

**PAY-AS-YOU-POLLUTE WASTE MANAGEMENT TAX:
PROSPECTS AND CHALLENGES**

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Abstract

The density of the waste composition with its ever-increasing pattern of generation globally is a threat to the natural environment and the well-being of the people. Its impact however, in developing countries is more pathetic, as most developed nations were able to turned their solid waste management challenges to their advantage. Efficient solid waste management is highly costly; as such putting in place in adequate infrastructures and well trained personnel to guarantee the achievement of efficient waste management requires an effective and sustainable source of funding. Studies has shown that most advanced nations have achieved this by introducing a waste management tax meant to both generate required fund for efficient management of solid waste in their metropolitans and also to reduce or even stop were possible the increasing generation of solid waste. This paper adopts secondary data to discuss the success of Pay-As-You-Pollute waste management tax in different countries across the globe and recommend its introduction by nations wishing to achieve not only efficient management of their solid waste but also, to guarantee it sustainability.

Keywords: Solid waste management, Tax, Cleaning of environment, Pay as You Pollute.

Introduction

It is a common believe that balancing the relationship between natures and other beings, particularly human beings is very paramount to a harmonious co-existence on earth, and for a sustainable development of both in this world. However, with advancement in civilisation, man continued indulging in activities that both, directly and indirectly, affect the natural environment negatively, resulting in so many environmental problems; such as solid or domestic waste (DW) accumulation, air pollution and water pollution (Sasikumar & Krishna, 2009). Since early 1990s, the issue of waste management has already become a disturbing factor in urban cities worldwide because of the increasing rate of waste generation coupled with massive production and consumption, resulting from growing economy of most nations (Kim, 2004). The global population increase brought with it an increasing demand for essentials of life (food, drink, shelter, and clothing) resulting in the rise of daily solid waste (SW) generation by households (Subramoniam & Suresh, 2015).

Globally, solid waste generation with its attendant consequence to people's health and the environment is overwhelming, posing severe challenge for governments and institutions (Periathamby, Hamid & Khidzir, 2009). The increasing population of the world has brought with it incredible SW generation. Earlier, in the year 2000 records show that 318 million SW tonnes were generated globally, with an estimated 6% annual increase. Based on this, it was forecasted that by 2008 global SW generation would amount to 518 million tonnes and 585 million tonnes by 2010 (Periathamby, Hamid, & Khidzir, 2009).

However, available information in 2015, revealed that 1.3 billion metric tons of municipal solid waste (MSW) is globally generated annually. This figure is estimated to increase to about 2.2 billion tons by 2025 (Kawai & Tasaki, 2016).

Albeit, it is contended that official statistics in respect of global solid waste generation is unavailable resulting from inadequate data collection (Periathamby, Hamid, & Khidzir, 2009). Such information however, in respect of advance countries is more easily obtain, owing to their entrenched guidelines and efficient waste management program (Lau, 2004). In fact, while, the developing nations characterized by weak enforcement, absent of technology, and ineffective policy implementation are still battling with the efforts of packing away the solid waste (SW) for proper hygiene disposals, most developed nations have since turned their domestic waste challenges to their advantage (Periathamby, Hamid, & Khidzir, 2009). Thus, the density of the waste composition with its ever-increasing pattern of generation in developing countries is a threat to the natural environment and the well-being of the people (Periathamby, Hamid, & Khidzir, 2009). Therefore, efficient solid waste management is necessary to guarantee a hygiene environment which is critical for the health and well-being of both rural dwellers and urban residents (World Bank, 2013).

However, waste management is costly and consumed a high portion of the limited resources available to the government to execute its capital projects and provision of infrastructures. This accounts for neglects of proper waste management or lack of it at all, in most developing countries, particularly at the local municipal/government areas, with its far-reaching effects on the environment and the citizens (Zainu&Songip, 2017; Welivita, Wattage & Gunawardena, 2015) and also (Maskey& Singh, 2017). As far back, to 1999, global cost records of solid waste management (SWM) is \$205.4 billion per annum which is expected to rise up to about \$375.5 billion in 2025. The cost upsurge is predicted to be very high in both lower income and lower-middle income countries, as it is going to be five times and four times respectively more than it is currently (Hoornweg& Thomas, 1999).

