

# From a Waste Cemetery to a Waste Hospital: Recreating Kisumu City's Waste Management System

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**Abstract Background:** With the new constitutional dispensation in Kenya, counties, cities and towns are creating and recreating their solid waste management systems. Taking Kisumu as a case, this study assesses the existing solid waste management system and how best to recreate it while giving special emphasis to its system configuration, governance framework and waste economy. **Methods:** Data was collected through group discussions, in depth interviews, document reviews, observations, and a city wide survey of solid waste generation and management. Results were analysed through content and critical analyses and descriptive statistics. **Results and Conclusion:** The existing configuration does not ensure service delivery to all while the governance framework is not up to the task at hand. Furthermore, the City's waste economy fails to capture a number of waste resources but loses them to Kachok dumpsite as wastes. **Recommendation:** First, to better recreate the City's solid waste management system, its configuration should be designed to ensure service delivery to all. Then its governance framework and waste economy be recreated to seamlessly and sustainably fit this configuration. Moreover, in order to increase the recovery of value from wastes, sorting at source and return funds should be engrained in the system. Additionally, the involvement of resident associations will help improve governance at the residential level. Finally, for all systems, processes, and facilities, performance standards, regular monitoring and evaluation mechanisms should be established and enforced.

**Keywords:** *governance framework, Kisumu city, circular economy, waste resources, recycling, return fund, solid waste management*

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## 1. Introduction

Solid waste management is one of the urban challenges in Africa and a growing body of evidence indicate that poor governance is at the core of the issue [1,2,3,4]. The various aspects of governance, namely; policy, legal, regulatory and institutional frameworks, are not well thought out. In some cases, policies are non-existent, and where they exist, implementation is often crippled by contradictory or inadequate legislation, political interference, corruption, lack of willingness or poor governance [5,6]. The situation is made worse by populations and governments that have poor attitude towards solid waste management and those who do the dirty work as is evidenced in the minimal support accorded to them in terms of funding, infrastructure, respect, recognition, cooperation, occupational safety, and conducive legal framework to name but a few [7,8,9]. It is, however, encouraging to note that the development of Sustainable Development Goals (SDGs) has helped bring this issue to the forefront and many countries in the developing world

are making strides to improve their solid waste management systems.

In Kisumu city, and Kenya as a whole, the National and County governments are taking initiatives to tame this urban problem. In 2017, the national government banned single use polythene bags and has currently banned single use plastics in all protected areas (e.g. national parks, forests and beaches). County governments which have the responsibility of managing solid wastes within their borders are also developing policies to govern the same. Additionally, Kenya Alliance of Resident Associations is also drafting policies across the country to help in the management of solid wastes. As it were, there are a host of initiatives from different quarters geared towards improving the management of solid wastes. As cities in developing countries make efforts to improve solid waste management, it is increasingly becoming important to have a fair understanding of the existing solid waste system. It is not only essential to know or have a vision of where we would like to have the system, but also where we are, in order to be able to identify areas that would be of significant impact and also to measure progress towards desired states. Taking Kisumu city as a case, the objective

of this study is to map and analyse the City's solid waste management system in terms of configuration, governance framework and waste economy with a view to suggest improvements for governance and overall sustainability. By system configuration we mean waste disposal circuit, infrastructural requirements and how actors are juxtaposed and their roles along this chain.

## 2. Methodology

In 2017 and 2018, a City wide survey was done in Kisumu to establishing the status of solid waste management in order to come up with a sustainable governance and business model for the City. Data was collected through household and business questionnaire surveys on solid waste generation and management, interviews with City and County officials in the dockets of environment, group discussion with Kisumu Waste Actors Network (KIWAN), document reviews on policy and legal framework, and observations. Three in-depth interviews with key informants (City Director of Environment, County Chief Officer-Environment and County Director- National Environmental Management Authority) were conducted. Three hundred and seventy-one (371) households of the City's approximately 102,508 households (according to Kenya Bureau of Statistics 2009 population census) were served with questionnaires. It was difficult to get the exact population of businesses in the city due to widespread informality (most entrepreneurs are not formally registered by the City) and therefore determining the appropriate sample was not possible. Consequently, 301 businesses were served with questionnaires on waste generation and management. These businesses and households were fairly distributed across the City.

