

## **S**USTAINABLE MUNICIPAL SOLID WASTE MANAGEMENT AND THE ROLE OF THE INFORMAL WASTE SECTOR IN DEVELOPING COUNTRIES.

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### **ABSTRACT**

***F**or sometimes now, sustainable management of municipal solid waste in developing countries have become a critical urban development issue because of many problems that have hampered the progress of cities in this regard. One option towards sustainability by developing countries, therefore is to begin to recognise and partner with the informal waste sector. Unfortunately, however, the informal waste sector has been viewed with hostility by most governments in developing countries and hence their activities are neither recognised nor integrated into the formal waste sector. This is not surprising because these governments believe that their activities create more nuisance to city scape and the environment than provide solution to myriads of problems of municipal solid waste management. It is therefore argued in this paper that some progress can be made by the developing countries in regards to sustainability of municipal solid waste management if they are able to*

### **Introduction:**

Municipal solid waste has been defined by OECD (2012) as waste collected and treated by or on behalf of municipalities. It is said to include solid waste from different sources but principally from households, commercial and industrial facilities (not industrial waste) institutions and small businesses, and street sweepings. It is estimated that in 2016 alone, urban centres globally generated 2.01 billion tonnes of municipal solid waste, which amounts to about 0.74 kilograms per person per day and this estimate is expected to increase to 3.40 billion tonnes in 2050; a 70% increase (World Bank, 2018a). This rapid increase in the amount of waste is most likely to occur more in developing than developed countries

*acknowledge the existence and contribution of the informal waste sector and consequently integrate them.*

**Keywords:** *sustainability, informal waste sector, municipal solid waste, recognition, integration*

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Because of the rapid urbanisation and subsequent rise in urban population coupled with changing life pattern as a result of increase in income. For instance, according to United Nations, (2014) urban centres are expected to rise from 3.9 billion persons in 2014 to 6.3 billion persons in 2015 with 73% residing in urban centres of Asia and Africa. The negative effects of poor municipal waste management is therefore expected to affect the developing countries more than the developed countries where 90% of the waste are indiscriminately disposed because of lack of communal collection facilities or illegally designated dump sites, which creates health, safety and environmental implications (World Bank, 2018). Generally speaking, unmanaged or improperly managed waste according Kaza et al. (2018) can also contribute to global problems by for instance, contaminating the oceans through creation of 'sea soup', from the transported municipal solid wastes such as plastics that can harm the marine ecosystem. It may also affect economic development especially for cities or regions that depend on tourism as their main source of revenue. In the face of other competing needs such as portable drinking water, education and health, and the current realities facing nations as regards to revenues accruing to both national and subnational levels that have been dwindling in real terms over the years, it will be a herculean task for the governments to tackle the myriads of problems of municipal solid waste management, now and in the future. This is especially so with generation outstripping the availability of resources and current collection rate standing at the level of between 20% to 30% of the total municipal solid waste generated in most cities of developing countries. This clearly calls for cost effective solution that will ensure sustainable provision of municipal solid waste management service at least cost. A solution that shall not exclude the poor from enjoying the same service when viewed from the principle of environmental justice. In most developing countries of Asia and Latin America, this solution include the recognition and integration of the informal waste sector into the formal sector activities. In some African countries, the informal waste sector is viewed with

disdain and those carrying the activities as anti-progress and of low social status. The usual verdict is banning them from operating especially during the so-called modernisation process of municipal solid waste management system by governments. Banning the informal waste sector not only deprive the poor from this important service but also the whole residents of a city the social, economic and environmental benefits of informal waste sector activities. No wonder, therefore one of the supports provided by the World Bank, in some countries of the developing world, is in the key area of supporting social inclusion that encourages, group, small enterprises or individuals that carry out activities in the informal waste sector in order to enhance their participation in resource recovery and other waste pickers' livelihoods (World Bank 2018b). The support also acknowledges the need for addressing strategies that will address the vex issue of recognition and integration of the informal waste sector into the formal sector activities.

