

CHAPTER 1 : INTRODUCTION

1.0 Introduction

Solid waste management has been around since the time man began to live on this earth. Early management of solid waste involved very little effort since not much waste was generated and the type of waste generated was simple in composition - that is mainly organic waste. This began to change with the increase in the human population compounded with the trend towards urbanization. Thus solid waste quantity increased while the composition too changed and as a result some form of systematic management of these solid waste was needed to avoid the proliferation of disease and aesthetic related problems such as odor. The evolution of solid waste follows a similar pattern with that of sewage but with one main difference - solid waste could not be channeled to the river or water bodies and it also took longer to decompose. Solid waste needed to be transported through land to a designated area for eventual decomposition. The easier alternative was to just burn it but this posed problems in terms of public hazard as well as when the quantity was large. Solid waste is generally defined as all the waste arising out of human and animal activities that are normally solid and that are discarded as useless and unwanted. The term includes waste from households as well as non-hazardous wastes from agricultural, industrial and commercial activities (Tchobanoglous *et al.*, 1993). Solid waste can be further classified according to its physical state (solid, liquid, gaseous), original use (packaging material), type of material (glass, paper, plastic), physical properties (combustible, compostable), origin (domestic, commercial, industrial, agricultural) and safety parameters (toxic) (Agamuthu, 1997a).

Evolution of Solid Waste Management in Malaysia

In Malaysia, intense and large scale solid waste management probably began in the early twentieth century with the colonization by the British. The colonizers brought with them the concept of large cities where the rich resources of the country could be brought for trade and subsequent export. This meant congregation of people, culminating in the generation of sewage and solid waste. In the beginning sewage and solid waste found their way easily in the river systems but solid waste soon had to be disposed of differently as the quantity increased.

Early options included burning and open dumps in remote areas via a transporting vehicle such as a small lorry. The quantity of solid waste in these dumps gradually increased. Other problems began to emerge from pests and scavengers. Both these problems lead to diseases and issues of land – nobody wanted these dumps in their backyard or near them or otherwise known as the "Not in My Backyard Syndrome" (NIMBY). Finally, the authorities had to find and utilize State owned lands as dumps. Up to recently, many of these dumps did not have any pollution control measures to protect the environment. Some of these dumps were ravaged with underground fires that were almost impossible to control since they were buried in a myriad of rubbish. The leachate from the rubbish also caused immeasurable pollution to the surrounding streams. Land value adjacent to these dumps plunged. Another largely undetected problem began to crop up which was the use of these open dumps for development. Due to land scarcity in urban areas these areas were being reused for development after filling without any form of treatment. Only many years later did problems begin to emerge – land subsidence caused buildings on it to crack and in some cases collapse.

Today after almost a century since solid waste management problems intensified there is still no clear road for a workable solution. In the early 1970s the government legislated laws that touched briefly on solid waste management in legislation such as the Streets, Drainage and Building Act, 1974, the Local Government Act, 1976 and the Environmental Quality Act, 1974. All these laws were not meant to address solid waste management per se but rather other issues related to the local government administration and environment. Consequently, in 1988 the Technical Section of the Local Government Department in the Ministry of Housing and Local Government in Malaysia initiated a proposal for a National Solid Waste Management Action Plan or also known as Action Plan for a Beautiful and Clean Malaysia (ABC). The ABC proposed a national policy for municipal solid waste management that had the objective of establishing by the year 2010 a uniform municipal solid waste management system for the country. *Unfortunately, the proposed policy was not officially endorsed by the National Council for Local Government (NCLG) (pers. comm, Engku Ezman, 2000).*

Following the ABC, the government in 1993 initiated the privatization of solid waste disposal by appointing four consortiums to manage solid waste for the whole country. Each of these consortiums listed below is proposed to be given a 20 year concession to manage solid waste.

1. Alam Flora Sdn Bhd, which is responsible for the central and eastern regions (the Federal Territory of Kuala Lumpur, Selangor, Pahang, Trengganu and Kelantan).
2. Northern Waste Industries Sdn Bhd, which is responsible for the northern region (Perlis, Kedah, Penang dan Perak).

