

# Development of Policy and Regulations for Hazardous Waste Management in Malaysia

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## Abstract

Managing hazardous waste is a challenging and demanding task, especially in terms of its implementation and monitoring. Malaysia has had policies and regulations on the management of hazardous wastes for the past 30 years and it is constantly in need of improvement and renewal in line with the changing times and technologies involved in producing these hazardous wastes. This study is related to the proposal to improve policies and regulations related to hazardous waste especially to household hazardous waste. The study begins by looking at previously implemented policies and related issues as well as paving the way for developing a new policy and regulations to address the challenges associated with hazardous waste that do not yet have policies and regulations in place. Qualitative research was conducted by examining previous documents related to hazardous waste, interviews, surveys and group discussions held in workshops and seminars related to this topic. All the data and information obtained is carefully analyzed and formulated to serve as a guide to formulate policies and regulations regarding hazardous waste in the future for Malaysia.

**Keywords:** Malaysia, hazardous waste, solid waste, sustainable management, regulations, policy

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## ■ 1.0 INTRODUCTION

The Development of Policy and Regulations (DPR) for Hazardous Waste Management (HWM) in Malaysia involves various parties led by the Ministry of Housing and Local Government (KPKT), the industry, academics and non-government organizations. The DPR is an ongoing process and is targeted to be completed by 12<sup>th</sup> Malaysia Plan (2021 – 2025). The DPR for HWM in Malaysia is part of a bigger strategic plan, called the National Strategic Plan for Solid Waste Management in Malaysia.

In this study, the DPR for HWM will be studied from the perspectives of solid waste management (SWM) framework in general because HWM is also part of SWM. The focus of analysis for this study will be on the development of Household Hazardous Waste (HHW) policies and regulations and not on Industrial Hazardous Waste (IHW) as Malaysia already has separated policies and regulations that include IHW and regulated by the Department of Environment (DOE).

### ■ 1.1 Definition of Waste and Hazardous Waste

Waste can be defined as any substance that is discarded after primary use, worthless, defective and of no use. It can be classified as household waste, clinical waste and industrial waste. Alternatively, it can also be categorised as hazardous waste and non-hazardous waste according to their functions of its toxicity, corrosiveness, explosiveness and radio activeness characteristics (N. Couto, 2013).

DOE define hazardous waste as any waste falling within the categories listed in the First Scheduled of Environmental Quality (Scheduled Wastes) Regulations 2005 (Zuraini, 2014). Hazardous Wastes are potentially harmful, therefore normal handling (storage, packaging, transport and disposal) methods that are usually being used for non-hazardous industrial wastes (such as using land filling) are not appropriate. This is due to scheduled wastes present potential risks to human health and environment. Four basic characteristics for hazardous wastes are listed as below:

- a. Ignitable (flash point of  $\leq 60^{\circ}\text{C}$ ).
- b. Corrosive (dissolves metals, burns the skin or has a  $\text{pH} \leq 2$  or  $\text{pH} \geq 12.5$ ).
- c. Reactive (unstable or undergoes rapid or violent chemical reaction with water, air or other materials).
- d. Toxic (poisonous or can cause cancer, mutations or death).

Thermal disposable techniques especially incinerations with energy recovery as an option often used in industrialised countries concerning waste management. Although, there is no comprehensive control in the emission reductions of Zn, As, Hg, Cd, Se, Pb, Cu and of other substances such as heavy metal and dioxin. These emission reductions control is mandatory to be fulfilled by industries according to the International Standard Organisation (ISO 9000) norms. This leads to the promotion of the use and investment in other conversion technologies such as combustion or gasification that can be combined with environmental improvements as well as enhanced efficiencies.

In Malaysia, for the last thirty years, the waste management has been a major concern and policies are made in order to minimize or manage them by changing the legislations frameworks, applying new technologies, developing new infrastructures and complex management networks.

In the next paragraphs, in order to understand the development of HWM policy and legislations in Malaysia, we will briefly look at the history of HWM starting from 1974 to 2020.