#### **Concept and Strategies of Sustainable Municipal Solid Waste Management.**

Waste is sometimes viewed as a relative term that denotes the discarding of material after it has become useless or valueless to the owner. However, what is sometimes regarded as valueless or useless, actually becomes an asset or raw material to somebody else. Generally, waste, especially solid waste has been defined variously. USEPA (2018) sees solid waste as any garbage or refuse that has been discarded and may be available for processing, treatment and disposal including materials that are recovered or sorted for use, reuse, recycling or used as inputs for another process. Kawai and Tasaki, (2016) citing Article 2 of the Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal also view solid wastes as substances or objects that are disposed of, intended to be disposed of or which national or subnational laws required that it should be disposed of. Municipal solid waste is, however seen as waste from non-hazardous sources such as homes, commercial areas, institutions and industrial facilities, excluding waste from industrial processes, (which requires collection, transportation and treatment before final disposal (Mundal (n.d). The collection of hazardous materials even if released from these safe sources are carried out separately because of their harmful effects on human health and the environment (Meakin, 1992). Consequently, it is imperative that municipal solid waste must be properly managed in order to save the environment, safeguard public health as well as support economic

growth and development so as to enhance the quality of life of the citizenry (Nathanson, 2018). Management of municipal solid waste is, thus seen as the process of collection, transportation, processing and/or treatment and disposal of solid waste that has been discarded including the supervision of such operations (Nathanson, 2018). It is apt to point out, however that some developed countries such as Canada, Germany, France and Japan have excluded recyclables or saleables from their definition of municipal solid waste through special legislation and policies that ban the disposal of these materials into the waste stream (Davidson, 2011; Kawai and Tasaki, 2016). These laws or policies often provides for recyclables to be treated separately through reuse, recycling and even composting in case of organic waste that has also been banned from the Canadian waste stream. Similarly, some States in America do not consider construction and demolition waste as part of the municipal solid waste because of its bulkiness and the need to arrange for special collection, transport and disposal by Municipal Waste Collection Authorities (Kawai and Tasaki, 2016). Whatever the differences in what is regarded as municipal solid waste by any law or policy, it is still expected that an effective and efficient service provision should be the goal of any municipality or government so as to guarantee sustainability of the service. So far, cities in developing countries have been left behind to search for solution that fits their local conditions and not to replicate the solutions from developed countries if they are to be taken seriously about sustainable municipal solid waste management. The focus on sustainability of municipal solid waste management emanates from the sustainable development concept. A concept that promotes intergenerational equity and require that we should be able to manage efficiently and effectively what we generate as waste and we must take into cognisance the negative effects of waste management on both the present and future generations yet unborn. The main aim of sustainable municipal solid waste management, therefore (Imran, 2008), is to achieve improved quality of human health and wellbeing, as well as ensure efficiency in use of resources without necessarily damaging the environment that sustains man on planet earth.

One of the strategies of achieving sustainable municipal solid waste management is the concept of integrated sustainable municipal waste management (ISWM). In defining ISWM, van de Klundert (1999); Imran, (2008) view it as a waste management system strategy that can be deployed to best fit local situations. The strategy thus has the advantage of looking at the whole

local conditions and the needs of the municipal solid waste management system from the point of exploitation of resources to production of items through consumption and final disposal; a cradle to grave approach (Winzeler et al, 2003). This is carried out with the view to identifying relevant policy mix that will address the local municipal solid waste problems and needs. The ISWM is, according to van de Klundert, (1999); Scheinberg et al, (2010) is based on three tripods or dimensions - waste system elements or technical components, sustainability aspects and stakeholders or actors that can be said to be affected and have stake in sustainable waste management. Of all these dimensions, stakeholders have been identified as the most important in achieving sustainability of municipal solid waste management service (Premakumara et al, (2011). This is so because stakeholders are expected to cooperate with government to ensure that municipal solid wastes are not disposed indiscriminately so as to reduce the costs of collection. With increased environmental awareness through proper public enlightenment and education, they are also expected to cooperate in waste reduction, reuse of items, source separation or sorting, composting at household and community levels including monitoring and prompt payment for services consumed. With increased participation of the stakeholders it also expected that the informal sector shall play a significant role in complementing, at a reduced cost, the municipal solid waste services of municipalities including those provided by the private sector. The waste management hierarchy which seeks to give priority to waste reduction, through reuse, recycle, recover, processing or treatment and then final disposal also forms an important part of the ISWM (Abdullahi, 2014).

