SOLID WASTE: IMPACT ON ECONOMIC

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Abstract: As the population in Malaysia is increasing, solid waste management is crucial to ensure future sustainability. Solid waste is useless and unwanted products in the solid form which derived from discard activities from society. Its comprehends with activities of control, generation, storage, collection, transfer and transportation, processing and disposal of solid waste consistent with the best practices of public health, economics and finance, engineering, administration, legal and environmental considerations. It became issues towards national economy as the cost of disposing of solid waste increases from time to time with potential damages towards next generation living. In addition, the country may benefit from solid waste management through recycling which has been well-practiced by many countries. Solid waste has been acknowledged as an income generator to the society, in line with rapid growth in population, urbanization and industrialization in Malaysia. This conceptual study will be carried out in the East Coast Region of Malaysia by using relevant data and relevant data analysis methods. The discussion of this paper will contribute to the solid waste industry growth in East Cost of Malaysia and also contributes to the academic bodies to further enlighten on solid waste impact towards economy.

Introduction

Solid waste management involves activities from generation to the final disposal including control, generation, storage, collection, transfer and transportation, processing and disposal of solid waste consistent with the best practices of public health, economics and finance, engineering, administration, legal and environmental considerations (Johari, Alkali, Hashim, Ahmed, & Mat, 2014). Population in Malaysia recently reported by Departments of Statistics Malaysia has reached 32 million and 70% reside in urban area. This indicates municipal waste management (MWM) has continuously growing as Malaysia has experiencing rapid growth in urbanization and industrialization (Johari, Alkali, Hashim, Ahmed, & Mat, 2014).

Study conducted by Goldman & Ogishi (2001) indicated the results from disposal and diversion activities has significant impact towards Carlifornia economy. The analysis revealed the impact from diversion activities has contributed double in output impacts, total income, and job impact instead of disposal on 1999, which showed that undoubtedly proved that when materials has been diverted as recyclable it could give positive impact towards economy (Goldman & Ogishi, 2001).

Problem Statement. The article released by Clean Malaysia (2015) stated that there are 30,000 tons of waste produced every day and only 5% being recycled due to poor waste management. The MWM has encountered issues such as open air landfills and lack of awareness about environmental education like throw away culture may rough the atmosphere. In disaster waste management in Malaysia is still lack of research despite it happen every year especially (Yusof, Zawawi, & Ismail, 2016) in east coast Malaysia. On the recent disaster that happen in Penang on Nov 2017 the local authorities said there are 10,000 tonnes have accumulated from the flood (The Sun Daily, 2017). Thus, awareness on reduce poor waste management as well as embarking on MWM has to take place for a bright future of our generation.

Research Objective. This conceptual study proposed model is intended to determine the relationship between solid waste management towards economy.

i) To determine solid waste management and its impact towards economy.

Literature Review

Solid Waste. Solid waste is the non-liquid waste materials arising from domestic, trade, commercial, industrial, agricultural and mining activities and from the public services (WHO, 1976). Although waste can be generally defined as worthless and useless by product (Webster‘s 1984), a more specific and precise definition is given by environmental literature. Gilpin (1976) gave a comprehensive definition for waste and defined waste as a matter, liquid, solid, gaseous or radioactive which is discharged or emitted or deposited in the environment in such a volume, constituency or manner as to cause alteration of the environment. Allaby (1977), extended the definition by adding the disposal component of waste and defined waste as any substance, solid liquid or gaseous for which no use can be found by the organism or system that produces it and for which a disposal method has to be devised.

Sinha (1997) defined solid waste as a heterogeneous mass of useless material, which may originate from homes or commercial or industrial activities. Hoornweg et al (1999), defined waste as an unwanted material intentionally thrown away for disposal. Solid waste is broadly defined as including non-hazardous industrial, commercial and domestic refuse including household organic trash, street sweepings, hospital and institutional garbage, and construction wastes; generally sludge and human wastes are regarded as a liquid waste problem outside the scope of MSW (OlarZorbeck et al 2003).Kishan et all 2014 defined solid waste as an undesirable material discharged by human activities that consist of solid, semisolid or liquid materials thrown away from households, commercial and industrials area. Solid wastes are the materials that have become of no or less value to the real owner and therefore planned to be thrown away. This support by Anwar et al, 2014 that defined solid waste as the material may not necessarily be valueless, but as long as the owner throws it away, it has become a waste.

