

Construction Waste Management: Malaysian Perspective

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Abstract

Construction industry is considered as major stimulant to Malaysia economy. However, it also generates waste from the construction activities. Managing construction waste is also an issue if not properly handle as it will gives negative impact to environment, social and finally economy. This paper presents the issues surrounding construction waste experience in Malaysia. It discusses about illegal dumping of construction waste due to attitude of the parties involved in construction industry and also common waste management strategy in Malaysia using disposal methods into landfills. Malaysia needs to embark towards waste management hierarchy through the enactment of specific construction waste regulation.

Keyword: construction waste; Illegal dump; waste management hierarchy

1.0 Issues on Construction Waste

Construction waste generation is becoming a pressing issue in Malaysia (Begum et. al, 2007; Begum et. al., 2010). There are a lots of construction waste generated in the country because of rapid development in construction industry. Demand of houses and major infrastructure projects make the amount of construction waste getting increased (Nasaruddin et. al., 2008; Siti and Noor, 2008).

Issues of illegal dumping have swelled rapidly all over the country as reported by Yahaya and Larsen, 2008. A study done in Johor district alone indicated there are 42% of 46 illegal dumping sites are of construction waste (Rahmat and Ibrahim, 2007). Furthermore, a study in Seberang Perai, Pulau Pinang also discovered more illegal dump site near along the road (Faridah et. al., 2004). Recent news had highlighted that almost 30 tons of construction wastes was dumped illegally in tropical mangrove swamp near Bandar Hilir, Malacca and construction debris problem near roadside at Section 17, Petaling Jaya, Selangor as shown in Figure 1 and Figure 2 (The Star, 2011; The Star, 2012).



Figure 1: Construction waste illegally dumped in mangrove swamp
(Source: *The Star Newspaper*, 2011)



Figure 2: Construction debris along roadside
(Source: *The Star Newspaper*, 2012)

These illegal dumping has causing risk to human health and environment (Faridah et. al., 2004; Rahmat and Ibrahim, 2007). The issues of illegal dumping arise according to Seow and Mohamad, 2007 is due to the cost and project location factors. Distance between the project location and the landfill site hinder the contractor to dispose in legal landfill. The contractors intended to maximise profit by avoiding transportation cost and payment charge to the gazetted landfill.

Meanwhile, a study conducted on 30 construction sites identified six types of waste materials which include concrete (12.32%), metals (9.62%), bricks (6.54%), plastics (0.43%), woods (69.10%) and others waste (2%). This indicates that wood waste generated is more than others for the composition of construction waste generated in this country (Faridah et. al., 2004).

2.0 Waste Management Hierarchy

Construction waste should not directly dispose however it needs to pass through several processes before being disposed. It should be treated according to proper waste management hierarchy as proposed by Peng et. al., 1997 in Figure 1. The waste management hierarchy suggests that waste should be reduced, reused, recycled then be disposed to proper dumpsite like landfill. Further research by Wolsink in 2010 has improvised the waste management hierarchy as in Figure 2. He introduced one step more by avoiding the waste generation.

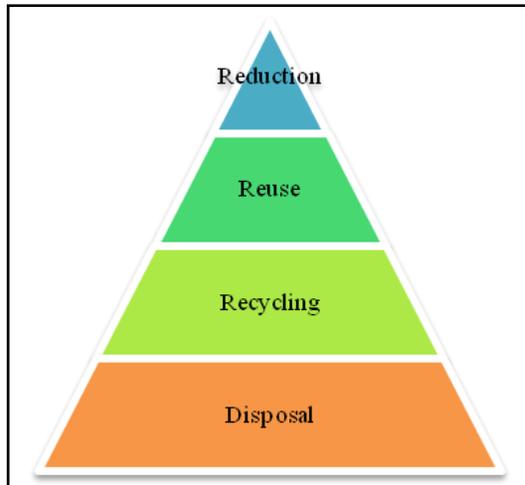


Figure 1: Waste Management Hierarchy
(Source: Peng et. al.,1997)



Figure 2: Waste Management Hierarchy
(Source: Wolsink, 2010)

However the terms avoid, minimize and reduction from Figure 1 and 2 are literally similar in actions. What is important is to prevent the generation of the construction waste (Osmani et. al., 2008; Peng et. al., 1997). In Hong Kong, the government focuses in reducing the waste at the source. This attempt in somehow will avoid any activities and process that can cause the waste generation (Tam et. al., 2007). Common understanding and regular emphasizing through meeting amongst all parties about the importance of avoiding the waste generation is a good approach in avoiding the waste generation (Zhao and Chua, 2003).