Other important strategies that are being adopted by some countries to ensure sustainability of municipal solid waste management services include the use of financial and economic instruments such as pay as you throw (PYT), polluter pays principle and the deposit refund scheme. The (PYT) is expected to provide incentives for households and other generators to source-separate their wastes so as to reduce the volume and weight of waste to be collected and thus invariably reduces the cost of collection, transportation and disposal for most municipalities and other municipal solid waste service providers. A life-line tariff may be provided for the sake of avoiding externalities by allowing consumption of the service to certain kilogramme per day of solid waste free of charge and after which additional solid waste generated becomes fully charged. However care must be taken to ensure that this is not abused as the study of

Bayawan in Indonesia shows. The study by GIZ (2010) as cited by Abdullahi, (2014) revealed that upon the introduction of PYT in Bayawan some customers scrupulously decided to embark on indiscriminate disposal of waste in addition to use of waste collection bags that were bigger than the approved 40 litres so as to pay lower collection cost. This could hamper the efforts of municipalities to recover cost of service provision and may return waste collection authorities to the vicious circle of low revenue begets low service or coverage and low coverage further begets low revenue and the vicious circle continues. This means that when coverage is low there will be low revenues and with low revenues, the municipalities may not be able to enlarge coverage and some residents, mostly the poor that live in inaccessible areas will be excluded from the service. But coverage can also be low if the appropriate technology is not acquired to provide the desired sustainable municipal solid management in developing countries. As van de Klundert (1999) rightly pointed out, the craze by developing countries to acquire waste collection vehicles akin to those of the developed countries has continued to lower coverage because of poor road network and inadequate maintenance. Consequently, sustainability of municipal solid waste management in developing countries should also be considered on the basis of acquisition of appropriate vehicles and waste equipment that are easy to maintain and can access core areas of neighbourhood where majority of the poor reside.

A significant achievement towards sustainability of municipal solid waste management is the adoption of the zero waste policy, which Anthony (2003) regards as elimination of about 90% municipal solid waste. For instance Germany composts 87% of its wastes and incinerate the remaining 13% (Bradford et al, 2018). In Sweden, which is also leading in the implementation of zero waste policy, only less than 1% was landfilled out of the 4.7 million tonnes of municipal solid waste that was generated in 2016. The remaining 99% of the wastes were subjected to either recycling or recovery through biological and thermal treatment in form of biogas, bio fertilizer, electricity and district heat (Rajendran et al, 2013). In fact, for Sweden to continue with the sustenance of its heavy investment in waste to energy facilities or plants, it had to import waste from some countries and this provided raw materials as well as generate revenue for the country. In a strive to achieve zero waste, therefore some countries have embarked on reducing food loss, encouraging separation of waste at source, introduction of pay as you throw (PAYT), which generates

revenues to carry out other waste management activities such as recycling and composting. Other measures include recognising the importance of providing laws or policies on extended producer responsibility (EPR) that will ensure that manufacturers or producers are involved in reduction of waste right from extraction to production through consumption and disposal. This can be achieved (Bradford et al, 2018; Fisherman, 2018) by encouraging producers or manufacturers to avoid producing single-use items or goods and concentrate on production of these items or goods that are durable and can easily be repaired, reused or recycled.

