

<https://doi.org/10.17576/akad-2019-89SI2-05>

A Survey on Perceptions of Legal and Non-Legal Factors Affecting Sustainable Solid Waste Management in Malaysia

Kaji Selidik Perspektif Faktor Undang-undang dan Bukan Undang-undang yang Mempengaruhi Kelestarian Pengurusan Sisa Pepejal di Malaysia

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ABSTRACT

Solid waste needs to be sustainably managed in order to mitigate its adverse impacts on the environment and human well-being. Sustainable solid waste management contributes to three important aspects of sustainable development, that is, environment, economic and social. It is clear that Malaysia aims to establish a sustainable solid waste management which is evident with the passing of the Solid Waste and Public Cleansing Management Act 2007 (Act 672). Act 672 introduces federalization and privatization of solid waste management in Peninsular Malaysia and Federal Territories of Putrajaya and Labuan. Nevertheless, various issues related with solid waste management in Malaysia give an indication that sustainable solid waste management is yet to be fully achievable in Malaysia. This study was conducted to examine level of perceptions of relevant authorities/agencies of legal and non-legal factors affecting sustainable solid waste management in Malaysia. Collection of data for this study was conducted through face to face interview by using questionnaire and the circulation of the questionnaire form. The study finds that as the average of agreement percentage for six positive statements on legal factors affecting solid waste management in Malaysia is high, all the legal factors are important to facilitate the practice of sustainable solid waste management in Malaysia. Besides, the non-legal factors are also important considerations in facilitating sustainable solid waste management in Malaysia though by comparison, the percentage of agreement for legal factors is higher than non-legal factors.

Keywords: Solid waste; survey; factors; sustainable; Malaysia

ABSTRAK

Sisa pepejal perlu diurus secara lestari untuk mengurangkan kesan buruk terhadap alam sekitar dan kesejahteraan manusia. Kelestarian pengurusan sisa pepejal ialah pengurusan sisa pepejal yang menyumbang kepada tiga aspek penting pembangunan lestari, iaitu, alam sekitar, ekonomi dan sosial. Adalah jelas bahawa Malaysia mensasarkan untuk mengadakan kelestarian pengurusan sisa pepejal dengan meluluskan Akta Pengurusan Sisa Pepejal dan Pembersihan Awam 2007 (Akta 672). Akta 672 memperkenalkan federalisasi dan penswastaan pengurusan sisa pepejal di Semenanjung Malaysia dan Wilayah-wilayah Persekutuan Putrajaya dan Labuan. Walaubagaimanapun, pelbagai isu berkaitan pengurusan sisa pepejal di Malaysia memberi indikasi bahawa kelestarian pengurusan sisa pepejal belum dicapai sepenuhnya di Malaysia. Kajian ini dijalankan untuk melihat tahap persepsi pihak autoriti atau agensi yang berkaitan mengenai faktor undang-undang dan bukan undang-undang yang mempengaruhi kelestarian pengurusan sisa pepejal di Malaysia. Kutipan data bagi kajian ini telah dijalankan secara edaran dan temubual bersemuka menggunakan borang soal selidik. Kajian mendapati bahawa purata peratusan persetujuan bagi enam kenyataan positif mengenai faktor undang-undang yang mempengaruhi pengurusan sisa pepejal di Malaysia adalah tinggi. Oleh itu semua faktor perundangan adalah penting untuk membantu amalan pengurusan sisa pepejal yang lestari di Malaysia. Selain itu, faktor bukan undang-undang juga merupakan pertimbangan penting dalam membantu pengurusan sisa pepejal yang lestari di Malaysia walaupun secara perbandingan, peratusan persetujuan untuk faktor undang-undang adalah lebih tinggi daripada faktor bukan undang-undang.

