

RESIDENTS PERCEPTION OF AND PARTICIPATION IN SOLID WASTE RECYCLING IN LANGKAWI

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ABSTRACT

Success of waste separation at source depends on the willingness of, and good practices among residents. Nowadays, managing household solid waste is a growing challenge for many cities, which is important for environmental conservation. In order to tackle this problem, local authority is turning towards recycling, which is an effective tool for solid waste management. Participation rate of waste separation among Malaysians is still low; thus, there is an urgency to foster waste separation practice beginning from the household. This research seeks to understand the residents' perception of, and participation in recycling activities in Langkawi to achieve environmental conservation in the context of island tourism. Recycling in Malaysia is protected by the law, under Solid Waste and Public Cleansing Management Act, 2007 (Act 672). The Separation at Source Initiative (SSI) became effective on September 2015 with mandatory requirement for residents to separate waste in their dwelling. A multiple acceptance dimension (socio-political, community, market, and technology) were discussed thoroughly in the context of island tourism (Langkawi) to explain resistance from the household towards SSI. The study involves a quantitative survey to understand the residents' perception and participation landscape, and also factors affecting recycling behaviors and attitudes of residents in Langkawi. In measuring residents' perception towards the recycling program, quantitative results from survey responses were used to create civic engagement, a recycling satisfaction, and a behavior score. As an outcome, the study strongly suggests that Langkawi local authority further develop an aggressive educational policy through program and activities, incentive policies, and craft a Master Plan to encourage a more robust public participation in continuous improvement of environmental conservation that would endure generations.

Keywords: environmental conservation, solid waste, recycling, residents, Langkawi

INTRODUCTION

Urbanization, increasing of population and lack of solid waste separation practice among household are causing the accumulation of solid waste in Malaysia. The practice of waste management at source becomes a critical component towards successful implementation of an

integrated waste management system. Thus, the household management of waste has been a critical issue for urban areas in many years, and recycling was among the most practiced waste management procedures as to address the issues (Tchobanoglous & Kreith, 2002). This issue can be solved through reduction of waste accumulation which will reduce the needed cost to process them, as it is also able to recover recyclable materials, and indirectly mitigates greenhouse emission through inefficient recycling process (Fitriyah et al., 2017). The current recycling method is inefficient. Recycling still produces carbon footprint and greenhouse gases. Therefore, it would be better to 'reduce' instead of 'recycle'.

Public engagement is recognized as critical in order to build a successful recycling program. Residents should be engaged at planning and pre-implementation in order to help them understand why a program is needed, how it will benefit all, and to encourage sustainable participation as well as ownership of the recycle program (Xu et al., 2017; Xu et al., 2016; Rada et al., 2016 & Lasana, 1993). These recycle programs also provide an opportunity for the resident and stakeholders to discuss the invisible problems, creating a public consensus around the issues, identifying possible solutions and upholding a commitment to the project (Salleh, 2009). Participation in waste separation programs by resident will also help to reduce solid waste volume which may contribute to environmental degradation.

Recycling is a method of separating, collecting, and reprocessing or converting used or waste products into new materials (Environmental Protection Agency, 2012). Studies by Folz (1991) on solid-waste management found that cities with higher rates of public participation in recycling placed a greater emphasis on recycling program or project planning process. Usually, when people are personally involved in decision making, they are easily motivated in leading the programs to success (Irvin & Stansbury, 2004 & Environmental Protection Agency, 2013). Furthermore, community demographic factors such as age, gender, education and income also influence the recycling participation (Sidique et al., 2010; Menses & Palacio, 2005 & Arcury et al., 1987). Age of people living in a community is among notable factors influencing participation (Menses & Palacio, 2005 & Scott, 1999). Based on report from (Menses & Palacio, 2005 & Saphores et al., 2006), older people in the age of forty and above are more likely to participate in recycling than younger counterparts, hence an opportunity gap.

Besides that, Menses and Palacio (Menses & Palacio, 2005) found women are more likely to engage in household recycling activities than their male counterparts. Arcury, Scrollay, and Johnson (1987) also found evidence where women playing the traditional gender role are more associated with household activities, and therefore are more likely to be involved in recycling activities. However, we find less agreement in the effect of education level on participation of recycling activities. Based on Sidique et al. (2010), they found that those with higher level of education and income are more likely to engage in recycling activities. In contrast, Gamba (1994) and Menses and Palacio (2005) found that a person's level of education has very little influence on recycling activities participation. Above all, the individual motivation, attitude and behavior also play an important role in participation of recycling activities.

