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Solid Waste Management in Malaysia: An overview

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Abstract: Malaysia is heavily dependent on landfilling as a method of waste disposal, and as a result, severe space constraints, health issues, and environmental issues will eventually affect the country. This essay aims to give a general overview of solid waste recycling in Malaysia at the level that affects a community or country the most, the family. In Malaysia, households are the main producers of municipal solid waste, with recyclable materials making up between 70 and 80 percent of the total waste found in landfills. To improve solid waste management from a recycling perspective, it is important to consider Malaysia's current household solid waste recycling policy and program status. Wastes are still dumped in open areas of land without any attempt at recovery or recycling, despite the high potential and opportunities for doing so. Malaysia's rate of 5% illustrates the rarity of this practice when compared to recycling rates in neighboring nations. The government is committed to greatly enhancing solid waste management services for all citizens, particularly waste minimization. Since wastes, separation, and recycling make up a sizable portion of the major changes in the current policy implementation, it is a good thing that the emphasis on recycling as a sustainable waste management strategy has undergone a paradigm shift. The question of whether the 2020 goals can be met is still up in the air, but there is a chance for a successful implementation of sustainable solid waste management, especially in recycling. These issues and challenges in recycling practice were highlighted in this context, particularly from the aspects of information availability and other loopholes within solid waste management policies and, related recycling programs within the community.

Keywords: *Solid Waste Management, Sustainability, Malaysia*

1. Solid Waste Management: The History

The control of waste generation, storage, collection, transfer, and disposal of solid wastes (SW) in accordance with best practices for public health, economics, finance, engineering, administration, law, and the environment is known as solid waste management (SWM). One of the top three environmental problems that municipalities face worldwide is the generation of solid waste. It is typically inversely proportional to the degree of urbanization and income, with economies with higher incomes and greater levels of urbanization producing higher per capita levels of solid waste.

Any solid waste may be disposed of, burned, deposited, or decomposed under the Malaysia Solid Waste and Public Cleansing Management Act 2007 (Act 672) (Nagapan et al., 2012). Landfill dumps, however, are still frequently used in Malaysia to manage solid wastes because they are inexpensive and easy to use, as opposed to incinerators, which are more expensive and operate with specialized technical knowledge. The waste problem is out of control and is not going away, as evidenced by landfill dumps. Since the majority of landfills are approaching or have already reached their capacity limits, disposing of solid waste in landfills is becoming more challenging. Building new landfill sites is also getting more and more challenging because of a lack of available land, rising land prices, and increased demand brought on by population growth (Latifah et al., 2009).

Municipal solid waste makes up 64% of Malaysia's total waste, with industrial waste making up 25%, commercial waste making up 8%, and construction waste making up 3% (EU- SWMC, 2009). In landfills, recyclable materials make up about 80% of municipal solid wastes (MHLG, 2006), and household waste contributes the most to this category of wastes, with recyclable materials making up no more than 70% to 80% of the total solid waste composition (Sumiani et al., 2009). One of the major sources of municipal solid waste in Malaysia, along with institutional and commercial waste, is the residential sector (Tariq and Mostafizur, 2007). The roughly 20 categories of municipal solid waste, which can be classified as organic or inorganic, include food waste, paper (mixed), cardboard, plastics (rigid, film, and foam), textile, wood waste, metals (ferrous or non-ferrous), diapers, newsprint, high grade and fine paper, fruit waste, green waste, batteries, construction waste, and glass (Amin & Go, 2012). Without any attempt to recover or recycle the waste, it is simply dumped in a field, regardless of its composition or type (Amin & Go, 2012).