## ■ 2.0 OVERVIEW OF HAZARDOUS WASTE MANAGEMENT POLICY AND LEGISLATION IN MALAYSIA

The Environmental Quality Act 1974 (Act 127) has been gazetted starting from 13th March 1974. Under Section 34B in the Act 127, there is a provision against unlawful disposal of schedule (hazardous) waste. Any individual or company who violates this law shall be liable to a fine not exceeding five hundred thousand ringgit or imprisonment for a period not exceeding five years or both (EQA, 1974).

During the period of 1995-1999, there was an increasing generation of toxic and hazardous wastes throughout the country especially in the urban and industrialized area. The government plan to introduce a comprehensive legislation for hazardous industrial waste in terms of its use, storage, handling, transportation as well as for the safe disposal and treatment.

As of October 1993, Malaysia has been part of Basel Convention on the Control of Transboundary Movement of Hazardous Waste and Disposal. The Department of Environment (DOE) is authorised by the Malaysian Government to prevent and to control hazardous waste generated from the household, business and industry (UNEP, 2011).

In 7th Malaysian Plan (1996-2000) (EPU, 1995) the environmental policy developed was focused on creating a balance between having the development of economy with sustainable environmental planning. In order to further substantiate the efforts to promote sustainable development, innovative economic mechanism was instituted to supplement legislative and enforcement means to encourage the private sector to adopt and implement the sustainable environmental policies introduced by the government.

At the same period of time a fully integrated toxic waste treatment and disposal facility was established at Bukit Nanas, Negeri Sembilan. By the end of the year 2000, the facility received waste for treatment from 1,002 Malaysian companies with the total of 216,500 tonnes of toxic and hazardous waste (Ali, 2015).

In 8th Malaysian Plan (2001-2005) (EPU, 1999) the plan on developing efficient waste management system and the privatisation of solid waste management has been initiated. As a result, the privatisation was awarded to three concessionaire companies, they are Alam Flora Sdn. Bhd., which will manage the central and east zones comprising the Federal Territory of Kuala Lumpur, Putrajaya, Pahang, Terengganu and Kelantan, SWM

Environment Sdn. Bhd. which will manage the southern zone covering Johor, Melaka and Negeri Sembilan and Environment Idaman Sdn. Bhd. which will manage the northern zones of Kedah and Perlis as shown in Figure 1.

During this period also, DOE revised scheduled waste regulation after 15 years since 1974 and the Environmental Quality (Scheduled Wastes) Regulations 2005 was established and prescribed 77 categories of hazardous wastes. Some of the key provisions under the regulations are:

- a. Control of the waste generated by notification system.
- b. Licensing of hazardous waste recovery facilities.
- c. Treatment and disposal of hazardous wastes at prescribed premises.
- d. Implementation of the manifest system for tracking and controlling movement of wastes (EQR, 2005).

9th Malaysian Plan (2006-2010) (EPU, 2005) saw a new Ministry of Natural Resources and Environment was formed and consolidated 10 environmental and natural resources agencies under one administration in order to better facilitate and coordinate comprehensive approach in managing environment and natural resources. During this period the Solid Waste Management and Public Cleansing Act 2007 (Act 672) was also formed and gazetted.

