



## Solid Waste Minimization in Malaysia

Fatma Sabariah ALIAS<sup>a</sup>, Latifah ABD MANAF<sup>a\*</sup>, Mariani Ariffin<sup>b</sup>, Sabrina Ho Abdullah<sup>b</sup>

<sup>a</sup>*Department of Environmental Sciences, Faculty of Environmental Studies,  
Universiti Putra Malaysia, 43400 UPM Serdang, Malaysia*

<sup>b</sup>*Department of Environmental Management, Faculty of Environmental Studies,  
Universiti Putra Malaysia, 43400 UPM Serdang, Malaysia*

\**latifahmanaf@upm.edu.my*

**Abstract** - Malaysia has taken initiative in enforcing the Solid Waste Management and Public Cleansing Act 2007 (Act 672) since 2011 to ensure the uniformity of law relating to the solid waste management and public cleansing. Despite the alarming issues on the increasing of solid waste generation, Malaysian government has made solid waste separation at source as mandatory starting 1<sup>st</sup> September 2015 at eight states. Solid waste separation at source has been seen as the best practice of solid waste minimization where it eliminates and reduces the amount of solid waste produced by the society. The government has taken seriously in solid waste separation at source as the lifespan of disposal site has been decreased and limited space for the new disposal site due to the increasing cost of solid waste management. Hence, to overcome the increasing of solid waste generation, an integrated solid waste minimization through recycling should be implemented as it is involved in minimizing resource and offers the best outcome for the environment. Thus, this paper discussed the overview of solid waste minimization in Malaysia and the stakeholder's role and their obstacles in solid waste minimization to attract the public participate in reducing the solid waste generation as an efficient solid waste management. A proper solid waste management ensures a sustainable development of Malaysia in terms of health, socio-economy and environment respectively towards Malaysian Vision of 2020.

**Keywords:** Act 672, solid waste, separation at source, solid waste minimization, stakeholder

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### Introduction

The transformation in economic globalization and emerging technologies has results the increasing amount of solid waste as urbanization and population increase. The facts which illustrate the magnitude of challenged associated with waste shouldn't be overlooked. Every year an estimated 1.3 billion tonnes of solid waste was collected worldwide. The quantity of solid waste were expected to reach 2.2 billion tonnes per year by year 2025 with almost the increasing were from developing countries (Hoornweg and Bhada-Tata, 2012).

Malaysia not excluded in this transformation era. This broad transformation is changing the ways how Malaysian life, think and act. The rapid development in Malaysia with total population approximately 29.2 million accelerate the daily waste generation which 30,000 tonnes was produce in year 2012. Respectively, 10.9 million tonnes of solid waste generated per year, however in year 2015, solid waste

generation has increased to 38,000 tonnes as 12.8 million tonnes of solid waste generated per year and predicted to increase 15.6 million tonnes of solid waste in year 2020 (Agamuthu and Dennis, 2011; SWCorp, 2014, Harian Metro, 2016).

Deputy Urban Wellbeing, Housing and Local Government Minister Datuk Halimah Mohd Sadique said the ministry viewed this as a major problem due to the latest figure exceeded the government's projected waste production of 30,000 tonnes daily by year 2020. The striking fact shows how Malaysians generates more waste continuously. The tremendous trend on the increasing of solid waste generation led to the potential threat to the environment, society and economic losses as the dependence on the landfill as the main disposal method which particularly causing a serious environmental problems such as soil contamination, leachate, gas emission, and air pollution (Shekdar, 2009; Fauziah et al, 2007; Agamuthu and Fauziah, 2011). Moreover, it also led to major waste problems such as flood, proliferation of insects, vector disease outbreak and contaminate surface and ground water which causing huge responsibility to the local authority (Alam and Ahmade, 2013).

Despite its negative impacts to the environment, solid waste which always been seen as dirty, neglected and not useful should be seen as positive and inherently valuable combination of material that can be processed with specific purpose (Connett and Sheehan, 2011). With the increasing pressure on the amount of waste generated, moves have to be taken to reduce, divert and recover materials as solid waste could create a large opportunity and benefits to the local authority, society and individual respectively. Proper solid waste management present an opportunity not only to avoid the detrimental impacts associated with waste but it can recover resources, environment, economic, social benefits which towards to the sustainable future.

