Universiti Malaysia Sarawak
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Fk

BORANG PENYERAHAN TESIS

Judul: SOLID WASTE TREATMENT AND DISPOSAL FOR RURAL AREA

SESI PENGAJIAN: 2002 - 2006

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(HURUF BESAR)

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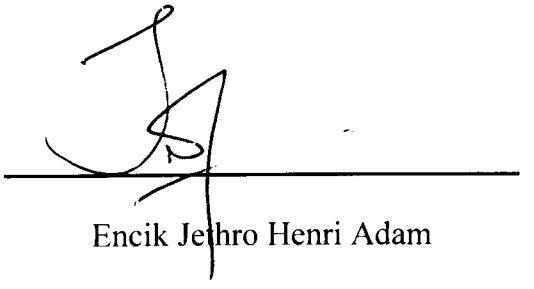

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SOLID WASTE TREATMENT AND DISPOSAL FOR RURAL AREA

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This project is submitted in partial fulfillment of
the requirements for the degree of Bachelor of Engineering with Honours
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Faculty of Engineering
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Dedicated to my beloved parent, Laja and Menda,
My two siblings, Dolly and Vincent,
Last but not least, especially for my husband, Ignitius Wellington

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ABSTRAK

Kajian ini dibuat untuk lebih memahami mengenai pengurusan sampah pepejal. Kehidupan seharian tidak dapat dipisahkan dengan bahan buangan seperti sampah. Tanpa pengurusan sampah yang betul, masalah pembuangan sampah yang tidak teratur boleh menyebabkan pencemaran. Penduduk kampong yang mengalami masalah ini untuk sekian lamanya melupuskan sampah-sarap mereka dengan membakar atau menanam serta membuang sampah tersebut di dalam sungai dengan harapan sampah-sarap tersebut akan hanyut dibawa arus. Tetapi mereka tidak menyedari bahawa perbuatan mereka ini telah mendatangkan pencemaran alam sekitar. Jarak kampung yang jauh dari kawasan bandar serta ketiadaan jalan dan keadaan jalan yang rosak menyukarkan lagi kerja pemunggutan sampah yang dijalan kan oleh majlis daerah sesebuah kawasan. Di dalam kajian ini, terdapat empat kaedah yang boleh digunakan untuk menguruskan sampah pepejal ini. Kaedah-kaedah tersebut ialah kitar semula, pemerapan sampah sebagai baja, penimbusan sampah menggunakan tanah dan pusat penggumpulan sampah. Pelbagai faktor penting yang perlu dalam kaedah-kaedah ini telah diambil kira dalam kajian ini. Ini adalah untuk mengenalpasti samada sesuatu kaedah tersebut bersesuaian untuk diguna pakai di kawasan luar bandar. Populasi penduduk sesebuah kawasan luar bandar adalah penting untuk membuat anggaran jumlah sampah yang dibuang di kawasan tersebut setiap hari. Jenis-jenis sampah yang dibuang juga di ambil kira bagi menentukan jenis sampah yang selalu dibuang oleh penduduk. Tahap pengetahuan para penduduk juga perlu dititikberatkan. Ini kerana tanpa pengetahuan yang mencukupi dalam kaedah-kaedah ini, sesuatu kaedah itu tidak dapat dijayakan. Di akhir kajian ini, bagi kawasan yang mempunyai peratusan sampah makanan yang tinggi, kaedah pemerapan sampah sebagai baja adalah paling bersesuaian.

ABSTRACT

This thesis was conducted to get more understanding about solid waste management. Everyday life cannot be separated from discarded things such as domestic wastes. Without a good management in solid waste, the dumping of the wastes will contributed to the pollution. Residents in rural area facing this problem for a long term banish the domestic waste by burning it or buried it and also throwing the waste into the river with a hope that the wastes will be carried away by the river flow. This resident was not realized that their attitudes are causing the environment pollution. The distance of the rural areas that is too far from the urban areas and also a bad condition of the road or not accessible by the public collection service from the city council made this problem become worse. There are four methods that can be use to manage the solid waste in this thesis. There are recycling, composting, mini landfilling and bin centre. Some important factors that must be consider in doing this thesis. These factors are important to see whether these methods are suitable or not to implement in the rural areas. The population of the resident must be determined because it important to estimate the solid waste that generated everyday. The type of waste that their thrown is also important to know what type of waste that their usually throw away. Besides that, the knowledge base of the residents needs to be identified. It is because without the knowledge about these methods, the implementation of these methods will not be successful. At the end of this thesis, for the area that contributed high percentage of food waste, the composting method is the most suitable method.