Methodology

This paper adopts secondary data to explore the contributions pay-as-you-pollute waste management tax vis-a-vis its prospects and challenges across the globe. The paper used journal articles, text books, newspapers, magazine among others to review key variables like environmental waste management, solid waste, Pay as you pollute, environmental tax among others.

Conceptual Discourse

Environmental waste management

According to a US based waste management company, environmental waste management refers to consuming less, emitting less and above all complying with all rules and regulations put in place to protect the environment. These encompass all efforts geared towards progressive usage, protection and preservation of the environment (Rick, 2017). As serious concern over environmental problems gather momentum, interest on environmental tax is on the raise. A good number of economists believed that levies on polluters can serve as an effective tool for government to achieve environmental sustainability objective (Bovenberg and De Mooji, 1994). Some are even of the opinion that environmental taxes can bring many benefits than environment free of pollution. They realized from their study that government can actually generate more revenue from taxes on polluters than can be gotten from normal routine taxes. And that government can use the revenues from polluter's taxes to even write-off some distortionary taxes.

In line with the above, the increasing volume of construction waste disposal, which is also a class of MSW, has prompted many economies across the globe to come up with various systems of charging construction waste disposal. Such as, "construction waste disposal charging schemes" which is based on

the “polluter pays principle” as a means of putting in place efficient and sustainable management of construction waste (Lu, et al., 2015).

According Rick (2017), there are six practical components of the waste management system refers to as the fundamentals of the waste management system, namely:

1. Waste generation refers to the act of identifying materials as usable and thrown away or collected together for an orderly disposal.
2. Onsite handling, storage, and processing: This has to do with placing of waste bins right at waste generation point to simplify collection.
3. Waste collection: A critical aspect of waste management, involving a wide range of starting with the placement of waste collection bins, a collection of waste from the bins, transferring to locations where trash is accumulated, and collection vehicles emptied.
4. Waste transfer and transport: Refers to the transferring/transportation of waste in large waste transport vehicles from local collection centres to the regional waste disposal sites
5. Waste Processing and Recovery: This refers to the series of activities which involve the employment of techniques and the utilization of facilities and equipment, to recover materials from the waste stream into a useable form that could be used to improve other serviceable components of waste management.

Disposal: Disposal is final phase in the sequence of activities involved in waste management disposal, it deals with the efficient discarding of waste materials to either landfills or for use in various waste treatment facilities, such as waste-to-energy facilities, etc (Rick, 2017).

Solid Waste Management

Solid waste is the urban and community waste products or items that are discarded by the public (Rick, 2017). The public SW is known as trash or garbage in the in the United States and as refuse or rubbish in Britain. Garbage is mostly referred to food waste and sometimes both the food waste and other SW are collected separately in different waste disposal tanks or cans and they could also be collected together. In addition, SW is the collection of waste products from both human and animal activities that are considered unwanted products (Rick, 2017).

This waste can emanate from either residential activity, industrial workplaces or even commercially generated, and can be managed in different ways. Waste can either be classified on a material basis, which may include plastic, paper, glass, metal, and organic waste. SW could also be classified based on how harmful is the waste product. This comprises waste such as radioactive, flammable, infectious, toxic, or non-toxic. Waste is sometimes categories based on where they are generated; like construction and demolition waste institutional, commercial or SW. Irrespective of the origin, content or how hazardous, SW must be thoroughly managed in line with the best environmental practices. And since SWM is crucial to environmental hygiene, it should, therefore, to be integrated into environmental planning (Rick, 2017).

Rick, (2017) defined SW administration as the profession that is concerned with the regulation of waste generation, collection, preservation, disposing of SW materials to be processed in order to efficiently and effectively dispose it to ensured sound public health, sustainable environmental conservation, and economic development. The scope of SWM may include planning, administration, finance, engineering and legal functions.