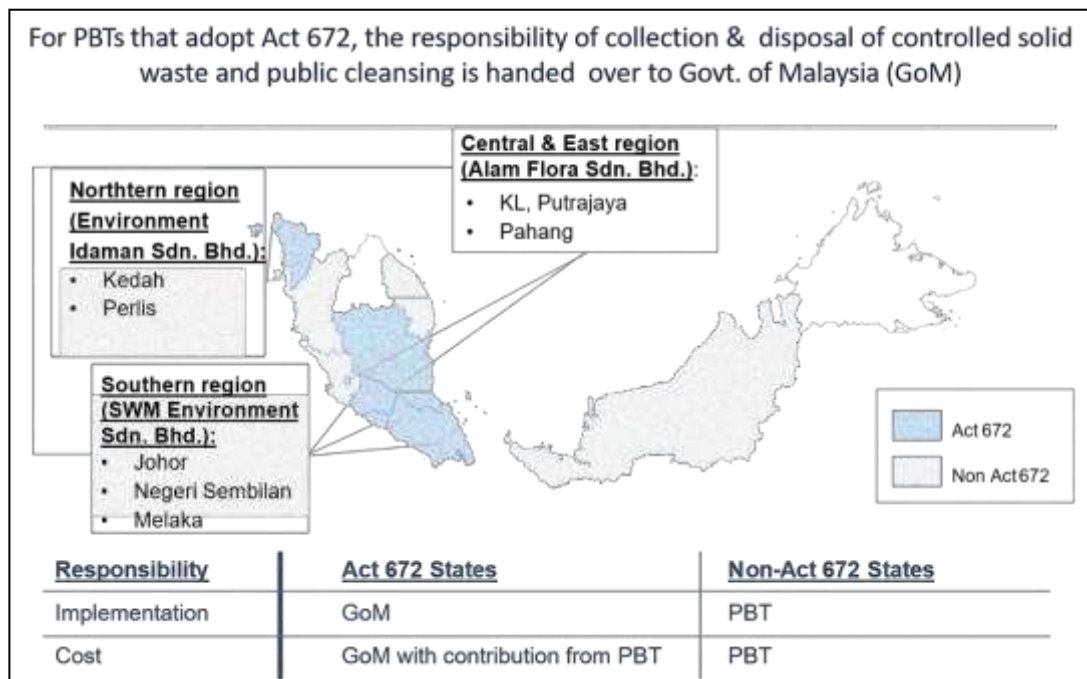


Figure 1: Concessionaire companies and their zoning plus states that adopt did not adopt Act 672. (PBT is the state local authority)

By the 10th Malaysia Plan (2011-2015) (EPU, 2010) the Malaysian government completed the plan to federalize solid waste management and public cleansing into full force. With these efforts the responsibility of solid waste management and public cleansing has been shifted from local authorities to the jurisdiction of the Federal Government. The main objective of the efforts is to provide support to local authorities in delivering comprehensive service to the country in managing waste sustainably.

Finally, the 11<sup>th</sup> Malaysia Plan (2016 – 2020) (EPU, 2015) provides the guiding principles for effective, holistic and sustainable schedule waste management throughout the country. The National Strategic Plan for Solid Waste Management which is developed during this period is used as the ultimate policy document on solid and hazardous waste management, an update to the policy which was well overdue as it was done prior to the establishment of Act 672, in the year 2005. From this moment on, this paper will focus on the development of the guiding principles which in the future will become the guidelines for the development of policy and regulations for hazardous waste management, especially on the household hazardous waste management (HHW) as mention in the introduction of this paper.

### ■ 3.0 RESEARCH METHODOLOGY

To gain insights from various perspectives on the development of policy and regulations related to the management of these hazardous waste, this study was conducted using qualitative methods and referred to the following sources: literature study, document analysis, comparative case studies abroad, interviews, surveys, group discussion in workshops and seminars held on this topic,

Literature study, document analysis and comparative case studies abroad are the secondary data which were previously published on this topic. Topics from this secondary data are topics related to solid waste management and public cleansing, hazardous waste management, e-waste management, general environmental management, solid waste and hazardous waste treatment and disposal, solid waste management technology, biochemical waste and e-waste treatment methodology. These topics are correlated and serve the purpose of this study.

These secondary data acquired helps the researcher to understand the link between different government agencies and the industries involvement in the management of SWM and HWM in Malaysia. Monitoring the link between these agencies and the industries and impacts of uninterrupted relationship between the two entities on SWM and HWM are crucial to this study because it helped this study to use it as reference to propose the development of DPR for HWM in this country.

On the other hand, interviews, surveys, group discussion in workshops and seminars held on this topic provide primary data for this study. Interviews were done with ten experts in this topic, two from DOE, two from Environmental Management and Research Association of Malaysia, four from the material recovery facility companies: Meriahtek Sdn. Bhd, Shan Poornam Sdn. Bhd., and two academicians from University Technology Malaysia (UTM-KL) and Universiti Kuala Lumpur.

Surveys, group discussion were done during Solid Waste Management Lab (SWML) which was held from 27<sup>th</sup> May to 17<sup>th</sup> June 2015 by KPKT and International Conference and Exhibition on Waste Management (ICEWM) organized by Environmental Management and Research Association of Malaysia (ENSEARCH) held from 24<sup>th</sup> to 26<sup>th</sup> September 2019.