The studies on recycling during 1980s and 1990s are focused at individual/family level using applied behavior and also attitude analysis model (Schultz et al., 1995), and the used method is obtained from individual's interest. Data from previous studies indicated that a prior commitment to recycling resulted in higher levels of participation (Burn & Oskamp, 1986). However, recent research findings on recycling behavior and attitude suggested convenience, level of satisfaction towards recycling services and economic incentives as the influencing factors of individual behavior and attitude (Upendra et al., 2017). Proximity of drop-off center

and frequent collection services are some examples of convenience factors and also strong predictors of recycling behavior and attitude (Saphores et al., 2006 & Omran et al., 2009). Likewise, rebate from containerized beverage deposits or money that is saved from recycling disposal costs could encourage individual participation from the angle of economic incentives (Arcury et al., 1987).

Additional role of local authority and government to support and promote recycling program is in the enforcement of a regulatory structure. The regulatory structures such as mandatory recycling would require residents to comply disposal control, allotment of recycling material and the attainment of recycling goals. Recycling activity can be motivated through establishment of educational policy in recycling ordinance. The policy will create awareness to educate public on methods and procedures. Purpose of this study is to understand the effectiveness of solid waste management landscape at Langkawi using three major themes: analyzing factors that are affecting the individual recycling behavior and attitude of residents via survey, understanding resident participation in recycling planning process, and highlighting the recycling efforts among resident.

BACKGROUND

With the increase of population and urbanization, managing solid waste remains at the forefront of policy discourse across the globe (Lakhan, 2015). Recycling is considered an environmentally friendly method that used to tackle solid waste issues that need to be critically analyzed. Waste management becomes ever more complex and the facilities provided still cannot cope with the increasing demands and needs. As Aye and Widjaya (2006) suggest in their study, the best approach need to be devised and implemented immediately while considering environmental, social and economic implications. Agamuthu et al. (2009) in their studies clarified that the drivers of sustainable waste management include human, economic, institutional and environmental aspects. Each driving group should be considered in local context as managing solid waste for a particular society may differ from another.

Langkawi is a developing island in terms of tourism activities, and the number of visiting tourists increases from year to year. It is located at the north-western part of peninsular Malaysia with a total population of 110,000 and 3.7 million of total tourist arrival in 2017. Langkawi was accorded the World Heritage Geopark status by UNESCO due to its stunning geological landscapes including caves, stacks, sea-arches, limestone rocks and millions years fossils (www.langkawi-insight.com). Besides that, Langkawi also serves as an access point and opportunity center of many outdoor recreation areas to those people who enjoy participating in recreation activities and tend to care about preserving the environment. In addition, the island has six residential areas that are *Ulu Melaka*, *Pekan Telok Datai*, *Padang Mat Sirat*, *Kedawang*, *Bohor* and *Padang Lalang*. The residents of Langkawi tend to have their own life activities, career and they are likely to respond favorably towards environmental protection.

DATA COLLECTION

In understanding the landscape of recycling perception and participation among residents in Langkawi, a survey was created with three main sections as an exploratory research design to obtain deeper understanding of the phenomenon (Stebbins, 2001). First section assesses respondents' understanding of public perception and participation on the island vis-à-vis recycling. The second section of the survey includes questions to understand factors that influence residents' recycling behavior and attitude, especially in terms of motivation for

recycling and the importance of recycling. The third section requests information about respondents' demographic background such as socio-economic status – years of residence in Langkawi, age, education level and annual income. The questionnaire uses structured and semi-structured questions to address both the quantitative and qualitative aspects of residents' perception and also recycling practice in Langkawi. 200 residents from Langkawi districts were randomly selected. The response rate for the survey was 85%, with 170 residents taking part. Among them, 52 respondents (31%) represented male and 118 (69%) represented female.