Since the waste generated is not fully avoidable, the next step should be consider is to reuse some of the construction waste likes using broken brick and concrete as a sub-grade of access road to the construction site. For waste that cannot be used at the site, it can be sorted for recycle purpose. Wastes like wood, steel, plastic and others can send to recycle factory. These efforts have to be carried carry out in order to reduce the disposal amount of construction waste to landfill. Thus, it will extend the life span of landfill. Following the steps in the waste management hierarchy is benefited to the environment and economy to a country (Tchobanoglous and Keith, 2002). Unfortunately, most of the contractors do not like this good practice of hierarchical waste management steps because they argued that the waste materials have little premium value and these cause them to dispose the waste in landfills (Poon et. al., 2004).

Under the Malaysia Solid Waste and Public Cleansing Management Act 2007 (Act 672), 'disposal' means the disposal of any solid waste by any means including destruction, incineration and deposit or decomposing. One of the common methods of disposal construction waste in Malaysia is through dumping in landfill (The Ingenieur, 2009). There are about 289 landfills which also includes

dumpsites. However, 113 of these landfills are no longer in operation due to protest from the surrounding residents or have reached their full capacity. The balances of 176 landfills which are in operation are as in **Table 1**. All the landfills are under the jurisdiction of local authority except a few owned by the Federal Government (The Ingenieur, 2009). The Malaysia Government is still planning to open another 9 more landfills to cope with the demand (Jurutera, 2011). Since landfill is simple and cheap method unlike incinerator which is more expensive and requires technological experts to operate it.

