# THE IMPACT OF A SOUND SOLID WASTE MANAGEMENT SYSTEM TOWARDS QUALITY OF LIFE

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**Abstract.** A sound solid waste management system is a mandatory requirement to acquire for a good quality of life. It is a basic human's need as well as a basic human's right to ensure a clean and healthy environment to live in. This phenomenon makes the solid waste management system is an inevitable utility service underpinning the 21st century. It is important to note that the cost of being ignorance on the importance of cleanliness exceeds the financial cost per capita by a factor of 5 – 10 times over the proper system. In Malaysia, the generation of solid waste has increased for more than 91% over the past decade and it has reached 37,000 tons per day in 2016 whereby only 21% were recycled. The remaining waste were disposed without proper treatment at the disposal sites which are mostly dumpsites. The unavailability of proper treatment and disposal have led to severe pollutions which are very detrimental to the environment and the public health. These adverse impacts coupled with a substantial cost of RM2.3 billion spent in 2016 proved that the current practice of a Linear Economy of extract-make-use-dispose is not sustainable. This phenomenon has alarmed the government to immediately transform to a new system of a Resource Management within a Circular Economy which is based on a closed loop system that promotes the application of Reduce, Re-use and Recycle (3R) to minimize the waste generation while maximizing the resource yields by circulating the materials in use as efficiently as possible. Circular Economy is a proven concept to holistically resolve the very unique solid waste management issues which will ultimately improve the quality of life. This paper gives an insight into possibility of embracing the concept of Circular Economy to promote inclusivity at every layers of societies and to transform towards a zero waste society.

## Introduction

Solid waste management (SWM) is one of the most challenging issues face by many developing countries around the world and it is inextricably link to population, economic development and urbanization [1]. As countries urbanize, their economic wealth and disposable income increases which leads to the increase in the consumption of goods and services and correspondingly increase the amount of solid waste being generated. International Solid Waste Association (ISWA) reported that the generation of solid waste will rise by 0.69% for every 1% increase in the national income in the Organization for Economic Co-operation and Development (OECD) countries [2]. Globally, the annual total solid waste generation worldwide is expected to reach approximately 27 billion tons by 2050 whereby 1.3 billion tons are the amount of solid waste generated by the world cities [3]. The tremendous amount of solid waste generated had polluted the environment and posed significant financial impact globally at a cost of USD205.4 billion currently to about USD375.5 billion in year 2025. The incremental cost is anticipated to be more severe in low and middle income countries [4]. Malaysia being one of the rapid developing country with 31.9 million populations and 1.8% population growth where more than 75% migration rate to major towns and cities faces similar problems due to its limitations to cope with the ever increasing rate of solid waste generation. Malaysia generates 37,000 tons of waste per day in 2016 and it has increased for more than 91% over the past 10 years due to the rapid development of urban cities, rural – urban migration, increase in per capita income, and the change in consumption patterns [5]. The waste generation rate is recorded at an average increase of 4% per annum with the waste generation per capita has been significantly increase over the years from 0.8kg per capita in 2005 to 1.17kg per capita in 2016 [6]. From the total amount of 37,000 tons per day, only 21% were recycled and the remaining waste were end up at disposal sites which majorities are dumpsites [7]. There are 155 disposal sites in Malaysia, however only 30 sites are sanitary while 125 are dumpsites.

Based on the national solid waste composition, Malaysian waste consist of 45% organic, 13% plastic, 9% paper, 6% garden waste, 12% diapers and 16% other residuals (as shown in Figure 1)[8]. The decomposition of the untreated waste will be very detrimental to the environment and public health and the negative impact is beyond our imaginary. Past studies revealed that the cost of being ignorance on the importance of cleanliness to the society exceed the financial cost per capita of a proper system by a factor of 5 – 10 times [9] and 1 ton of untreated solid waste disposed at the landfill will emit the greenhouse gas (GHG) of 1.1 ton of carbon dioxide (CO2) to the atmosphere [10]. Therefore, with only 21% waste diversion, 10.7 million tons per year will be disposed at landfills which resulted to 11.7 million tons of CO2 will



be released to the atmosphere. Alongside, significant amount of leachate water will be leaching into groundwater daily and finally to the river. Therefore, a sound SWM system is indeed very important to minimize the waste generation and to ensure every ton of waste generated will be treated, recovered and finally disposed in a safely manner. As a short term goal by the year 2020, the government aims to increase the recycling rate to 30% and to divert 40% waste from landfills which will result in the potential economic value per annum of RM 1.4 billion from the recyclables, a cost saving of RM 135 million from the waste diversion and avoidance of 5.81 million tons of CO2 from the environment [11].

