

CHALLENGES IN 3R IMPLEMENTATION AND PUBLIC PARTICIPATION

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ABSTRACT The increase in waste generation in the world today alarms the waste managers. The cost in managing waste keeps increasing annually while the highly preferred conventional option of waste management namely landfill disposal seems to lose its efficiency in many developing nations. Thus, implementation of an integrated waste management is crucially important to ensure that human health and environmental protection are preserved. Nevertheless, the implementation requires the adoption of various strategies since numerous factors influence the success of an integrated waste management system. Among the most vital factors is public participation. Being the main contributor of waste in a country, it is imperative that the public play an effective role in the waste management system. This research aims to discuss the challenges and 3Rs participation among the public in Malaysia. The survey targeted 625 respondents randomly selected from Klang Valley area. Series of questions were given to each respondent to determine their level of awareness in issues and challenges of 3R activities in Malaysia. Additionally, questionnaires were also formulated to determine the public attentiveness and understanding in 3Rs concepts. Collated data were analyzed to deploy the level of awareness and other relevant factors. Results indicated that the majority (83%) of respondents believed that they understand the concept of 3Rs. However, the actual responses from the assessment within the survey indicated that their main understanding is on recycling rather than 3R on the whole. These findings indicate the need for extensive campaign on 3Rs rather than on recycling strategy alone. It is necessary since Recycling is placed at the very bottom of the 3Rs practices while Reduce and Reuse are of higher priority. As for the actual practice, though more than 88% know the concept of recycling, only less than 30% practice it. Interestingly, various issues have been identified as the reasons not to participate in 3Rs activities. Among others are non-mandatory program and lack of regulations on the indiscriminate disposal of MSW. Many respondents (70%) also believe that mandatory participation in 3Rs programs would be more effective in ensuring its success. Additionally, 26% of the respondents strongly believed that the Solid Waste Management and Public Cleansing Act 2007 can be the right engine in improving the current waste management scenario in the country. In conclusion, major actions need to be instigated in order to overcome various challenges for successful implementation of 3Rs program in the country.

(Keywords: 3Rs, Municipal solid waste, public participation, SPSS.)

INTRODUCTION

The unsightly scenario of improper waste management in many parts of the world indicates that the existing waste management system particularly in the developing nations has deteriorated from bad to worse. This is evident with numerous report and publication on the pollution impacts originating from the waste sector [1,2,3,4,5].

In fact, it is identified as one of the main environmental source of pollution within the developing Asian countries [6]. Indiscriminate disposal of municipal solid wastes (MSW) into landfills is very unsustainable that it is a trend in the developed nations to reduce their dependency on landfill as the method to manage the generated waste and curb environmental pollution. Nevertheless, it is undeniable that landfill is still

necessary for any waste management system. In addition, since its technology is simple while the cost is low, landfilling is highly preferred in most developing nations.

As a result, the current waste management in many of these countries are practicing unsustainable waste management approach as illustrated in Figure 1 where less effort and focus is given to the options at the higher hierarchy. The darker the shades of the option the more polluting it is to the environment. Due to the lack of 'cleaner' options in many developing countries, disposal of waste via landfilling is currently the most preferred practice [5,7]. As a result, MSW disposal ground become the main culprit to air, and water and soil pollutions, namely from the release of landfill gases and leachate, respectively. Thus, this calls for the urgent need for an improved waste management system.