Recent years, solid waste minimization strategies particularly in recycling has seem to be noticed as a solution in reducing the solid waste generation. Thus, the Malaysian government has taken initiative by force the Solid Waste Management and Public Cleansing Act 2007 (Act 672) by mandatory of solid waste separation at source in September 2015 in order to reduce the solid waste generation at the disposal site and encourage solid waste separation at source among the householders. However, Malaysian still sporadic and skeptical on the beneficial of recycling practices as the current recycling rate in Malaysia was 17.5% in 2016 which still far from the target of 22% by year 2020 (JPSPN, 2017). Former Solid Waste Corporation (SWCorp) Chief Executive Officer Datuk Ab Rahim Md Noor has stated that the recycling rate were still lower compared to other developed countries which have reached more than 40% such as Singapore 59%, Korea 49%, Taiwan 60% and developing countries within Asia where recycling rate about 30% to 47% (SWCorp, 2014; Mahmud and Osman, 2010). Thus, the role of stakeholders such as local government, manufacturers and society were vital in educating the public on the needs in maximizing the solid waste minimization with proper solid waste management towards the sustainable future development.

### **Solid Waste Minimization in Malaysia**

In 1990s, solid waste management were responsible by the local authorities and state government under the Local Government Act of 1976. However, due to numerous complaint on the services, the federal government has decided that solid waste management would be privatised under private company by zones as shown in Table 1 (APO, 2009).

*Table 1: Solid Waste Management by Zones*

Zone	States	Private Company
Northern Zone	Perlis, Kedah	E. Idaman
Central Zone	Selangor, Pahang, Kuala Lumpur, and Putrajaya	Alam Flora
Southern Zone	Negeri Sembilan, Melaka, Johor	Southern Waste Management
Eastern Zone	Sabah, Sarawak	Local Authority

Source: APO, 2009

Malaysian government has taken into account regarding the solid waste issues and committed to solid waste minimization programme as well as organized and instituting the solid waste management and disposal. Thus, the main focused were on recycling practices. Recycling become government programme in early 1990s as illustrated in Figure 1. The first official recycling campaign was launched in Shah Alam, Selangor by the Minister of Housing and Local Government in October 1991 (MHLG, 2008). There are 20 local authorities were involved as the lead agencies to promote recycling programme. The recycling campaign became a part of the “Clean and Beautiful Programme” in 1992, as all city and municipal council were required to launch recycling programme. Since 1993, there were a major effort of recycling waste programme, however, unfortunately only limited recycling activities were organized (Agamuthu, 2003). Then, in year 2000, the government has re-launched the recycling campaign with 29 local authorities involved. However, the rate were still low and did not improve the existing solid waste management practices due to the local authority could not sustained the programme as limitation in lack of market for recyclables materials, poor collection recyclables waste, lack of public awareness, lack of participation by stakeholders and lack of policy and master plan for the recycling programme (Nor Eeda and Ho, 2013).

