

Community Participation and Performance of Waste Segregation Program in Malacca: Towards Sustainable Waste Management

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Abstract. This paper reviews the current practice and challenges of community participation on waste segregation program in Jasin Malacca since 2015-2017. The Solid Waste Management and Public Cleansing (Act 672) which came into force on 1st September 2011, is Governments' effort to provide a systematic, coordinated, effective and efficient solid waste management system in Malaysia including Malacca. Since then, there has been significance increase on the amount recycle waste collected. However, the community participation on solid waste segregation and recycling program still at low level due to lack of awareness, attitude and exposure on the advantages of recycling in the long term. Thirty preliminary questionnaires were distributed randomly at resident's housing area in Jasin and analysed through Average Index (AI) method. The result obtained shows the current challenges of the community in performing the waste segregation at source. From the result, further study will be conducted to discover new approach on promoting waste segregation which could provide the basis for success of 3R program in Malacca.

1 Introduction

Solid waste management has becoming the most challenging issues in developing countries due to rapid urbanization, different standard of lifestyle and increase of population level. Despite various effort from the government and stakeholders in promoting the waste segregation since 1 September 2015 under Bill 672, the community participation on solid waste segregation and recycling program still at low level due to lack of awareness, attitude and exposure on the advantages of recycling in the long term [1]. Therefore, appropriate recycling program should be introduced within an established standard operation to change the current attitude and behaviour towards the habit of separation at source [2].

Community participation describes any process that starts with inform, gather input or involve the community regarding decision making processes. It will cover all level of information, awareness creation, outreach, input involvement and collaboration [3]

Some researchers believe the contribution of leaders is important to ensure the success of community participation in waste segregation. According to Subash [4] community leaders is essential in promoting community responsibility to contribute in collection of waste by ensuring that communities paying fees, to

promote waste segregation and supervise the performance of the services by local authorities. The awareness factor in community participation is also crucial to the success in waste segregation. According to Minn et al, awareness factor is required to enable the community to understand the issues that happened, cause and effect, and expand on their role in the participation to manage solid waste [5].

The primary goal of this paper is to review the current practice of waste segregation and challenges on community participation on Waste Segregation program in Jasin Malacca. Since Malacca is progressing with major project such as Malacca Gateway and Jasin Bestari New Town, the movement of local and foreign people into the district is very well expected. Therefore, there is a great challenge to improve the commitment and community engagement in waste recycling as the movement of people will generate more waste in the future. Changing of the mind-set of the residents in the community is so crucial in determining the success of waste segregation program.

1.1 Aim and objectives

This paper will focus on 2 objectives such as the following:

- i) to identify authority current practice of waste segregation activity in Malacca

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- ii) to evaluate challenges and problems faced by the community in improving the waste separation efforts in Jasin Malacca

The paper then focus on way forward on improving the waste segregation performance towards achieving Melaka Green Technology City in 2020 as well as Sustainable City in year 2022.

2 Research Background

The total number of populations in Malaysia is 29,947.6 million in 2013 and expected to increase up to 36.8 million by 2040 [6] It is projected more waste to be generated and the scarcity of landfill for waste disposal will be another major issues. It has been said that community participation is key factor in attaining the goal of solid waste management [3, 4]. Public awareness on waste reduction and knowledge of 3Rs also have been promoted by the Ministry of Urban Wellbeing, Housing and Local Government through three main strategies area including the Enhancement of Awareness on Waste Minimization (Awareness), Strengthening of Partnership of Partnership for 3Rs Activities and Enhancement of Institution to Strengthen government policies on waste Minimization [7].

As a strategic move in promoting waste segregation in Malacca, the State Government has sent 5 of its high ranking personnel for training of household garbage separation in UBE City, Japan in early 2015. The objective was to adapt and incorporate the culture and success of UBE City in managing its solid waste. As a reference, each community nominates waste reduction officers to Ube City. The Mayor of Ube commissioned them as a person promoting garbage separation and reduction of waste. Ube City has built a system that can promote separation and reduction of garbage by the community itself. Japan cultures of keeping the things cleaned are well rooted, so they are able to respond to the garbage separation relatively smoothly after residents understood the necessity.

Malacca has embarked on the waste separation program on 1st September 2015. Since then, there have been various efforts being introduced by the authority, operator and the community such as the formation of Recycling School Club, Waste Awareness Campaign, Waste Decomposition and Workshops. Community engagement on waste separation has been the focus on reducing waste disposed at the Sg. Udang landfill. This is done through the support of state agencies such Malacca Green Technology Corporation who is in charge to educate, promote and motivate the public. The programs for “Integrated Waste Management” and “Low Carbon Energy” which focus on alternative and environmentally friendly methods of responding to waste have been held continuously since then. In year 2017, through the authority management and supervision of Solid Waste Management and Public Cleansing Corporation (SWCorp) and Solid Waste Management

Environment (SWM) as the operator, results have shown that there has been positive progression in the amount of waste separated from various sectors of the community.