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C	=	Celsius
Cm	=	Centimeter
C/N	=	Carbon-to-Nitrogen Ratio
d	=	Day
F	=	Fahrenheit
ft	=	Feet
h	=	Hour
in	=	Inch
Ib	=	Pound
Kg	=	Kilograms
Mm	=	Millimeters
pH	=	Potential of Hydrogen
yd	=	Yard (= 3 feet)
yr	=	Year (= 365 day)
%	=	Percent
°	=	degree

CHAPTER 1

INTRODUCTION

1.1 Waste

Waste has always been a result of our daily activities, but mostly viewed as an undesirable by product. Because of that, view people manage the waste with the quickest and cheapest way. Nevertheless, they not realize that this way of management will effect the environment.

Under the heading 'waste matter, refuse', the Oxford English Dictionary (OED) defines 'refuse matter' as 'unserviceable material remaining over from any process of manufacture: the useless by-products of any industrial process; material or manufactured articles so damaged as to be useless or unsaleable'.

Webster's New International Dictionary (3rd Edition) echoes the OED in considering waste as 'damaged, defective or superfluous material produced during or left over from a manufacturing process or industrial operation' and, having used the word 'superfluous', proceeds to add, 'material not usable for the ordinary or main purpose of manufacture'.

There a three forms of waste from all sources. A waste can be in liquid, gaseous or solid in form. However, these three forms are closely related by a conversion cycle. The liquid waste can be transformed to solid waste form after it was generated. The gaseous waste holds the same procedure. In turn, after the solid waste when to incinerated, it wills outcome in the fabrication of gaseous and liquid wastes (Figure 1.1).

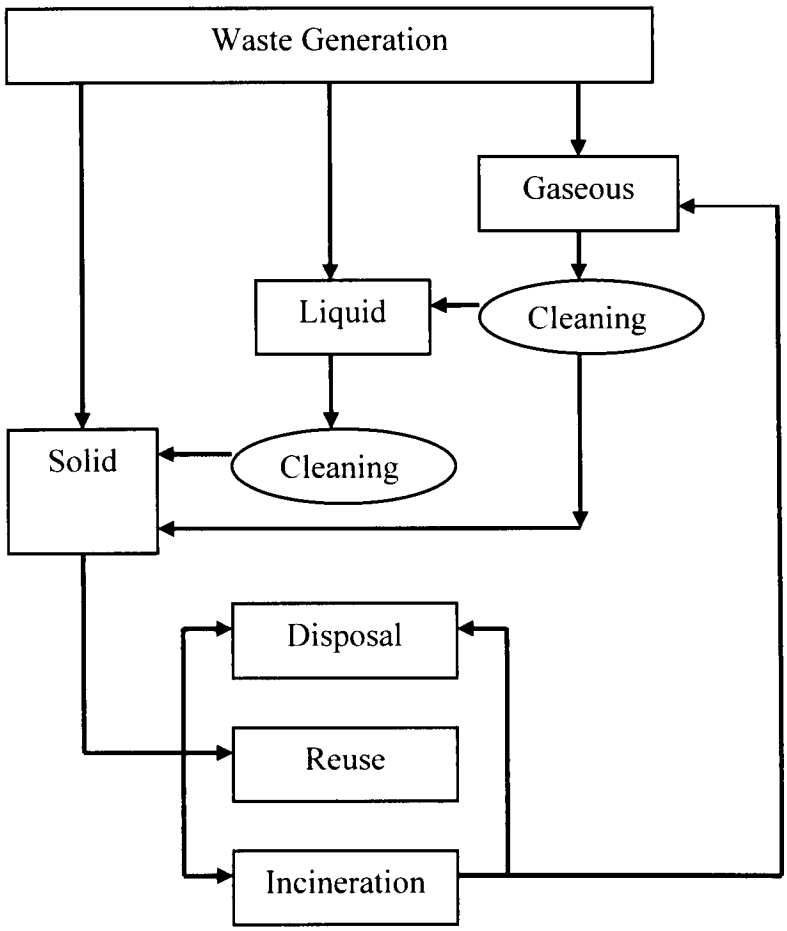

Figure 1.1 Waste types and their interrelationship. (Ishwar P. Murarka, 2000)