Kata kunci: Sisa pepejal; kaji selidik; faktor-faktor; lestari; Malaysia

INTRODUCTION

Solid waste management is a global environmental issue throughout the world where due to the ineffective management of solid waste, waste generation could give rise to health problems and adverse effects on the environment (Hwa 2007). Therefore, it is crucial to manage solid waste according to sustainable development. According to the Guidelines issued by the United Nations Institute for Training and Research (UNITAR), waste management policy contributes to the environmental, economical and social features of sustainable development, that is, through the following ways: first is the environment, that is “by reducing or eliminating adverse impacts on the local and general environment and minimizing resource extraction”; second is economic, that is “by improving economic efficiency, especially in resource extraction and use, by reducing the budget needed for solid waste collection services, treatment and disposal, and by the creation of markets for the recyclables”; and third is social, that is “by reducing or eliminating adverse impacts on healthy and delivering more attractive and pleasant human settlements, better social amenity, sources of employment, and potentially a route out of poverty for some of the poorest members of the community” (United Nations Institute for Training and Research 2013). Bell, Mc Gillivray & Pedersen (2013) emphasized that the key indicator of sustainable waste management would be a continuous reduction in the volume of waste generated. Therefore, sustainable solid waste management contributes to the environmental, economical and social features of sustainable development, and this is shown by the decrease in waste generation.

Malaysia aspires to establish a sustainable management of solid waste. Nevertheless, it is pointed out that the emphasis of the existing policy and plan strategies on removal and disposal of solid waste as compared to the use of waste materials as resources has caused source separation, recycling and composting which constitute sustainable option become a challenge in Malaysia (Moh & Latifah Abd Manaf 2017). As far as sustainable landfilling practices are concerned, economic limitations in terms of lack of financial support and increase in the price of land are among the issues that need to be dealt with in Malaysia (Agamuthu 2014).

Specifically, the inadequate financial support from the government has resulted in the monopoly by certain companies in providing waste treatment

and disposal services (Agamuthu 2014). It is also highlighted that there is a policy in Malaysia which hinders financial institutions from investing in waste management projects which resulted in ‘just enough’ attitude by the waste managers rather than establishing ‘self-sustained landfill’ due to the reason that they have a lack of resources to establish sustainable landfills (Agamuthu 2014). Apart from that, due to the increase in the price of land, new landfill’s locations have fewer infrastructures or none at all for the purpose to reduce the capital cost to develop a landfill (Agamuthu 2014). This gives an indication that sustainable solid waste management is yet to be fully achievable in Malaysia.

OVERVIEW ON SOLID WASTE MANAGEMENT

“*Solid Waste*” is defined by Bailey (2004) as any solid material discarded as waste, for example garbage, sludge from sewage treatment plants, commercial and domestic refuse, and mining slag or spoil. It may include hazardous waste, such as refuse from hospitals or industrial plants. Chapter 21 of Agenda 21 provides that solid wastes include “all domestic refuse and non-hazardous wastes such as commercial and institutional wastes, street sweepings and construction debris”.

Solid Waste is defined under Section 2 of the Solid Waste and Public Cleansing Management Act 2007 (Act 672) as follows: “Solid waste includes (a) any scrap material or other unwanted surplus substance or rejected products arising from the application of any process; (b) any substance required to be disposed of as being broken, worn out, contaminated or otherwise spoiled; or (c) any other material that according to this Act or any other written law is required by the authority to be disposed of, but does not include scheduled wastes¹ as prescribed under the Environmental Quality Act 1974 [Act 127], sewage² as defined in the Water Services Industry Act 2006 [Act 655] or radioactive waste³ as defined in the Atomic Energy Licensing Act 1984 [Act 304]”.

Therefore, based on the above provision, solid waste means “any scrap material or other unwanted surplus substance or rejected products, any substance required to be disposed of, or any other material based on Act 672 or any other written law that is required by the authority to be disposed of and the three types of wastes, namely, scheduled wastes, sewage and radioactive waste are not included”.

In Malaysia, solid waste management was under the responsibility of local governments and state governments before 1995 as indicated under the Local Government Act 1976 (Act 171) (Solid Waste and Public Cleansing Management Corporation (SWCorp) 2016). In this regard, the Local Government Act 1976 under its section 72 (1) (a) states among others that a local authority shall have power to do all or any of the following things which include “to establish, maintain and carry out such sanitary services for the removal and destruction of, or otherwise dealing with, night soil, slops rubbish, litter, dead animals and all kinds of refuse and effluent”. Amid that material time, there was specific role of the Federal, State and local governments where the local governments were responsible for direct solid waste collection services or contracted these services to private contractors. In the meantime, the federal government through the Ministry of Urban Wellbeing, Housing and Local Government, Ministry of Health, and Economic Planning Unit gave technical and financial assistance only and State Governments had function in providing land for disposal facilities and role in the administration of the local authorities (Moh & Latifah Abd Manaf 2017). The duties of the local authorities were to collect and transport waste to the disposal site and manage the operation of recycling centers or contract them out to the private sectors (Moh & Latifah Abd Manaf 2014). There were several issues faced by the local government such as financial problem and inadequacy of infrastructure and expertise especially when the generation of solid waste has been increasing due to the growing number of population (Mazlin Mokhtar et al. 2010).