Category/ Composition of Solid Waste. Solid waste composition is the various constituents that the waste contains (Anwar et al 2014). It was reported that the waste compositions in most countries of the world is normally dominated by organic matter followed by paper and plastics. It was also reported that in all the Asian countries except Japan, the waste is dominated by organic material, comprising approximately 75% of the total waste stream (Agamuthu & Fauziah, 2007). In Malaysia, the main component of the solid waste are organics (food wastes), followed by papers, plastics and glass (Anwar et al, 2014).

Solid Waste Management. Solid waste management encompasses all the activities from generation to the final disposal and is defined as the control, generation, storage, collection, transfer and transportation, processing and disposal of solid waste consistent with the best practices of public health, economics and finance, engineering, administration, legal and environmental considerations (Anwar et al, 2014). Solid waste management is a major challenge in urban areas throughout the world. The management of solid waste has become critical and a lot of critics from the public due to the poor quality in some places which give local authority a lot of pressure to handle the waste properly (Eric *et al*. 2000). Moreover, there is a lot of area which didn’t have waste collected service due to the financial problem (Fatma Et al, 2013). The local authority responsible within their jurisdiction area, however, for the uncollected area, it will become a problem for them. Illegal dumping site, open burning, and improper waste management will make the waste management become worse.

The generated solid waste is increasing over the years, improper waste management are mostly the adverse impacts of waste to the environment, scarcity of land and loss of recyclable resources (Shapkota *et al*., 2006). Hence, effective waste management service is crucial for maintaining the health of urban and rural communities and protection of the environment as well as generating employment and revenue.

1. Around the world
   Every country around the world is concerned regarding solid waste management. The UK government is trying to encourage more people to recycle their waste and reduce the UK’s waste mountain. Figures suggest 60% of all household waste could be recycled or composted, but the largest nation in the UK, England, appears to be reusing only 17.7%. Switzerland is proud of its recycling efforts, there are bottle banks everywhere, and every town has a free paper collection once a month. Then there is green waste, aluminums and tin can is taken to local depots and old oil or other chemicals deposited at special of sites. 80% of plastic PET bottles are recycled. Swiss do not recycle just because they care about the environment. There is a strong financial incentive. Recycling is free, but in most parts of Switzerland throwing away rubbish costs money. Today, the US recycles about 28% of its waste, the EPA says, a rate that has almost doubled during the past 15 years. Recycling of specific materials has grown even more drastically: 42% of all paper, 40% of all plastic soft drink bottles, 55% of all aluminums beer and soft drink cans, 57% of all steel packaging, and 52% of all major appliances are now recycled (United Nations Human Settlements Programme, 2010).

2. In Malaysia
   Malaysia, with a population of over 29 million in 2014 generates approximately 25,000 metric tons of domestic waste per day [1]. Status Collection and transportation Among the 25,000 metric tons of waste generated daily

as mentioned above, 45% are organic waste (food waste), 24% are plastics, 7% paper, 6% metal and 18% are glass and others [2]. The country's build up of solid waste is resulting in tremendous land and air pollution for the environment, health problems for communities and bottlenecks to the economic growth. In general, municipal solid waste management is handled by several government agencies from the federal to state and to local authorities. There are many agencies of solid waste management and public cleansing in Malaysia which are as tables below:

Table 1: Breakdown of Local Authorities in Malaysia.

Number of LAs		Breakdown of Local Authorities(LA)/ Pihak Berkuasa Tempatan (PBT)			Total Number of LAs
		Dewan / Majlis Bandaraya	Majlis Perbandaran	Majlis Daerah	
LAs in each region in Malaysia	Peninsular Malaysia	8	34	57	99
	Sabah	1	2	21	24
	Sarawak	3	3	20	26
	Total	12	39	98	149
LAs selected for the Study in each region	Peninsular Malaysia	2	6	4	12
	Sabah	1	1	1	3
	Sarawak	1	1	1	3
	Total	4	8	6	18
Percentage of LAs represented		33.3%	20.5%	6.1%	12.1%

Source: Jabatan Kerajaan Tempatan, Jun 2013 (http://www2.epbt.gov.my)

The survey areas have been tabled in table 1 above which are covered Peninsular Malaysia and the states of Sabah and Sarawak. The survey also has included 18 sites or locations which covered MP Klang, DBKL, MP Kota Bharu, MP Kuantan, MD Besut, MD Kubang Pasu, MD Tanjong Malim, MP Kangar, MP Pulau Pinang, MB Johor Bharu, MP Jasin, MD Kuala Pilah, MD Beaufort, DB Kota Kinabalu, MP Sandakan, MB Miri, MD Samarahan and MP Sibuas. Therefore, there were agencies for non-government managing the solid wastes which are the E Idaman in Kedah and Perlis, Alam Flora in WP Kuala Lumpur, WP Putrajaya, Pahang, SWM Environment in Johor, Melaka and Negeri Sembilan. There is a guideline and procedure established in implementing of solid waste management program in Malaysia.