The data acquired from these activities were qualitative data in which all the interviews, surveys and group discussion were noted and transcribed manually and later analyzed in detail. The findings of the interviews are analyzed to investigate the government-industry relationship in the development of policy and regulations for HWM in Malaysia.

All of this is done to ensure comprehensive data and information is available, covering a wide range of stakeholders as Chanopas et al (2006) claimed that the data acquired from multiple sources is complementary, reduces the chances of biases, and is more balanced in the research. This argument supports the methodology of this study to collect data from various sources.

### ■ 4.0 FINDINGS AND DISCUSSION

Based on the findings, the researcher will discuss aspects that are needed to be considered to ensure the success of sustainable SWM and HWM in Malaysia. The discussion will be based on data and information acquired from surveys, interviews, group discussions, presentations and document analysis done during the workshops and seminars related to this topic.

Several other related documents such as written notes and analysis done during group discussions and paper presentations during SWML workshop and ICEWM conference as mentioned in Section 3, Research Methodology, will also be used in this section. The findings and discussions are as below: -

#### ■ 4.1 Cost of SWM

Privatization cost especially for Public Cleansing is expected to increase substantially, with Federal Government is currently paying 61% of the total cost. Cost to be borne by the Federal Government will continue to increase, due to following factors (Pemandu, 2015):

- Opening of new areas in SWM for local authorities (PBTs) that adopting Act 672 which require solid waste management and public cleansing (SWMPC) service.
- PBTs does not have the ability to pay the proper amount to SWMPC fund.
- Additional number of states adopting Act 672 is expected (Perak and Kelantan).
- Additional scope of public cleansing such as public toilets cleaning to be carried out by the concessionaires.

Details on the privatisation cost of SWMPC is as shown in Figure 2 below. Steps needed to be taken in order to reduce Government’s burden with regards to this matter in order to have a sustainable model to finance SWMPC. Propose actions to be taken in order to address this challenges will be discuss in Section 6, Recommendations and Conclusions.



Figure 2 shows the details of the amount and percentage of contribution of the privatization cost borne by the Government (Source: Pemandu, 2015)

#### ■ 4.2 Dependency on Landfills

Malaysia is currently dependent on landfills with about 89% of waste collected ending up in landfills. 49,670 tonne/day of waste (inclusive of household waste, industrial, commercial and institutional waste) is expected to be generated by Malaysians in the year 2020. Out of the amount, about 20% or 19,867 ton/day waste nationwide need to be treated and recycled in order to achieve the 40% waste diversion from landfill by year 2020 (Pemandu, 2015).

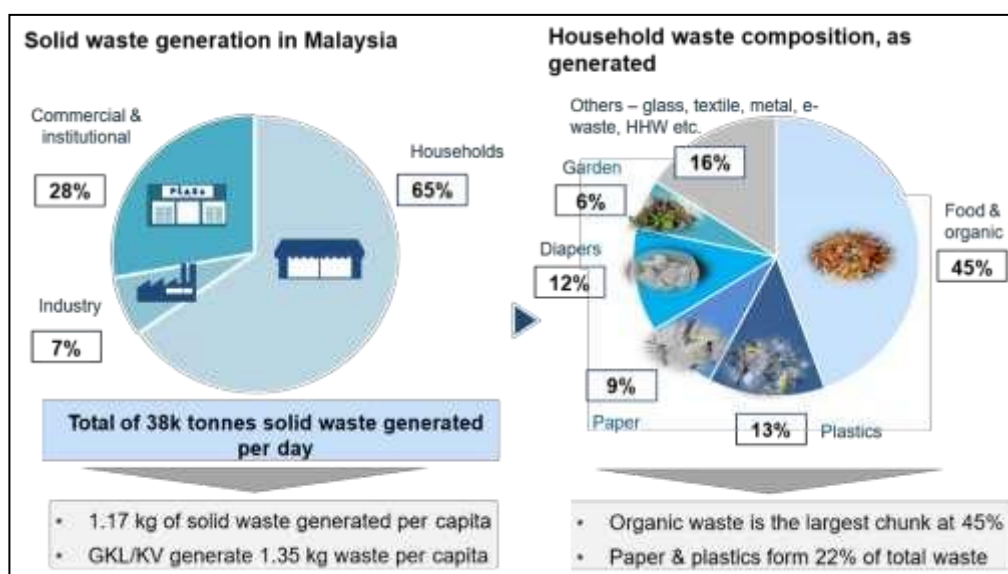


Figure 3: Solid waste generation and household waste composition (Source: Survey on Solid Waste Composition, Characteristics & Existing Practice of Solid Waste & Recycling in Malaysia (Pemandu, 2015))