On 6 September 1995, the cabinet ministers approved for the privatization of solid waste management. Therefore, interim privatization was executed on 8 April 1998 in middle zone and south zone and on 1 November 2009 in north zone before full privatization which began on 1 September 2011 (Solid Waste and Public Cleansing Management Corporation (SWCorp) 2016). A long term agreement was unrealistic due to the requirement that a legislation should be passed first to shift the executive authority to the federal government (Nadzri Bin Yahaya & Larsen 2008).

In 2007, the Parliament passed the Solid Waste and Public Cleansing Act 2007 (Act 672) which was executed formally in 2011. With the enactment of Act 672, the authority governing solid waste and public cleansing was changed from state governments and

local authorities to the Federal Government (Md. Abdul Jalil 2010). The institutional framework in Peninsular Malaysia has likewise been improved with the federalization of solid waste management under Act 672. This is anticipated to bring major transformations and contemporary challenges in waste management in Malaysia (Periathamby Hamid & Khidzir 2009). The importance of the Solid Waste and Public Cleansing Management Act 2007 (Act 672) could be seen in its aim to uniform solid waste management in Malaysia and the introduction of the Act has enhanced economic growth in the solid waste management sector; for instance, the long term of concession has provided the concession companies good opportunities to invest for good solid waste management facilities.⁴ Nevertheless, not all states in Malaysia have agreed with the implementation of Act 672. It is currently enforced only in Johor, Kedah, Melaka, Negeri Sembilan, Pahang, Perlis, and the Federal Territories of Kuala Lumpur and Putrajaya. The States of Perak, Selangor, Pulau Pinang, Kelantan, Terengganu and Federal Territory of Labuan have not implemented Act 672 yet.

LITERATURE REVIEW ON FACTORS AFFECTING SOLID WASTE MANAGEMENT

The sustainable solid waste management relies upon an integrated approach which incorporates factors such as technological, institutional and financial aspects (S. Saxena, R.K. Srivastava & A.B. Samaddar 2010). A literature proposes that factors which affect sustainable waste management are: “public health; environmental protection; resource value of waste; closing the loop; institutional and responsibility issues, and public awareness” (Wilson 2007). P. Agamuthu, K.M. Khidzir & Fauziah Sahul Hamid (2009) at that point assembled the above drivers into four, that is, human, economic, institutional and environmental drivers. Technical, environmental, financial, socio-cultural, institutional, and legal factors impact the successful management of solid waste (Guerrero, Maas & Hogland 2013).

Among factors that impact solid waste generation is legislation and policy (Hasnah Ali et al. 2012) which are viewed as government instruments to help enhance solid waste management programmes. Besides, Halvorsen (2012) claims that legislation may strengthen norms which ultimately will build social sanctions and sentiments of guilt if society

does not obey the legislation (Halvorsen 2012). Solid waste management which is not effective demonstrates the inadequate implementation of policy in pragmatic terms (Muhamad Azahar Abas & Wee 2014).

Malaysia's Solid Waste and Public Cleansing Management Corporation states that major factor which affects sustainable solid waste management is the effective, efficient and advanced management in order to ensure the environmental sustainability beside the reduction of resource usage and environmental protection at the stage of production and distribution for the purpose to avoid wastage of the usage and to increase the rate of recycled materials productions (SWCorp 2016).⁵

It could be seen from the above discussion that there is a variety of factors that affect sustainable solid waste management which include human, economic, institutional and environmental factors. Hence, in order to study perspective of legal and non-legal factors affecting sustainable solid waste management in Malaysia among those who are working with ministry/department/corporation/agency related with solid waste management in Malaysia, a survey was conducted from 8 May 2016 until 21 June 2016.

OBJECTIVE OF THE SURVEY

This survey was conducted to obtain the following:

1. Profile of respondents
2. Legal factors affecting solid waste management in Malaysia
3. Non-legal factors affecting solid waste management in Malaysia.

A total of 33 respondents comprising legal officers, environmental health officers, and other officers/staffs involved in solid waste management were administered the survey.