1.2 Solid Waste

The Solid Waste Disposal Act of 1965 [Title II, P.L. 89-272, 89th Congress, October 20, 1965, Section 203 (4)] defines solid waste as garbage, refuse, and other discarded solid materials, including solid waste materials resulting from industrial, commercial and agricultural operations, and from community activities, but does not include solids or dissolved materials in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended

solids in industrial wastewater effluents, dissolved materials in irrigation return flows or other common water pollutants.

Solid wastes include garbage, old newspaper, yard waste, packaging materials and the other item that are discarded by the typical household. There are eight categories of sources classification of solid wastes in a community (Table 1.1) which are residential, commercial, institutional, construction and demolition, municipal services, treatment plant sites, industrial and agricultural. (Tchobanoglous, Theisen and Vigil, 1993)

Table 1.1 Sources of solid wastes within a community

Source	**Typical facilities, activities, or locations where wastes are generated**	**Types of solid wastes**
Residential	Single family and multifamily detached dwellings, low-, medium-, and high-rise apartments, etc.	Food wastes, paper, cardboard, plastics, textiles, leather, yard wastes, wood, glass, tin cans, aluminum, other metals, ashes, street leaves, special wastes (including bulky items, consumer electronics, white goods, yard wastes collected separately, batteries, oil, and tires), household hazardous wastes
Commercial	Stores, restaurants, markets, office buildings, hotels, motels, print shops, service stations, auto	Paper, cardboard, plastics, wood, food waste, glass, metals, special wastes (see above), hazardous wastes,

	repair shops, etc.	etc.
Institutional	Schools, hospitals, prisons, government centers	As above in commercial
Construction and demolition	New construction sites, road repair/renovation sites, razing of buildings, broken pavement	Wood, steel, concrete, dirt, etc.
Municipal services (excluding treatment facilities)	Street cleaning, landscaping, catch basin cleaning, parks and beaches, other recreational areas	Special wastes, rubbish, street sweepings, landscape and tree trimmings, catch basin debris, general wastes from parks, beaches, and recreational areas
Treatment plant sites; municipal incinerators	Water, wastewater, and industrial treatment processes, etc.	Treatment plant wastes, principally composed of residual sludges
Municipal solid waste	All of above	All of the above
Industrial	Construction, fabrication, light and heavy manufacturing, refineries, chemical plants, power plants, demolition, etc.	Industrial process wastes, scrap materials, etc. Non-industrial wastes including food wastes, rubbish, ashes, demolition and construction wastes, special wastes, hazardous wastes
Agricultural	Field and raw crops, orchards, vineyards, dairies, feedlots, farms, etc.	Spoiled food wastes, agricultural wastes, rubbish, hazardous wastes

Source: Tchobanoglous, Theisen and Vigil, 1993

1.3 Solid Waste Management

Tchobanoglous, Theisen and Vigil (1993), defined the solid waste management as the discipline associated with the control of generation, storage, collection, transfer and transport, processing, and disposal of solid waste in a manner that is in accord with the best principles of public health, economics, engineering, conversation, aesthetics, and other environmental considerations, and that is also responsive to public attitudes.

An efficiency waste management becomes important since nineteenth century. Unfortunately, waste management in rural area is mismanaged. According to M. Joe and B. Alison (2001), 'rural' is a relative term used to describe geographically based characteristics, circumstances and practices which are not urban. By comparison, 'urban' refers to that commonly found in towns and cities. Rural implies landscapes characterized by open space, vegetation and natural physical features, land use characterized by farmed land and a relative low incidence of built property and infrastructure. Rural also implies human socio-cultural norms captured in labels such as 'conservatism; and 'traditionalism', with social attitudes and behavior strongly influenced by the patterns of natural processes and a shared sense of heritage and belonging. The residents in the rural area throw they rubbish into the river or burning the waste besides buried it in the soil. Furthermore, this practice will lead to pollution.