The practice of SWM can vary between industrial producers and residential, between municipal and countryside, and between technologically advanced nations and the developing countries. Basically, in practice, the management of non-hazardous waste in the local government areas is the primary responsibility of the municipal council, while hazardous waste material management is usually the corporate social responsibility of the generator. The system of SWM practices for each category will also

be determined, in conformity with the prevailing law of a country, or state, or declaration of any international law to which a country is a signatory (Rick, 2017)

The principal purpose of managing SW products is to reduce and total elimination of harmful effects of unwanted materials on the health and environment of its inhabitants, in line with the best practice of sustainable economic development and well-being of humanity (Rick, 2017).

Waste Management Tax

Environmental taxes, sometimes also called eco taxes, green taxes, pollution taxes at different situations, refers to various statutory charges on both private individuals and corporate entities by government; to facilitate the cleaning of the environment. Environmental taxes are normally put in place to checkmate activities that corrupt or pollute the environment. Thus, different classes of environmental tax exist, depending on government intention of usage. For instance, it can serve as a penalising tool against those discharging hazardous substance in the environment, or maybe rewarding tool to support and encourage those that embraces practices that are friendly to the environment (“Environmental Technology” April 2, 2015)

Therefore, environmental taxes are designed on account of the environment, to either make available incentives to lessen or cut down certain secretions from human activities to protect the environment or to place high levied on hazardous products that are harmful to the environment (“USLEGAL”, n.d). Environmental tax can also be defined as a tax which has a physical unit tax base (or its proxy) that has proven specific negative effect on the environment (OECD, 2005).

Furthermore, for a tax to be classified as environmental tax, it must have the following characteristics:

- (1) The tax should be clearly linked to the environmental objectives of government.
- (2) The prima objective of the tax, should be the encouragement of positive change of environmental behaviour.
- (3) The tax should be structure in manner that vividly express government environmental goals. It should for example, the higher the gravity or level of polluting behaviour, the greater the tax levied (Gov.UK, 2012).

Classification of environmental taxes

Basically, environmental taxes can be broadly group into three main categories (“Environmental Technology”, 2015) namely:

- (1) Industrial pollution taxes: - These aimed at making corporate entities and industrial companies to be responsible for polluting the environment with harmful discharges emanating from their activities. For which, they do not suffered, but the local inhabitant of the environment surrounding their area of operation suffered instead.
- (2) Individual revenue-based taxes: - These are directed at private individuals, as against corporate entities and industrial companies. Aimed at cutting dawn activities that causes damage to the environment. These can be in a form of increased gasoline tax, or maybe vehicle taxation or even congestion charges. Though taxes in these class may not actually be popular, particularly for a short-term measures. But the United Kingdom was able to reduce up to 20% of the secretions of “CO₂” by commuters to its atmosphere, after the introduction of “London congestion charge” which result in reduction of 30% of the roads traffic.
- (3) Incentivized taxation: - Taxes in this category operate in an opposite direction to the two mentioned above and, are applicable in all spheres, be it solid or industrial. These taxes, rather than punishing environmental polluters, particularly in cases of hazardous substances, they are applied instead to reward organisations and industries that designed their operations, adopting practices that assist in the sustainability of the environment. This serve as an incentive to encourage environmental best practices (“Environmental Technology” 2015).

Incorporating Tax into Waste Management

Ultimately, imposing tax on waste generators is to raise fund for government to be able to put in place, and sustain efficient waste management. When households bear financial burden of the waste they generates, they will be force to minimise the volume of their waste generation. In line with this, economists have suggested several tax and subsidy schemes; in order to internalize disposal costs. According to the economist (Kinnaman & Thomas 2001), applying tax policy to waste management is necessary to assist in achieving efficiency in waste management. Hence, different WMT systems were formulated, such as households waste disposals tax; for which polluters are taxed on each unit of garbage. "at rate tg" and can be subsidized base on recycling volume to encourage recycling effort "at rate Shr" (Kinnaman & Thomas 2001).