METHODOLOGY

Research on factors affecting solid waste management in Malaysia was conducted through collection of data to assess agreement in the form of percentage from samples of officers/staffs involved in solid waste management. Data is sought through responses written in questionnaire survey form. Questions are designed to get information on respondents' profile, respondents' perceptions on "legal and non-legal factors affecting solid waste management in

Malaysia" and respondents' comments or suggestions to improve the management of solid waste in Malaysia. A total of 33 respondents have answered this questionnaire survey. The respondents were from ministry and agency involved in solid waste management in Malaysia. Collection of data for this survey was conducted through face to face interview by using questionnaire and the circulation of the questionnaire form.

FINDINGS

The discussion on the findings is divided according to the parts provided, that is, respondents' profile, level of agreement on legal factors affecting solid waste management, level of agreement on non-legal factors affecting solid waste management in Malaysia and comments and suggestions of the respondents on solid waste management improvement.

RESPONDENTS' PROFILE

From the total of 33 respondents, 51.5 % respondents were from management and professional group while 48.5 % were not from management and professional group. Distribution of the designations of respondents are as illustrated below in Figure 1.

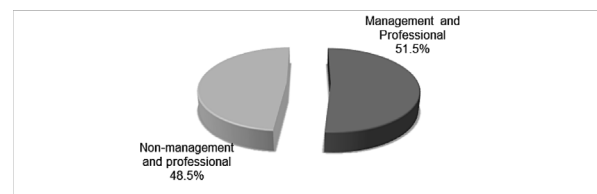


FIGURE 1. Distribution of respondents according to group of designation

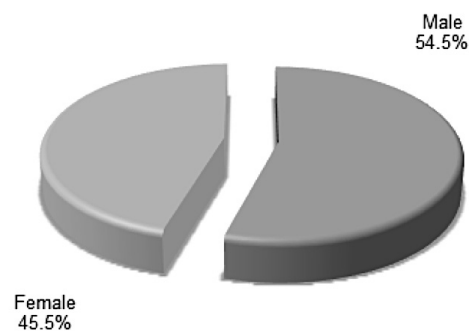


FIGURE 2. Distribution of respondents according to gender

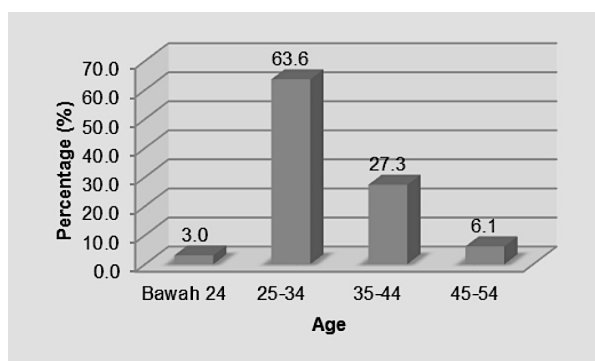


FIGURE 3. Distribution of respondents according to age

Out of 33 respondents, 54.5% are male while the rest are female (45.5%) (as illustrated in Figure 2). Figure 3 indicates that more than half of the respondents are of the age between 25 to 34 years old (63.6%), followed by 35 to 44 years old with 27.3% and 6.1% of the respondents are of the age

45-54 years old. The rest are respondents aged below 24 years old (3.0%).

Approximately half of the respondents hold degree (48.5%), followed by holders of diploma/matriculation level of education (33.3%) and 15.2% SPM/STPM holders. Only 3.0% of the respondents hold master's degree.

Table 1 provided below shows distribution of respondents according to the place and States where they are working. Some of them are working at the Solid Waste and Public Cleansing Management Corporation (54.5%), followed by Alam Flora Sdn. Bhd (15.2%) and the National Solid Waste Management Department Malaysia (Ministry of Urban Well-being, Housing and Local Government) and Town Council of Sepang, that is, 12.1% respectively. Most of them are working in Kuala Lumpur (57.6%), followed by Selangor (21.2%) and Putrajaya (12.1%).