There have been issues on lack of awareness from the public regarding the management of waste. It has been believed that the authority has the responsibility to manage waste, to provide an effective and efficient system to the population rather than the public. The expectations of the responsibility sometime has gone beyond the capacity of the authority to handle [8].

3 Current Practices for Malacca Municipal Solid Waste Management

Malacca was declared as Develop State using Organization for Economic Cooperation and Development (OECD) Indicators on 20th October 2010 by Malaysian Prime Minister YAB Dato Seri Najib Abd Razak. Since then, the state has embarked on Green City Action Plan in which many green programs and initiation have been established. One of the major goals is to put Malacca on the path to become a “zero waste” state and reduce waste-related Greenhouse Gas (GHG) emission [9]

SWCorp, the solid waste management enforcement agency has taken the lead in ensuring proper separation, collection, and transportation of waste to the landfill. The ‘2+1’Municipal Waste Collection System was introduced by SWCorp and SWM in 2013. It means the organic and unrecyclable wastes are collected twice a week whereas recyclable waste such as plastic, paper, etc are collected once a week. The Separation at Source (SAS) campaign was initiated starting from 1st September 2015 in which all premises are required to separate waste at the source. This implementation is pursuant to regulations under Solid Waste and Public Cleansing Management Act 2007 (Act 672) enforced in the other following states and Federal Territories: Kuala Lumpur, Putrajaya, Johor, Melaka, Negeri Sembilan, Pahang, Kedah and Perlis. Other than recycling, composting is the method that has been introduced to minimize the quantity of waste being disposed at the landfill. The initiative to achieve status of Green City by 2020 has been promoted rigorously and integrated solid waste management system is one of the key performance indicators.

The collection of waste in Malacca is done by SWM Environment Sdn Bhd., a company in charge as waste concessionaire for Malacca, Negeri Sembilan and Johor, An example of schedule of waste collection in Malacca is shown in Table 1.

Table 1- Schedule of Waste Collection

Schedule of Waste Collection		
Activity	Day	Time
Domestic Waste	Wednesday and Saturday	8.00am–12.00pm
Bulk Waste and Recycled Waste	Monday	8.00am –12.00pm

Road Cleaning	-	-
Drain Cleaning	Week 3	8.00am–5.00pm
Grass Cutting	Week 2 and Week 4	8.00 am– 5.00pm

Source: SWM Environment

Upon the collection of waste from various locations in Malacca, the waste will be transported to the landfill in Sg Udang, Malacca. The total area is 64 acres and considered to be a level 4 waste disposal facility which consists of environmentally engineered landfill cell, materials recovery facility (MRF), leachate treatment plan (LTP) and support infrastructure. The operation commenced on 1st April 2015 with estimated lifespan of 5 years and the operation is 24 hours.

The greatest challenge regarding the landfill is that it has reached its maximum capacity despite the design is supposed to sustain until year 2020. This is situation reflects as the indicator that waste segregation activity at source is still lacking and more efforts must be initiated at the community. For short measure to handle the situation, another new landfill has been constructed near the existing Sg Udang Landfill. Table 2 shows the composition of recycle materials collected at the landfill.

Table 2 -The overall types of recycle materials at Landfill

Year	Plastic	Paper	Metal	Glass
2015	13,915	19,543	7,097	2,063
2016	76,473	110,626	44,412	4,214
2017	96,127	135,160	53,040	5,343

*Weight in KG

Source : SWM Emvironment Sdn Bhd.

3.1 Performance of Waste Segregation Program

Table 3- Performance of Waste Segregation Program in Malacca

Performance of Separation at Source (SAS) According to District Authority					
YEAR	Malacca Historical City	Hang Tuah Jaya	Alor Gajah	Jasin	TOTAL (KG)
2015	13,147	6,042	13,421	15,256	47,866
2016	67,285	21,185	61,189	96,595	236,234
2017	79,248	27,503	60,513	123,424	290,688
Total (KG)	159,680	54,730	135,103	225,275	574,788