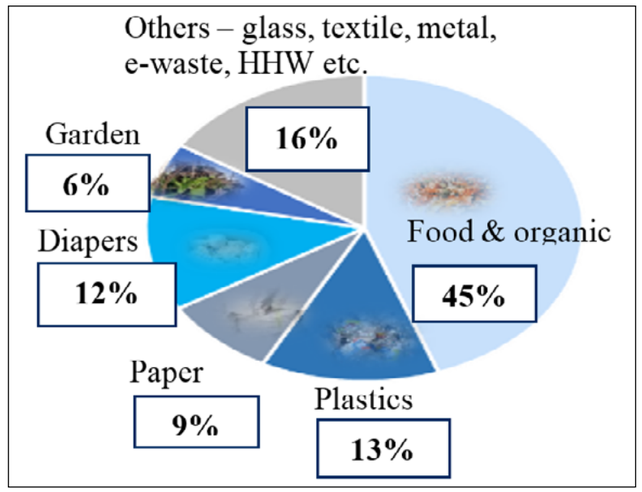


Figure 1: Solid Waste Composition (Source: PEMANDU. 2015)

## Impact on Environment

SWM is known to be an important contributor to many different environmental problems including severe land pollution, groundwater and sea pollution, local air pollution and climate change.

**Air Pollution.** The Intergovernmental Panel on Climate Change (IPCC) estimates that SWM accounted for around 3% of global GHG emissions in 2010, with most of that attributable to methane emissions from landfill sites. The fact is that emission of GHG from the degradation of waste will severely impact the environment as the methane gas (CH4) is twenty (20) times more potent than CO2. Under the UN Framework Convention on Climate Change (UNFCCC) of 1992 the Kyoto Protocol is developed which aims to limit their GHG emissions relative to the levels emitted in 1990. However, the latest data released by the International Energy Agency (2010) showed that the Global CO2 emissions increased by 0.4 Gt CO2 between 2007 and 2008, which represented the growth of 1.5% which will resulted in the amount of CO2 released to the atmosphere by a whopping 15-20% in the next decade. The increased is contributed by developing countries with an average increase of approximately 6% per annum [12]. Diverting the organic discards is the only solution to avoid significant volumes of methane. Six greenhouse gases are identified under the Kyoto Protocol: carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and three fluorinated gases.

**Biodiversity Impacts.** Romanian Ministry of Environment and Forests indicated that the development of a landfill site causes the loss of approximately 30 to 300 species per hectare. The effect does also change the local species, with some mammals and birds being replaced by species that feed on refuse, such as rats and crows. Vegetation changes also occur, regardless of the duration of the landfill site, as some plant species are replaced by others.

**Groundwater Pollution.** As rain falls on landfill sites, organic and inorganic constituents dissolve, forming highly toxic chemicals leaching into groundwater. Water that rinses through these chemicals collects at the base of the landfill and usually contains high levels of toxic metals, ammonia, toxic organic compounds and pathogens. This can result in serious contamination of the local groundwater. Even more dangers, this mixture usually creates a high biological oxygen demand, meaning it can quickly de-oxygenate water. If or when these noxious chemicals reach rivers or lakes, it could result in the death of aquatic life. Pollution By products of air and water pollution are acidic. While natural alkaline substances in the soil can reduce their impact, the result of such pollution is often a much more acidic environment than normal. Consequences As pH drops, more fragile plants and animals may become sick and die. In addition, a pH change in a body of water can affect the microorganisms living within, with domino effects that can destroy the entire aquatic food chain.