Malaysia generates 38,142 tonnes of solid waste per day in 2018, and mostly are from households (65%) with at least 22% of waste can be extracted and recycled. Details of the percentage and waste composition are as shown in Figure 3 above. Household Hazardous Waste (HHW) is included in the 16% of others category of household waste composition. Even though the amount is small but due to its hazardousness it is significant because it can cause harmful effects to human health.

#### ■ 4.3 Lack of Separation of Waste at Source

In current situation, e-waste such as used electronic and electrical equipment and hazardous household waste (HHW) are co-mingled with other domestic or municipal waste. Improper disposal of this co-mingled waste will lead to environmental contamination and harmful to the environment and will be detrimental to human health. There are many issues that have caused this problem, among them are: -

- a. Ineffective collection system.
- b. Underutilised recycling facilities.
- c. Lack of awareness to separate e-waste and HHW from other household waste.
- d. Recycling facilities are inexistent.

#### ■ 4.4 Lack of Recycling

Currently overall recycling rate in Malaysia was low at a mere 28% from the overall volume of waste generated. It needs to be increased especially from households and ICI (Industrial, Commercial & Institutional). According to Solid Waste Management and Public Cleansing Corporation (SWCorp) in 2018, Malaysians generated a whopping 38,142 tonnes of waste per day, an increase from 19,000 tonnes of waste a day in 2005. 44.5% of the waste collected was food waste, followed by plastic waste (13.2%) and diapers (12.1%). The composition of waste was changing, with the latest statistics showing plastic making up 20% of waste. This data is for municipal solid waste and did not include construction and manufacturing waste (Fong, 2019).

More than half of the waste generated are sent to sanitary landfills as mentioned in 5.2, approximately 40% of waste was recyclable. Malaysians have a lackadaisical attitude when it comes to recycling and waste management. The relatively low recycling rate in Malaysia is caused by several key factors, mainly due to undeveloped mindset and database system as listed below: -

- a. Society absolves responsibility of waste management to the authorities.
- b. No consolidated data collection system in place, especially for industrial & commercial waste.
- c. Done on a case-by-case basis via the commissioning of a sampling study.
- d. Different types of waste fall under the purview of different Ministries/ Agencies.

### ■ 5.0 FRAMEWORK FOR SUSTAINABLE SOLID WASTE MANAGEMENT IN MALAYSIA

The framework for sustainable solid waste management (SWM) in Malaysia have been developed and presented below in this study and will be used as guidelines to develop policy and regulations for HHW in Malaysia. Before we discuss further on the framework, let's look at the current status of SWM implementation in Malaysia: -

- a. The implementation of SWM currently facing several issues and roadblocks such as issues related to the lower recycling rate and lack of centralize database of waste generated resulting in data gaps.
- b. There is a problem with the lack of ownership among the stakeholders to tackle issues related to improving SWM.
- c. Shortages of budget and resources for the implementation of sustainable SWM.
- d. Weaknesses in terms of coordination and alignment among all stakeholders.
- e. There is no monitoring involved in determining what action plans need to be implemented.
- f. Basically, there are many aspects in for the sustainable SWM implementation that are still a work in progress.

This study has also been able to identify the main issues related to SWM (and HWM). In order to enable us to better understand the overall scenario of SWM in Malaysia, the following is a list of issues: -

- a. There are gaps in existing policies, guidelines and standards hindering the actual implementation of SWM.
- b. There are inadequate resources such technical expertise, skilled manpower and financial resources.

There are also delays in receiving the designated funding, setting back implementation of prior national plan on SWM.