A paradigm shift from traditional waste collection and disposal is represented by the emphasis on recycling as a strategy for sustainable waste management (Bolaane, 2006). Due to its potential to lower disposal and waste transport costs and increase the lifespan of landfill sites, recycling has gained widespread acceptance as a sustainable method of solid waste management (Folz, 1991; Muttamara et al., 1994; Suttibak and Nitivattananon, 2008). Since it is one of the most economically and ecologically sound approaches to waste management (Omran et al., 2009), the idea of turning materials that would otherwise be discarded into valuable resources with financial, environmental, and social returns (US EPA, 2012) has attracted increasing attention as a means of protecting the environment.

For this reason, Malaysia's Ministry of Housing and Local Government started a national recycling campaign in 1993. However, recycling has not yet become a common practice in Malaysia despite significant efforts. Over 100 million tonnes of solid waste are dumped or buried each year when they could be recycled. For the collection and disposal of its urban waste, Malaysia spent RM37.4 million (8.11645 million Euros) in 1990, which amounted to 877 million pounds or 546 kg per person per year. The government decided to restart the recycling campaign in 2001. This time, more money was allocated to public relations and instruction. Leading recycling campaigns and the collection of recyclable materials were a number of non-governmental and community organizations. The results, however, have remained largely unchanged seven years after the relaunch (Abdelnaser et al., 2006 a, b). However, only 5% of waste is recycled, leaving the question, "Why were recycling campaigns unsuccessful?" unanswered.

Concessionaires, local governments, and their contractors only collected about 75% of the solid waste produced in 1998 (UNDP, 2008). As the population grows overall, living standards rise, and people's lifestyles change, so will the amount of waste produced by residential and commercial facilities (Hassan et al., 2001). According to the World Bank (1999), urban residents produce two to three times as much solid waste as their rural counterparts. The rate of waste production in urban areas is currently around 760,000 tonnes per day, but by 2025, it is predicted to soar to 1.8 million tonnes per day. (1999, World Bank).

2. Solid Waste Management and Disposal in Malaysia

According to Latifah et al. (2009), solid waste is typically divided into three major categories, each of which is controlled by a different government. The Ministry of Housing and Local Government (MHLG) is in charge of managing municipal solid waste; the DOE is in charge of managing hazardous or scheduled waste; and the Ministry of Health (MOH) is in charge of managing clinical waste. In essence, the National Solid Waste Management Department (NSWMD) of Malaysia develops and recommends solid waste management and public cleansing policies, plans, and strategies, establishes standards, specifications, and codes of practice, and grants licenses and approval in accordance with the Act 672. While doing so, the Solid Waste Management and Public Cleansing Corporation (PPSPPA) carries out the proposed policies, plans, and strategies of NSWMD, monitors adherence to its standards, specifications, and code of conduct, and carries out, enforces, and recommends changes to its solid waste management and public cleansing laws.

Because wastes must undergo pricey and time-consuming physical, chemical, and biological treatment and segregation, the landfill method is the least preferred method of waste disposal (Grodzinska-Jurczak, 2001). According to Tchobanoglous et al. (1993), landfills are physical facilities used for the final disposal of unrecovered wastes. They are used for the disposal of residual solid wastes in the earth's surface solids. The majority of landfill sites in Malaysia, however, are open dumping grounds with overloaded capacity, posing serious environmental and social risks (Yunus and Kadir, 2003; Latifah et al., 2009). Landfilling is also the most popular method of disposing of solid waste in Malaysia. The majority (95%) of waste that is collected is sent to landfills for disposal, with a very small percentage undergoing intermediate processing; the remainder is either sent to small incineration plants for treatment, diverted to recyclers or re-processors, or illegally dumped (NSP, 2005). According to UNDP (2008), Malaysia's solid waste collection is primarily restricted to urban and township areas, with adjacent rural areas receiving only sporadic collection. Because there are no solid waste collection services in these areas, residents must rely heavily on burials close to their homes and are largely independent. This explains the widespread use of open dumping and small dumpsites as well as illegal dumping.