TABLE 1. Distribution of respondents according to place and State where they are working

Elements		No.	%
Working place (Ministry or agency)	Alam Flora Sdn Bhd	5	15.2
	E-Idaman Sdn Bhd	1	3.0
	Jabatan Pengurusan Sisa Pepejal Negara, KPKT	4	12.1
	Majlis Daerah Kerian, Perak	1	3.0
	Majlis Perbandaran Sepang	4	12.1
	Perbadanan Pengurusan Sisa Pepejal dan Pembersihan Awam, KPKT	18	54.5
	Kuala Lumpur	19	57.6
	Putrajaya	4	12.1
	Negeri Sembilan	1	3.0
	States	Kedah	1
Selangor		7	21.2
Perak		1	3.0
Total		33	100.0

According to the responses, most of the respondents have worked around the period between 5 until 10 years (54.5%), followed by 30.3% respondents who have worked for less than 5 years and the rest, 15.2% have worked for more than 10 years. In management and professional group, the highest percentage is the respondents who have worked between 5 until 10 years with 30.3% for non-management and professional group.

LEGAL FACTORS AFFECTING SOLID WASTE MANAGEMENT IN MALAYSIA

For the purpose to investigate "legal factors affecting solid waste management in Malaysia", respondents need to give their views on the level agreement towards "legal factors affecting solid waste management in Malaysia". Respondents are provided with six (6) questions where each question requires respondents to give response by stating their level of agreement, that is, whether they strongly agree, agree, neutral, disagree or strongly disagree. Percentage of response for each

statement according to level of agreement is as provided below.

As illustrated in Figure 4, the average of agreement percentage (strongly agree and agree) for six (6) positive statements on “legal factors affecting the management of solid waste in Malaysia” is high, that is, 92.9%. Agreement percentage of 94.0% is noted for statements “satisfactory policy facilitates a sustainable solid waste management” and “adequate regulations supporting the implementation of the laws facilitate a sustainable solid waste management”. Majority of respondents (93.9%) state their agreement for “strategic plans for solid waste management facilitate a sustainable solid waste management” and “good coordination and cooperation among institutions/agencies related with solid waste management facilitates a sustainable solid waste management” whereas 90.9% respondents state their agreement for “comprehensive laws facilitate a sustainable solid waste management” and “enforcement of the laws and regulations related with solid waste management as well as comprehensive monitoring process facilitate a sustainable solid waste management”.

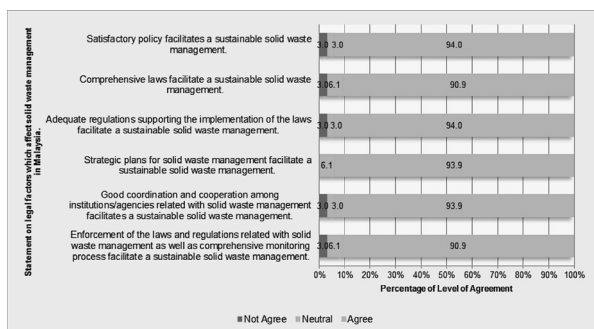


FIGURE 4. Respondents' perception on legal factors affecting solid waste management in Malaysia

NON-LEGAL FACTORS AFFECTING SOLID WASTE MANAGEMENT IN MALAYSIA

Respondents were asked on their view towards “non-legal factors affecting solid waste management in Malaysia”. The respondents were forwarded with 13 questions where they need to give response by stating their level of agreement, that is, whether they strongly agree, agree, neutral, disagree or strongly disagree. Total and percentage of response for each statement according to level of agreement is provided below.

The average of agreement percentage (strongly agree and agree) for 13 positive statements on “non-

legal factors affecting solid waste management in Malaysia” is high, that is 83.5%. Agreement percentage of 90.9% is noted for statement “a sound technical skill among personnel involved with solid waste management facilitates a sustainable solid waste management” and “evaluation of environmental impacts related with solid waste management facilitates a sustainable solid waste management”.

Besides, 93.9% state agreement on “adequate infrastructures and facilities facilitate a sustainable solid waste management” whereas 94.0% respondents state their agreement on “vehicles which are well maintained for the purpose to transport solid waste facilitate a sustainable solid waste management”. For statements “a good environmental control system facilitates a sustainable solid waste management”, a total of 87.9% state their agreement while 72.7% respondents agree with statement “routes used for solid waste haulage which are well maintained facilitate a sustainable solid waste management”.

Furthermore, 87.9% respondents agree with statement “community readiness for contributing in solving solid waste related issues facilitates a sustainable solid waste management” and “community awareness in performing specific function as contained in solid waste management strategic plan facilitates a sustainable solid waste management”. On the other hand, 84.8% agree with statement “adequate financial support by the government facilitates a sustainable solid waste management” and 81.8% for statement “adequate relevant resources facilitate a sustainable solid waste management.”