- c. Inadequate fund and mismatch between revenue and cost to support implementation plans. The current revenue-cost model is unsustainable and contribution from the local authority is insufficient and the Federal Government must cover the losses, hence increasing the financial burden and delaying some implementation plans.
- d. There is only a fraction of the waste facilities planned were approved due to constraint in funds and due to limited manpower.
- e. There are gaps in existing data management practice such as lack of a proper data system, data obsolescence, complications in data handover, and a lack of supporting facilities.
- f. Currently the recyclable market is highly unregulated and operates as a grey market. Its vast economic potential is undervalued as market demand for products from the waste stream cannot be properly analyzed or tracked.

Based on current position and issues related to SWM and HWM as mentioned above, below is a list of actionable plans to resolve issues related to implementation of DPR for SWM in the future: -

- a. Improve the planning, execution and implementation of waste management that involves the 3R (Reduce, Reuse, Recycle), Recovery, Treatment and Disposal in Malaysia – optimization and minimization of solid waste, utilizing and building waste recovery facilities.
- b. Address governance and regulation issues in relation to solid waste management by having a committee that plans, solves problems, implements and monitors the action plans to ensure its success.
- c. To propose structural and policy adjustments including enablers that will ensure longer term viability of solid waste management and public cleansing initiatives.
- d. Find and recommend options in alleviating Government’s financial burden in ensuring sustainable solid waste management and public cleansing activities by market and enterprise creation.

From the combination of all the information in Section 4.0 and 5.0 as mentioned above, a framework for sustainable SWM in Malaysia as shown in Figure 4 is proposed. This framework set the objectives to be achieved by 2020 that is to reduce the amount of solid waste going to the landfill by 40% and increase the amount of recycling of the waste by 22%.

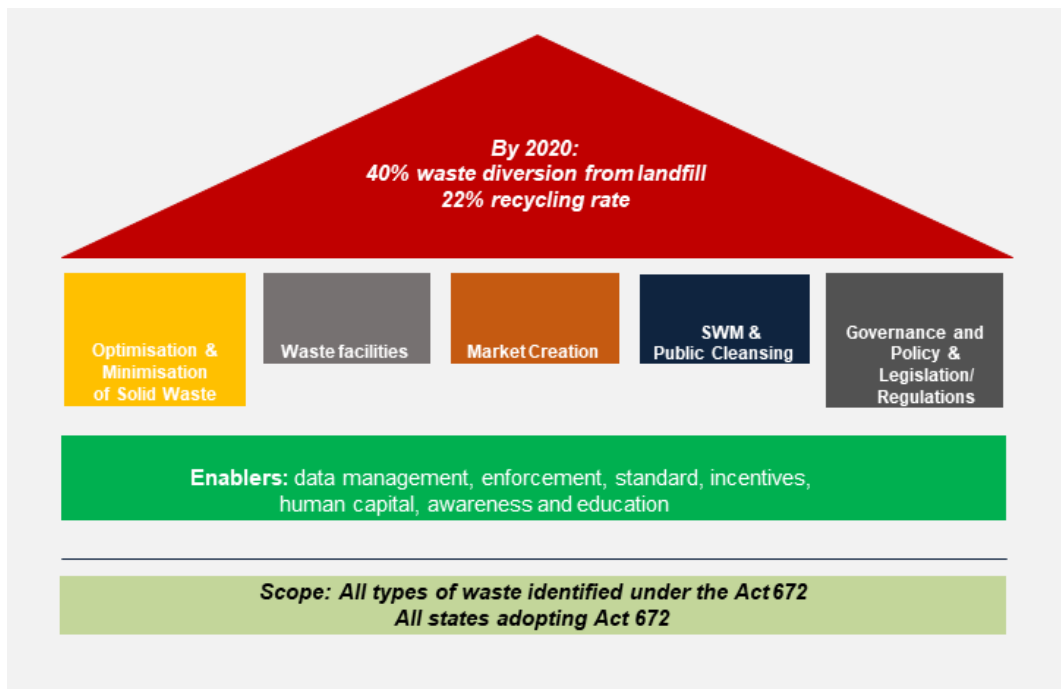


Figure 4: Framework for SWM in Malaysia

In the following paragraphs, matters that contribute to the development of SWM and HWM policy and regulations will be discussed further in Section 6.0, Recommendations and Conclusions.