Anaerobic landfill, anaerobic sanitary landfill with daily cover, improved anaerobic sanitary landfill with buried leachate collection pipes, semi-aerobic landfill with natural ventilation and leachate collection facilities, and

aerobic landfill with forced aeration are the five categories into which the decomposition processes in a landfill are divided. Level 0, open dumping; Level 1, controlled tipping; Level 2, sanitary landfill with a bund (embankment and daily soil covering); Level 3, sanitary landfill with a leachate recirculation system; and Level 4, sanitary landfill with a leachate treatment system (Latifah et al., 2009). However, a second classification system is used for operational purposes. In Malaysia, landfill sites are accessed and categorized using the second classification system (Idris et al., 2004). The majority of these sites are nearly full, and 50% of them have a remaining lifespan of less than five years, according to the resources available; an MHLG survey conducted in 2002 found that of the 112 disposal landfill sites in use, 43 percent were open dumps, and only 6.3 percent were classified as Level 4 landfills (NSP, 2005). Recycling in Malaysia is still in its infancy, and these landfills are in poor condition (Latifah et al., 2009).

In the current Malaysian Plan, the government outlined actions to increase the effectiveness of solid waste management, which will lower greenhouse gas emissions, including the recycling of non-organic waste and the construction of material recovery facilities and thermal treatment plants (Lim, 2019). At the most recent United Nations Summit on Climate Change in Copenhagen, Denmark, Malaysia pledged to reduce greenhouse gas emissions by 40% of the nation's GDP by 2020 compared to 2005 levels (Lim, 2019). The use of an incinerator is being considered as one of the disposal options because Malaysia cannot rely solely on landfills. Despite being the second most popular method for disposing of solid waste after landfilling, incineration is also one of the most expensive ways to manage solid waste because of its high capital and operating costs (World Bank, 1999). To get rid of hazardous waste, Malaysians developed incineration (Latifah et al., 2009). Recycling alternatives to composting seems to offer a more environmentally friendly way to dispose of waste because recyclable materials make up the majority of the waste disposed of. Existing smaller incinerators don't seem to have any positive effects, and some of them aren't even operational when they're finished because of the mounting financial burden this technology's operating costs cause.

By 2025, Malaysia wanted to recycle 40% of all solid waste, but the country's current recycling rate is only 31.5%. Malaysia's recycling rate is less than half as high as that of other developed nations, which is more than 60%. The majority of studies emphasize an overall picture of the state of solid waste management, despite the need to draw attention to other issues like recycling solid waste. Despite the fact that sustainability in solid waste generation at the source is achieved by implementing the 3Rs, which are reuse, reduce, and recycle in ascending priority order, the term "recycle" should not be taken lightly.

3. Challenges of the Recycling Program

It is thought that the main barriers to participation are knowledge of the existence of a recycling program and the knowledge necessary to adhere to the program's rules and regulations. Salhofer and Isaac (2002) provided evidence of the importance of PR in the recycling strategy. They thought public relations could be utilized to inform and motivate people to take part in recycling campaigns. According to Salhofer and Isaac (2002), public relations projects must be meticulously and professionally planned, and they must also include an analysis of the target audience and media selection. Public relations activities must target specific audiences to produce promising results. Government support and encouragement for recycling are frequently widespread, but public participation in recycling is generally low. Why is there a disparity like this? Numerous explanations have been discovered by researchers.

In their thorough meta-analysis of 67 empirical studies on recycling, Hornik et al. (1995) found a number of factors that might affect recycling behavior. The two basic types of variables were identified as incentives for social behavior and facilitators (or barriers to social behavior). They might be internal to the person or outside. Hormuth et al.'s (1993) analysis of flat dwellers' recycling practices identified two interrelated strategies for making daily recycling easier. One involved placing recycling bins in convenient spots, and the other involved integrating recycling into the regular behavior stream of cooking and cleaning up after meals. Similar thinking was put forth by Zimmerman (1989), albeit from a different theoretical standpoint. Zimmerman (1989) asserted that individuals must learn how to set up their environment so that it supports desired behaviors in his analysis of effective self-regulation. To find out whether manageability affects desired behavior, he used an open-ended survey to find out how participants organized their recyclables. Social influence was defined by Vining and Ebreo (1990) as the worry about how one's friends and family may view his or her recycling behavior, including the presence or absence of support. This social pressure might be enough to keep recycling practices going. DeYoung (1989) found that the importance of feeling good about recycling was underestimated. Recycling is a practice that can demand a