3. Southern Waste Management Sdn Bhd, which is responsible for the southern region (Negeri Sembilan, Melaka and Johor).
4. Eastern Waste Management Sdn Bhd, which is responsible for East Malaysia (Sarawak, Sabah and Federal Territory of Labuan).

Privatization of solid waste management was initiated with the intention to improve the efficiency and standard of solid waste management. Although a policy had been proposed for solid waste management in 1988 and privatization was initiated in 1993, problems relating to solid waste management are still very much real on the ground. Though the 1988 proposed policy has a number of useful suggestions, its relevance has to be re-examined, in view of the privatization of solid waste management in Malaysia as well as due to other developments that have cropped up during the past 12 years. The other factors that warrant consideration are the disturbing trends observed in the field of solid waste management in recent years. These on the ground realities, deal with increasing waste generation, the lack of legislation and policies and the lack of integration in solid waste management decisions.

1.1 Waste Management Issues and Trends

Waste Generation

The first trend is the increasing production of solid waste in the country concurrent with the growth of the nation. In the early eighties the estimated generation of solid waste in urban centers was 0.5kg/capita/day (Sekarajasekaran and Lum, 1982). This figure rose to approximately 0.75kg/capita/day in the early nineties. Currently, the estimated average generation of solid waste is 1.0 kg/capita/day.

This represents a 200% increase within 20 years in Malaysia. The estimated solid waste generation in Malaysia in 1998 was approximately 15,000 tonnes/day for a population of approximately 16 million people. It is further estimated that out of the 15,000 tonnes/day of solid waste, only 11,000 tonnes/day were collected. This represents 70% of the total waste generated. The remaining 30% not collected is probably due to illegal dumping and diversion of waste during the collection for recycling purposes (Nasir *et al.*, 2000). Solid waste generation is projected to increase from 2.5 million tonnes in 1991 to 3.9 million tonnes in 2000. Over the past two decades the increased generation of solid waste has been reported not only in Malaysia but also world wide with many ascribing it to industrialization. Solid waste generation has been found to show a stable or growing ratio with respect to economic growth in many industrialized countries (Curzio *et al.*, 1994). This means that solid waste generation in Malaysia is expected to grow as Malaysia moves towards a fully developed nation status. Consequently, Malaysia must begin to give serious thought in addressing solid waste management now to avoid major problems in this area in the future. Malaysia may have to learn from the experiences of other countries in solid waste management and initiate a strategy that best fits its' local conditions

Legislation & Policies on Solid Waste Management

The second trend observed is the fact that legislation on solid waste management has been slow in evolving in the country as compared to other environment related legislation. The Federal Constitution, which is the highest legislative law in the country, is also silent on the subject though it does allude to the matter under sanitation.

The Environmental Quality Act (EQA) (1974), though having provisions for Scheduled Waste, does not address the issue of solid waste directly at all. Section 21 of the EQA indirectly touches on controlling odour contributed by the discharge of waste but this is only remotely connected to solid waste. Nevertheless, some local governments under Section 72 of the Local Government Act (LGA) (1976) have invoked some legislative powers for solid waste management but these are still limited in nature. Section 72 of the LGA has provisions to cover the elements of nuisance, public health and safety but is also only indirectly linked to solid waste. It is learned that a new Act on solid waste management is currently being drafted for submission to Parliament. The exact content and scope of this new legislation is still unknown and may take some time prior to being enacted by Parliament. Furthermore, there is no official national policy on solid waste management though one had been proposed under the ABC in 1988. This deserves critical review since Malaysia is planning to achieve a developed country status by 2020. Experience world-wide has shown that ill planned solid waste management can prove detrimental if not tackled in a systematic and cohesive manner (Curzio *et al.*, 1994).