## ■ 6.0 RECOMMENDATIONS AND CONCLUSION

Based on the findings and overall situations of hazardous waste in the country, the policy and regulations development for hazardous waste should especially focus on the optimization and minimization of prioritized types of HHW prior to being sent for recovery/ treatment or disposal. Examples on the types of HHW are: -

- a. Hazardous/Toxic Solid Waste : Waste that poses threats to the public health or environment.
- b. Biochemical Waste : Waste products that are produced from healthcare and commercial centres and services.
- c. Electronic Waste (E-Waste) : Waste type consisting of any electrical or electronic appliance.

The handling of prioritized types of HHW would require analysis on how to optimize and minimize every step of the process involved, as shown in Figure 5 below.

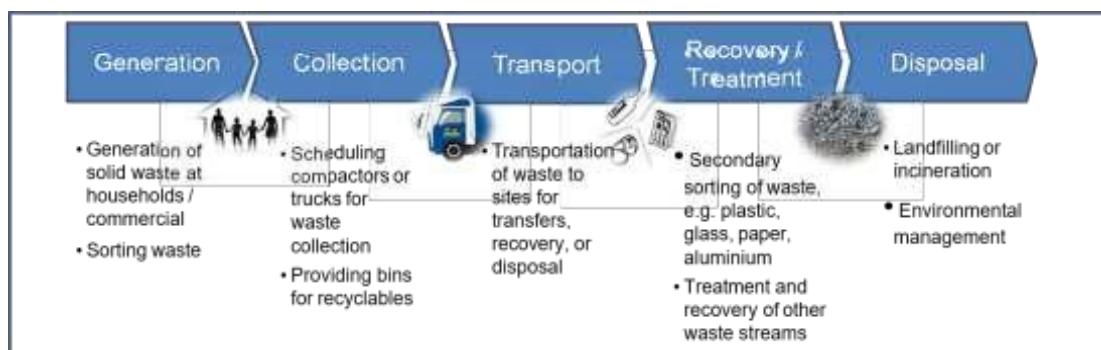


Figure 5: The management process of waste from generation to disposal

As mentioned in 5.4, with the increase of solid waste generation, an effective management of hazardous household waste (HHW) such as e-waste from other household's waste is very important to prevent an increase of pollution from these types of waste. Based on the findings and studied done, below are the propose actions to be included in the development of policy and regulations for hazardous waste in Malaysia: -

- a. The needs to coordinate the collection system and mechanism and to increase the awareness on the importance of proper disposal of e-waste and HHW.
- b. Leverage on regulation that require household to do separation at source of their waste.
- c. Enhance knowledge and awareness on separation of e-waste and HHW at households.
- d. Strong collaboration between KPKT and its agencies, SWCorp, DOE and other stakeholders to consolidate collection of e-waste and HHW.
- e. Provide access to DOE's appointed contractor to collect waste from concessionaire drop off points.
- f. Establish adequate collection and recycling centres.
- g. Establish data gathering mechanism from collection centres to obtain information on waste quantity and composition.
- h. Effective monitoring of collection and separation activities up to final disposal facility according to procedures.
- i. Encourage/enforce collector to send the collected waste to licensed facility.
- j. Fully utilized recovery facilities available.

With the implementation of the above proposed actions, it is expected that impact will be able to: -

- a. Minimise toxic materials entering the waste stream.
- b. Consolidated collection system for e-waste & HHW.
- c. Create economies of scale for the recycling/recovery industry.
- d. Improve utilization of e-waste recovery facilities.

Key success factors to these efforts are collaborations among key organizations or stakeholders such as between JPSPN, SWCorp, DOE, concessionaires, local authorities and industry. Each organization should share and collaborate in terms of development of policy, sharing database and provide competent manpower to ensure the good outcome of these initiatives as well as making sure that the existing regulations are enforced and monitored.



Its important to have multiple layers of participation in every organization and provide flexibility to each parties to ensure that the objective can be achieved. Develop clear roles and policy guidelines for this collaboration so that each organizations can recognize their differences and learn to adapt among each other and allow each organization to move according to their capability and development pace. Collectively the policy development, regulations and implementation efforts will peak in 2020 and hopefully will be able to be completed for implementation.

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