lot of work from the individual as it requires sorting, preparation, and storage of household waste (Boldero, 1995). As a result, choosing to recycle is probably going to be difficult, and a number of things might be taken into account. Convenience is one of the factors that researchers are looking at, though. Nyamwange (1996) asserts that making recycling more convenient can be a strong motivator. Furthermore, numerous studies that sought to pinpoint particular traits associated with recycling participation have conducted extensive research on the motivational factors that underlie recycling attitudes and behaviors.

The significance of comprehending the environmental influences on consumer behavior and figuring out the factors that predicted such behavior was emphasized by Bratt (1999). The study found no correlation between behavior and the social norm, which is made up of the consistent behavioral patterns of the vast majority of people around the individual. Peer pressure was found to be a significant predictor or motivator of recycling behavior in the findings of Oskamp et al. (1991), which was unexpected. This shows that subjects tended to behave more morally when around other people, especially when their peers engaged in recycling. Some of the reasons why some communities develop strong recycling habits include social influences, altruism, and regulatory factors (Vining and Ebrero, 1990; Ewing, 2001). However, the main drawbacks are the effort (Oskamp et al., 1991), space (Vining and Ebrero, 1990; Boldero, 1995), and cost (Ewing, 2001).

One way to lessen inconvenience and facilitate recycling is to recycle at the curb. According to Boldero (1995), contextual elements like the amount of work required, inconvenience, storage space, and accessibility to recycling programs are likely to have an impact on recycling behavior. A measure incorporating situational variables was incorporated into the model because of the significance of these variables in Boldero's (1995) research. The importance of public awareness in determining participation rates was emphasized by Thomas (2001). The success factors, which are their consistency and effectiveness rather than the quantity of participating homeowners, are appropriately highlighted. The importance of local government awareness and promotion campaigns was emphasized by Evison and Read (2001); campaigns that are poorly planned and executed will have low participation rates. In the United Kingdom, even though a very high percentage of householders (over 60 percent) claimed to recycle, evidence suggested that this self-reported behavior was exaggerated, with the actual proportion being much lower. This was stated in a MORI report from 2002. What's more concerning is that a sizable minority (10–15%) never recycles under any circumstances. A predictive model for recycling participation and material capture rates has been created by Tucker et al. (2018). They mention the relatively low recycling rates. However, there are a number of low-cost tactics available, such as carefully planned information campaigns for practical collection systems, for achieving and maintaining high participation and capture rates. They correctly point out that high informational and operational costs frequently accompany recycling programs, and they emphasize the need for a variety of activities to support such expensive programs to ensure cost-effectiveness. According to Parfitt (2001), a number of factors are to blame for the rise in municipal waste. Demographic factors, increased consumer spending, changes in consumer behavior, and adjustments to waste management practices are a few of these. According to Garcés et al. (2002), a person's recycling behavior was influenced by their level of environmental consciousness and their understanding of the effects of urban waste on the environment. McDonald and Oates (2003) looked into the barriers to curbside collection and produced useful recommendations regarding the need for a thorough audit of the target area before collection scheme development.