As part of the zero waste strategy some cities of developed countries have gone ahead to redefine growth (Wikipedia, 2019) by embarking on the circular material economy which focusses on keeping products on life circle by ensuring that materials are returned back to start another process of remaking or remanufacturing instead of throwing away after it has outlived its life span (Ellen MacArthur Foundation, 2017). This is contrary to the present linear model of material use where materials are first extracted, then produced or manufactured and after consumption are thrown out (Bradford et al, 2018). In the linear model, when materials are thrown away after consumption, fresh resources are then extracted to produce new materials instead of starting a new process of remaking the products. The linear process thus encourages the exploitation of natural resources, encourages pollution and degradation of the environment including intake of precious or prime land for construction of landfill or dumpsites as a result of continuous presence of solid waste in the waste stream and reliance on landfill or dumpsite as a solution to discarded waste.

Laudable as these strategies are, it is debatable if most cities in developing countries can afford to pursue and implement these strategies for achieving sustainability of municipal solid waste. For instance, while cities in developed countries have moved to the advanced stage of using technology to convert municipal waste to liquid fuel and energy, yet, most developing countries are still battling on how to achieve a successful disposal of municipal solid waste in a landfill (Elagroudy, et al, 2016). Using a landfill in the waste management hierarchy is less preferred and that is why in developed countries landfills are being phased out and thus landfilling has become a solution of last resort The reason for this slow progress in developing countries can be adduced to current

political, social, environmental, technical, legal and even historical background as it relates to management of waste generally.

Politically, most cities have found it difficult to take the bull by the horn by introducing user charges, for instance, because that will affect the electivity of politicians to political offices and instead have continued to poorly fund the waste management authorities. The meagre amount received from government could only provide services for some few days of the month and meanwhile, municipal solid waste will continue to accumulate awaiting collection. Socially, it is believed that the attitude to waste and proper municipal waste management in some cities of the developing countries is poor and shall require continuous education and public enlightenment especially in the areas of the negative effects of indiscriminate disposal of municipal solid wastes, source separation and the effects of comingled wastes in the waste stream, the need for reuse and recycle of solid waste. A change of attitude may provide the needed impetus for residents to contribute towards sustainable municipal solid waste management by, for instance, subscribing to the programme of pay as you throw (PAYT), and stop indiscriminate disposal and littering of streets.

Technically, most cities of developing countries lack qualified technical manpower to sustain even the so-called modernisation process and thus some of these processes are dead upon arrival after possibly expending huge public funds to acquire modern equipment. For instance, it is not uncommon to find that trucks reminiscent of those in the developed countries are purchased by governments in developing countries without taking into consideration the differences in the character and composition of waste including social and economic differences. After some years, the vehicles then begin to fall behind maintenance schedule owing to lack of readily available spare parts that are sometimes costly to import. Legally, in most cities of developing countries, there is complete absence of any legal backing to guide the provision of municipal solid waste management. In Nigeria, for instance, except in some few cities where some semblance of legal framework exists, the country is yet to establish any law or policy that should guide municipal solid waste management. But even for those that already have these laws or policies, there has been inadequate enforcement mechanisms, which in turn provides opportunity for scrupulous persons to circumvent the laws and the enforcement officers to resort to extortion and bribery. One of the serious environmental problems that has hampered the sustainability of municipal



solid waste management is the inadequate or total absence of communal collection points or disposal sites. Disposal of solid waste is carried out on uncontrolled marginal lands, borrow pits, marshy lands and other derelict lands that in turn pollute the environment and harm public health. This has further been exacerbated by lack of accurate data and information on the rate of generation, composition and collection of waste that could influence, for instance, the size and nature of transfer station and landfill sites that should be provided including equipment and appropriate waste collection vehicles to be purchased.