**Soil Fertility Effects.** The mixture of toxic substances and decaying organic material can impact the soil quality of the

areas surrounding a landfill site. This can compound the effects on biodiversity as local vegetation may cease to grow and be permanently altered.

**Impact on Economy**

In low- and middle-income country cities, SWM is usually the city's single largest budgetary item and it is the most important services provided by the Municipalities. A poor SWM system which applies a concept of a Linear Economy (LE) is not sustainable and very costly where 80-90% of all the resources applied in the production will end up at the disposal facility within a year [13]. With no policy and direction in place, the phenomenon will definitely cause a tremendous depletion in natural resources and increase the carbon footprint for reproduction. The adoption of a Circular Economy (CE) will provide excellent platform for Malaysia to reap the potential economic benefit in waste from the efficient energy emission from landfill gas, valuables secondary materials, reduce the depletion of natural resources and carbon footprint while at the same time create job opportunities through the new market creation and tourism industry.

**Impact on Society**

This environmental problem causes human health damages due to the exposure to chemicals and particles during waste collection and treatment. In addition, the uncollected waste contributes to flooding, air pollution, and public health impacts such as respiratory ailments, diarrhea and dengue fever. Landfill sites are often very unpopular with residents as it impact the natural landscape: they stink, they are trashy looking and a become bacteria breeding ground. The smell, traffic, noise and vermin that accompany landfills can lower house prices. Because of the increase in vermin surrounding landfills, disease becomes an issue with other adverse health effects, such as birth defects, cancer and respiratory illnesses also being linked with exposure to landfill sites.

Like other countries, Malaysia has taken several initiatives to cope with these issues from the implementation of the national action plan known as Action Plan for a Beautiful and Clean Malaysia (ABC) in 1988 to the recent Enactment of Solid Waste Management and Public Cleansing Act (Act 672) in 2011. The Enactment of Act 672 which commenced on September 2011 together with the privatization has substantially improve the service quality of the SWM in Malaysia. The primary objective of the Act is to standardize the SWM service quality to all local authorities regardless of their incomes [14]. Under this Act, the overall SWM activities which include waste collection and public cleansing activities are handed over to the federal government. In this regard, National Solid Waste Management Policy was endorsed with two goals (1) To develop a sustainable SWM system that is acceptable to the community, with an emphasis on the environmental conservation and technology selection which are affordable and assure public health; (2) To implement SWM system based on the WMH that gives priority to waste reduction through 3R, intermediate treatment and disposal.

Despite of the above initiatives, Malaysia has yet to realize a sustainable SWM system. It is observed that the primary issues are due to lack of inclusivity among the Malaysian's people to inculcate the cleanliness culture, lack of political drive to enforce on related policies, funding, technology, markets and cultural change to adopt to the sustainable development approaches. Malaysian society is still being ignorant on the importance of creating a sustainable living. As reported by Perbadanan Pengurusan Sisa Pepejal Dan Pembersihan Awam (SWCorp), the government program on separation at source which was enforced on June 2016 did not bring significant impact in the waste generation pattern [15]. Therefore, this study proposes to transform from the current practice of a LE (as shown in fig. 2) to adopt the concept of a CE (as shown in fig.3) from a developed country like Sweden and Japan which are based on a closed loop system that promotes the application of 3R principle to minimize the waste at source and maximizing the resource yields by circulating the materials in use as efficiently as possible. The concept brings new growth and job opportunities and it has developed from the recognition that a Linear Economy is unsustainable [16]. It is important to ensure that every product produced with the waste prevention in mind and every ton of solid waste being generated and collected will be reused, recycled and treated with suitable technology prior to disposal at safely engineered landfills. Besides, CE concept encourage people inclusivity from every layers to collaborate and uphold the objective as the national agenda. Hence, this paper gives an insight into possibility of embracing the concept of CE and further establishes a proposed framework and enablers to suit Malaysian's needs towards developing a sustainable solid waste management in the country. Findings from the study endeavor to provide guidelines for Malaysia to realize the gap between the current practices of a LE to the new concept of a CE. A successful transformation will maximize the economic return from waste, reduce the cost, protect the environment and improve the quality of life. This will pave the way for a more realistic roadmap towards sustainability.