The importance of socioeconomic factors and their impact on recycling rates are emphasized by Emery et al. (2003). The authors show that precise data on household purchasing patterns and waste composition are crucial before creating efficient local strategies. Williams and Kelly's 2003 investigation into the problems with recycling green waste for MSW collection. Absence from this waste stream is a complicated, multifaceted issue that necessitates extensive, ongoing research. People must be made aware of the why, what, and where of recycling. People with an external locus of control or skepticism (Rotter, 1954) might think that participating in recycling wouldn't make a difference. These people might need extra encouragement to recycle. People must therefore be aware of the benefits recycling has for the environment as well as its motivations. Having the right opportunities, resources, and information to recycle, as well as not being discouraged by the physical challenges of recycling (such as time, space, and inconvenience), are thought to have the greatest impact on recycling behavior, according to Tonglet et al. (2004). Increased public understanding and participation in recycling services are necessary for awareness-raising campaigns to be effective (Read, 1998; 1999). In their study, Garcés et al. (2002) found that when a recycling program is perceived to be supported by sound environmental policies and to be organized and controlled by good management, it has a positive impact on individual recycling behavior. According to the study, one major barrier for people who wanted to lessen their environmental impact but weren't willing to comply with

government initiatives by going above and beyond was the amount of effort needed to participate in a program.

Therefore, it is the responsibility of the government to carry out efficient programs that consider both the needs of individuals and the environment. As a side note, Guerin et al. (2001) also looked at how people reacted after assessing how well the government handled environmental issues. People were more likely to adopt environmentally friendly habits if they thought their government was making an honest effort to protect the environment. If people think recycling is a significant issue, perhaps because they are aware of the government's proactive actions, they will devote their time and energy to a recycling program (Guerin et al., 2001). Polish officials from Jaslo City determined that a similar approach would be effective there. The findings, however, do not support the earlier hypotheses (Grodzinska-Jurczak et al., 2006; that household motivation is a function of socioeconomic factors). According to researchers, areas, where residents are well-educated, financially secure, and have satisfied their basic needs, are those where recycling participation rates are highest (Tikka et al., 1999).

Perry and Williams (2006) highlighted the significance of comprehending ethnic minorities' recycling profiles and promoting their participation in recycling programs in recent research. According to their conclusions, this can be achieved by offering written information in ethnic minority languages and by holding presentations and focus groups at religious or cultural institutions in those languages. Bolaane (2006) identifies potential obstacles to advancing people-centered recycling approaches and offers many solutions to overcome them. His research included key informant interviews as well as household member interviews. It was based on a case study of Gaborone, Botswana. The study found that although Gaborone's municipal officials are aware of the potential advantages of recycling, they don't seem to support waste management reforms like municipally run recycling programs. Williams (2005) contends that the central government should create tools to help local governments evaluate and choose their strategic waste management options and create implementation plans. Local governments should be required to produce municipal waste management strategies through a two-stage process that focuses on operational issues and is based on the strategies and goals already developed and published by the central government. Imam et al. (2008) conducted recent research that examined Abuja City residents' mentalities in great detail. They found that Abuja residents have a bad opinion of waste disposal. Transporting garbage to bins is frequently seen as something that only children should be responsible for, and people who deal with garbage are frequently stereotyped as filthy, downtrodden, and inferior. In Abuja, both the public and private sectors have worked to raise public awareness of the problems with solid waste management. Televised debates on waste management have also taken place. It is also well known that improper waste disposal has negative effects. However, the majority of people still do not understand that everyone has a crucial role to play in improving environmental quality and that it is not just the government's responsibility.

4. Conclusion

Malaysia faces a serious problem with solid waste management because the nation produces a lot of waste each day. Approximately 38 thousand tonnes of waste were produced daily in Malaysia in 2020, according to the Ministry of Environment and Water. Numerous challenges are presented by Malaysia's solid waste management as it stands right now. The absence of adequate waste management infrastructure, such as landfills and waste treatment facilities, is one of the major problems. This has led to a large number of illegal dumpsites, which may cause environmental pollution and present health risks for the communities nearby. The lack of public education and awareness regarding waste management is another barrier. Many Malaysians are still ignorant of the value of waste minimization, recycling, and appropriate waste disposal techniques. Low recycling rates and contamination levels in the recycling stream are the results of this.