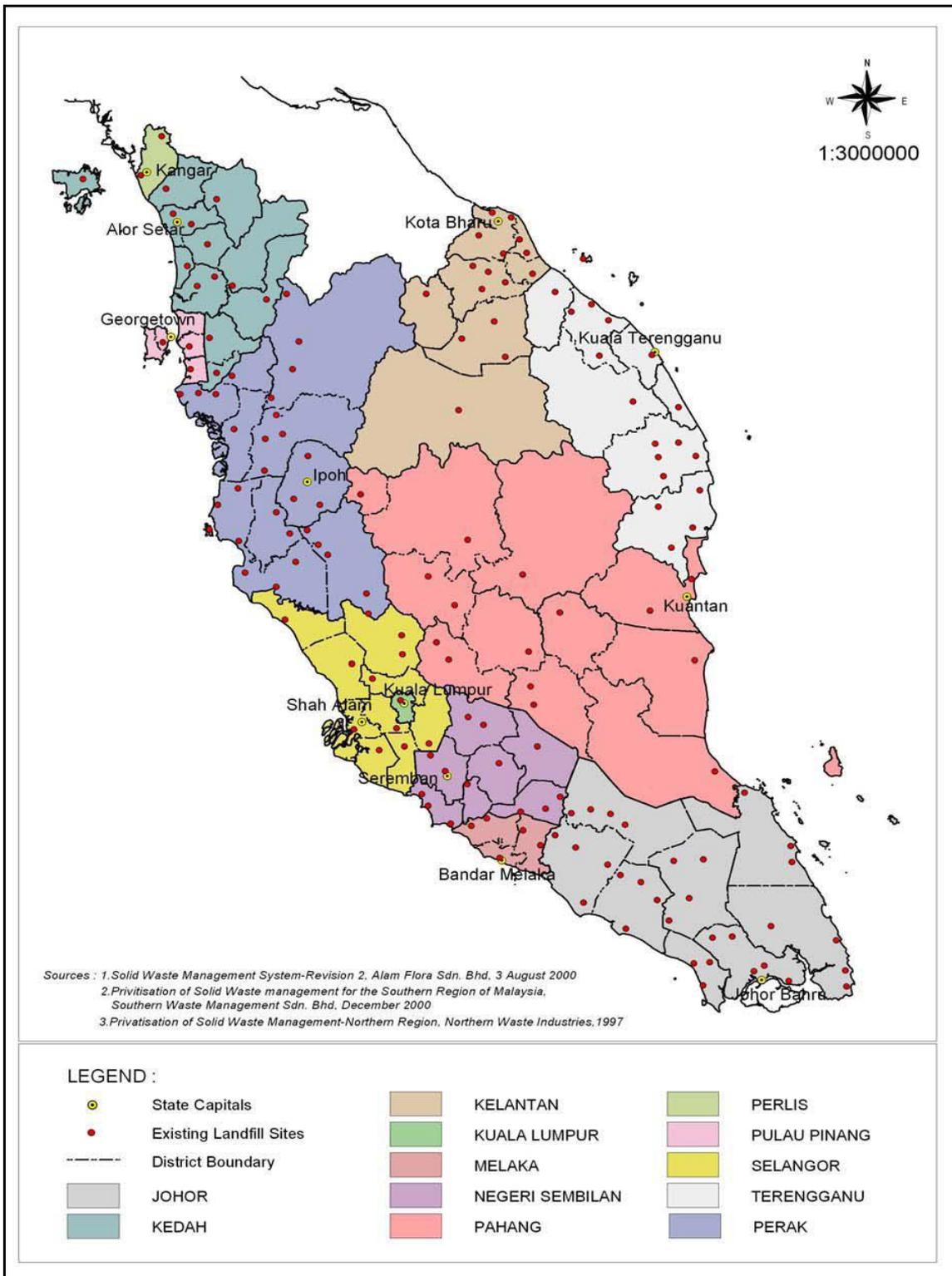
Table 1: Landfills in Malaysia

State	Operational Landfills	Non-Operational Landfills
Perlis	1	1
Kedah	11	4
Pulau Pinang	1	2
Perak	20	9
Pahang	19	13
Selangor	7	12
Federal Territory Putrajaya	0	0
Federal Territory KL	0	7
Negeri Sembilan	8	10
Melaka	2	5
Johor	13	21
Kelantan	13	4
Terengganu	9	12
Federal Territory Labuan	1	0
Sabah	20	1
Sarawak	51	12
Total	176	113
Overall Landfills	289	

Source: Department of National Solid Waste Management, The Ingenieur, 2009

The distribution of this landfill is as shown in Figure 3. The locations of these landfills are in the densely populated area of peninsula Malaysia. The figure indicates that the disposal technique of waste is popular in Malaysia. Some of the landfills are well manage with proper technology and sanitation. However, there are also landfills that create nuisance to the surrounding and general public.

Figure 3: Landfills site in Malaysia



Source: Report of Yussof, 2008



Figure 4: Manual sorting on site



Figure 5: Dumping activity using lorry



Figure 6: Levelling activity using bulldozer



Figure 7: Stacking of recycled wood

Figures 4-7 show the activities on Dengkil Landfill site. This landfill receives construction waste like soil, used tires, garden waste and other material which will not produce leachate. In general, landfills or dumpsites receive wastes from many sources such as residential, industrial, commercial, institutional, construction and demolition, municipal services and others. Landfills are regarded as one of the major contributors to negative impact on the environment in Malaysia (Lau et. al., 2008). Currently, there is a lack of regulation and no clear responsibility to any party for ensuring landfill sites are properly managed (Yussof, 2008). Since construction industry has generated significant amount of waste, it also taking up large space of the landfills. It is timely for the country to adopt a proper waste management hierarchy to avoid opening more landfill in future.

3.0 Legal and Enforcement

Construction waste management can be viewed from legal and enforcement perspectives. It requires proper legal system to give framework for parties involved in construction industry. To make sure the system is in place enforcement has to be exercised to give deterrent to parties that do not abide the laws. This study identified several authorities and law under their jurisdiction in handling solid waste as in **Table 2**.

Table 2: Authorities involving in construction waste management

Authorities	Laws / Acts / Standard	Scope	Remarks
Ministry of Housing and Local Government	Solid Waste and Public Cleansing Management Act 2007 (Act 672)	This act is to provide and regulate the management of controlled solid waste and public cleansing for the purpose of maintaining proper sanitation.	The solid waste is defined inclusively in the construction solid waste
Ministry of Works	Standard Specifications for Buildings Works (2005 Edition) Clause 46.3	This standard is only applied to contract works awarded using JKR procurement approach.	Clause 46.3 (clearance, cleaning and making good) completion states it is the duties of the contractor to gather up and clear away all rubbish / garbage / construction waste as it accumulates during the progress of the Works at least twice each week at times approved by the Superintending Officer.
Ministry of Natural Resources and Environment	Environmental Quality Act 1974 (Act 127) -Part IV Section 24 (2b)	This act is to prevent, abatement, control pollution and to enhance environment within Malaysia	Part IV Section 24 (2b) (prohibition and control of pollution) states a person deemed as pollute soil or land if disposal solid waste can be obnoxious and offensive to human beings; effects underground water; detrimental soil and surface of land.
Construction Industry Development Board	Pembinaan Malaysia Act 1994 (Act 520) - Part IX Section 35 (2)	This act is to provide functions relating to the construction works	Part IX Section 35(2) (enforcement and investigation) describes investigation officer have power to enter construction site at any times to inspect the construction works.