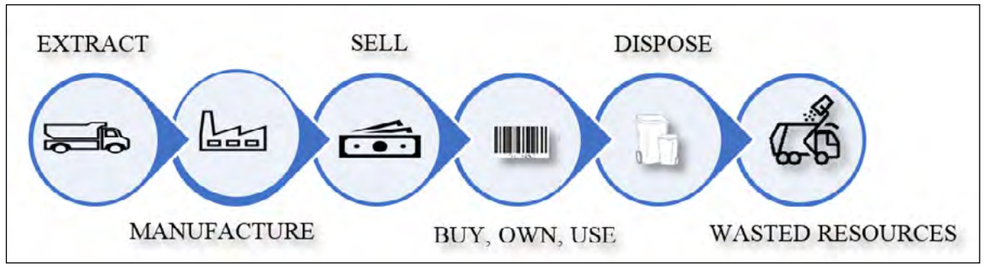


Figure 2 – Linear Economy

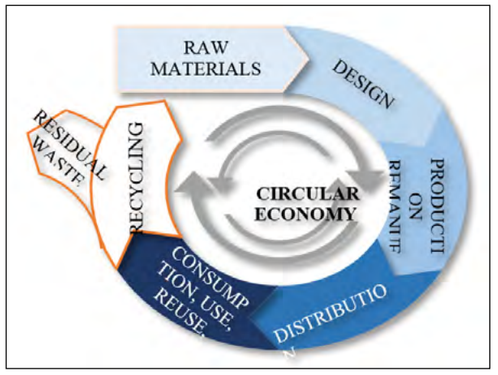


Figure 3 – Circular Economy EU Model

**Literature Review**

SWM is uniquely position as an entry point for Sustainable Development (SD) which directly links to a range of global challenges such as health, climate change, poverty reduction, food and resource security and sustainable production and consumption [17]. Therefore, majority of studies on SWM have been conducted in the framework of SD. A study by the United Nations Environment Program (UNEP) indicated that solving SWM problems will help to address more than half of the high-level Sustainable Development Goals (SDGs) within the Post-2015 Development Agenda and promises significant early reductions in GHGs emissions throughout the economy. Among primary goals of SDGs that are related to SWM are (1) To provide affordable solid waste collection services for all areas by 2020; (2) To eliminate uncontrolled dumping and open burning by 2020; (3) To provide sustainable SWM, particularly hazardous waste by 2030; (4) To substantially reduce the solid waste generation through adoption of the CE. This study proofs that SWM is well embedded within the SDGs to harmonize the environment, economy and society as well as to the inter-generational equity. Solid waste industry also sits at the center of the transformation with the ability to work with both industry and policy makers to shift the balance between the primary and secondary raw materials. This study will emphasize on the adoption of a CE as part of the Zero Waste Theory that emphasize on waste prevention as opposed to end-of-pipe waste management and to treat waste as valuable resources. The core research questions that guided this study can be stated as follows:

i. RQ1 - Do population growth, economic development and urbanization increased the waste generation?
ii. RQ2 – Does the increase in waste generation resulted in the increase in SWM cost?
iii. RQ3 – Do political drive, education and public's attitude, policy adjustment and enforcement influence the current LE practice and the transformation towards a CE?
iv. RQ4 – How much economic benefits that we can derive from solid waste?
v. RQ5- How a CE can intervene the current SWM practice to achieve sustainability?