In response to these problems, the Malaysian government has implemented several measures to enhance solid waste management throughout the nation. Among them is the National Strategic Plan for Solid Waste Management 2019–2030, which seeks to lower waste generation, boost recycling rates, and enhance waste management facilities. The Extended Producer Responsibility (EPR) policy, which mandates that importers and manufacturers be in charge of the entire product lifecycle, including waste management, is currently being put into practice. Enforcing the 2007 Solid Waste and Public Cleansing Management Act, which defines penalties for violations and governs waste management practices? Promoting public education and awareness campaigns on waste management, including the 3R (reduce, reuse, recycle) concept and appropriate waste segregation is the final step. Despite the fact that solid waste management in Malaysia continues to face difficulties, the government's initiatives as well as greater public awareness and education could help the situation in the years to come.

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References

Abdelnaser, O., Mahmood, A. and Aziz, H. A. (2006a). A Brief Case on the Attitude of Households toward Recycling of Solid Waste in Terengganu State, Malaysia. Paper presented at the International Conference on Infrastructure Development and Environmental, Abuja City, Nigeria.

Abdelnaser, O., Mahmood, A. & Aziz, H. A. (2006b). Study on Households Attitude toward solid waste recycling in Perlis State, Malaysia. Paper presented at the 3rd International Conference on Environmental Engineering and Management (ICEEM/03), Iasi City, Romania.

Amin, K., Go, S. Y. (2012). Identification of the municipal solid waste characteristics and potential of plastic recovery at Bakri landfill, Muar, Malaysia. *Journal of Sustainable Development, 5*(7), 11–7.

Boards of Engineers Malaysia (BEM). (2009). The Ingenieur. Sanitary landfill: a strategic approach towards solid waste management.

Bolaane, B. (2006). Constraints to promoting people cantered approaches in recycling. *Habitat International, 30,* 731–40.

Boldero, J. (1995). The prediction of household recycling of newspapers; the role of attitudes, intentions and situational factors. *J. App. Soc. Psych., 25***,** 440-462.

Bratt, C. (1999). The impact of norms and assumed consequences on recycling behavior. *J. Environ. Behav., 31***,** 630-656.

DeYoung, R. (1989). Exploring the difference between recyclers and non-recyclers: The role of information. *J. Environ. Syst., 18,* 341-351.

EA-Sustainable Waste Management Cycle (EA-SWMC). (August 2009). EU-Perak Solid Waste Management Plan (EU-PSWMP). Available from: www.apo-tokyo.org/publications/files/ind-22-swm.pdf

Emery, A.D., Griffiths, A.J. and Williams, K.P. (2003). An in-depth study of the effects of socio-economic conditions on household waste recycling practices. *J. Waste. Manage. Resea., 21***,** 180-1 90.

Evison, T. and Read, A.D. (2001). Local authority recycling and waste awareness publicity/ promotion in the UK. J. *Resou. Conserv. Recyc., 32***,** 275-291.

Ewing, G. (2001). Altruistic, egoistic and normative effects on curbside recycling. *J. Environ. Behav., 33*(6), 733-764.

Folz, D. H. (1991). Recycling program design, management and participation: a national survey of municipal experience. *Public Administration Review, 51*(3), 222–231.

Garcés, C., Lafuente, A., Pedraja, M., and Rivera, P. (2002). Urban waste recycling behavior: Antecedents of participation in a selection collection program. *J. Environ. Manage., 30*(3), 378-390.

Grodzinska-Jurczak, M. S. (2001). Management of industrial and municipal solid wastes in Poland. *Resources, Conservation and Recycling, 32*(2), 85–103.

Grodzinska-Jurczak, M., Tomal, P., Tarabula-Fiertak, M., Nieszporek, K. and Read, A.D. (2006). Effects of an educational campaign on public environmental attitudes and Behavior in Poland. *Int. J. Resou., Conver. Recyc., 46***,** 182-197.