The last significant problem being faced by the developing countries in their efforts towards implementing sustainable municipal solid waste strategies may be attributable to their historical background on waste management. This aspect is normally overlooked and little or no research has so far been carried out to ascertain the influence of colonial legacy on the current state of former colonies on municipal solid waste management. With the experience garnered by the colonialist in management of waste generally, it was expected that this will be transferred to the colonies without necessarily requiring them (colonies) to reinvent the wheels. For instance, by the end of the 14<sup>th</sup> century waste collectors better known then as official scavengers have been introduced to collect and transport wastes from streets to dumpsites that were located outside city walls using carts as the mode of transportation (Nathanson 2018). By the turn of the 18<sup>th</sup> century (Vilis et al, 2009), what could be referred to as the forbearer of modern day solid waste management system was introduced in London. Unfortunately, evidences do suggest (Yuen, 2011; Falaye 2017) however, that instead of continuing with the good municipal solid waste management practice in the colonies, the colonial masters were instead preoccupied with the development of trade. Consequently, the sanitary conditions of cities continued to deteriorate as a result of bad municipal solid waste management. Thus, when the bubonic plague broke out in the 20<sup>th</sup> century in the colonies, the colonialists were interested only in protecting themselves through policies such as physical segregation form the native populations by creating European settlement areas with a buffer separating them away from indigenous settlement. These European Areas which are referred to Government Reservation Areas (GRA) survived till today and are known to have cleaner environment and also better planned (Yuen, 2011; Carlos, 2015). It is argued, therefore that if the colonialists had made enough

commitments towards providing sustainable municipal solid waste management just as they have done over centuries ago in Europe, the colonies may have been better able to handle or come to grips with the current realities in municipal solid waste management especially in the face of the current rapid urbanisation without commensurate industrialisation.

But what can the developing countries do in the face of these inadequacies? The answer may lie in domesticating some of the strategies based on peculiarities in addition to adoption of a home grown strategy that will enable them provide this vital service at least cost by municipalities or governments. One such strategy could be the effective use of the informal waste sector to complement the services provided by both the public and private sector. This will be a win-win situation; providing employment on one hand and on the other ensuring that the environment is clean and safe. It is unfortunate however, that most politicians and government officials in developing countries view the utilisation or partnering with the informal waste sector as retrogressive. After all, in their various trips to developed countries, the informal waste sector is absent or is not part of the municipal solid waste management system. Consequently they become unrecognised and are later banned when cities decide to embark on the so-called modernisation process. So what is the informal waste sector and what role or contribution can this sector make in providing sustainable municipal waste management at a least cost for developing countries? Attempts have been made to answer these questions in the next section.

#### **Informal Waste Sector: Definition and Role.**

The term informal sector, from which the term informal waste sector was derived, is not new to the academic or practice because as far back as 1960s, it has been in use by anthropologists before its appearance in development literature in the 1970s. The use of the term 'informal sector' can however, essentially be attributed to Keith Hart; a British anthropologist, based on his seminal work on the economic activities among rural migrants in Accra, Ghana. (Citing Hart (1970 and 1973); ILO (1972), Tokman (1978) views the informal sector as comprising of people or group who despite lack of formal access to capital or other resource, markets including absence of recognition and support from the authorities, still earn some income from their products or services. Generally, the informal sector according to De Soto (1989) is a product of excessive bureaucratic red-tape coupled with the high costs of formalisation

that include other burdens such as taxes, bribes and sometimes harassment or arrests. Unlike the formal sector, the informal sector worker, however lacks welfare benefits and financial support because he does not possess collateral, in addition lacks job security since he can neither be protected by union laws nor the state laws since the state does not even recognise his contribution.

Arising from the foregoing definitions of the informal sector, therefore the informal waste sector has been defined as comprising individuals or group of individuals including small and micro enterprises that are not registered or recognised as providers of municipal solid waste management services but are still involved in waste picking, scrap collections and storing including trading (itinerant buyers) and recycling of municipal solid waste (International Labour Organisation (ILO) as cited by Gupta, 2012). However, Gunsilius, et al (2011) adds that informal waste sector are not only unrecognised or unregistered to provide waste management services but also consist of individuals, families and micro enterprises that carry out activities that are not organised, sponsored, financed, contracted, managed, taxed or even acknowledged by the authorities. Gunsilius, et al (2011) further categorised the informal waste sector into the *informal service sector* that is involved in street sweeping, drainage evacuation, collection, transportation and disposal of waste while the *informal valorisation sector* focuses on the collection, processing and transportation in addition to purchase or barter mostly household or children toys with reusable and recyclable materials.