E idaman (ENVI) Solid Waste Collection Services covers domestic and non-hazardous wastes from households, commercial and other relevant premises where applicable and designated in the concession agreement and stipulated by the Solid Waste Corporation (SWcorp) accordingly.Alam Flora has projects and initiatives that benefit the waste industry, the communities and the ecosystem. Meanwhile, SWM has conducted several activities regarding recycling solid waste via 3R banner educates the public on proper recycling methods through public areas.

The Malaysia government and private organizations have done some hygiene campaigns among the people since 2000s. The implementation of these campaigns is closely linked to the public's awareness and enforcement of regulatory in managing solid waste management. Therefore, in the context of Islamic awareness on solid waste management among the population, the Malaysia government and private organizations should emphasize and educates people regarding the awareness of Islamic Shared Values that have been applied in Islam.

Product from Solid Waste Management. Solid waste management system is important to ensure our environment is protected and also take into consideration the impact of solid waste management towards economic, aesthetics and public concerns (Agamuthu, 2001; Agamuthu, P and Fauziah, S.H, 2010). Therefore, various strategies have been introduced to improve the concept of waste management (Narayana, 2009; Agamuthu, P and Fauziah, S.H, 2010). Among the most well adopted concept of waste reduction, reutilization and recycling or the 3Rs concept are widely used to achieve sustainable waste management in Malaysia (Agamuthu, P and Fauziah, S.H, 2010).

Thus, we can produce variety of goods from recycling programs. Recycling programs means collecting and separating solid waste for the purpose of producing output. Recycling occurs when ingredients are processed and produced the same product or converting them to new products or material (Akta Pengurusan Sisa Pepejal Dan Pembersihan Awam 2007{Akta 672}). Recycling changes the materials that should be residual to valuable resources. Recommended goods that can be recycled are all types of office and computer paper, newsprint include of newspaper and magazines, iron, steel and tin metal cans, clear and coloured glass, all types of plastics, woods such as pallet, timber and furniture and others. (Agamuthu, P and Fauziah, S.H, 2010).

Example of products produced from recycling program is summarized in the table below:

Table 2: Product from Solid Waste (reference)

No	Basic Product to be recycled	Product made with recycled content (Example)
1.	Foods waste &organics	• Compost materials such as fertilizer and animal feeds
2.	All types of paper waste	• Newspaper, magazines, all types of paper • Multifunction paper bags
3.	All types of plastics waste	• Bottles for non-food items such as shampoo, detergent, motor oil • Film and sheet • Plastic lumber for outdoor decking, fencing and picnic tables • Shipping envelopes • Floor tile, furniture • Decorative lights from recycled plastic bottles • Diesel
4.	Glass waste	• Bottle up design jewellery, • glass bowl, glass jars, glass tiles, • beads from recycled glass, • decorative lights from recycled glass
5.	Textiles Waste	• Bags, pencil case, craft products
6.	Woods waste	• Pallets and used furniture such as book shelves, table
7.	Aluminium waste	• All types of beverage cans

However, there are some of the products used in our daily life that cannot be recycled as per table 3 below:

Table 3: Non-recyclable Product from Solid Waste (http://my3rblog.blogspot.my/)

No	Basic Product	Non-recyclable products (Example)
1.	Paper	• Pizza box or anything affected with oil • Food wrapping paper • Tissues • Disposable diapers • Cleaning wax plastic paper • Frozen food paper containers
2.	Aluminium	• Insect spray cans • Paint cans • Aluminium foil • The clothes hanger • Medical equipment • Oil filter
3.	Glass	• Drinking glasses • Mineral bulbs • Broken glass windows and vehicles mirrors • High temperature resistant glass - Pyrex, Corning Ware, Vision Ware • The glass used in the laboratory or hospital for research and medical purposes • Face mirrors, crystal, ceramic
4.	Plastics	• Plastic container with oil residue, insecticide or toxic substances • Styrofoam (expanded polystyrene)