Guerin, D., Crete, J. and Mercier, J. (2001). A multilevel analysis of the 0determinants of recycling Behaviour in European countries. *J. Soc. Scie. Resea., 30***,** 195-218.

Hassan, M. N., Chong, T. L., Rahman, M., Salleh, M. N., Zakaria, Z., & Awang, M. (2001). Solid waste management in Southeast Asian countries with special attention to Malaysia. Paper presented at the 8th international waste management and landfill symposium.

Hornik, J., Cherian, J., Michelle, M. and Narayana, C. (1995). Determinants of recycling behavior: A synthesis of research results. *J. Socio-Econom. 4(*1), 105-127.

Hormuth, S.E., Katzenstein, H., Bruch, B. & Ringenberger, B. (1993). Psychological Studies on Garbage Avoidance and Recycling. Paper presented at the International Conference on Healthy Environments, Oklahoma City.

Idris, A., Inane, B. & Hassan, M. N. (2004). Overview of waste disposal and landfills/dumps in Asian countries. *Journal of Material Cycles and Waste Management, 6*(2), 104–10.

Imam, A., Mohammed, B., Wilson, D.C. and Cheeseman, C.R. (2007). Solid waste management in Abuja, Nigeria. *J. Waste. Manage. 28*(2), 468-472.

Latifah, A. M., Mohd Armi, A. S., NurIlyana, M. Z. (2009). Municipal solid waste management in Malaysia: practices and challenges. *Waste Management*, 29, 2902–2906.

Lim, B. (2019, September). Reducing the impact of e-waste. *New Straits Times.* Retrieved from https://www.nst.com.my/lifestyle/bots/2019/09/525027/reducing-impact-e- waste?fbclid= IwAR3Hp

QXu2SDJw6rP20_3TBKSnvK1oghE3vrY- EfkoxEwIuhGTX02pnN24XIn

McDonald, S. and Oates, C. (2003). Reasons for non-participation in a kerbside Recycling schemes. *J. Resou. Conserv. Recyc. 39,* 369–385.

Ministry of Housing and Local Government. (2005). NSP. National Strategic Plan for solid waste management. Malaysia.

Ministry of Housing and Local Government Malaysia. (2011). Annual Report 2011. Available from: http://www.kpkt.gov.my/kpkt/index.php/pages/view/104

MORI Social Research Institute, (2002). Public attitudes towards recycling and waste management. From http://www.number-10.gov.uk/su/ waste/report/downloads/mori.pdf;2002.

Muttamara, S., Visvanathan, C., & Alwis, K. U. (1994). Solid waste recycling and reuse in Bangkok. *Waste Management and Research, 12*, 151–163.

Nagapan, S., Ismail, A. R. & Ade, A. (2012). Construction waste management: Malaysian perspective. Paper presented at the International Conference on Civil and Environmental Engineering Sustainability (IConCEES), Malaysia.

Nyamwange, M. (1996). Public perception of strategies for increasing participation in recycling programs. *J. Environ. Educa. 27*, 19–22.

Omran, A., Mahmood, A., Abdul Aziz, H. & Robinson, G. M. (2009). Investigating households attitude toward recycling of solid waste in Malaysia: a case study. *Journal of Environmental Research, 3*(2), 275–88.

Oskamp, S., Harrington, M., Edwards, T., Sherwood, D., Okuda, S. and Swanson, D. (1991). Factors influencing household recycling behavior. *J. Environ. Behav. 23*(4), 494-519.

Parfitt, J.P. Lovett, A.A. and Sunnenberg, G. (2001). A classification of local authority waste collection and recycling strategies in England and Wales. *J. Resou.Conserv. Recyc., 32*, 239–58.

Perry, G.D.R. and Williams, I.D. (2006). The participation of ethnic minorities in kerbside recycling: A case study. *J. Resou.Conserv. Recyc., 49*(3), 308-323.