Until recently, the contribution of the informal waste sector to sustainable municipal waste management was not acknowledged by governments in developing countries. Indeed before now informal waste sector workers are called all sort of derogatory names and considered as of low social status because they are involved in waste that majority refer to as 'dirty' job. This is notwithstanding their responsibility as collectors of recyclable materials from different sources and picking of waste from neighbourhoods that are not normally accessible to municipalities' waste collection vehicles. Consequently, the significant roles or contributions of the informal waste sector to sustainable municipal solid waste management can be viewed from two aspects – Diversion of waste from the waste stream thus creating environmental and public health benefits and improving coverage of municipal solid service provision by providing service to areas that cannot be covered by the formal waste sector.

This in addition to providing more jobs in the municipal waste management sector more than what the formal sectors can offer.

### **Diversion of waste and the environmental and public health benefits.**

Although there is dearth of data in many developing countries on the quantum of waste being handled by the informal waste sector, reviewing literature, Linzner and Lange (2012) found out that informal sector waste picker on foot can collect a maximum of 40 kg per day while other primary collection vehicles such as bicycle may collect up to 60 kg per day and other muscle driven vehicles such as rickshaw and pushcart could collect a maximum of 200 kg per day and in rare cases where the informal sector has a pick-up truck, it could collect between 2-3 tonnes per day. In addition to waste picking, it has been revealed (Dias, 2012) that as a result of the recovery of recyclable materials, the informal waste sector in developing countries has been responsible for more of the recycling activity than the formal sector and thus accounts for diverting significant amount of waste from the waste stream than the formal sector thus reducing the weight and volume of waste to be collected and transported to the landfills or dumpsites. Indeed, some including Ndum (2013) citing Suchada et al. (2003) believe that the informal waste sector has the capability to divert about 90% of the recyclables from the waste stream. Diversion is reckoned to contribute to preventing injury to public health of the residents by reducing possible amount of carbon dioxide from emission of waste collection vehicles as well as pollution emanating from the dumpsite either from burning of waste or release of green gasses which could harm the environment. Citing from World Bank (2004) sources, Elagroudy, et al, (2016) revealed that if municipal solid waste remains uncollected it can contribute to increase in health risks from open dumping, burning and release of leachate that contaminates both ground and surface water sources.

Diverting waste from the waste stream also have the advantage of providing savings to the municipalities. In Delhi alone, for instance, Gupta (2012) noted that about EUR 6.7-7.5 million was saved from diversion of waste by the informal sector. Just like in Delhi, Medina (2008) also indicates that in Jakarta, Indonesia, the informal waste sector was responsible for the reduction of about 30% of the volume of waste that was destined for the dumpsites or landfills and this resulted in the reduction for the municipality of the cost of fuelling vehicles, labour and equipment. These savings could be ploughed back to provide

additional labour, vehicles or equipment to improve coverage and sustain municipal solid waste operations. Apart from financial savings, Gupta (2012) further noted that when the informal waste sector recovers materials from the waste stream that are recycled or reused, the sector contributes to another environmental benefits because it saves natural resources that could otherwise have been extracted for production of new item or product. That may explain the reason why, for instance, the Mexican Paper Mills decided to cooperate with the informal waste sector to ensure supply of recovered wastepaper which is reckoned to be seven times cheaper than imported wood pulp (Medina, 2008 citing Medina 2005). Using recovered materials to remake new or different products also improves conservation and preservation of natural resources and hence the promotion of intergenerational equity and justice, which is a cardinal principle of sustainable development.