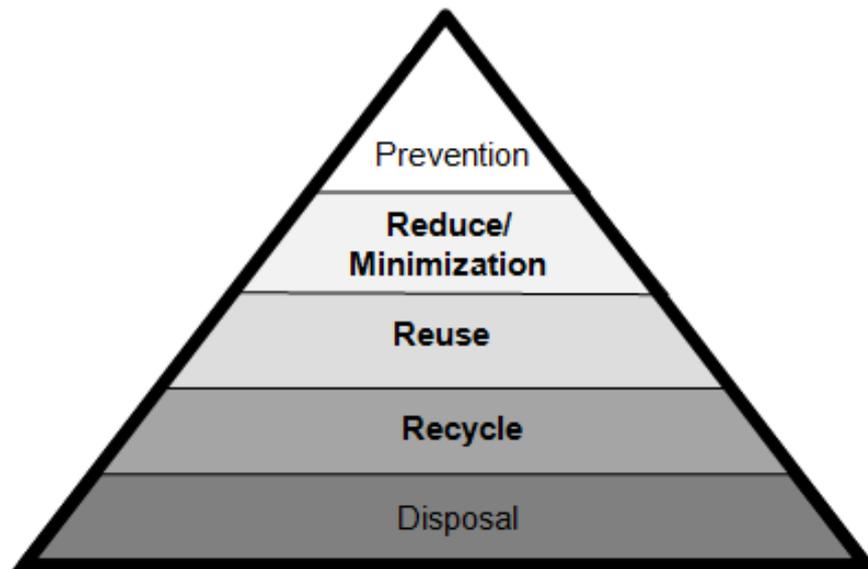


Figure 1: Common practice of waste management in many developing countries.

Evidently, other options within the integrated waste management hierarchy can promote a more efficient and sustainable waste management strategy that can abate and finally prevent environmental deterioration. This promising action has been proven to be successfully workable in many nations including Singapore, Japan, Denmark and Germany [8]. Waste management hierarchy highlights the need for MSW stream to undergo Reduce, Reuse and Recycling (3Rs) where waste can be diverted from its disposal route. This is

highly associated with the contemporary tendency in waste management system in moving towards a more environmental friendly concept [9] as illustrated in Figure 2. Of the highest inclination, reduction strategies are placed at the top, followed by reuse, recycle and finally disposal. Under conservative circumstances, the base of a waste management hierarchy necessitates waste disposal option should the possibility of energy recovery, recycling, reusing and reducing failed.

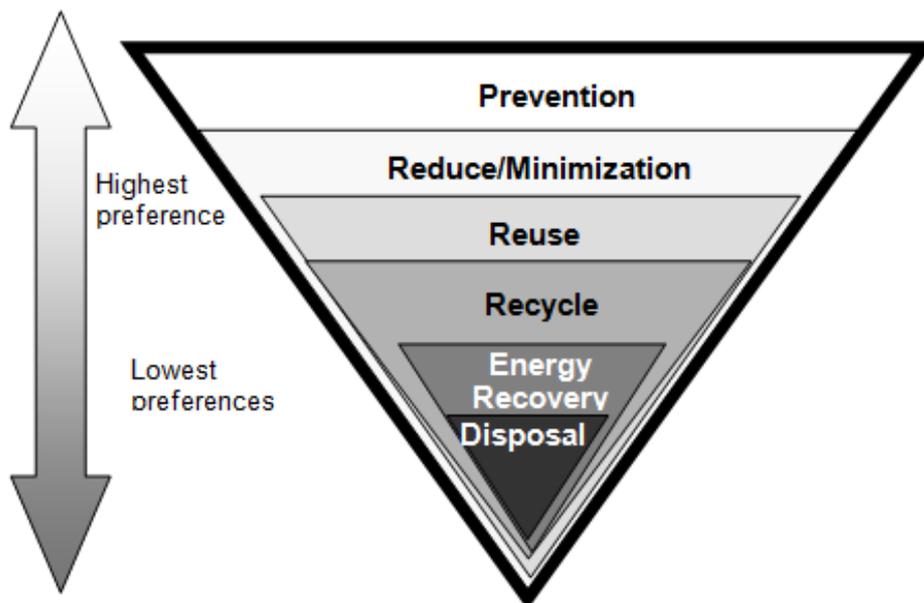


Figure 2: The waste management hierarchy towards sustainable development.

This approach which is the reversed of current conventional practices need to be applied for future planning, depicted as an inverted pyramid (Figure 2) with the smaller tip pointing downwards.

The highest predilection within a waste management hierarchy is waste prevention, to be achieved by not producing waste in the first place. "Prevention" is closely related to "reduction" in the 3R. This is because "reduction" can be expressed as action that results in prevention or minimization of wastes. To achieve sustainable development, "reduction" is the next highest preference after "prevention" as illustrated in Figure 2. This approach can be achieved by having a good consumption practice where functioning and usable items should not be thrown away if repairing and mending can improved its purpose. This is applicable to many consumer items such as clothing, furniture and electrical items. Instead of 'throw-away' habit, consumer should be practicing 'give-away' tradition. These appraisal techniques are applicable to any scale i.e. from large-scale commercial/industrial procedures to a small scale of an individual daily activity. Also, incorporating clean and efficient alternatives into the procedure help to effectively enhance "reduction" within a system.