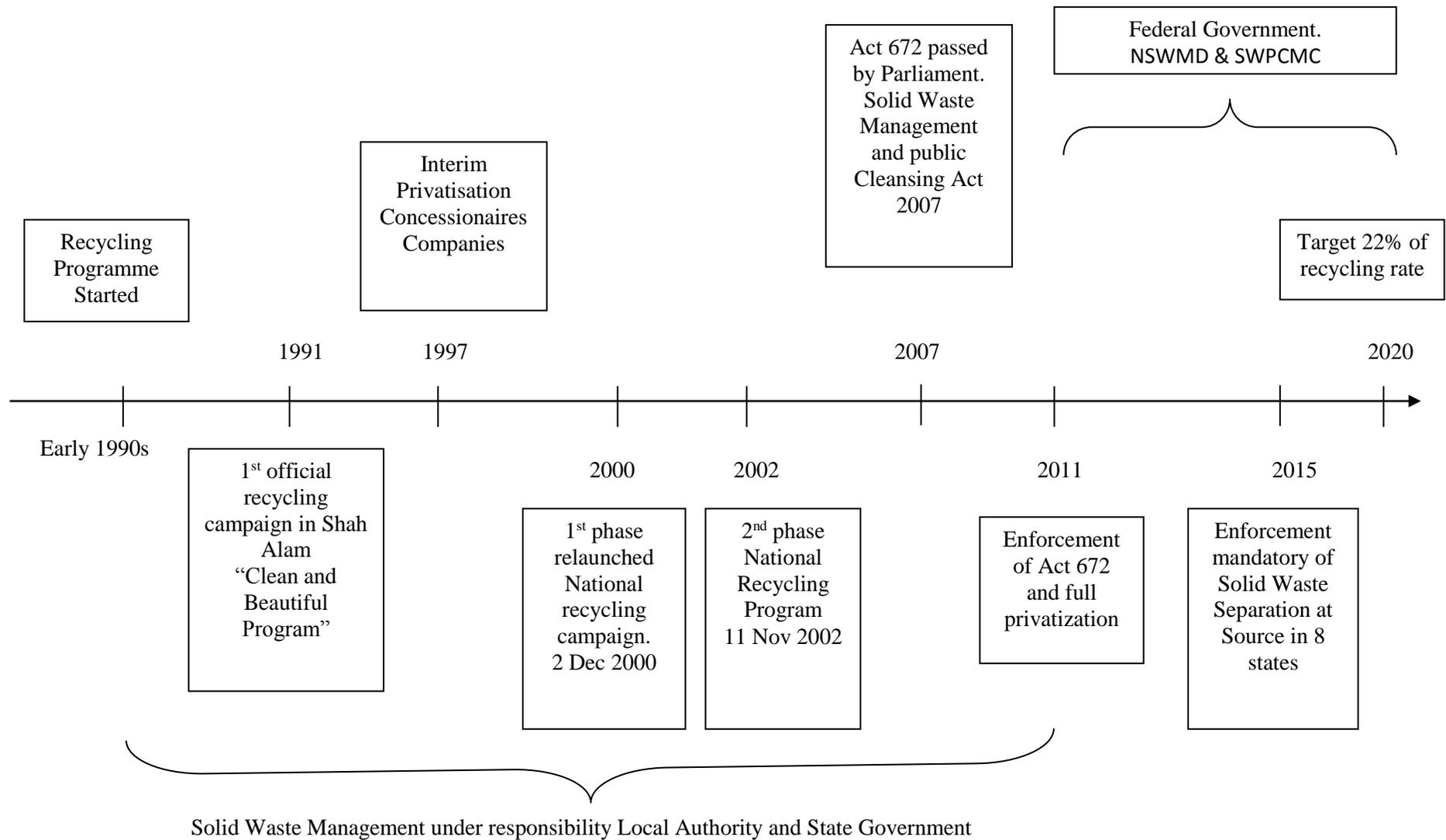


Figure 1: Overview of Solid Waste Minimization in Malaysia  
Source: Moh and Latifah, 2017

Thus, in 2002, the government relaunched the recycling programme as the second phase by involving 95 local authorities. The National Strategic Plan (NSP) has set the target rate for recycling and reduction at 22% by the year 2020 as shown in Figure 2 and provides understanding of the principles of 3Rs and put them into practice among the communities (Nor Eeda and Ho, 2013). In addition, the efficiency of recycling programme could diverted 20% of municipal solid waste and extended the life of disposal sites if the community supports the recycling programme (MHLG, 2008; Latifah et al, 2009; Chua et al, 2011; Ogboo et al, 2014).