This lack of a basic legislation and clear policies on solid waste management has been identified as one of the core problem in solid waste management in Malaysia. Thus solid waste management is currently implemented by invoking sections of legislation from the LGA, 1976 or the EQA, 1974. In practice, this results in various government institutions such as the Local Authorities (LA), Local Government Department and the Department of Environment (DOE) implementing parts of solid waste management. This results in solid waste management being tackled in a piece-meal manner.

Consequently, the lack of legislation highlights the fact that solid waste management is in need of a comprehensive legislation covering the subject that also empowers a relevant government agency to carry out the implementation aspects on the ground. The lack of policies highlights the fact that there is a lack of national strategy and guidance in tackling solid waste management. This also results in ad-hoc management of solid waste rather than an integrated and strategic long term planning.

Solid Waste Management Decisions

The third main trend relates to solid waste management decisions and the way they are made. There is an increasing popularity in directly incorporating technological innovations and solutions in solid waste management from developed countries without considering critical differences between countries. Differences in waste composition and socio-economic conditions require that innovations and solutions in waste management be tailor-made for each country especially when the differences are between developed countries and developing countries. One main difference is the waste composition between countries where generally waste composition in developing countries is higher in organic and moisture content as compared with developed countries. On the other hand, generally developed countries have higher percentages of recyclable items such as paper and plastic due to increased affluence as compared to developing countries (Beukering *et al.*, 1999). International trends reflect that incineration and recycling are particularly popular in densely populated countries such as Japan and the Netherlands. However, differences in waste composition and socio-economic conditions may not render them as the optimal solution for waste management in Malaysia.

An example of this is the current plans by the government in Malaysia to introduce capital intensive systems such as transfer stations and incinerators (Nasir *et al.*, 2000). Thus incinerators have been proposed for Kuala Lumpur and Labuan though their use has stirred some controversy from Non-governmental organizations (NGOs). Furthermore, in Malaysia a lot of emphasis has been placed on treating solid waste that has been generated and recycling as compared to reduction of waste at source. Thus incorporating technological solutions have been popular since it provides a solution for waste management without the need for major changes in the existing socio-economic structure such as a change in consumer behavior resulting in reduction in waste generation. However, it must be remembered that the choices of the consumer product industries and consumer behavior may be the most critical factor in tackling solid waste management. This is because treating solid waste after being generated will only partially solve the problem when solid waste generation keeps on increasing due to packaging and consumer behavior (Curzio *et al.*, 1994). An example of this is in the event incinerators are introduced in urban centers in Malaysia but product packaging and the behavior of the general public in waste generation are not addressed. This results in solid waste being treated but it still does not solve the problem of solid waste generation or the need for society to make changes in its behavior.

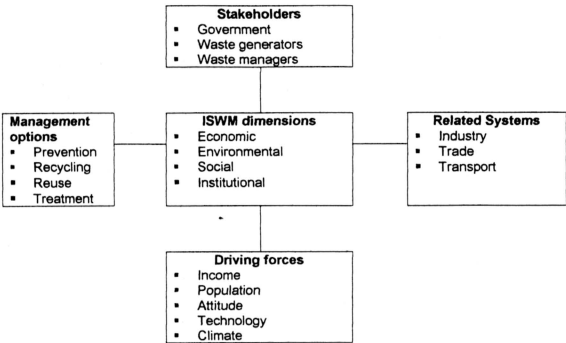
Consequently, direct implementation of solutions and technological innovations from developed countries as the main solution for solid waste management may not be the best approach for Malaysia. While it is important that Malaysia learn from the experience of other countries, it should also analyze its own unique situation to come out with an integrated approach that is workable in Malaysia.

1.2 Future Directions

Solid waste management involves technological, behavioral and economic aspects with many different agents such as consumers, manufacturers, waste management organizations and governments at all the various levels (Federal, State and Local). Until now solid waste management has been fragmented with emphasis placed mainly on provision of public services for solid waste collection and disposal. Nevertheless, this needs some rethinking and probably a paradigm shift in its approach where the concept of integrated solid waste management may prove viable.