There are three (3) statements with note percentage of agreement below 80.0%, that is, for statement “the provision on incentives for members of the society who are involved actively in the management of solid waste facilitates a sustainable solid waste management” 66.7%, “active participation by members of the society in decision making process on matters related with solid waste management facilitates a sustainable solid waste management.(Example: views of the public are taken into consideration before any plan or regulation is finalized), 72.7% and 72.8% for statement “willingness of the users to pay for the solid waste service charge facilitates a sustainable solid waste management” (as indicated in Figure 5 and 6 as provided below).

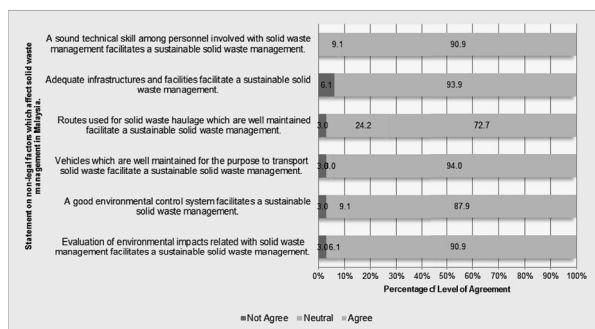


FIGURE 5. Respondents; perception on non-legal factors affecting solid waste management in Malaysia

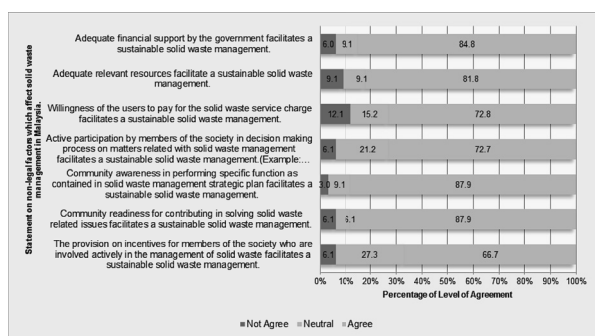


FIGURE 6. Respondents' Perception On Non-Legal Factors Affecting Solid Waste Management In Malaysia

COMMENTS AND SUGGESTIONS OF RESPONDENTS ON SOLID WASTE MANAGEMENT IMPROVEMENT

Respondents' comments were also sought on legal and non-legal factors affecting sustainable solid waste management in Malaysia. Generally, their comments can be divided into three parts, that is, laws, enforcement, and public participation.

LAWS

On the legal factor, it is emphasized that there are several states which have not implemented Act 672. One of the states is Selangor where the local government implements by-laws based on Selangor draft enactment on solid waste collection, dumping, disposal, and public cleansing for the purpose of enhancing sustainable and effective solid waste management. Interestingly, it is also viewed that the existing Solid Waste and Public Cleansing Management Act 2017 should be made applicable to all states without the need for their agreement in order to

have a uniform law all over the country. Nevertheless, it is argued that there is a need to review the existing law in order to strengthen the implementation of the law on solid waste management in Malaysia due to the reason that the current implementation of the law is inadequate. A cross-cutting law which could be implemented by all agencies involved in solid waste management should be established in order to develop a holistic regulation. In addition, there should be only one comprehensive Act which contains all cleansing aspects which could be gathered from all other Acts and by-laws in order to avoid the overlapping of functions of various agencies.

Further, laws relating to solid waste management should be reviewed based on the Federal Constitution and they should be comprehensive enough to cover all relevant matters. In contrast, it is said that Act 672 and regulations made under it are adequate if there is strict and continuous enforcement. A respondent also agreed that the existing regulations are not enforced comprehensively in all states due to several factors.

ENFORCEMENT

It is agreed that sustainable solid waste management requires the enforcement of laws in the area of service particularly the recycling programmes. The government should monitor the enforcement agencies in order to control the management of waste specifically toxic waste. Therefore, adequate staff should be placed at respective areas. On top of that, it is of the utmost importance to have standard enforcement in all states regardless of political interests and that federal and state laws should both be implemented at par to avoid misconceptions.

In addition to that, the monitoring authorities should ensure that existing laws are effectively enforced to increase awareness on the seriousness of committing solid-waste-related offences such as illegal dumping. State authorities should cooperate and give commitments as contained in the agreement to ensure sustainable environment by managing solid waste effectively. Enforcement of the relevant laws is important to educate society on good values and environmental protection. Strict enforcement of laws found in countries such as Japan and Singapore should be adapted in Malaysia. From the aspect of penalties, beside compound fines, social work sentences should be meted to increase public awareness. In contrast, there is also argument on whether there should be comprehensive laws with strategic action plan which aim more on education and not merely on punishing offenders.