ANALYSIS, RESULT AND DISCUSSION

Residents' participation is a very important component of recycling programs which include rigorous engagement of people, from implementation to success, especially at their residents. The responses to the questions were analyzed quantitatively with 1 (Yes) and 2 (No). In the context of Langkawi, level of public participation and engagement on recycling matters (giving comment and provide feedback about recycling programs and services in Langkawi) using technology medium is only at 32% (54 respondent) while another 68% (116 respondent) are only practicing recycling on their own, at home among family members. The question was: *I have used technology as a medium to deliver a comment on recycling matters in Langkawi?*

Understanding Recycling Behavior and Attitude

Many factors affect individual recycling behavior and attitude. The most important elements include residents' motivations for recycling. In the case of Langkawi, the factors affecting individual behavior and attitude that are respondents recycling motivation, recycling importance, recycling satisfaction and recycling behavioral score were determined.

Motivation for Recycling

Motivations were among the strong variables shaping the recycling behavior (Peattie, 2010). The environmental concern, the influence by family and friends, and convenience leads to the motivation for behavior (Scott, 1999). In the case of Langkawi, 133 (78%) out of 170 respondents were claimed to have high motivation in practicing recycling in their life. Respondents expressed recycle program (74%), convenience of recycling facilities (72%) and environmental concern (71%) of conserving natural resources on the island as well as avoiding negative long-term impacts of landfill, among the most important factors that motivate them to engage in recycling (Table 1).

Table 1: Motivations for Recycling

Environmental Concern		Convenience Recycles Facilities	Family/ Friends Pressure	Recycle Program	Others
121	98	122	78	126	96
71%	58%	72%	46%	74%	56%

Strong correlation between the environmental concern and motivation for recycling are aligned with (Menses & Palacio, 2005) research finding. In addition to that, motivation in recycling as a function of environmental concern may vary depending on the education background of the residents. As noticed by (Organization for Economic Cooperation and Development, 2008) in their research, persons with lower level of education that lack awareness seems to be influenced by their friends and neighbors rather than originally, in becoming environmentally concerned.

Economic incentives for recycling activities was important for 98 (58%) respondents, while 96 (56%) respondents stated that they were more influenced by other reason such as charitable nature of non-profits that motivate them to join recycling, and only 78 (46%) respondents reported that they were influenced by family and friends to participate in recycling.

Recycling Attitude: Importance of Recycling

The residents’ perception of recycling has influential role in determining their behavior and attitude towards recycling practices. As Irvin and Stansbury (2004) suggested, it is necessary to understand individuals’ beliefs, intentions and level of importance that they give to recycling in order to determine their behavior. Survey participants were asked two major questions to identify level of importance in their view, and also level of knowledge pertaining to recycling methods and procedures: (a) *Level of recycling importance to me is?* and (b) *Level of my knowledge on recycling methods and procedures?* The responses to the first question were quantified with Don’t Know = 1, Less Important = 2, Neutral =3, Important =4 and Very Important = 5. While, responses to second question were quantified with Don’t Know = 1, Less Knowledgeable = 2, Neutral = 3, Knowledgeable = 4 and Very Knowledgeable =5.

Table 2: Recycling Behavior

Recycling Importance	Don’t Know	Less Important	Neutral	Important	Very Important
	2 (1%)	2 (1%)	22 (13%)	63 (37%)	81 (48%)
Recycling Methods & Procedures	Don’t Know	Less Knowledgeable	Neutral	Knowledgeable	Very Knowledgeable
	9 (5%)	7 (4%)	55 (32%)	85 (50%)	14 (8%)

The analysis result shows that most of the respondents gave high importance to recycling (48%), as an important precursor to a proper waste management, and only 22 residents (13%) had a neutral opinion to it (Table 2). Scott (1999) made similar observation in Ontario, Canada, where residents perceived recycling as an important method of addressing solid waste management issue in their community. Apart from that, only 99 respondents (58%) indicated they were knowledgeable or very knowledgeable on recycling methods and procedures (Table 2). Nevertheless, the evidence shows that most respondents in Langkawi care about recycling and are motivated to participate in recycling activities.

Another supporting factor that makes respondents regard recycling highly could be the respondents’ level of education. In this study, 95% of the respondents have good education background starting from secondary school (110 respondents) and a tertiary education (51 respondents). Studies from Jenkins et al. (2003) also suggests that people with high level of education tend to know more about the benefits of recycling and the related procedures, thus causing them to give high importance to it, and later leading to participation.