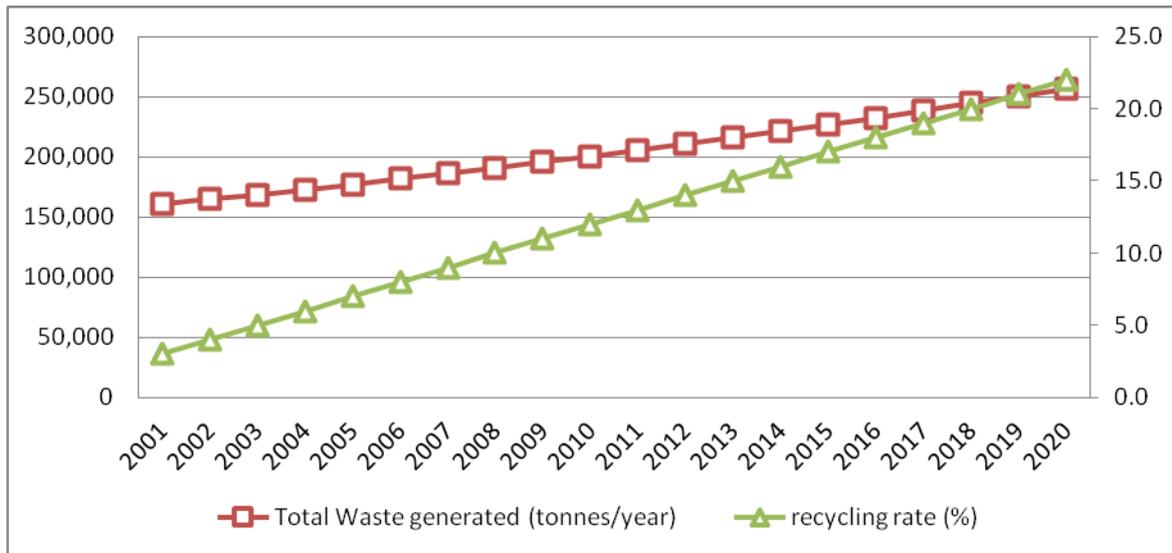


Figure 2: Projection of recycling rate in Malaysia from 2001 until 2020

Source: SWCorp, 2014

Hence, in September 2015, the government implemented a new rule in Solid Waste Management and Public Cleansing Act 2007 (Act 672) which it will be compulsory for Malaysian to separate waste according to category includes plastic, paper, cardboards, metal, and food waste before collection of solid waste by concessionaires. The new rule is part of the government’s effort in increasing the national recycling rate. The efforts has achieved 4741.48 tonnes of recyclables in 2015-2017 by State as illustrated in Figure 3. The state that involved were Kuala Lumpur, Putrajaya, Pahang, Melaka, Negeri Sembilan, Perlis, Kedah and Johor. In addition, the E-Idaman concessionaires at Kedah and Perlis has encourage public participation on recycling by giving incentives in redeem card and provided 2,000 recycle bin which distribute in residential area (SWCorp, 2014). Due to the rising awareness on the solid waste separation at source has led an increasing number of recycling rate which is 17.5% in year 2016 which rise from 10.5% in 2012 and 15% in year 2014. It shows that, the government efforts by mandatory of solid waste separation at source has fruitfully successful.

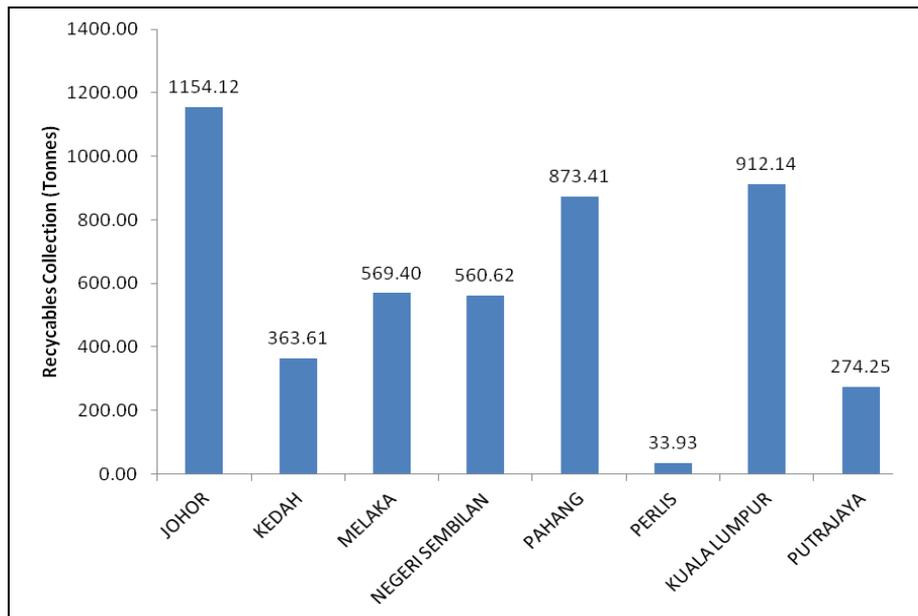


Figure 3: Total Recyclables Waste Collection by State in year 2015-2017  
Source: MHLG, 2018

### Solid Waste Minimization through Recycling

Recycling is one of the fundamental parts of the solid waste minimization plan which the most desirable approach in reducing the amount of solid waste generation dumped in the landfill (Mohd Dinie and Mashitah Mat Don, 2013). However, in order to attain the recycling targets, the solid waste management essential an involvement from the local community as it largely depends on the household awareness regarding the solid waste recycling issues rather than focused on the local authority responsibility services (Keramitsoglou and Tsagarakis, 2013).

There are two main collections for recyclables materials in Malaysia which is buy-back/drop-off and curbside collection centres which set up by LAs, concessionaires, NGOs, and private organizations. In either way, the collected recyclables materials are sold to recycling factories or intermediate buyers which export the recyclables materials to other countries (JICA, 2006). Initially, the recycling collection in Malaysia were dominated by the informal sector such as door to door itinerant recycling buyers, waste collection workers separate the recyclables materials and scavenging activity in landfill site (Fei et al, 2016). However, nowadays, recycle centre was established in intention to increase awareness and participation of the community involving in the recycling practices.

#### *Buy back centre/ Drop-off centre*

According to Malaysian Standard MS 2303:2010, buy back centre is an initiative whereby recyclables materials are purchased from any person in exchange for an incentive. In this type of recycling centre, the residents are paid for their recyclables either directly or indirectly through a reduction in monthly collection (Alam Flora, 2009). In addition, there are increasing of accessible recyclables centre in the country which addition 15 recycling centres in Kuala Lumpur, 22 in Selangor operated, and 56 in Pahang operated by Alam Flora Sdn. Bhd in 2009 (NSWMD, 2010).

Meanwhile, drop off centre requires residents to separate recyclables at source and transport them to a specified drop-off or collection centre (Malaysian Standard MS 2303:2010). Drop-off centres range from single material collection points staffed multi material collection centres. Drop-off centre also require residents to store recyclable until sufficient enough to transport them to the drop-off centres. To encourage recycling participants, drop-off centres or collection centres are usually located at convenient places, such as at shopping centres or supermarkets. There are 38 drop off point were introduced to the public with 2,567 recycling cages were provided for high rise residency (NEHAP, 2016). In recent years, recycling seems to be noticed as practical solution to the increasing solid waste generation as more recycling facility was provided.