PUBLIC PARTICIPATION

An important non-legal factor is active public participation in the management of solid waste without expecting any government's incentive because the public should be made aware that effective waste management is important for environmental protection. Nevertheless, there is a view that incentives is an important factor beside education and public awareness campaigns. Besides, the public's willingness to pay a reasonable amount for service is vital because solid waste management is costly. The reality is that though there are many efforts to increase public awareness on solid waste management issues, proper practices are still lacking and hardly part of daily routines. Transforming the public in Malaysia to make the best practice in solid waste management a habit is difficult compared to that in developed countries. In addition, the presence of many foreign nationals in Malaysia requires other efforts in delivering information to them on solid waste management practices.

Further, public's awareness and understanding on effective solid waste management such as recycling should be continuously implemented in order to develop a sustainable community because the level of public awareness in this matter is still low. The younger generation should be educated to increase their awareness on the importance of environmental protection such as by introducing modules or subjects including solid waste management at primary schools. Early education should also concentrate on educating children on separation of solid waste at source. Attention should also be paid to non-landed properties on the practice of solid waste management.

Respondents also held the view that several factors are relevant in solid waste management namely, public attitudes, proper procedures for solid waste disposal, separation of waste at home, appointment of qualified contractors who have sufficient logistic facilities, the practice of professional attitude regardless of political ideology, and cooperation among agencies which have related

jurisdictions. Moreover, it was pointed out that traffic congestion particularly in high rise buildings areas hinders sustainable solid waste management. A respondent also agreed that the separation of solid waste and recycling could enhance sustainable solid waste management. It is also important not to implement solid waste management on the basis of profit and business because the focus should be more on operational costs and environmental issues.

DISCUSSION

A survey to identify factors affecting solid waste management in Malaysia was conducted from 8 May to 21 June 2016 through face-to-face interviews and the circulation of a questionnaire prepared by the researcher. Areas covered in the survey were Selangor, Kuala Lumpur, Putrajaya, and several locations in Peninsular Malaysia.

A total of 33 participants responded to the survey and majority of them were from the management and professional group (51.5%). 54.5% of the respondents were male. Age-wise, most of the respondents were between 25 to 34 years old (63.6%), Most of the respondents were from SWCorp, Ministry of Urban Well-being, Housing and Local Government (54.5%) and most of them worked in Kuala Lumpur (57.6%),

Most of the respondents had been in service between 5 to 10 years (54.5%). Among the management and professional group, the highest percentage comprised respondents who had worked between 5 to 10 years, similarly for non-management group with the percentage of 30.3%.

As stated in the findings, the average of agreement percentage (strongly agree and agree) for six positive statements on legal factors affecting solid waste management in Malaysia is high, that is, 92.9%. Therefore, it is submitted that all the legal factors are important to facilitate the practice of sustainable solid waste management in Malaysia. Based on the rank of percentage of agreement, these are factors that should be taken into consideration:

No.	Legal Factors
1	Satisfactory policy (94.0%)
2	Adequate regulations supporting the implementation of the laws (94.0%)
3	Strategic plans for solid waste management (93.9%)
4	Good coordination and cooperation among institutions/agencies related with solid waste management (93.9%)
5	Comprehensive laws (90.9%)
6	Enforcement of the laws and regulations related with solid waste management as well as comprehensive monitoring process (90.9%)

In respect of non-legal factors, the average of agreement percentage (strongly agree and agree) for 13 positive statements on non-legal factors affecting solid waste management in Malaysia is high at 83.5%. Therefore, the non-legal factors are also

important considerations in facilitating sustainable solid waste management in Malaysia. Based on the rank of percentage of agreement, the important non-legal factors are as follows:

No.	Non-legal Factors
1	Vehicles which are well maintained for the purpose to transport solid waste (94.0%).
2	Adequate infrastructures and facilities (93.9%).
3	A sound technical skill among personnel involved with solid waste management (90.9%).
4	Evaluation of environmental impacts related with solid waste management (90.9%).
5	A good environmental control system (87.9%).
6	Community awareness in performing specific function as contained in solid waste management strategic plan (87.9%).
7	Community readiness for contributing in solving solid waste related issues (87.9%).
8	Adequate financial support by the government (84.8%).
9	Adequate relevant resources (81.8%).
10	Willingness of the users to pay for the solid waste service charge (72.8%).
11	Routes used for solid waste haulage which are well maintained (72.7%).
12	Active participation by members of the society in decision making process on matters related with solid waste management (72.7%).
13	The provision on incentives for members of the society who are involved actively in the management of solid waste facilitates a sustainable solid waste management (66.7%).