Solid Waste Impact on Economy. Study conducted by Goldman & Ogishi (2001) indicated the results from disposal and diversion activities of solid waste has significant impact towards Carlifornia economy. This is similar in our country,

Malaysia. Solid wastes especially food and organics waste need to be managed properly to ensure the environment and Malaysian citizens are in a good health and can give positive impact on economic (Mohamed & Yahya, 2012, Utusan online). The state government of Terengganu has invested the project called "Waste To Wealth (W2W)". This initiative focuses on the recycling project, that is converts the solid wastes into profitable products and can generate revenue for our country. MOSTI makes the concept as initiatives that need to be considered in the management of solid waste to improve the country's economy. The example of project through MOSTI's subsidiary, Technology Park Malaysia (TPM), TPM Engineering has developed a food waste processing machine which is called Compostech. (Mohamed & Yahya, 2012, Utusan online). Head of Design Department of TPM Engineering, Syahrir Mahmood had said the Compostech food waste processing machine could be useful in our country to generate side income by converting food and organic waste into usable products. (Mohamed & Yahya, 2012, Utusan online). He also said this food waste processing machine will convert the foods and organics waste into animal feed and organic fertilizer. Other project under the initiative of waste to wealth (W2W) was also successfully implemented in Terengganu. The State Government of Terengganu signed a Waste To Wealth project development agreement or residual wealth with Mercu RESolution Sdn. Bhd. with a total of RM280 million that was successfully implemented in early 2017. (Nur Nazlina Nadzari, 2016, Utusan Online). According to the State Minister of Terengganu, Ahmad Razif Abd said, the recycling project agreement with Mercu RESolution SDN Bhd is expected to create about 100 new jobs in Terengganu and will create new entrepreneurs in the recycling industry. The project is also expected to generate RM236 million to the state's Gross Domestic Product (GDP) by 2020 (Nur Nazlina Nadzari, 2016, Utusan Online).

Therefore, these recycling projects will give positive impact on our economy, increasing job opportunity or creating additional jobs for Malaysian citizens. This is supported by Goldman & Ogishi (2001) and Goldman & Ogishi (2000) where they have found that recycling activity generated large impacts in the economy, increasing net employment and value-added in the economy. Other several studies done nationwide also concluded that recycling activity was more cost effective compared to other method of disposal solid waste. (Goldman & Ogishi, 2001, Platt and Morris, 1993; Deyle and Schade, 1991; North Carolina Department of Environment, Health and Natural Resources, 1997; and Sound Resource Management Group, Inc., 1993).

Methodology

This conceptual paper employed extensive literature review about solid waste and its impact on economic by using library research. This study explored the impact of solid waste management towards economic in the East Coast Region of Malaysia by adopting a content analysis technique to understand, views, discussions and debates among jurists and scholars on the impact of solid waste management towards economy. We also search all journals and other materials in the online digital library collection and internet particularly in the context of current practice of solid waste management in Malaysia.

Discussion and Conclusion

According to Anwar, Habib, Haslenda, Saeed & Ramli, (2014) in their study on municipal solid waste in Malaysia, they said the greater the economic prosperity of any nation the higher the rate of urbanization and consequently the greater the amount of solid waste produced and Malaysia is one of such nations. Therefore, when the greater the amount of solid waste produced in the country, that means the country need to manage them properly with an efficient management method to avoid from the serious problem such as environmental pollution and negative impact especially towards country's economy. From the several strategies of the solid waste management, the 3Rs strategies are emphasized by Solid Waste Management and Public Cleansing Corporation (SWCorp Malaysia) in managing the solid waste in Malaysia. Those 3Rs strategies are reduction, reuse and recycling of solid waste which give the positive impact on economy in the generating income for that nation and can create the opportunity of the job for Malaysian.

From our discussion above, we can conclude that recycling activity can give the positive impact on economy in Malaysia. However, Dr Mohd Pauze as a deputy chief executive officer (technical) of SWCorp Malaysia said that the recycling rate in Malaysia for the year 2016 is only 17.5% despite introducing the waste segregation programme. (The star online, 2017). He said the reason for the low recycling rate is due to a "much lower" level of awareness on the 3Rs: Reduce, Reuse and Recycle here. (The star online, 2017). So, there are many initiatives have been done by many regulatory bodies and other organization such as an enforcement of polystyrene ban on the 1st September 2016 announced by Petaling Jaya City Council (MBPJ), SWCorp has provided various public awareness campaigns at schools and extra-curricular clubs and also providing talks and exhibitions to other target groups such as colleges, universities, the private sector and non-governmental organizations. (The star online, 2017). Besides, SWCorp also create an awareness program among universities students at the USM in Penang called Green Campus Program since 2014 (The star online, 2014).