#### **Extending coverage of municipal solid waste service.**

Owing to accessibility problems as a result of poor road network, technical financial and manpower constraint, some municipalities can only provide limited coverage and majority of residents that live outside this coverage must find a cheaper and reliable means of disposing their solid waste. In this situation, the informal waste sector readily comes to the rescue because they know the terrain better and can afford to access neighbourhoods of the poor to pick up the waste, door-to-door at a fee, and either take it to the communal collection points or dispose it on the streets for collection by the municipality's waste collection vehicles. The charges are normally affordable and the residents have been reported to be satisfied with services provided by the informal waste sector (Afon, 2007). The collection of municipal solid wastes from these neighbourhood reduces the indiscriminate disposal of wastes that could create visual intrusion and public health problems.

Indeed for a long time, the informal waste sector have been the vanguard of waste collection before the advent of the modern municipal solid waste collection system even in the developed countries. In the developing countries the informal waste sector is still playing this vital role. This is because according to Balarman, (2015) most developing countries collect about 60% of the waste generated despite allocating about 80% to 90% to municipal solid waste management service. For instance in the Lagos, the informal waste sector (Afon, 2007 as cited by Nzeadibe, and Ajaero, 2010) is responsible for 73.3% of the

waste being collected and disposed. In Cairo, Egypt, Zabbaleen has been noted to be one of the early informal waste pickers that was responsible for collection, transportation and disposal of one-third of the municipal solid waste in Cairo, Egypt using donkeys as mode of transportation of the waste (Nas and Jaffe, 2002, Wilson et al, 2006). This may explain why, according to Gupta (2012), in 2010 Cairo became one of the highest city that recorded EUR 14.47 million as cost savings from the informal waste sector waste collection, transportation and disposal service; second only to Lima, Peru.

### **Providing employment in the municipal solid waste service sector.**

According to Medina (2008), about 15 million are known to eke some living from the informal waste activities in developing countries. Considering the increase in rural urban migration, the fall in economic activities in the formal sector in many countries and recognition and integration of informal waste sector by some countries, it is believed that this figure may have risen by now. Although there is dearth of data in most developing countries, Linzner and Lange (2012 estimates that the percentage of the informal sector involved in waste management ranges from 0.5% to 2% of the total population of cities. Majority of those engaged in this sector are, however, made-up of persons that lack skills, education, experience or capital to start any trade and thus not fit for employment in the formal sector. One of the major significance of the informal waste sector therefore is the reduction of unemployment especially in youth, which carries some multiplier effects such as reduction in crime.

### **Recommendations**

While the sustainability of municipal solid waste management has become a paramount importance to both developed and developing countries, it is clear however that the informal waste sector still play a vital role in the provision of sustainable municipal solid waste management service in developing countries. This contribution includes the diversion of volumes of municipal solid waste from the waste stream thus creating savings for municipalities that could be used to provide, for instance, additional equipment. The diversion can create environmental and health benefits to residents of cities in developing countries. The informal waste sector also extends coverage of its waste picking activities to neighbourhoods that could have otherwise being neglected because of poor road network which makes them inaccessible for waste collection. In addition,

it provides employment to the teeming persons migrating into urban centres in search of employment opportunities without skills, formal education, experience and even capital to start any viable business. For the informal waste sector to be an efficient and effective strategy, however, the following recommendations are made:

- i. Developing countries must first acknowledge or recognise the roles of the informal waste sector as partners in municipal solid waste management system. Unfortunately, instead of this recognition, they are sometimes outrightly banned from operations because they are considered as nuisance in cities who carry out dirty jobs and responsible for indiscriminate waste disposal. With recognition by governments, the informal waste sector will be provided voice and social acceptance that may lead to removal of stigmatisation by the public. This will however require sustained education and enlightenment campaigns by the media and spirited non-governmental organisations (NGOs) that will increase awareness in the politicians, waste management officials and the public on the need for a change of perception on the informal waste sector (GTZ, 2010). In India and Brazil, according to GTZ (2010) campaigns were also extended to schools and financial institutions that hitherto viewed the informal waste sector workers as not credit worthy because they lack collateral.
- ii. There is the need to go further than recognition by integrating the informal into the formal waste sector. This will require the political will of the politicians who normally view informal waste sector as retrogressive and out of tune with the current modernisation process and must therefore be kept out of business. The politicians at federal, state and municipal levels must therefore muster the political will to enact and enforce policies, laws and regulations that will give the integration process a legal backing. Brazil, for instance, which already have long history of interacting with the informal waste sector has a strong federal law that provides for mandatory participation of the informal waste sector in municipal solid waste management programmes (GTZ, 2010). This is in addition to outright engagement of the informal waste sector by municipalities for municipal waste management contract without bidding. Similarly, in