The transformation of the SWM concept of a LE to a CE is an important step to achieve an effective sustainable SWM system [18]. The approach of LE is not only places pressure on the natural resources, but also on its ability to absorb waste. The life of materials in a LE tend to be short, with 80-90% of goods produced becoming waste within less than a year and end up in landfills. CE which is based on the WMH and 3Rs principles are the best tool to address reduction in the amount of solid waste generated regardless of the population and economic growth. CE aims to decouple economic growth from the finite resource consumption, environment degradation and to decouple waste generation growth from the population, urbanization and economic growth. CE falls back against the Zero Waste Theory and relies on 3 principles (1) Design out waste and pollution; (2) Keep products, components and materials at their highest value in use; and (3) Regenerate natural

systems. The successful implementation of CE will (1) Relieve pressures on municipal service and budgets; (2) Increase disposable incomes; (3) Encourage an innovation-rich economy; (4) Protect the environment: (5) Increase quality of life; and (6) Increase employment opportunities. According to the European Commission using resources more efficiently will bring new growth and job opportunities. The EU model of CE has outlined four key drivers which includes (1) legislation; (2) commodity price and raw material; (3) business drivers and; (4) green taxation.

For Malaysia to embrace to this change towards a CE, the country need to develop a comprehensive and holistic transformation that cover all aspects including most importantly the structural and policy adjustments, political will, public attitude and behavioral change to ensure smooth and successful transformation. Malaysia need to fill in the gaps following the successful implementation of CE by the developed countries. The recent enactment of Act 672 mainly focusses on the solid waste collection and public cleansing activities and little attention was given on the waste avoidance, reduction, reuse, recycle and recovery. The Act only touch base on the enforcement of separation at source, buy back and deposit system which is still far from achieving its full objectives [19]. Following the EU model, is time for the country to relook at the applicable policies like extended producer responsibility, pay as you throw principle and tax incentive for green projects and also to seriously enforce on the separation at source, landfill tax, banning the import of secondary raw materials and increase the primary raw material's cost and to ensure a priority utilization of renewable energy produce from solid waste. The government has to create a market for the secondary raw material and to make it viable for the private investment and to ensure full financial support from the financial institutions. In addition, government need to strengthen the communication, engagement, education and enforcement on the importance of sustainable SWM system to be ingrained in every level of societies and to build as everyone's culture. Ultimately, the government need to gain new competencies and provide policies that support circular business models.

After five (5) years of the execution and enforcement of the Act 672 and full privatization of the SWM system, the concept proven to be efficient and effective with tremendous reduction in complaints (87%) from public from 2011 to 2015, increased in recycling rate from 5.5% in 2007 to 21% in 2016. The privatization had also succeeded in delivering effective and efficient services where more than 90% of waste generated been able to collect, transport and disposed at landfills as compared to previous years whereby only 76% of waste were able to collect and disposed. Nevertheless, the improvement in collection and transportation of the solid waste need to be fully complemented with the availability of proper treatment and disposal facility which are still missing in the waste management chain. Due to this limitation of proper treatment and sanitary landfills, the amount being disposed without treatment remain status quo. The capacity of these dumpsites has been overloaded and the operations have been extended due to the absence of appropriate and cost-effective alternatives to treat the waste. With only 30 sanitary landfills out of 155 disposal sites, the detrimental impact on the environment and public health are severe [20]. The issues of environmental pollution and degradation continues despite Act 672 being in force and the government has to identify suitable treatment and disposal technologies to curb with the problem.

Despite the significant improvement on the quality of SWM services after the privatization as reported by SWCorp in their annual report, the overall SWM is not sustainable due to the substantially increase in cost. According to the solid waste management final lab report, the government had spent RM2.38 billion in year 2016 to manage the solid waste, 115% higher than the initial budget of RM1.105 billion [21]. With a significantly low recycling rate at only 21% that make the current SWM practices are not sustainable and tend to fail in the long run. The report also highlighted six (6) overarching issues related to the SWM industry that requires urgent attention to be resolved which includes (1) there are gaps in existing policies, guidelines and standards hindering the actual implementations; (2) inadequate resources especially on the technical expertise and skilled manpower; (3) inadequate fund and mismatch between revenue and cost; (4) inadequate waste facilities to cater for waste treatment and disposal; (5) inadequate of data to support the implementation; and (6) unregulated and unmonitored recyclables market. It is important to include the element of RE into the practice to maximize the benefit of secondary raw materials in the loop.