Following "reduction" is "reuse". "Reduce" has a moderate desirability in the waste management hierarchy since it will be practiced if there is no possibility of preventing the generation of waste material. "Reuse" can be defined as reutilization of a waste, in its original state either for its novel purpose or a new use with no chemical or/and physical changes.

The practice of "reuse" was actually a normal habit of many communities with lower income level. This includes the use of various glass and plastics containers as food storage/containers in many homes. Nevertheless with improved standard of living, this practice has been abandoned due to the higher affordability of moderate and high income level groups. Thus, economic necessities usually drive the reutilization of wastes rather than the consciousness to avoid waste generation. Therefore, from the sustainable waste management point of view, the existence of financial incentives including deposit-refund scheme, for wastes reutilization is essential to promote the "reuse" concept, besides creative thinking (out of the box approach) or via appropriate policy and legislation.

Similar to waste reduction, the waste reutilization approach provide benefits as a result of the

improvement of resource efficiency, money-saving opportunities, and environmental preservation with less utilization of resources and less generation of waste, etc [5,7]. Additionally, reuse concept definitely enables significant lessening of the ecological footprint. However, reutilization also yields certain disadvantages. This includes the incurrence of extra cost when certain types of waste require extra expenses for cleaning or modification prior to their reutilization, as well as, wear and tear factor.

If "Reuse" is not possible, the next option will be "Recycling". Waste recycling encompasses retrieval of waste components into their various sources to manufacture new products. This third and last 3R application requires the waste to undergo physical and /or chemical changes in order to salvage valuable material within the waste material. This option has been one of the most favoured methods of solid waste disposal. Generally, recycling creates a healthy market for basic resources for industries, particularly when resource of concern is highly scarce. Recycling is defined as utilizing wastes as resources.

In Asia, recycling is reported to have a bearing on the inherent economic dynamics of the individuals within the industry [9]. Yet, recycling practice is highly dependable to various factors particularly economic returns. It is very common to see the retrieval of resources which are limited such as metal and plastic when its market price is fluctuating. However, when the market drop or discouraging, more of these components will be discarded indiscriminately, causing the total loss of the resources to landfills. Thus, it is crucial that valuable components including metal, paper, plastic and wood are retrieved for recycling purpose to prevent and minimize total loss of the resources.

For these obvious reasons, 3R is deemed important in ensuring an effective and sustainable waste management system. However, theories are not easily implemented into the actual ground practice. This is mainly due to the fact that various contributing factors need to be considered seriously while possible complications need to be identified and overcome.

Also, challenges and issues need to be pinpointed in order to identify the appropriate implementation strategies. This not only will ensure successful execution of a program but also allow the preparations to overcome obstacles encountered along the way. Among the most crucial factors in ensuring the success of a waste management

program is public participation. It is a well known fact that 3R program depend heavily on the participation of the general public and the private sector, as the waste generators. While more participation can be observed from the private sector, particularly from the industries, it is very lacking among the Malaysian public.

It is reported that Malaysians generate more than 30,000 tonnes of MSW everyday [7,10]. Approximately 95% of these wastes are sent to the 190 operating landfills in Malaysia without any treatment or retrieval activities. As a result, more than 50% of recyclables which exist in the MSW stream will be lost to the landfills [7].

The absence of waste separation activities hampered the retrieval of the recyclable wastes [11]. This is generally due to the throwing habits of Malaysians where all waste regardless of its recyclability nature will be mixed together in a single bag for disposal. As a result, the wastes generated are highly mixed and heterogenous. Thus, retrieval of recyclables prior to landfilling is very uneconomical and nearly impossible in Malaysia.