Source: SWCorp Melaka 2017

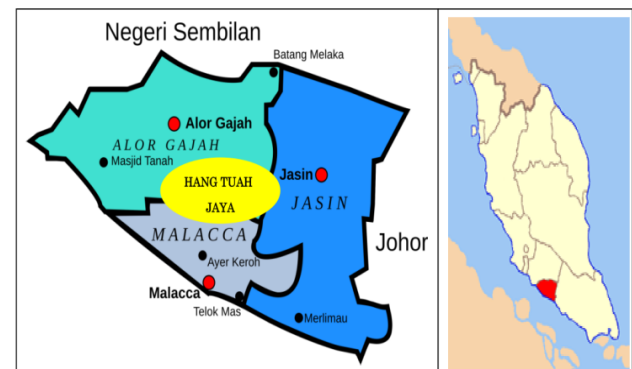
Table 3 shows the performance of Separation at Source (SAS) activity for all the local city council in Malacca since year 2015 until mid-year 2017. In general, it can be seen that there have been steady progress in terms of the recycle waste being collected even though the program has only been launched for 2 years. This could be due to various awareness program initiated by the local authority agencies such as SWCorp and Malacca Green Technology Corporation (PTHM). Jasin City Council (MPJ) has shown the highest performance in recycling activity.

The socio-economic activity at the town area may influence the performance of waste segregation. The traffic congestion may defer the residents to spent time on segregating the waste. This situation is shown in Hang Tuah Jaya Local Authority where the performance of separation as source is the lowest.

4 Research Methodology

4.1 Description of the Study Area

THE DISTRICTS IN STATE OF MALACCA, MALAYSIA



(MBMB), Jasin City Council, (MPJ), Alor Gajah City Council (MPAG) and Hang Tuah Jaya City Council (MPHTJ). The total populations in the respective districts are as the Table 4 below:

Table 4. Total Population in Districts in State of Malacca.

Alor Gajah	205,900
Jasin	152,100
Central Malacca	563,400

Source: Department of Statistic Malaysia 2017

Jasin has been selected for the preliminary study due to its performance as the highest district in collection of recycle waste for the previous 3 consecutive years. [9] Moreover, Jasin District is the largest district in Melaka occupying almost 42% of the state area.

4.2 Data Collection

This paper employed literature reviews and preliminary questionnaires. Through the literature reviews, it is found that the performance and community participation in solid waste segregation have been improved significantly. The questionnaire highlighted the needs on changing of mind-set among the citizen, authority and community leader in achieving the sustainable waste segregation vision.

Structured questionnaire was design based on Likert Scale method and distributed to the randomly selected respondents as primary data for this study. The questionnaires consist of 4 sections where the first part of questions were related to the demographic profile of respondents; the second part of questions were to explore the respondent's challenges on solid waste segregation at

source; the third part of questions were exploring the attributes of leadership in promoting waste segregation and the last part was to evaluate the authority performance in managing waste. The results were evaluated by using Average Index (AI) formula.

30 household respondents were randomly selected in communities whose areas have been involved in waste separation since 2015. The secondary data on waste separation performance from year 2015 until June 2017 were provided by SWCorp Malacca. The organization responsibility is to enforce, guide, monitor and educate the stakeholders on the importance of integrated solid waste management initiatives. The results have shown substantial performance of each district on collection of recycle waste and also the types of waste being separated.

5 Results and Discussions

It is clearly shown that through various efforts and campaign on waste separation at source, the performance has been steadily increased from 2015 to 2017. It is expected that the initiative shall be rigorously promoted as to achieve the 30% recycling rate in 2020. Currently in 2018, the Malaysian overall performance of recycling rate is at 24.6% [10]

5.1 Community Challenges on Waste Segregation

A preliminary survey through questionnaires was distributed randomly in resident area in Jasin Malacca. 30 respondents answered the questions relating to the challenges they are facing in waste segregation activities. The data were collected on door to door basis and the results are shown as the following:

Table 5 - Community Challenges on Waste Segregation

	Challenges	AI
1	Limited space to store	4.41
2	Limited waste materials to segregate	4.03
3	Need guidance on how to segregate	3.86
4	Able to segregate the waste occasionally	4.38
5	Need to identify and understand the purpose to segregate	3.45
6	Need to put extra cost in buying extra plastic bag	4.21
7	Need money incentive for doing the waste segregation	3.03
8	Recycling facilities is far and inconvenient	4.07
9	Limited time to segregate waste	4.07
10	Waste segregation is an unpleasant activity to do	2.93
11	Never think about the need of recycling	3.07
12	Needs cooperation from family members to segregate waste	3.90
13	Viewed that the appointed waste collector by Local Authority should be responsible to do segregation	3.86
14	There exist individual waste collector who take the recycled waste when it is segregated	3.55
15	The waste cage in the community is not provided	3.10

From the results of the preliminary survey, it is found that in Table 5 that the greatest challenges for the community to segregate waste are:

- There is lack of space to store the recycle materials in the house. This is due to the fact the operator will collect only once a week for recycle materials.
- The residents only able to separate waste occasionally and they have limited time to perform waste segregation.
- The residents need to put extra cost to buy the plastic bags for recycle materials. This is because the state government has already formulated the policy of no usage of plastic and polystyrene bag
- The distance of recycling facilities is very far and inconvenient for them to send the recycled waste materials

The result is quite similar to the study conducted in Putrajaya by Nur Khaliesah et al [11] where time constraint, limited of space and bin and the distance from home to recycling facilities centre were the major factors that prevent the community participation to segregate the solid waste. Omran et al. [12] also mentioned that the collection centre in residential areas can influence the community to easily reach the facilities and be more participating in recycling programme. Majority of the respondents only can segregate waste occasionally. This is also similar to the previous study by Alexander et al [13], in which state that the barriers of recycling were limited of time to do. It is also important to note that the community members are comfortable with the waste segregation activity.

Residents in Malacca have to bring along their own shopping bags to grocery stores beginning 1st January 2016 because the state government had declared that plastic bags made from petroleum by-products were banned at all supermarkets and shopping malls. This policy caused them to allocate extra money in buying biodegradable plastic to segregate waste. Incentives in terms of money are of less concerned for the residents to segregate waste even though many researches have been focused on this issue. Some community researchers (Laura Moninka, 2000; Reid, 2000, The National Environment Justice Advisory Council, 2000) agree that community participation on waste segregation can be achieved through providing incentives or any form of rewards. [14]

5.2 The Way Forward

At the authority level, provision of integrated structure and stakeholders should be formulated by providing the necessary facilities. These facilities include funding, equipment, incentives and waste disposal area. Greater role of the local authority is required and work closely with the community committees to address feedbacks and problems encountered during the period of execution.

The Government servant has limited capacity to transform change. Therefore, active participation from community leaders and members is strongly needed. This could be done through greater role of State Assemblyman and local authority interaction with the community members so that the community will be able to lead the waste separation at source.

It is also a prime importance to look at the 'what is it for me' situation so as to motivate more community members to participate in separating waste. Certain incentives should be developed such as cash rewards, tax incentives or reward points to encourage the youth in waste separation efforts. Dhokhikah and Thrihadiningrum [15] have mentioned that the existence of *environmental cadre* can support the dissemination of information about environmental issues, and can improve attitude, behaviour and actions toward the environment. In order to improve the community's level of knowledge, the environmental cadre has to spread out to community to motivate, guide, counsel about sorting, recycling and composting Household Solid Waste (HSW) at source. It is essential also to nurture and find a good leader in the community to lead the SAS efforts in which he must have good public relationship with community members. Moreover, it is also important to avoid any political involvement, to be neutral and promote involvement of all races in waste segregation activity.

Through an interview with a well-known Malacca "environmental cadre" or community volunteer, En.Wan Hauri bin Wan Ali, he mentioned that the Recycle Cage at the community should be operated and managed by the community members instead of the local authority. This will give the opportunity for the community to generate income from waste materials and give back the money to organize community activity.

The next effort is educating on composting shall be the next effort besides campaigning on the reduction of food waste. Aluminium and tin cans should be cleaned prior to disposal to avoid producing nasty smell and invited the animal scavengers to disturb the separated waste in the plastic bags.

With regards to technology, introduction of incinerator to solve the disposal of burnable waste is still under study in terms of its impact to the environment even though there have been numerous proposals from the interested industry operators. As mentioned by Dr Masao Ukita, Emeritus Professor Yamaguchi University (Environmental Engineering) upon his UBE-IECA Japan team visit in Malacca on 9th of July 2018, having the incinerator will not solve all the waste problems. Instead, the promotion of 3R shall be done concurrently to foster greater roles of the community [16].

Finally, it is important to understand that the greatest incentive in waste segregation is not only about monetary values but enjoying the environmental cleanliness and prosperity of healthy living for the current and future generations.

6 Conclusion

After almost three (3) years of SAS operation in Malacca especially in Jasin, there have been tremendous improvements in terms of the amount of recycle waste collection year by year. This is definitely due to efforts and awareness programs organized by the local authorities such as SWCORP, PTHM and SWM Environment. Many workshops and educating the kids programs in school have been implemented and to nurture the "Recycling Culture" into the heart of younger generations. It is hoped that 20 years from now, this young generation will be able to transform the community to be more responsive to the environmental cleanliness and sustainability. Moreover, the authority needs to provide more Recycle Cage at convenient distance and locations in the community. The community, on the other hand, needs to comply with the scheduled collection of recycled waste as specified by the authority. Indeed, the greatest challenge of all is to "Change the Mind-set" of the people on managing and practicing the 3R (Recycle, Reuse and Reduce) concepts in their daily life.

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