The last four non-legal factors listed above gain percentage less than 80.0%. This indicates that these factors are less significance as compared to other factors.

By comparing between the average percentage of agreement on legal factors and non-legal factors, the percentage for legal factors is higher than non-legal factors. Therefore, these legal factors should be given focus in enhancing sustainable solid waste management in Malaysia.

The respondents provided suggestions and comments among others on the need to review the existing laws; to have comprehensive and cross-cutting laws as well as strict enforcement; to impose monitoring on the enforcement agencies; to impose social work sentences beside compound fines; to have comprehensive laws and strategic plan which focus more on education; the importance to improve public participation and public awareness in this matter; the significance of the practice of solid waste separation and recycling to enhance sustainable solid waste management; and the importance to focus on operational costs and environmental issues in managing solid waste rather than to focus on business and profit.

CONCLUSION

Solid waste is one of the environmental concern which gains domestic and global attention. Sustainable solid waste management is therefore crucial in order to mitigate adverse impacts due to ineffective solid waste management. In Malaysia, a significant legal development took place in 2007 with the enactment of Act 672 which introduces federalization and privatization of solid waste management in Malaysia. A variety of factors influence sustainable solid waste management which include human, economic, institutional and environmental factors. A survey was conducted to investigate legal and non-legal factors affecting sustainable solid waste management in Malaysia. The findings indicate among others that there are important legal factors affecting solid waste management in Malaysia, that is, satisfactory policy and adequate regulations. It is also important to note that 90.9% of respondents of the survey agreed that comprehensive laws and regulations, their enforcement, and close monitoring processes facilitate sustainable solid waste management. Since the average of agreement percentage (strongly agree and agree) for six positive statements on legal factors affecting solid waste management in

Malaysia is high, therefore, all the legal factors are important to facilitate the practice of sustainable solid waste management in Malaysia.

In terms of non-legal factors, among others, solid waste management would be enhanced by the existence of adequate infrastructure and facilities and well-maintained vehicles. As the average of agreement percentage (strongly agree and agree) for 13 positive statements on non-legal factors affecting solid waste management in Malaysia is also high, the non-legal factors are also important considerations in facilitating sustainable solid waste management in Malaysia. By comparison, the percentage of agreement for legal factors is higher than non-legal factors. Besides, the respondents also give suggestions on law, enforcement and public participation in relation to solid waste management.

NOTES

- ¹ Section 2 of the Environmental Quality Act 1974 states that scheduled wastes means “any waste prescribed by the Minister in the regulations as scheduled wastes”.
- ² Section 2 of the Water Services Industry Act 2006 states that sewage means “any liquid discharges containing human excreta, animal or vegetable matters in suspension or solution derived from domestic activities and being generated from household, commercial, institutional and industrial premises including liquid discharges from water closets, basins, sinks, bathrooms and other sanitary appliances but excluding rain water and prohibited effluent”.
- ³ Section 2 of the Atomic Energy Licensing Act 1984 states that radioactive waste means “any waste which consists wholly or partly of (a) a substance or article which if it were not waste would be radioactive material; or (b) a substance or article which has been contaminated in the course of the production, storage or use of any radioactive material, nuclear material or prescribed substance or by contact with, or proximity to, any other waste within the meaning of paragraph (a) of this definition”
- ⁴ Interview with Dato’ Dr. Nadzri bin Yahaya, Deputy Secretary General (Natural Resources), Ministry of Natural Resources and Environment Malaysia, Wisma Sumber Asli, Putrajaya, 10 March 2017. He was the Director General of the National Solid Waste Management Department Malaysia for the period of 7 years starting from 2006.
- ⁵ SWCorp, 19 February 2016 (Written response by the SWCorp through its officer, Mohamed Nur Shafiq bin Mohamed Hanif, Engineer, Domestic Waste and Public Cleansing Division, SWCorp).

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