Sources: Act 672, Act 127, Act 520 and Standard Specifications for Buildings Works

As in Table 2, the first authority is the Ministry of Housing and Local Government with its Solid Waste and Public Cleansing Management Act 2007 (Act 672). This act is to provide and to regulate the management of controlled solid waste and public cleansing for the purpose of maintaining proper sanitation under the housing and local government authority. The act has limitation where it covers housing scheme and area governed by local government jurisdiction. The regulation is more focused on avoiding the waste from contributing to improper sanitation. Even though the act did specify construction solid waste as part of controlled solid waste but the whole scope of managing the construction waste is not enough as compared to the steps given in the waste management hierarchy.

The second is the Ministry of Works through the Standard Specifications for Buildings Works (2005 Edition). The standard is solely for contractors who are handling project with Public Work Department (JKR). The standard is applied to contract works awarded using JKR procurement approach. The construction waste handling appears in the standard under the Clearing, Cleaning, and Making Good on Completion Clause. It briefly explains that the clearing garbage or construction waste has to be done twice a week. It did mention that contractors are needed to dispose the construction waste in landfills or approved sites.

The following authority is Ministry of Natural Resources and Environment with its Environmental Quality Act 1974 (Act 127). The act scopes are to prevent, to reduce, to control pollution and to enhance environment. The wastes appears in this act are more related with general environmental problems. The wastes are interpreted as liquid, solid, gasses and radioactive. The wastes are either normal waste or schedule waste (Mustafa, 2011; Environmental Quality Report, 2006). The drawback of the law is it considers waste when it is deposited and cause pollution to environment.

The final authority that concern waste is the Construction Industry Development Board (CIDB) and the law under it supervision is Pembinaan Malaysia Act 1994 (Act 520). There are 10 parts prescribes under this act namely Preliminary; The Lembaga; Chairman, officer and servants; Finance; Other power or The Lembaga; Registration of Contactors; Accreditation and Certification; Levy; Enforcement and investigation and General Part. In this act, only Part I and Part IX can be related with construction waste issues. Part 1 describes construction works whilst Part IX is more towards enforcement and investigation. The act is to provide functions relating to the construction works in the country. It gives power to investigation officer for entering construction site at any times to do inspection. This enforcement law gives the authority to act upon construction waste left on site through the term of site clearance. However it does not fulfil the spirit of waste management hierarchy.

In order for Malaysia to move toward green or sustainable environment, the country has to benchmark developed nation like Japan and Hong Kong in handling construction waste issues. Japan manages their construction waste in sustainable manner where in 1991 the Japanese Government has established Recycling Law. The law empowers minister to select materials for recycle and encourage reuse of those materials in the country (Kawano, 2003 cited in Rao et. al., 2007). Several positive steps taken by Japanese Government, such as compulsory requirement of Waste Management Report for public or private construction projects; Waste management clauses of contract for contactors; Submission of Sorting Report and obligation to sort on site under Construction Recycle Act and establishment of Standard for Recycle Construction Waste (Gao and Ming, 2008). These legal approaches taken by Japanese government made the country become more sustainable in handling construction waste.

Hong Kong is another country that has able to manage construction waste very well. Hong Kong Government has introduced Construction Waste Disposal Charging Scheme (CWDCS) in December 2005. The scheme is to ensure the disposal of construction waste properly. A survey conducted revealed that waste dumped to landfills has reduced by approximately 65% after the implementation of CWDCS. Thus, this indicates the implementation of the CWDCS has effectively reduced construction waste disposal and helps to improve the country environment (Hao et. al., 2008).

4.0 Conclusion

Managing construction waste is vital for Malaysia in coping with future sustainable development. Current method of waste disposal is not sustainable and the country should try to use waste management hierarchy approach. The approach will helps to reduce negative issues related to environment, social and economy. Beside this, Malaysia must also impose good practices among Malaysian contactors the way they manage the construction waste. The construction parties involved should try to reduce, reuse and recycle the construction before it dispose to landfills.

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