### ***Curbside Collection***

In a curbside system, source separated recyclables are collected separately from curbside, alley or commercial facility (Ramachandra, 2006). Using these ways, household do not have to transport the recyclables any further than the curb, and participation in curbside collection centre is normally much higher than drop-off centre. Curbside collections vary greatly within communities which require the residents to separate several different materials which are then stored in their own container and collected separately. Meanwhile other curbside collection used one to two containers to store all the recyclables. Curbside recycling has been known as one of the effective ways to reduce household cost of recycling and it consumes less time (Aadland and Caplan, 1999; Jenkins, et al, 2000). Thus, there are 599 communities recycle centre or buy-back centre in whole Malaysia and as an effort to encourage household to practices recycling. Statistical records showed that 62 and 1000 recycle bins were distributed respectively in Kuala Lumpur and in the other 13 states of Malaysia as part of the recycling campaign (DOS, 2014; Zen et al, 2015).

### **Stakeholders Roles towards Solid Waste Minimization**

Hence, the government, manufacturer and society play a vital role in the transformation of the solid waste minimization and recycling through rules and regulation, agreement and local ordinance. These tale the form of taxes, law subsidies, business regulation, environmental law, environmental conservation and land use requirement which together ensure that solid waste management infrastructures and recycling initiatives were flourish and profitably.

### ***Role of Local Government***

The government alone cannot reach the ultimate solid waste minimization which requires the involvement in all sectors. The role of local government act as the central steering mechanism brings together government; manufacturer and society viewed as important contribution in reducing the solid waste generation. The local government take the leadership role in develops and support the goal. Local government provide waste services to the communities which either directly or through contractors. In these circumstances, the local government is the main role in managing waste as according to Hezri and Hassan, (2006), solid waste is one of the most important issues for local government in the country, where most money and efforts are spent in the collection and disposal of solid waste. Thus, the role of local government was crucial as the regulators of waste practices by setting the rules and regulations on how waste were managed efficiently and effectively.

The Malaysian Government has gazetted the Solid Waste Management and Public Cleansing Act (Act 672) in year 2007. Under this Act, the Federal has given the executive power in relation to solid waste management and public cleansing in Peninsular Malaysia and Federal Territories. Admitting a fact that solid waste generation has increasing rapidly, the government has put a serious attentions and efforts by enforced the Solid Waste Management and Public Cleansing Act 2007 (Act 672) in 1

September 2011 (Nadzri, 2012). The implementation of Act 672 were create to increase awareness towards solid waste separation at source by organizing a lot of recycling programmes such as recycling bank in kindergartens, recycling bank in school, solid waste separation at source in residential area and community, solid waste separation at source in government offices and statutory bodies, drive-thru recycling in hypermarkets with vast potential to be expanded to all states in Malaysia (SWCorp, 2014). Besides that, a lot of campaign on talks and exhibition also been organized in order to encourage the society to practice recycling in their household by engage and collaborate with private companies and government agencies.

Meanwhile in Sabah, municipal solid waste is under the jurisdiction of the respective municipalities' council based on the Local Government Ordinance, 1961 which responsible for the collection, treatment and disposal of solid waste (*Anti-Litter By Laws, 1984; Conservancy and Hygiene By-laws, 1984*). The municipal council has enforced the Municipal Council (Anti-Litter) By-Laws enacted in 1976, which allows for a maximum compound of RM100.00 as low as RM5.00 to RM 10.00. The enforcement is intention to raise the people awareness to throw their waste in a proper place and in proper manner. It can be simplify that people who pollute will be punished. Moreover, the local governments need to act as the educator of solid waste management to the society by develop a continuously awareness programme in spreading knowledge and educate the society on the proper handling of solid waste management. The engagement between the local government with the society helps to increase the number of participation in recycling programme and increase the recycling rate as well.

### ***The Role of Manufacturer***

Manufacturer, industrial designer, business sector has important role in solid waste management system. It is the industrial responsibility in creating and designing long lasting, easily maintainable and repairable products by reducing packaging and redesign product that are recyclables which encourage their suppliers to use minimal packaging, provide systems for consumers to recycle, and promote products that are environmentally sustainable. Other than that, the manufacturer should implements the “cradle to cradle” concept in their manufacturing product. “Cradle to cradle” concept best describe a material that begins with resource extraction, moves to product manufacturing then the product recycle into a new product at the end of its life which ultimately there is no waste (McDonough, 2003). Besides that, the manufacturer can invest in new design technology which create minimal waste, environmentally sustainable product and responsible for a whole product life cycle. It shows that, the manufacturer and the industrial designer has the biggest role in minimalist waste product as it reduces the amount of solid waste generation.