Read, A.D. (1998). Getting the message across: recycling in Kensington and Chelsea. *Int. J. Educ. Inform., 17,* 299-314.

Read, A.D. (1999). A Weekly doorstep recycling collection, I had no idea we could overcome the Local barriers to Participation. *Int. J. Resou., Conver. Recyc., 26*, 217-249.

Rotter, B. (1954). Social learning and clinical psychology. Prentice–Hall, New Jersey, USA.

Salhofer, S. and Issac, N.A. (2002). Importance of public relations in recycling strategies: Principles and Case Studies. *J. Environ. Manage*., 30(1), 68-76.

Sumiani, Y., Onn, C. C., Mohd, D., Wan, W. Z. (2009). Strategies for the planning of optimum landfill sitting decision-making. *Journal of Sains Malaysiana*, 457–462.

Suttibak, S., & Nitivattananon, V. (2008). Assessment of factors increasing the performance of solid waste recycling programs. *Resources, Conservation and Recycling,* 45–56.

Tariq, Y., Mostafizur, R. (2007). Monitoring quantity and characteristics of municipal solid waste in Dhaka city. *Environmental Monitoring and Assessment, 135*, 3–11.

Tchobanoglous, G., Theisen, H., & Vigil, S. (1993). Integrated solid waste management. In: Engineering principles and management issues. Singapore: McGraw-Hill Inc.

Thomas, C. (2001). Public Understanding and its Effect on Recycling Performance in Hampshire and Milton Keynes. Int. *J. Resou., Conver. Recyc., 32*, 259-274.

Tikka, P.M., Kuitunen, M. and Tynys, S.A. (1999). Effects of educational background on students' attitudes, activity levels and knowledge concerning the environment. *J. Environ. Educa., 31*, 12-8.

Tonglet, M., Phillips, P.S. and Bates, M.P. (2004). Determining the drivers for householder behavior: waste minimization compared to recycling. *Int. J. Resou., Conver. Recyc., 42*, 27-48.

Tucker, J.A.; Guess, a.; Barbera, P.; Vaccari, C.; Siegel, A.; Sanovich, S.; Stukal, D.; Nyhan, B. Social media, political polarization, and political disinformation: A review of the scientific literature. *SSRN Electron. J., 2018*, 1–95.

United Nations Development Programme – UNDP. (2008). Malaysia developing a solid waste management model for Penang. Retrieved from http://webcache. googleusercontent.com/search?q=cache:Di7wCVOzZAcJ :www.undp.org.my/ uploads/SWM-2008 final.pdf+&cd=1&hl=en&ct=clnk.

US Environmental Protection Agency. Wastes: resource conservation-reuse, recycle. Retrieved from http://www.epa.gov/waste/conserve/rrr/recycle.htm

Vining, J. and Ebreo, A. (1990). What makes a recycler? A compression of Recyclers and Non-recyclers. *J. Environ. Behav., 22*, 55-73.

Williams, I.D. (2005). Waste strategies for local authorities: a systematic approach: Paper presented at the Annual Conference of CIWM, Raising Standard.

Williams, I.D. and Kelly, J. (2003). Green waste collection and the public recycling behavior in the Borough of Wyre, England. *Int. J. Resou., Conver. Recyc., 38***,** 139–160.

World Bank, Decision makers' guide to municipal solid waste incineration. Available from http://web.mit.edu/urbanupgrading/urbanenvironment/ resources/references/pdfs/DecisionMakers.pdf

Yunus, M. N. M. & Kadir, K. A. (2003). The development of solid waste treatment technology based on refuse deprived fuel and bio gasification integration. Paper presented in international symposium on renewable energy, Kuala Lumpur, Malaysia.

Zimmerman, J. (1989). A social cognitive view of self-regulated academic learning. *J. Educa. Psycho., 81***,** 329-339.