1.3 Integrated Solid Waste Management (ISWM)

Integrated solid waste management (ISWM) is a very broad concept where essentially ISWM implies that decisions on waste management take into account economic, environmental, social and institutional dimensions. Economic aspects may include the costs and benefits of implementation while environmental dimensions may consist of issues of pollution and resource depletion. Social aspects include attitudes and the political climate towards environmental and solid waste management issues. Finally, the institutional dimension aims to develop a system, which effectively involves the main stakeholders (**Figure 1-1**). Thus ISWM is linked by the stakeholders, management options, driving forces and other related system. All these factors must be considered in formulating a solid waste management framework. Thus, focusing on management options such as recycling without integrating the industry factor will result in a framework that is not integrated.



(Adapted from Beukering *et al*, 1999)

Figure 1-1 : Framework for a conceptual Integrated Solid Waste Management

ISWM provides an inter-disciplinary, comprehensive framework for addressing the problems of managing solid waste, particularly in the resource constrained developing countries where solid waste management service quality is poor, costs are high and often with no effective means of recovering costs. This approach takes into account economic, environmental, social and institutional aspects involved in the process (Beukering *et al*, 1999). The integrative aspects lie in the trade-off between these four dimensions. For example, in certain situations although recycling may be preferred from an environmental perspective, the economic cost involved or the presence of institutional complications may prevent recycling from being promoted and implemented in ISWM (Lardinios *et al.*, 1997). Thus implementing ISWM will mean that recycling is considered in the light of other factors such as cost and finally a decision suited for that situation will be derived.

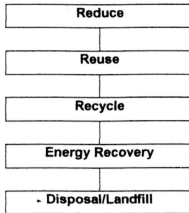
In practice ISWM may take place at various levels such as :-

- a) The use of a range of different waste collection and treatment options. These include prevention, recycling, energy recovery and sound land-filling of solid waste.

- b) The involvement and participation of all the stakeholders. These may include waste generators such as households, waste managers such as government institutions and urban planners and finally of waste processors such as formal and informal recyclers.

- c) The interaction between the waste management system and other relevant system. This is related to the impact of product design on the waste management system as well as the impact of producer responsibility on the waste stream.

One key principle being advocated in ISWM especially in developed countries is the waste hierarchy. The waste hierarchy is based on environmental principles such as pollution prevention and resource conservation, which propose that the management of waste should follow a hierarchy that gives preference to the higher levels (Figure 1-2). The waste hierarchy suggests that the most effective waste management solution may often be to *reduce* the generation of waste; where further reduction is not practicable, products and materials can sometimes be used again, either for the same or a different purpose: *re-use*; failing that, *value* should be *recovered* from waste, through recycling, composting or energy recovery from waste; only if none of the above offer an appropriate solution should waste be disposed of (DETR, 1999).



(DETR,1999)

Figure 1-2 : The Waste Hierarchy

Although the waste hierarchy provides effective waste management options, ISWM goes beyond the waste hierarchy. In ISWM the waste hierarchy serves as a general guideline to achieve the best environmental solution in the long term and is applied in a flexible way. This is because the waste hierarchy addresses only the environmental dimension and not the economic and social dimensions of waste management. Therefore, it has been suggested that the waste hierarchy should be considered as a menu of options without any particular hierarchy. Consequently, in ISWM, the core issue is not a question of good and bad waste management or options or technologies but rather choosing the right option under the right set of conditions for the right set of waste management issues (Schall, 1995).

1.4 Objectives

The main objective of this study is to formulate a policy for solid waste management in Malaysia taking into consideration the various developments in the field during the past 30 years. The specific objectives of this study are as follows :-

1. To understand the legal and institutional frameworks for solid waste management in Malaysia.
2. To learn key lessons from international trends in solid waste management especially in developed countries.
3. To understand the existing practice, issues, strengths and weaknesses in solid waste management in Malaysia.
4. To review alternative policy approaches for solid waste management in Malaysia.
5. To propose policy recommendations for integrated solid waste management in Malaysia.