## 3. Results and Discussions

In this section, we present our results and discussions, beginning with the solid waste system and its configuration, then governance framework and finish with the waste economy.

### 3.1. Solid Waste System and Its Configuration

**Waste generation and service coverage:** Our findings indicate that the City Directorate of Environment serves the Central Business District (CBD) of the City and markets while private waste entrepreneurs service some clients in the CBD, and residential areas including informal settlements. However, there are complaints by some residents that some of the entrepreneurs are not consistent with their service delivery. They sometimes skip a week or more before collecting wastes from their clients. Skips are provided in markets and some strategic areas where residents and peasant business persons can dispose their wastes which are then collected on a weekly basis by the City and transported to Kachok dumpsite. These skips are not closed. Thus, when it rains, organic matter rots rapidly hence depreciating in value and emits

bad odour to neighbouring areas. As currently configured, waste entrepreneurs are not confined to service zones (residential and business areas), and as they revealed in our group discussion, "it becomes difficult to know which areas have not been covered." According to our survey, 68% of households have not subscribed to solid waste management services for various reasons, some of which include inability to pay for the services, the services have already been paid for in tax, they can manage their wastes, and that their residential areas are not covered by waste entrepreneurs. Some of these households thus manage their wastes in undesirable ways such as dumping in open spaces, along roadsides and in trenches. Others feed organic waste to their livestock and pets. There are businesses that are also not subscribed to solid waste management services. Some of these are night clubs and they end up dumping broken glasses along roadsides and open spaces.

**Collection and transportation:** Since there is no law requiring waste generators to subscribe to solid waste collection and management services, generators manage their wastes as they please. According to our survey, only 38% of households in the City are subscribed to solid waste management services. For collection, transportation and management services, households pay entrepreneurs fees that range from K.Shs 30 - 500 per month. Whereas the City uses trucks to transport wastes, private entrepreneurs often use pickup vans (mostly hired), rickshaws (*tuk-tuk*), hand pushed carts and motorbikes. These often prove challenging to severely under-resourced entrepreneurs collecting wastes from distant parts of the City. Thus, some (usually those without recognition letters from the City) end up dumping these wastes in bushes, trenches and unoccupied parcels of land. As there is no sorting in households, waste entrepreneurs who reclaim valuable waste resources often begin their sorting process during their collection rounds from household to household and during transportation to Kachok dumpsite for final disposal.

**Valorisation:** At the household level, there is some non-commercial valorisation of wastes especially plastic containers, metal/iron sheets and some organic wastes e.g paper/boxes and food leftovers. Consequently, some households find value in reusing, recycling or reclaiming heat or nutrients (through composting or disposing in their kitchen gardens) from some waste resources. Commercial, valorisation of wastes is practiced by entrepreneurs by recycling of wastes such as paper, plastics, tyres, and metallic sheets. Valorisation of organic wastes has been tried through composting and biogas but it is not yet widespread. A larger part of it still ends up at Kachok dumpsite to be lost through decomposition. Electronic wastes are largely stored in homes and office stores since the fast developing electronics industry renders them less marketable. Attempts to salvage them sees some of them abandoned in repair shops or sold along streets as or for spare parts. Construction wastes are usually privately used for carpeting private access roads or neglected public roads.

**Treatment and disposal:** The City's Directorate of Environment does no treatment of solid wastes before disposal. It simply collects and disposes. Even those sorted into segregation bins located along the City's

streets are mixed together and disposed at Kachok dumpsite. The understanding is that municipal wastes essentially need no treatment before disposal. However, a form of treatment may be sorting of wastes into different types for value recovery, and true wastes for appropriate final disposal. Furthermore, there is need for regular testing for contamination of wastes that reach the dumpsite. Even though the dumpsite is like a waste cemetery to the City, waste pickers scour the site for valuable waste resources which they sell to entrepreneurs. The dumpsite is also poorly managed and situated at a most undesirable location [10]. This system and configuration is summarized in Figure 1.

### 3.1.1. An ideal Solid Waste Management System Configuration

The management chain for true waste has four stages, namely, generation, collection and transportation, treatment and final disposal, and is a unidirectional chain (Figure 2). The treatment phase may not be mandatory depending on the nature of wastes. Nevertheless, solid wastes from urban areas are not pure true wastes since some resources that can be reused and recycled are mixed in them. Consequently, the chain for solid wastes from urban areas is not unidirectional but has loops between the different stages (Figure 1).