So, we can conclude that the 3Rs activities especially recycling activity in Malaysia need to be concerned from all responsible parties of Malaysia citizens in achieving the positive impact on economy, which can create the job opportunity

and increases the income for citizens and the nation.

Reference

Giguere, C. (n.d.). Economic impact. Retrieved September 29, 2014, from http://www.recyclingtoday.com/article/rt1014-waste-recycling-economic-factors/

Goldman, G., & Ogishi, A. (2001). The Economic Impact of Waste Disposal and Diversion in California. University of California, Berkeley.

Jabatan Pengurusan Sisa Pepejal Negara. (2013). Survey on Solid Waste Composition, Characteristics & Existing Practice of Solid Waste Recycling in Malaysia. Kementerian Kesejahteraan Bandar, Perumahan Dan Kerajaan Tempatan.

Johari, A., Alkali, H., Hashim, H., Ahmed, S. I., & Mat, R. (2014). Municipal solid waste management and potential revenue from recycling in Malaysia. Modern Applied Science, 8(4), 37.

Krausz, T. (2015, September 04). Waste Management in Malaysia: In the Dumps. Retrieved March 08, 2018, from http://cleanmalaysia.com/2015/09/04/waste-management-in-malaysia-in-the-dumps/

Malaysia, D. o. (2018). Retrieved from https://www.dosm.gov.my/v1/

Manaf, L. A., Samah, M. A. A., & Zukki, N. I. M. (2009). Municipal solid waste management in Malaysia: Practices and challenges. Waste management, 29(11), 2902-2906.

Manaf, L. A., Samah, M. A. A., & Zukki, N. I. M. (2009). Municipal solid waste management in Malaysia: Practices and challenges. *Waste management*, *29*(11), 2902-2906.

N. Yahaya and I. Larsen, "Federalising Solid Waste Management in Peninsular Malaysia," in Proceeding of International Solid Waste Association (ISWA) World Congress, Singapore, 2008.

Nadzari, N. N. (2016, December 01). Kerajaan Terengganu tandatangani projek Waste To Wealth RM280j. Retrieved March 08, 2018, from http://www.utusan.com.my/mobile/bisnes/ekonomi/kerajaan-terengganu-tandatangani-projek-i-waste-to-wealth-rm280j-i-1.414454

Nadzri, Yahaya. "The Way Forward: Solid Waste Managment in Malaysia." 10th Annual Waste Management Conference & Exhibition, Malaysia, p.10, 19 July, 2013.

Okot-Okumu, J. (2012). Solid waste management in African cities–East Africa. In Waste Management-An Integrated Vision. InTech.

Online, T. S. (2017, August 20). Low Awareness on Recycling among Malaysians. Retrieved March 08, 2018, from https://www.thestar.com.my/news/nation/2017/08/20/low-awareness-on-recycling-among-malaysians/

Priya, S. S. (2016, July 1). Enforcement of Polystyrene Ban to Start on Sept 1. Retrieved March 08, 2018, from https://www.thestar.com.my/metro/community/2016/07/01/enforcement-of-polystyrene-ban-to-start-on-sept-1/#kJw3pxrqECHfD0EQ.99

Sakawi, Z. (2011). Municipal Solid Waste Management in Malaysia: Solution For Sustainable Waste Management. Journal of Applied Sciences in Environmental Sanitation, 6(1).

Tey, J. S., Goh, K. C., Kek, S. L., & Goh, H. H. (2013). Current practice of waste management system in Malaysia: Towards sustainable waste management.

Wilson, D. C., Rodic, L., Scheinberg, A., Velis, C. A., & Alabaster, G. (2012). Comparative analysis of solid waste management in 20 cities. Waste Management & Research, 30(3), 237-254.

Yusof, N. S., Zawawi, E. M. A., & Ismail, Z. (2016). Disaster Waste Management in Malaysia: Significant Issues, Policies & Strategies. In MATEC Web of Conferences (Vol. 66, p. 00051). EDP Sciences.

United Nations Human Settlements Programme (UN-HABITAT)(2010), Solid Waste Management, In The World's Cities Water And Sanitation In The World's Cities