According to Malaysian Paper Merchant' Association, (2009), which Malaysia has consumed 380,000 tonnes of printing and writing paper annually, however about 230,000 tons of paper were imported. This is cause by the limit number of supplier in paper industry which causing in waste paper imports (Joy, 2012). As most paper is sourced from wood, recycling used paper creates a significant step to protect the environment. As the high demand of paper will creates high demand for logging, thereby increasing emissions and environmental impacts from the logging industry. Nowadays, paper production has grown exponentially in this modern life where supermarkets and retail stores use corrugated cardboard as packaging design. Paper manufacturing includes the processing of wood, recovered paper and paperboard and other cellulose fibres into thousands of end-use products. Meanwhile, high grade paper includes computer paper, white and coloured ledger paper (writing, typing and other bond papers), guillotined books (covers and spine cut off) and reproduction paper

can be used as a direct substitute for wood pulp or can be de-inked to produce tissues or high-quality bond papers.

Besides that, plastics are the most common recyclables materials with high potential for recycling in Malaysia (Zamali et al, 2009). This can be supported as reported by NSWMD under MHLG which plastic dominated as the second highest in the solid waste composition after organic waste. However, the recovery rate was poor although the fact that most plastics are recyclables which is only 13.2% (Ab Rahim, 2014). Plastic has becoming more commonly as packaging, components of items and traded as commodities at present days. The usage of plastic materials such as plastic bags and other plastic packaging materials has been increasing over years. Plastic is a type of synthetic or man-made polymer which contain various complex organic compound produced by polymerization, capable of being molded, extruded into several of shapes. According to Malaysian Plastics Manufactures Association (MPMA) (2014), plastic waste can be divided into two types namely thermoplastics and thermosets. Thermoplastics are the plastics which can be recycled and consist of seven types while on the other hand thermosets are plastics which cannot be recycled. Thus, the role of manufacturer and industrial designer were crucial in providing biodegradable plastics which can be recycled for daily use in order to reduce the solid waste generation.

### ***The Role of Society / Community***

Community engagement and participation is the key factor for the success of any solid waste management plans. Society should become an active participation in the resource management system towards solid waste minimization. Solid waste minimization is influenced by the motivated people to change their attitude, behaviour and lifestyle. Society needs to apply 3R (Reduce, Reuse, recycle) practices in handling their waste and actively involves in recycling programmes. Additionally, the society can select product based on environmental performance, price and quality. Limit the consumption of buying new product or non-environmentally product as it helps to reduce solid waste generation effectively. The community itself needs to change their practice and attitude. It is important that the effort is initiated by the community itself and not depending on the leader or the local government. Their attitude and passion will lead to a better environment in their community and reduce cost used in other area such as marketing or resources that need to be provided by the local government. Therefore, the goal for the community is to raise awareness with concrete ideas to combat any obstacles in the activity.

Asim et al (2012), has mentioned that recycling is widely recognised as the sustainable solid waste management strategy where it should be integrated into a project at community-based level. Recycling activity enhances the efficiency of recovering process, reduce the disposal cost and create additional income especially for the underprivileged groups. Community-based waste bank (CBWB) contributes in solving the waste problem especially in the developing country (Hasfarm et al, 2014). Due to the increasing volume of solid waste generation urge the government of Indonesia enacted the Waste Management Act in 2008 which modified the government's waste management focused on reduction, reuse and recycling as the key components. Thus, waste bank was establish in parallel with the private waste collectors and the recycling centre act to reduce waste by channeling the waste to be recycled (Hasfarm et al, 2014; Halimatussadiyah et al, 2016; Nur Indrianti, 2016). The waste bank mainly addressed to motivate the community to separate their waste, give rewards and collecting waste in form of monetary incentives.

Meanwhile in Thailand, recycling campaign and activities had been integrated into a community project by implementing solid waste recycling bank project which in return recycling had provide

economic opportunities for poor families to generate income (Singhirunnusorn et al, 2012). Moreover, the community participation has encouraged the household behaviour to reduce solid waste from the source (Chakrabarti et al, 2009; Singhirunnusorn et al, 2012). Not only that, case studies in Thailand shows that, economic incentive mechanism allows to increase the waste separation behaviour at source as well (Boonroda et al, 2015). Besides that, the appliance of 3R concept in community-based solid waste management didn't only significant in changing people attitude and behaviour but changing the people mindset through education and practices on 3R. Halimatussadiyah et al (2016), has found that waste bank activity was incentivized in many form which is money and other benefits such as information exchange which increase the community's awareness and knowledge in recycling. Meanwhile Nur Indrianti (2016) supported that waste bank increase community awareness to practice environmentally solid waste management where waste bank activity instilled leadership and managerial practices among the community especially, to the young generation in managing solid waste in a sustainable manner.