Waste taxes and waste charges are severally used interchangeably by different countries at different times, based on their needs. Both are applied to either generate fund for government (at state, local or municipal levels) to finance its waste management operations or to make households or any waste generators to beer the financial burden of managing waste they generated, thereby, making them to be responsive to waste generation by reducing the volume of their waste generation or allowing households some cut-off from their due tax (i.e. tax exemption) as incentives to encourage them to actively participate more in the recycling activities. All aim at reducing waste generation at source and to achieve sustainable efficient waste management (Kinnaman, 2000).

Concept of Pay As You Pollute (PAYP) or Pay As You Throw (PAYT)

Folz and Giles (2002), defines PAYP as a mutable rate or pricing per unit charges, in which customers are charged on the basis of amount or volume of solid waste they disposed. PAYT systems, is also defined as variable rates programs or user pay, by asking households to pay more if they put out more garbage for collection (Skumatz & Freeman, 2006). PAYT or PAYP, also refers to as, trash metering, variable rate pricing, or user-pay pricing. It is a method of waste management services which entails pricing MSW per unit of disposal (Batllell & Hanf, 2008).

PAYP system employed for SW disposal and collection services at the local level is originally used for charging of local utilities, such as electricity, gas, water, and sanitary sewer services, for which the customers pay for whatever they use. This technique, in 20 years back, was limited to few hundred cities. But as at today, the PAYP program has been adopted by 4,032 communities in 43 states US, the total of these communities amounted to 10% of the U.S. population (Skumatz & Freeman, 2006).

Rationales for PAYP Principle, for Waste Management System

There are two most common traditional system of financing the management of MSW:

- (1) Flat-rate system or municipal taxes: - In this system every polluter in respective of the weight or volume of waste generated have to pay equal tax rate. Thus, the flat-rate principle does not encourage source waste reduction, because it doesn't provides incentives for waste reduction.
- (2) PAYP which operates on the basis of polluter pays system for which every polluter is taxed in accordance to the weight or volume of waste generated. And as such PAYP system, in itself encourages source waste reduction (Batllell & Hanf, 2008; Kelleher, Dixie & Robins 2005; Bilitewski, 2008).

Further justification for the appropriateness and the advantages for the use of PAYP system in the management of MSW can be summarized into three sub-headings: economically, socially, and efficiency and effectiveness coded as ESEE.

Economic

Economically, PAYP system of financing MSW brings with it tremendous benefits to all stakeholders in the generation and management of MSW. To start with, PAYP system removed cost of managing waste from property tax bills, making the financing of residential waste management independent, and self-proficient. Thus, the financing of waste management services is handled in same way as the services of utilities. Like water and electricity, in which consumers are charged on per unit consumption.

Moreover, once polluters knows that payment of high or low WMT to the government, is the function of how much waste they generates, they become more careful and prudent in generating waste (Kelleher, Dixie & Robins 2005; Bilitewski, 2008). This normally grossly reduces the volume of waste government and its agencies have to deal with. In terms of the waste size or weight that have to be collected, transported and disposed of, effectively in an hygiene manner, to protect both the citizens (which also includes the polluters) and the environment from any danger that may emanate from poor and un-hygiene disposal. It also provides for government not only a readily available finance to the immediate management of the present waste generated, but also an assured source of income to guaranty sustainable efficient waste management (Kelleher, Dixie & Robins 2005; Bilitewski, 2008).

In addition, PAYP system of financing MSW also provides employment opportunities to citizens, as it encourages both waste separation and recycling activities. Hence, both government and Individuals will set up centers for collection of specific recyclable items and even processing factories for the recycling of collected materials, which definitely would provide employment opportunities in the economy. This resulted in recycling outputs increasing the volume of material recovery, which drastically reduces pollutions both of landfills and incinerators. Above all, the PAYP system, to a large extend inspire producers to develop products that are not only proficiently designed, but which life cycles are environmentally friendly (Batllell & Hanf, 2008; Kelleher, Dixie & Robins 2005).