The implementation of 3R programs among Malaysians can be successful by encouraging the waste generators namely the household to conduct waste separation. A community will separate their MSW if they understand the need and urgency to take up 3R activities. Therefore, it is crucial to conduct research to find out the level of understanding on concepts of 3R. This research aims to seek the attentiveness and to determine the level of understanding on 3Rs concepts among the Malaysian public. It is also aimed to discuss the challenges in 3Rs participation among the general public in the country.

METHODOLOGY

Series of questions were given to each respondent to determine their level of awareness on 3Rs issues and its challenges in Malaysia. Additionally, questions were also given to test the level of understanding in 3Rs concepts among the respondents. The survey consisted of 35 close-ended questions where 30 questions focussed on the challenges in 3R participation and respondents' understanding on a variety of issues on reduce, reuse and recycling activities.

The survey involved randomly selected respondents from Klang Valley area covering various levels of age and different socio-economic background. The survey targeted more than 625

respondents to obtain 96% confidence level for a population of more than 100,000 inhabitants. Collated data were analyzed to deploy the level of awareness and other relevant factors.

RESULTS AND DISCUSSIONS

Results indicated that the majority (83%) of the respondents believed that they understand the concept of 3R. Approximately 84 % were absolutely correct that 3R consists namely of reduce, reuse and recycling. Yet, 16% were somewhat confused with the meaning of 3R. Given a list of 3R activities, many respondents (80%) were highly uncertain of reducing and reusing activities as a part of the 3R activities. Thus the results implied that the respondents thought 3R is only deals with the practices of recycling and nothing more. This generally due to the fact that less awareness and consciousness on reduce and reuse are instil among the Malaysian public. This is supported by the findings of Irra[12] on public perception in recycling. Nevertheless, majority of the public generally understand the types of activities which are related to recycling practices since they are able to identify the activities accurately.

Only 16% were totally correct in identifying all 3R activities while another 4% managed to get 70% correct answer. The remaining 80% failed to recognize all 3R activities listed in the questionnaires. Again, the actual responses from the assessment indicated that their main understanding is on recycling rather than 3R on the whole.

These findings indicate the need for extensive campaign on 3Rs among Malaysian public rather than on recycling strategy alone. It is very important since recycling is placed at the very bottom of the 3Rs practices while Reduce and Reuse are held at higher priority. Thus Recycling should only be the option should Reduce and Reuse options failed to be incorporated into the waste management system.

Consequently, more effort should be given to promote reduce and reuse programs in order to ensure that these higher tiers of the 3R hierarchy can be accomplished to the fullest prior to recycling. Additionally, this enables smaller ecological footprint for the individual as compared to recycling which sometimes can be energy extensive in retrieving the resources. Thus, extensive campaigns and education fair to popularize Reduce and Reuse option in the 3R

hierarchy should be planned by the government and need to be executed as soon as possible.

Based on the findings more than 80% of the respondents are fully aware of the recycling concepts. Yet, responses obtained from this survey indicated that very low percentage (30%) of the respondents participate in recycling. Thus, it can be concluded that understanding on certain concepts (namely recycling in this study) does not translate to active participation of the program. Regardless of the fact that they understood the concept of recycling, due to the lack of attentiveness it failed to drive their participation in recycling activities. As a result, very low recycling rate (15%) was recorded in the country's current recycling statistics, which indicated that only approximately 4,500 tonnes of MSW in Malaysia is recycled everyday [7,13].

Interestingly, many respondents (50%) believed that Malaysians are participative in 3R activities whereas 35% were not sure. This can be explained by the fact that recycling is not seen as an environmentally benefiting practises but merely an act of convenience. As a result, the public probably feel that if they recycle paper, aluminium cans or other recyclable material they are actively participative in recycling campaign regardless of the amount of recyclables and recycling frequency involved. This probably contributed to the fact that many are ignorant of the actual sustainable waste management concepts either due to lack of proper campaign, lack of knowledge and subsurface information dissemination, which failed to deliver the tangible purposes of recycling practices.