2006, India (GTZ, 2010), reviewed its laws to make it effective by providing for not only recognition but integrating informal waste sector into the formal waste sector by strengthening its capacities to undertake segregation and recycling activities.

- iii. Encourage, through a sustainable business development support the informal waste sector to form organisations or cooperatives. Even with recognition and integration, left alone as individual informal waste sector workers, it will be difficult for them to have the bargaining powers to negotiate for contracts or enforce appropriate price for collection of waste or sale of recyclable materials. In supporting the formation of organisations or cooperatives, Dias (2008) advocates for 3Rs; recognition, representation and rights. Recognition grants the informal waste sector, through policies or laws, the right to become a stakeholder in the municipal solid waste management that enable these stakeholders to be involved in determine policies or laws affecting municipal solid waste management in a city as demonstrated by the Peruvian Government. In enacting its Law 29.419 of 2020, for instance, the Peruvian Government received inputs from the representatives of the informal waste sector as a manifest of the recognition of the sector in policy and Law formulation process (Dias, 2008 as cited by GTZ, 2011). Representation is also one of the 3Rs and refers to giving voice to the informal waste sector to participate in designing a viable municipal solid waste management system that could suit the peculiarities of a given city. The third of the 3Rs is the right of the Informal waste sector to be granted access to resources such as obtaining credit to enable it grow; to equip and maintain its organisations or cooperatives so that they no longer continue to be exploited by the middlemen or manufacturers.

When organisations or cooperatives are formed, they also create a lot of other benefits for the informal waste sector and by extension to sustainability of municipal solid waste management service. This may include the ability to create partnership with the formal waste sector in provision of municipal solid waste management. The case of Colombian cities (Medina, 2008) is a good example of a partnership where the municipalities provide equipment and other



infrastructures while the informal waste sector provides the labour for collection of municipal solid waste free of charge but retaining the recovered materials to earn income for its members. Alternatively, collection of municipal solid wastes from some waste generating sources, such as households and commercial areas could be ceded to the informal waste sector organisation or cooperative. This synergy ensures waste collection and recycling activities are carried out on behalf of the municipalities at least cost.

- iv. Assist in improving the health and welfare of the informal waste sector who normally carry out their activities in poor health condition associated with potential health risks such as HIV and hepatitis. Addressing the poor health conditions through provision of adequate health services such as protective personnel equipment (PPE) could address poor health and occupational safety as well as improve the performance of the informal waste sector worker. The informal waste sector worker will thus be protected from physical injury and inhalation of substances that can also be injurious to health. NGOs could take the initiatives, as they have always done, to educate and enlighten the informal waste sector workers on improving occupational and health safety including labour conditions.

### **Conclusion.**

From the foregoing it is clear that sustainable municipal solid waste management is necessary at least in order to maintain intergenerational equity which is one of the cardinal principles of sustainable development. But to achieve this, there will be the need for authorities to adopt, adapt and implement different strategies. However, it has been argued that some cities of developing countries may not afford to implement some of these strategies because of environmental, legal, political financial, technical and historical problems. They can however leverage on the existence of the informal waste sector as one of the strategies to provide municipal solid waste management service in a sustainable manner and at least cost. But they will need to first recognise the importance of the informal waste sector as an alternative provider of municipal solid waste management service and hence integrate it

into the formal waste sector through legal, policy and programme formulation and execution.

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