**Obstacles in Solid Waste Minimization**

The rapid urbanization in Malaysia have given adverse effects on the environment which cause the increasing of solid waste generated and it also changed the characteristics of Malaysian solid waste generated. Although the government has mandatory the Act 672 in solid waste separation at source, however, there are some obstacles that still should be taken into account.

**Increase in Solid Waste Generation**

The increasing of solid waste mainly attributed to the improvement of living standards especially in Asian countries (APO, 2009). With the rapid changing culture Malaysians has produced more waste than before. Malaysian generates more waste due to the latest figure solid waste production was 33,000 tonnes in 2012 and increase to 38,000 tonnes of waste per day in 2016 as indicate in Table 2. The amount of solid waste generation will keep increasing if neither action is taken in minimizing the solid waste generation.

Table 2: Solid Waste Generation in Malaysia

Year	2005	2012	2016
Total Solid Waste Generated (Tonne/day)	19,000	33,000	38,000
Waste Disposed in Landfill (Tonne/day)	18,050	30,129	35,335
Disposal percentage	95%	91.3%	82.5%

Source: NEHAP, 2016

**Increase in Solid Waste Management Cost**

Solid waste management were known to be a costly affair with about two-thirds of the local councils' total collected annual assessment fees being spent on solid waste management collection and disposal. There are about 40% to 80% of local authority expenditure are on solid waste and public cleansing (Nadzri, 2012). Cost to be borne by the federal Government continues to increase cause by the

opening of new areas in local authority that adopting the Act 672 which require solid waste management and public cleansing services as shown in Figure 4. According to MHLG (2015), the federal government pays 61% of the total cost of solid waste management and public cleansing while the local authority pays 39% from the total cost. Inadequate fund to support the implementations plans has delay as the contribution from the local authority was insufficient and the federal government has to cover the losses hence increasing the financial burden.

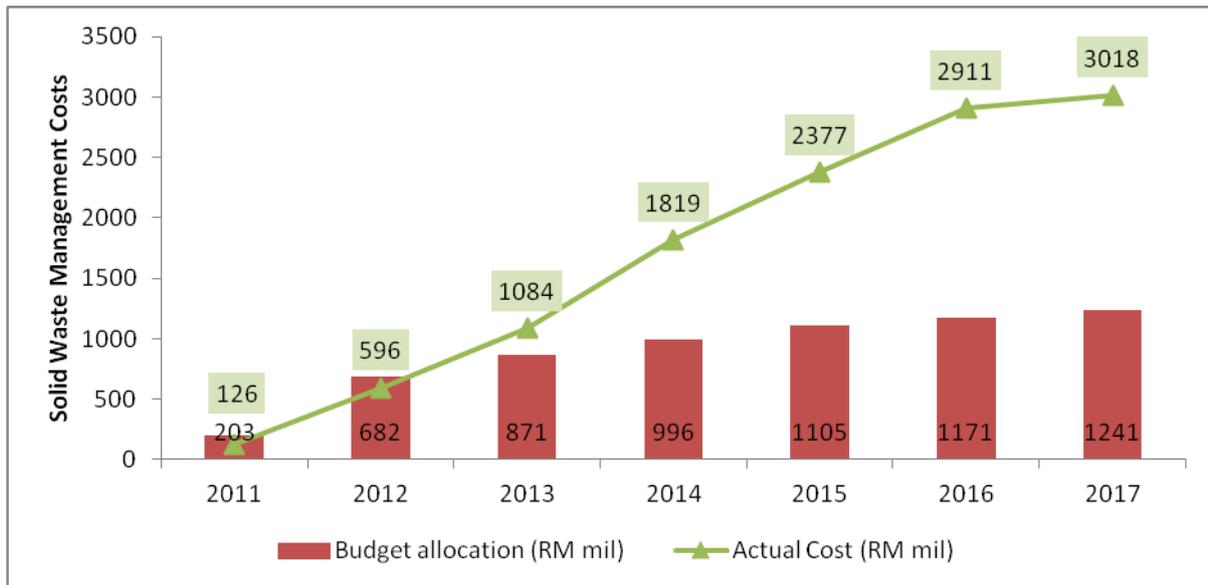


Figure 4: Solid Waste Management Costs from 2011 till 2017  
Source: MHLG, 2015

Current estimated cost for solid waste management in Malaysia is RM 148/tonne/day (MHLG, 2015). The solid waste management cost might be increased more unless urgent action is taken to reduce the disposed waste amount.

