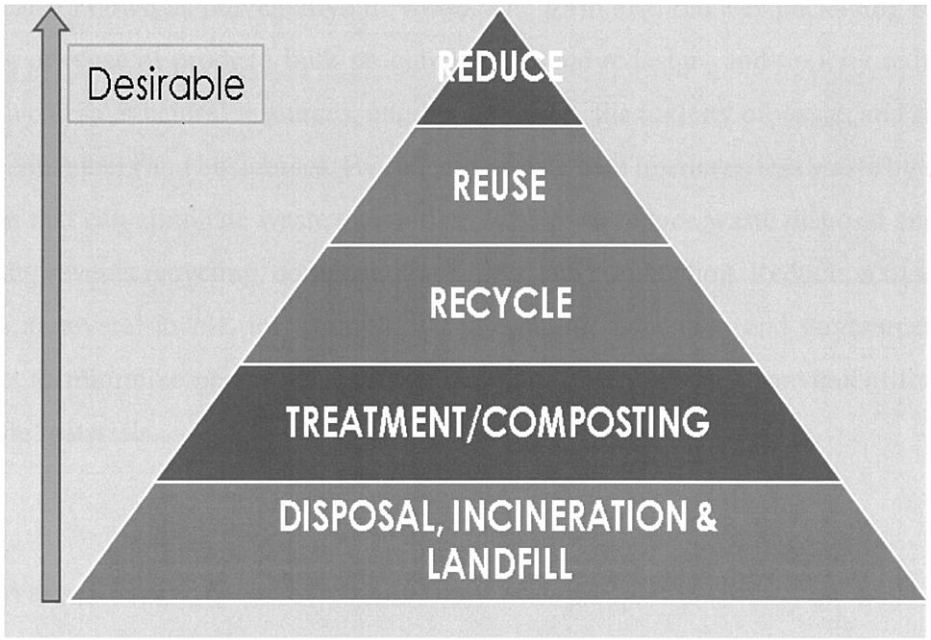

Figure 2.1: The Hierarchy of Waste Management 3R (Sreenivasan et al., 2012)