Social

Socially, PAYP brings sense of belonging and fairness to the poor citizens as every household pays pro rata to waste generated. Hence, families with low-income generating less waste (since they consume less) pay lower. Therefore, the costs of waste management services are evenly distributed, which assist in promoting unity in the community (Batllell & Hanf, 2008; Kelleher, Dixie & Robins 2005).

Efficiency and Effectiveness

Waste charging can sometimes bring about illegal dumping and diversion of waste, which can affect PAYP negatively. However, the experienced of most communities that adopted the system of pay-as-you-pollute, such as Massachusetts Municipalities, Washington City, Michigan, California New York, cities of America (Batllell & Hanf, 2008; Kelleher, Dixie & Robins 2005) Also, South Korea and Japan in Asia, have no record of fly-tipping (illegal dumping), not even of burning waste in an open space. But rather observed a more drastic reduction of trash; than the increased recycling activities (Batllell & Hanf, 2008; Kelleher, Dixie & Robins 2005).

Pay-as-You-Pollute (PAYP) Waste Management Tax in Global

The discourse on the need for polluters to bear the burden of their pollution by paying for the damages they caused to the environment, can be traced to as far back to 1920. When an economist by name Arthur C. Pigou, in his write ups contended that, there is the need to have a pollution tax system which will be based on PAYP; in his words he said “a pollution tax should be set such that an increment of pollution would incur a tax that is equal to the costs that the pollution imposes on others” (Bernow, Costanza, Daly, DeGennaro, Erlandson, Ferris & Norland, 1998). The cost he said, should include health cost, property cost and the environmental cost. He believes that making polluters to bear the burden of their pollutions, on both social and economic costs their activities placed on the society, will

serve as correct incentive for them to minimize their pollutions or where possible stop the act. And that most times, comparing the system of using tax to control pollution with other policies of controlling pollution, this system seems to be more cost-effective (Bernow, et al.,1998).

By way of keying into the above call, for governments across the globe to look into the option of pushing the burden of cleaning the environment on the polluters, as early as 1932, the America city of Francisco did introduce a kind of PAYP system. By 1970s, Washington City, Michigan, New York and California cities of America have all put in operation the PAYP/PAYT waste management system. As at 2000, up to 20% of U.S, amounting to 6,000 communities, with additional 200 in Canada had in operation user fees waste management system of PAYP (Kerr, Rust & Sandhei, 2015). Furthermore, in 1997 US government introduced a new legislation to replace old tax system connected to SWM to raise more revenues, in order to ensure availability of more fund to guaranty sustainability of the SWM system. Thus, the new SWMT replaces two existing taxes connected to SWM namely:

1. The Select Committee on Recycling and the Environment (SCORE) sales tax on garbage collection services, which paid for waste reduction and recycling programs.
2. The Solid Waste Generator Assessment, which paid for cleaning up old landfill sites that are environmental hazards.”

Positively, the new tax system raises more funds to continue financing of the existing programs been sponsored with income generated from the formal system and still, have more to transfer to the “Environmental Fund” to support sponsored programs. Such as “Capital Assistance Program (CAP)”, solid waste landfill cleaning activities and also to provide funds to local municipalities to support their “landfill abatement” project, to facilitate efficiency in SWM (Kerr, Rust & Sandhei, 2015)

Table Show the minimum tax rates provided by the new SWMT legislation.

Table :Solid Waste Management Tax (WMT) rates

Waste type	Fee
MMSW – residential	9.75% of service fee
MMSW– commercial	17% of service fee
MMSW– self haul	17% of tip fee
Non-MMSW (industrial, demolition, medical)	\$0.60 per cubic yard of container

Source: 2015 Solid Waste Policy Report.