RECOMMENDATION

Based on the findings and discussion of the study, the enforcement and establishment of an education policy should be adopted in order to educate residents in Langkawi about the importance of recycling, and the methods and procedures. For example, a door-to-door

campaign, distribution of pamphlets and posters during community events handled by local authorities, increasing of access to educational seminars for community members and creation of special training packages for elementary and high school teachers on various recycling contests among students, can be continuously implemented with little cost.

CONCLUSION

Even though changes will not happen overnight, the study result shows that there are few options local authorities of Langkawi can take in order to increase recycling rates since residents' involvement is fundamental to all this process. By cultivating a sense of community purpose and perception among Langkawi residents, their views and attitudes about recycling can lead to a sustainable community development, and also environmental conservation. A proper definition of waste is crucial to construct a sustainable agenda of waste management. The Waste Management Theory (WMT) is founded on the expectation that waste management is to prevent waste that cause harm to human health and the environment. Constructing WMT is an effort towards scientification of waste management. Pongracz (2002) also suggests WMT to embrace the following notions: (1) waste management is to prevent waste that cause harm to human health and the environment; (2) a primary aim of waste management is the conservation of resources; (3) shall avoid waste creation by creating useful objects primarily; and (4) waste management is to encompass the goal of turning waste into non waste. Recycling when paired with reusing and reducing can lead to a better safeguarding of the environment and therefore the future generation. People tend to respond positively when both sides of residents and local authorities see the potential returns on investment. Local authority should actively increase and promote recycling activities to the community; Langkawi can reap many benefits from recycling activities. The duality of economic and environmental gain should not persist when we have come to a tipping point of environmental destruction; the cost of global warming to the then and even now, is shown time and time again throughout the world, to far exceed the short term economic gain enjoyed by a selected, small quarter of the society.

Next, Langkawi local authority should develop more creative ways of engaging the community in recycling programs. The process can be aided by working together with local community groups, businesses, public figures, youth groups, as well as schools and universities to integrate recycling themes into their events. This platform can be used to gather feedback more directly and indirectly about further recycling initiatives in Langkawi. In so doing, recycling awareness targets directly at the young and educated. The efforts will be used to continuously remind people of how recycling will benefit them and their communities and help alleviate the costs associated with environmental degradation. It will certainly help them to become more knowledgeable about recycling methods and procedures. Therefore, people will be more likely to continue the attitude and practice once they are able to see the positive results. This will keep people reminded, educated, inspired, motivated and informed about the essentials of sustainable development in Langkawi. Future programs or activities for Langkawi and other local authorities in island tourism is (1) creating a comprehensive Zero Waste Action Plan at island tourism; (2) diverting organic waste from landfill by creating composting opportunities for hotels and residents; (3) banning polystyrene take-out food containers at all stalls and restaurants; (3) ongoingly educating the public on recyclable material processing and eco-conscious purchasing practices; (4) discouraging single use bags within the island; and (5) providing accessible recycle bins at tourist places, businesses and residential. The study of reduce, reuse and recycle (the 3Rs) can be further implemented throughout Malaysia, where recycling can become more effective and efficient through public outreach and education programs.

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REFERENCES

- Agamuthu, P. (2001). *Solid Waste: Principles and Management: With Malaysian case studies*. Institute of Biological Sciences, University of Malaya, Kuala Lumpur.
- Arcury, T.A., Scollay, S. & Johnson, T.P. (1987). Sex differences in environmental concern and knowledge: The case of acid rain. *Sex Roles*, 16, 463-472.
- Aye, L. & Widjaya, E.R. (2006). Environmental and economic analyses of waste disposal options for traditional markets in Indonesia. *Waste Management*, 26, 1180-1191.
- Bhattacharya, R. (2019). *Langkawi Insight: Langkawi Island Information*. Retrieved from https://www.langkawi-insight.com/langkawi_000001.htm (accessed on 8 August 2019).
- Burn, S.M. & Oskamp, S. (1986). Increasing community recycling with persuasive communication and public commitment. *Journal of Applied Social Psychology*, 16, 29-41.
- Environmental Protection Agency (2013). *Introduction to the Resource Conservation and Recovery Act*. Environmental Protection Agency (EPA): Washington, DC, USA, 21 September 2013.
- Environmental Protection Agency (2012). *Municipal Solid Waste Generation, Recycling and Disposal in the United States: Facts and Figures for 2010*. Environmental Protection Agency (EPA): Washington, DC, USA.
- Fitriyah Razali, Choong W. W., Zulkarnain Daud & Chin H. C. (2017). Acceptance of Waste Separation at Source Practice Among Households: A Literature Review. *International Journal of Real Estate Studies*, 11 (2), 131.
- Folz, D.H. (1991). Recycling program design, management, and participation: A national survey of municipal experience. *Public Admin Review*, 51, 222-231.
- Gamba, J.R. (1994). Factors influencing community residents' participation in commingled Curbside Recycling Programs. *Environmental Behavior*, 26, 587-612.
- Irvin, R.A. & Stansbury, J. (2004). Citizen participation in decision-making: Is it worth the effort? *Public Admin Review*, 64, 55-65.
- Jenkins, R.R., Martinez, S.A., Plamer, K. & Podolsky, M.J. (2003). The determinants of household recycling: A material-specific analysis of recycling program features and unit pricing. *Journal of Environmental Economy Management*. 45, 294-318.
- Lakhan, C. (2015). A comparison of single and multi-stream recycling systems in Ontario, Canada. *Resources*, 4, 385-397.