With limited educational and awareness campaigns and non-availability of suitable policies and legislation and institutional frameworks, the aims to inculcate the cleanliness and 3Rs culture among the public may take a longer time than expected which may go beyond 2020. It is predicted that the implementation of CE which is based on the integrated SWM that focused on the concept "from cradle to cradle" would have the moderating effect on the strategy use. The adoption of CE into the system may be well supported by the application of good waste to energy technology that may produce renewable energy that can be derived from solid waste to mitigate greenhouse gaseous emissions in an economically feasible manner and at the same time provides financial return to the economy. These strategic approaches will be the main anchor for this study to intervene the relationship between waste growth and environmental degradation, pollution, resource depletion and economy. In short, adoption of CE will pave the way for an effective and sustainable SWM system in Malaysia.

**Research Method**

This study will be based on the quantitative research. A baseline data will include the current CE practices in developed countries and Malaysian practices to identify the gaps. People inclusivity and behavioral change towards cleanliness



will also be addressed to promote the transformation towards a CE. Solid waste compositions, characteristics will be determined to estimate the economic and energy potential in waste. The data sampling will be collected and divided according to (1) geographical distribution; (2) regional distribution; (3) size variation; (4) socio-economic; (5) sectorial diversity; and (6) rural and urban areas. The analysis on the waste will be carried out using the sampling technique as per draft Malaysian Standard 10Z011R0 (2011). All other data will be collected from the scientific literatures, existing data bases, observations on the phenomenon, and structured interviews with relevant policy makers, and set of questionnaires applied to stakeholders. Descriptive and inferential statistic methods were used to draw conclusions. The outcomes of the study are a comprehensive list of information on key enablers, initiatives and indicators that are relevant to the CE.
Based on the main objectives of this research proposal which will determine the relationship of the independent variables (sound solid waste system) over the dependent variables (sustainability focusing on the economic return, environmental and quality of life), and the causal effect will be intervened through the application of CE put into reaction (treatment). Quantitative Research and the Experimental methodology will be used in this study to gather good and relevant data. Past studies refer to experimental research as the most valid approach to solution of solving SWM problems. The experimental research design method is also generally regarded as the most sophisticated research method for the testing of hypotheses. Sample and sampling technique used will be as per draft Malaysian Standard 10Z011R0 (2011). Due to the importance to collect the right information on waste generation, composition and characteristic to ascertain the full value in waste, the actual weighing of waste (wet and dry) will be carried out as below:

Category 1 & 2 - Waste Generation and Waste Composition

- To collect waste generation data (historical data from literature) from one sample each to provide benchmarking in term of waste generation per capita for 2 developing and 2 developed countries, 7 States in Malaysia and 12 municipalities (Kedah).
- To collect waste samples from household based on income groups (Kedah only).
- To collect waste samples from other categories such as commercial areas, institutional and industrials (Kedah only)
- To collect waste samples for each income group – high income, medium and low income group (Kedah only).
  Note: Load Account Analysis (LCA) which is based on the amount of waste discarded (source) and disposed (landfills) will be used to identify the amount of waste generated.
  Note (for waste composition): Sample and sampling technique used will be as per draft Malaysian Standard 10Z011R0 (2011).
- Sampling data: - minimum two (2) samples.

Category 3 - Waste Characteristics (Data collection samples – same areas as above)
In term of the emission and energy benefit from solid waste, data such as population, waste generation, composition and its characteristics are collected. The moisture content will be analyzed using proximate (wet) and elemental (dry) analysis. The Energy conversion model and carbon emission model will be used to calculate the emission benefit and energy potential from incineration and landfill gas recovery system. The amount of GHG emission and water pollution will be analyzed to indicate the level of environmental degradation using IPCC analysis. In spite of some underlying problems and challenges, life cycle assessment (LCA) is a decision-support tool that, through its holistic perspective in quantifying environmental impacts, has been demonstrated to provide valuable inputs to identify appropriate. There is a relatively good correlation of cumulative energy demand scores with stratospheric ozone depletion and resource depletion indicator scores for waste treatment processes. The results of the emission quality and the economic benefit will be derived to ascertain the economic value [22].