From the survey, 100% of the respondent indicated that they have never attended any training related to 3R in their work place. This may indicate that their lack of appropriate understanding on 3R concept is due to the negligence of employers to provide such trainings to their employees. This is rather crucial as working place can provide an excellent environment to nurture 3R practices among working adults. As for information and knowledge in recycling, most respondents probably obtained them via mass media and outside-working-place recycling campaigns. Again, this implies the needs for the government to encourage government and non-governmental institutions and also private entities to organize programs on 3R or recycling in order to provide a more comprehensive understanding to their subordinates. The government can play a crucial role by providing incentives including tax exemption to any entities that organize and educate their workers the importance of 3R and recycling in ensuring

sustainable waste management for the country [5,14].

From the incentive provision aspect, not a single respondent indicated that they have received any recognition from their employer from practicing 3R. Failure to acknowledge the voluntary practice of recycling might eventually lead to the disappointment of the recycler to be actively involved. It will lead to recyclers being discouraged by the response received. Worse situation can be seen if the recycling activities (which normally require some space for collection and storage) are seen as inconvenient practice in a limited space of the working area. This not only discourages the instillation of good recycling practices but also inhibit further participation in other recovery activities.

Therefore, in order to promote participation in recycling encouragement particularly from the employers is important to indicate and support the need of such good habit. This is so since many reports indicated that incentives play a crucial role in promoting recycling practices while ensuring continuous support in recycling activities [14,15,16,17]. Thus more attractive returns and rewards can positively encourage active participation in recycling since in many occasion fluctuating market value of recyclables in developing countries dictate the recovery rate of recyclables from the waste stream [7].

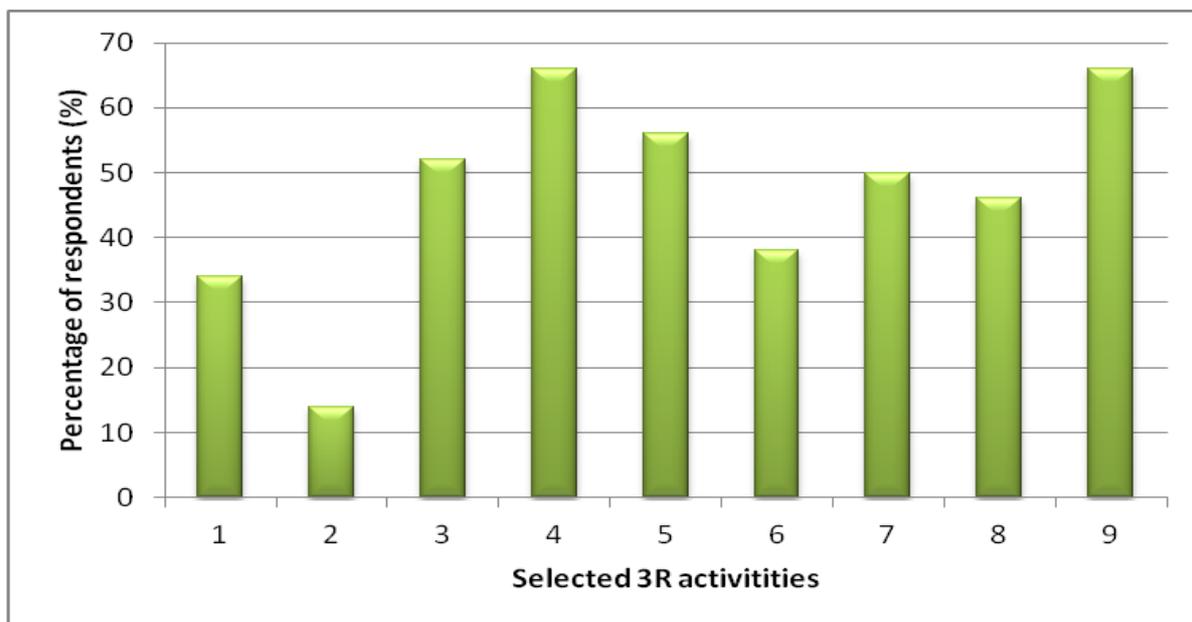
To further strengthen the issue on encouragement of recycling at work place, respondent were also asked on the recycling facility provided. More than 96% was not satisfied with the facilities that promote 3R activities provide by their company. This can be translated to the absence or insufficient number of bins available in their working place dedicated for recycling activities. Absence of recycling bins and other facility can dissuade recycling habits which will cause the employees to be complacent to discard their recyclables into the garbage bins. If this happened, not only it will instil unfriendly and unsustainable habits among the workers but it will also ensure the failure of the recycling campaigns launched by the government to promote and encourage recycling practices.