Another good example from the European nations of SWMT system in operation is the German waste management tax (GWMT) where government put in place deposit system regulations that imposes tax on waste disposal (Zainu & Songip, 2017). From early 1990s, Japan adopted a centrally organized and control WMS of dealing with waste within the environment that generated it, which solve the problem faced then, with the local community of “Not in My Backyard” opposing the sitting of landfill close to their homes. Thus, making the communities indirectly responsible for waste generated by them. While government is still saddle with the financial obligation of financing waste management operations using public financing systems (Okuda & Thomson, 2007)

However, as waste management cost (WMC) continue to rise and landfills become more and more scarce, couple with closing dawn of incinerators with low sophisticated features to efficiently handle “high dioxin emissions” this system become inadequate to sufficiently handle the generated waste. Again Japan introduces another technique to tackle the MSW management which has to do with the

Regionalization of municipal solid waste management operations (MSWMO), so as to allow for easy access to and sharing the use of modern advanced facilities put in place across metropolises for efficient (MSW) management (Okuda & Thomson, 2007).

Again, the introduction of regionalized used of MSW facilities could not solve the problem, the increasingly WMC continue to posed serious challenge to Japan central government. Hence, the “user fees” principle of waste management was introduced into the MSWM in Japan, similar to the system mostly used for MSWM financing by the US. As far back as 2003, many Metropolises, mostly small rural towns and even some big cities in Japan have introduced up to 42% “service fees” in respect of household SW management, while commercial SW management “service fees” was at 70%. Also, different “charge fees” for “special waste” management was brought on board, which includes “bulky waste. Prepaid garbage bags or stickers” Thus, the practice of placing management fees for garbage collection from Japanese households is similar to the system in used in the United States, and is based on the principle of PAYP, WMT systems (Okuda & Thomson, 2007).

In South Korea, the outcries and oppositions against the sitting and construction of new waste treatment plants, such as incinerators, landfill, etc., has necessitated the idea of a comprehensive method of managing waste problems, than just limiting it to the provisions of waste treatment facilities. This led to the introduction of Volume-based Garbage Collection Fee (VGCF) and “the Extended Producer Responsibility systems (EPR)” in Seoul. Both are used for management of Metropolitan SW. The Volume-Based Waste Collection System is actually same as, pay-as-you-pollutes systems, which also aim at encouraging the South Koreans reduce their waste generation. Since, by this system in operation, each waste generator is tax for the management of his/her waste, based on the volume of waste generated or discharged. While The Extended Producer Responsibility system (EPR) requires the recycling of some percentage of manufacturers and importers' waste products. (Lau, 2004)

Similar to the Japanese waste management operation, payment of special fees also applied in the South Korean waste management system, as “households or dischargers” pay special fees, such as, payment for “designated plastic bag” for collection of waste. But additional features of South Korean waste management system, is the provision of free collection of five (5) categories of “recyclable products” when separated according to lay down instructions. The categories includes; packaging material, fluorescent lamps, electronic devices, lubricating oil and tires. While On the other hand, generally waste puts in other bags different from the labeled bags will not be collected (Lau, 2004). On the average, Seoul generated 15,397 tons daily average of waste in 1994. Most of these generated wastes were Land filled, with only 3,159 tons (20.5%) recycled. However, the introduction of VGCF system in 1995, has cut down the volume of SW generated to an average of 14,102 (8.4 %,) tons daily. Out of this, 4,137 tons (30.9%) of generated waste were recycled. Thus, only 9,965 tons were land filled and incinerated. Hence the volume of treated wastes was reduced by 18.6%, while the recycled wastes increased by 31 % (Lau, 2004). Also, in Malaysia at a time during the Concession Agreement for privatization of SWM; Kualiti Alam Sdn. Bhd., the operators of hazardous waste treatment plant, charges those generating the waste on the principle of PAYP (Lau, 2004)

Conclusion

Fundamental phenomena associated with development and industrialization is waste generation. Consequently, putting in place a reliable source of funding or method or an operating system that guarantees efficient sustainable SWM is a serious task to most governments across the globe. However, the PAYP waste management tax system, has been instrumental in curbing down waste generation at source in many countries, and also providing an assured system of generating fund to achieve sustainable efficient management of solid waste. This study recommend for landfill approach of solid waste management currently in used by many countries need to be replace by more hygienic and economically viable system. Nations facing serious threat of very poor solid waste management system that is

fundamentally dangerous the well-being of both the environment and the inhabitant need to urgently embrace the PAYP waste management tax system to effectively succeed in efficiently managing their solid waste.

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