Category 4 – 3R practices
The successful implementation of 3R initiatives will be use to gauge the implementation. Survey and observation will also be used to gauge the implementation of policy and legislation, education and awareness level on the 3R concept.

**Analyzing Data.** Hypotheses testing, ANOVA, Correlation Analysis, Pearson correlation Analysis and Multiple Regression Analysis will be used to analyze all the hypothesis in the research questions.

**Findings**

There is a huge gap for Malaysia to realize the transformation from the current practices of a LE to a new system of a Resource Management within a CE. CE is more on upstream oriented that emphasize more on the waste minimization and re-use whereas LE is more to address on the downstream which focus on the recycle and recovery. Many developed countries are putting their effort to decouple the relationship on the waste generation over the population, economic development and urbanization which is the key to achieve sustainable SWM system. Likewise in Malaysia, the amount of waste generated has increased for more than 91% over the past 10 years and the waste generation or capita has increased from 0.8kg per capita in 2008 to 1.17 kg per capita in 2016. The increase in waste for 37,000 tons per day in 2016 with only 21% being recycled which left 79% of remaining waste disposed without proper treatment and recovery has brought

significant negative impact to the environment as well as our economy which then lead to the huge detrimental impact to human's life, health and the environment. Thus, in order to develop a sustainable living to the society, the amount of waste generated, waste discarded and disposed must be reduced immediately. Malaysia has to adopt the vision of no waste on earth – waste should be reduced and reused to a minimum, then collected, recycled and treated properly while residual matter should be disposed of in a safely engineered way, ensuring a clean and healthy environment.

In many developed countries, the process towards sustainable development required strong support from the government, public and other stakeholders. The government need to drive a holistic transformation programs to ensure that CE is becoming a national policy that will be strongly upholds by every levels in the government and the societies. It is imperative for the government to develop suitable framework and key enablers to drive the transformation towards a CE which includes (1) Government political will to develop and enforce related policies, institutional and legislation framework; (2) Acquiring expertise and suitable technologies; (3) Stakeholders engagement and education towards behavioral changes; (4) To develop the viable market for secondary raw materials; (5) Waste optimization and minimization; (6) Financial supports; and (7) Reliable data management. These are the prerequisite enablers to ensure the successful transformation of CE that work on the closed loop approach. As observed, Malaysia is still very much lacking on the above disciplines and it is time to encourage inclusivity among all the societies to put this transformation as a national agenda with strong key indicators to measure the successful progress. It is proposed that the key indicators will include (1) Waste generation growth; (2) Recycling rate; (3) Waste diversion; (4) GHG emissions and carbon footprints; (5) Green products and services; (6) Renewable Energy from solid waste; (7) Eco-projects; (8) Resource Productivity; (9) Domestic material consumption per capita; (10) Employment in the CE. Based on the key enablers and key indicators set for the adoption process of a CE, government would be able to develop realistic targets for deliverables to cater for short, medium and long term goals. Thus, this paper need to go deep to understand on every perspective related to CE and finally is able to provide the conclusion as well as policy recommendations for CE's future planning and improvement in Malaysia.

On the other hand, the government should reap the potential economic benefit from the valuable materials and the energy emission derived from the solid waste. By ensuring there is no leakage of recyclable materials to the informal sectors, Government could anticipate an income amounting to RM1.4 billion per year derived from the 22% of recyclables items. This will prove that SWM is financially capable to be self-sustaining and would alleviate the government financial burden

## Conclusions

CE embraces the economic strategy to promote the sustainable development of economy and society, and to achieve sustainable environmental protection. The application of the concept has been proven by many developed countries and it is time for Malaysia to adopt the concept to fast track the transformation towards developing a cost-effective and sustainable solid waste management system in the country. To do so, the CE must be treated as a National Policy that will be strongly upholds by every levels in the government and societies. The successful adoption of the CE would provide a very significant contribution to the economy, environment and the society. Malaysia would be able to develop and spur his economy without imposing any negative impacts on the environment, preserve the natural resources and at the same time provides healthy and conducive living to the society. A sound SWM system is a key to ensure a quality of life. This will pave the way for Malaysia to realize his dream to become a develop nation.

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