- Lasana, F.M. (1993). A comparative analysis of curbside recycling behavior in urban and suburban communities. *Professional Geography*. 45, 169-179.
- Menses, G.D. & Palacio, A.B. (2005) Recycling behavior: A multidimensional approach. *Environmental Behavior*, 37, 837-860.
- Omran, A., Mahmood, A., Abdul Aziz, H. & Robinson, G.M. (2009). Investing households attitude toward recycling of solid waste in Malaysia: A case study. *International Journal of Environmental Resident*, 3, 275-288.
- Organization for Economic Cooperation and Development (2008). *Household Behavior and the Environment: Reviewing the Evidence*. Organization for Economic Cooperation and Development (OECD): Paris, France.
- Peattie, K. (2010). Green Consumption: Behavior and norms. *Annual Review Environmental Resource*. 35, 195-228.
- Pongracz, E. (2002). Re-defining the Concepts of Waste and Waste Management Evolving the Theory of Waste Management. Doctoral Dissertation. University of Oulu, Department of Process and Environmental Engineering. Oulu University Press: Oulu. <http://herkules.oulu.fi/isbn9514268210/>.
- Rada, E.C., Bresciani, C., Girelli, E., Ragazzi, M., Schiavon, M. & Torretta, V. (2016). Analysis and measures to improve waste management in school. *Sustainability*, 8, 840.
- Salleh, D. (2009). Critical Success Factors of Project Management for Brunei Construction Projects: Improving Project Performance. Doctoral Dissertation. Queensland University of Technology, Queensland, Australia.
- Saphores, J.M., Nixon, H., Ogunseitan, O.A. & Shapiro, A.A. (2006). Household willingness to recycle electronic waste: An application to California. *Environmental Behavior*, 38, 183-208.
- Schultz, P., Oskamp, S. & Mainieri, T. (1995). Who recycles and when? A review of personal and situational factors. *Journal of Environmental Psychology*. 15, 105-121.
- Scott, D. (1999). Equal opportunity, unequal result: Determinants of household recycling intensity. *Environmental Behavior*, 31, 267-290.
- Sidique, S.F., Lupi, F. & Joshi S.V. (2010). The effects of behavior and attitudes on drop-off recycling activities. *Resource Conservation Recycle*. 54, 163-170.
- Stebbins, R.A. (Ed.) (2001). *Exploratory Research in the Social Sciences*. Sage Publications: Thousand Oaks, CA, USA. (Vol. 48)
- Tchobanoglous, G. & Kreith, F. (2002). *Handbook of Solid Waste Management*. McGraw-Hill: New York, NY, USA.
- Upendra B.B., Shashidhar Belbase & Reni Bibriven Lila (2017). *Public Perceptions and Practices of Solid Waste Recycling in the City of Laramie in Wyoming, USA*. 11(2), 1-19.

- Xu, L., Ling, M., Lu, Y. & Shen, M. (2017). External influences on forming residents' waste separation behavior: Evidence from households in Hangzhou, China. *Habitat International*, 63, 21-33.
- Xu, D.Y., Lin, Z.Y, Gordon, M.P.R., Robinson, N.K.L. & Harder, M.K. (2016). Perceived key elements of a successful residential food waste sorting program in urban apartments: Stakeholder views. *Journal of Clean Production*, 134, 362-370.