**Lack of Basic Data on Recycling**

The government is largely dependent on local authorities and the concessionaires for solid waste management database. There is lack of regulation leads to inaccurate data which there is no proper record of recycling data. It is cause by the establishment of informal recycling collectors that didn't registered to the local authorities. The composition data of recyclables item collected shows as 55% by scavengers in landfills, 30% from recycling by communities and 15% by educational institutions (Ab Rahim, 2014). It shows that data of recyclables waste collected dominated by informal sector in Malaysia. Meanwhile, for the data on solid waste minimization and recycling, Malaysia relies on information provided by the local authorities that participating in the National Recycling Program (NRP). There are gaps in existing data management practice such as lack of proper data system, data obsolescence, complication in data handover and lack of supporting facilities. Moreover, the recyclables 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 tracked bring obstacles to the local authority in regulates the recyclables data collection.

***Lack of recycling awareness and facility***

Malaysian government has been making an effort to increase the awareness on recycling however the implementation of practices to behavior were still slow. Public is more interested only in segregating at the source and selling of recyclables that fetch high prices (Nadzri, 2012). Lack of awareness on recycling practices creates resource scarcity and others possible consequence as solid waste management were costly which could affect the social and living cost. A survey by the Solid Waste Management and Public Cleaning Corporation's, Recycling & Public Awareness Division in 2012, showed that 89% of respondents were aware of recycling programmes, but only 68.8% said they would put this awareness into practice (SWCorp, 2012). It shows that, recycling awareness were still low and it would becomes an obstacle to increase the recycling rate among the society as they lack of awareness regarding the importance of recycling practices.

Besides that, only a fraction of the recycling facilities were planned were approved by the government due to the constraints in funds and also due to the limited manpower. Increasing the accessibility of recycling facilities should be considered as an important factor in changing the society behaviour, and as a convenience method of separating. Recycling industry in Malaysia shows a positive towards recycling but the availability of recycling industry is limited (Saeed et al, 2009). According to Maresova and Kollarova (2010), householders are more willing to undertake to recycle if it was workable and beneficial. Besides that, lack of sufficient recycling facilities or the inappropriate of the facilities location contributed further to the decreasing of recycling practices. As according to Gonzalez-Torre et al, (2003) studies, recycling practices were lower when they need to walk for a long time to leave their waste and prefer to use curbside collection system.

***Lack of policies and regulations***

The basic policy formulation on solid waste minimization is the primary tasks of the government to officially declare and demonstrate its vision and resolution of realizing a society in future with reduced waste and impacts to human health and environment. To reduce solid waste disposal problem, 3R practices should be implemented as campaign policy. 3R concepts were more environmentally friendly alternative than seeking a new landfill site, and capable to extend the lifespan of the existing landfill. The successful recycling programmes essential a good solid waste management including a well enforced policies through rules and regulations (Brown et al, 2011). However, in Malaysia, Act 672 was implemented only in eight states which causing obstacles to other states that do not apply Act 672. Selangor, Penang and Perak have exempted from the Solid Waste Management and Public Cleansing Act 2007 (Act 672) where the state choose not to privatize their solid waste collection and public cleansing services. In addition, Sabah and Sarawak also has their own regulations regarding the solid waste management and public cleansing act.

Moreover, in legal definition of solid waste provided under the Solid Waste Management and Public Cleansing Act 2007 (Act 672), solid waste can be defined as any scrap material or other unwanted surplus substance or rejected products arising from the application of any process; or any substance required to be disposed of as being broken, worn out, contaminated or otherwise spoiled or any other material that is required by the authority to be disposed of. However, there are various types of sources of solid waste in a community and it is usually in a commingled state. There are includes solid waste generated from residential, commercial, institutional, and others which causing problems to the local authority and the society as well. Some household waste may contain a significant amount of toxic of hazardous waste however there is no special collection for this waste from house to house. Therefore, this hazardous waste was commonly stored in the same storage bin with other MSW. There are gaps in existing policies, guidelines and standards that hindering the actual implementation of

solid waste minimization. Hence, enforcement of regulation and policies were importance to lead the society to be more aware and responsible with their own waste respectively.

### **Conclusion**

Solid waste minimization was the key to a sustainable solid waste management which need to be acknowledged as its benefit in reducing the solid waste generation. Despite the fact that Malaysia highly dependent on land filling as disposal method need to overlook as the opportunities in recycling strategies has been proven in diverting the solid waste from dispose at landfill site. Substantial efforts by the stakeholders such as government, local authorities, manufacturer and society in combat with the solid waste issues by recycling awareness programme still remains inconvenience to the household which only 17.5% of Malaysian were practicing recycling. Thus, a comprehensive solid waste minimization, recycling facilities and awareness programme were necessarily to empower Malaysian involve in the recycling practices effectively. Continuous campaign on environmental awareness and education should not be neglected and solid waste minimization programs must be strategically planned. Solid waste minimization and recycling should be put at the top hierarchy in solid waste management to ensure a sustainable development of Malaysia towards achieving Malaysian Vision of 2020.

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