These findings imply the need for the government to re-evaluate the policy related to recycling campaign imposed on government and private agencies so that it can enhance the promotion of recycling in the country. With the right facility and encouragement, public in general will be called to participate in recycling and consequently develop

the sense of responsibility to practice more sustainable waste management options.

When enquiry whether respondents are satisfied or content to recycling at their place, only 20% indicated that they are comfortable to recycle at work. This low percentage again reflects the

ignorant of employers to assist the government in achieving higher recycling rate by not providing a comfortable and conducive environment to recycle. Nevertheless, many respondents actually practice some sort of 3R activities individually. Figure 3 depicts the percentage of respondents involved in various 3R activities at their working place.



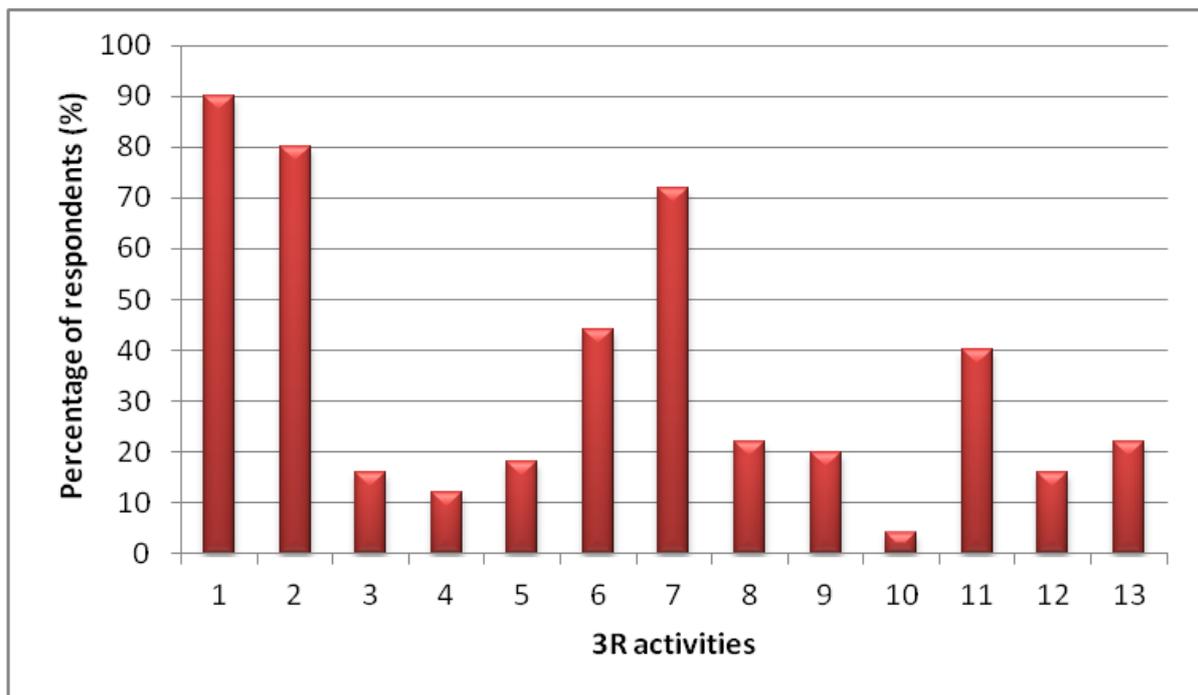
1. I separate different types of waste into the designated containers (paper, plastics etc).
2. I use my own food container when buying take-away food from the cafeteria.
3. I only use used paper to draft my work.
4. I print my work on both sides of paper.
5. I do not throw used paper with one blank page.
6. I switch off my computer/monitor during idle time.
7. I bring my own mugs to prepare my drinks.
8. I use used envelopes whenever possible.
9. I prefer washable forks, spoons, chopsticks etc. when eating in the cafeteria.

Figure 3: Selected 3R activities conducted by the respondents at working place/school.

As for the actual practice at home not a single respondent donate left-over food to others or compost the food waste. As a result, the wastes are disposed off into the MSW stream. This is agreeable with the results obtained from various findings where Malaysian MSW composed of more than 40% food waste [7,11,13].

As for the practice of 3R at home, all respondents indicated some involvement namely by collecting and recycling paper, plastic and metal. Figure 4 illustrates the selected 3R activities conducted by the respondents at home.

Interestingly, the use of disposable items including kitchen utensils and wares are very high where 84% admitted their dependency on such products. Only 16% stated that they do not use disposable kitchen wares at home. This probably is contributed by their ignorant and failure to realize that use of disposable wares though convenient is actually generating more waste. This could also attributed to the fact that usage of disposable wares guaranteed more ‘sanitized’ utensils of which is demanded among people with higher standard of living.



1. I switch off light, fan and other electrical appliance when they are not in use.
2. I do not leave the tap-water running during teeth-brushing.
3. I separate waste (paper, plastics etc.) and sell it off.
4. I separate waste and donate it.
5. I donate old computers, furniture, books and other items to charity.
6. I use suitable glass bottles for other purposes in the kitchen after the content is finished.
7. I use grocery plastic bags as garbage bags.
8. I use the same plastic bags again and again to shop.
9. I use a non-disposable bag during shopping
10. I use boxes during shopping.
11. I feed food residue to animals.
12. I repair broken appliances and use it again.
13. I mend my clothes if necessary.

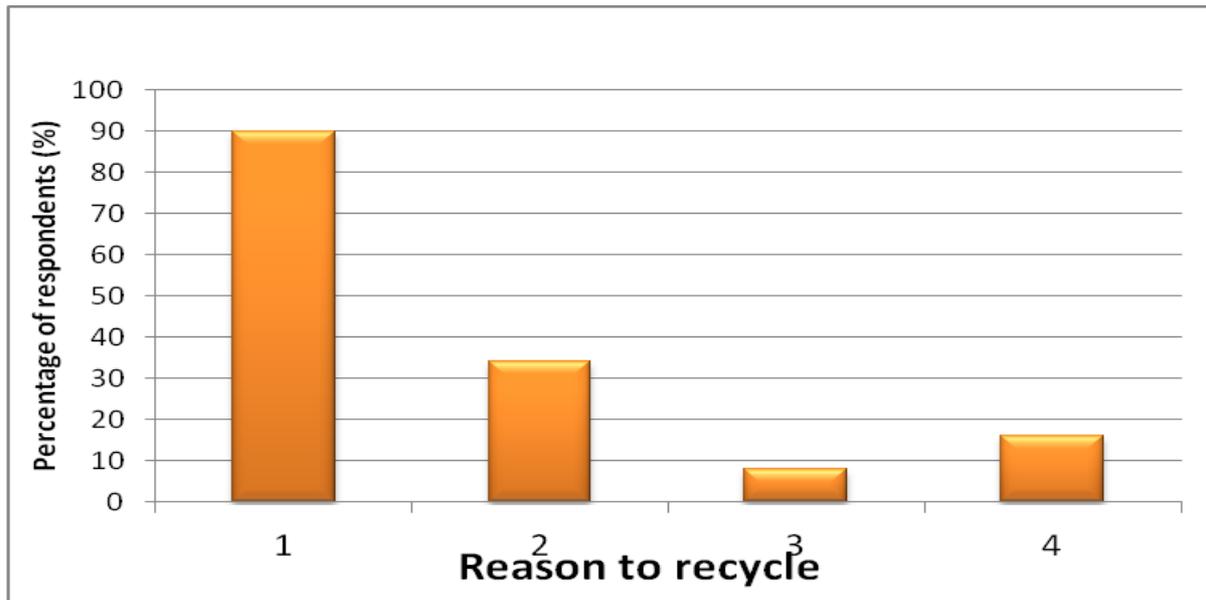
Figure 4: Selected 3R activities conducted by the respondents at home.

As for the concept of ‘reduce’, only 96% of the respondents are knowledgeable while 4% do not understand the concept of ‘reduce’. However, 100% believed that it is importance to incorporate ‘reduce’ into the waste management system. While reduce is not completely understandable by all, 100% of the respondents know the concept of ‘reuse’. The concept of ‘reuse’ is highly regarded by all respondents and they feel that it is very important to integrate this concept in daily practices. The low understanding of ‘reduce and reuse’ concepts indicated the crucial need for various agencies namely the government and environmental entities to introduce these concepts to the public. It is essential to create higher environmental attentiveness and consciousness

particularly in managing the waste generated [11,14].

Although more than 88% know the concept of recycling, only less than 30% practice it. This is aligned with the official reports of the unchanging 5% recycling rate in the country for the past 20 years [7,8,]. Majority of the respondents (42%) thought that current recycling rate in Malaysia is only 2% while the unofficial rate is reported to be more than 15%.

As for the importance of recycling, 96% strongly believed that it is necessary to recycle. Figure 5 illustrates the reasons why recycling is important according to the respondents.



1. We have limited resources
2. Quality of life is more important
3. Recycling is meant for sustainability
4. Recycling reduce the needs for disposal space

Figure 5: Reponses to the reasons that necessitate recycling effort.

All of the respondents believed that we do not have unlimited resources that recycling is very important. Negative response was received when asked if recycling is unfit in a healthy and wealthy life-style. That indicates that the respondents are generally aware and have accepted the fact that recycling is very important in recovering resources prior to disposal.

As far as awareness on recycling campaign in concern, majority of the respondents (48%) agreed that Malaysians are aware. However 16% of the respondents do not think that Malaysians are aware of the recycling campaigns. These thoughts probably is originated from the fact that recycling campaigns were very minimal and only during a limited period that the effectiveness is not visible and failed to create awareness [11].

Interestingly, various issues have been identified being the reasons for them not to participate in 3Rs activities including recycling. Among others are non-mandatory program and lack of regulations on indiscriminate disposal of MSW. It is agreeable among 48% of the respondents that recycling is an inconvenient practice. This is strongly supported by their opinion that recycling facilities is one the factor. 42% believed that the facilities are

insufficient to make recycling a convenient practice in Malaysia. Additionally, 12% and 58% respondent felt that Malaysians are not ready or uncertain, respectively to participate and recycle their wastes. Yet, the majority 99% hoped that the government would promote 3Rs programs more effectively with apt motivations to the public, such as, reasonable price for recyclable items, redemption programs and rewarding approaches.

Approximately 68% feels that incentives should be provided to those that participate in recycling and other 3R activities. On the other hand, 70% respondents believe that Malaysians will be more participative in 3R namely recycling if it is mandatory. Generally, many respondents agreed that Malaysian empathy can be changed with suitable rules and regulations, and the indifferent attitude can be slowly reduced.

The majority of the respondents (80%) were not aware of the Solid Waste and Public Cleansing Management Act (SWPCMA) 2007. Interestingly, more than 80% do not know the implementation date of the SWPCMA 2007. As to that, 76% were sceptical as to the act would be able to encourage Malaysians to participate in 3R activities.

Only 24% believed that the act will promote higher participation in 3R programs. Nevertheless, 26% of the respondents strongly believed that the act can be the right engine in improving the current waste management scenario in the country, while 60% was uncertain.

This indicates the necessity for NDSW to conduct more extensive dissemination of information to the general public regarding the SWPCMA 2007 which has been implemented last September 2012. This is crucial since the majority of the respondents believed that 3R practices can only be encouraged if it is made mandatory. Therefore, understanding and knowledge on SWPCMA 2007 is very important to encourage public participation in the 3R activities.

CONCLUSIONS

It can be concluded that the Malaysian public have certain level of understanding on the 3R concepts. Yet, more comprehensive campaign is essential to provide more information and better understanding on the concepts of 'reduce' and 'reuse' since both concepts should be given higher priority than 'recycling' options. Nevertheless, the public in general do practices 3R activities in their daily life. Yet, this needs to be further encouraged in order to allow a more sustainable waste management system in the country. Therefore, the identified issues and challenges concerning the set-backs the implementations of 3R programs in Malaysia need to be addressed appropriately. Major actions need to be instigated in order to overcome various challenges for successful implementation of 3Rs program in the country.

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