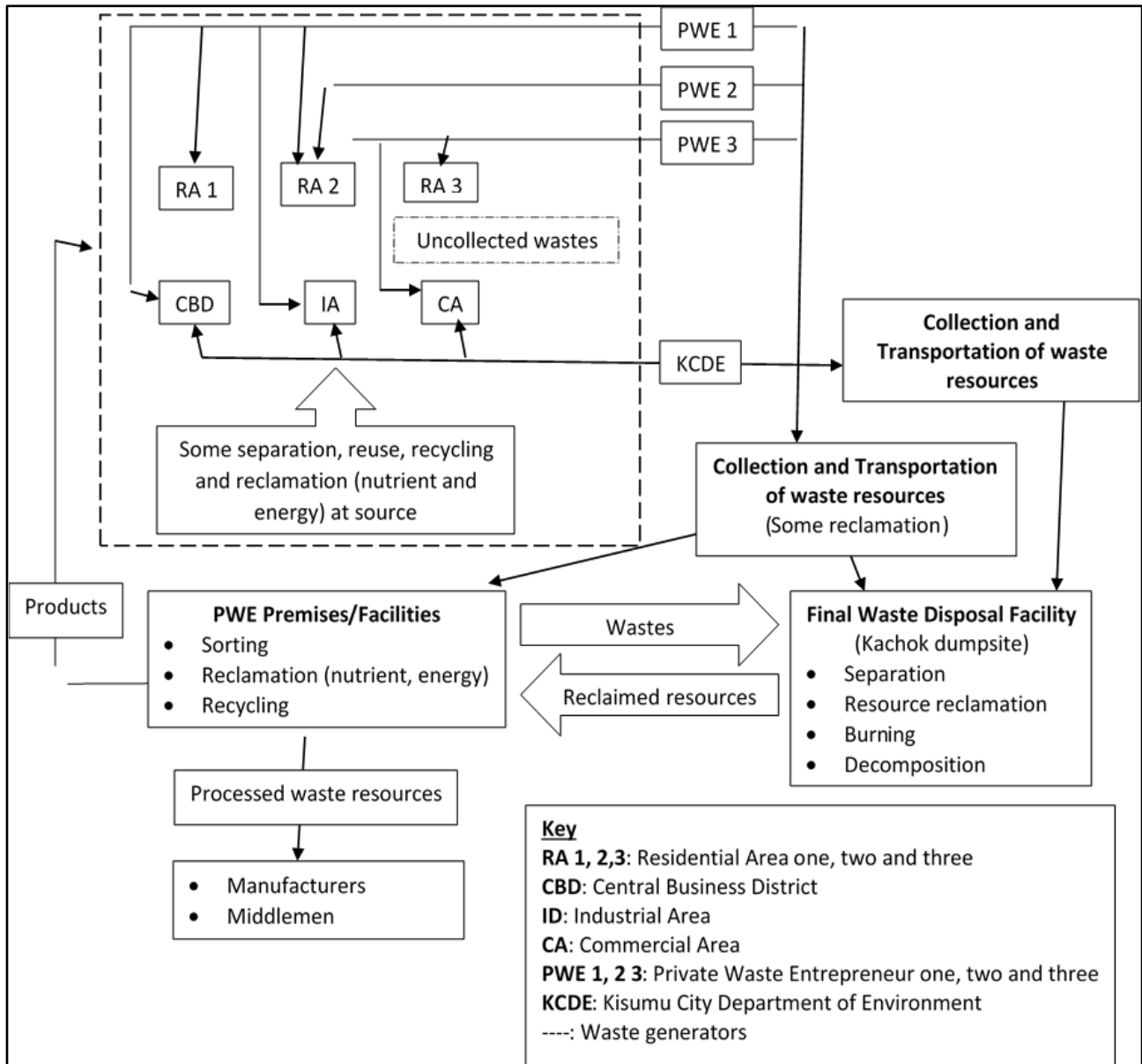


Figure 1. Current Kisumu city's solid waste management system and its configuration



Figure 2. Disposal chain of true wastes

Unlike sewage whose collection and transportation is seamlessly connected through pipes to treatment plants and from there to a final disposal point, solid wastes have not such a seamless system. All solid waste disposal chains begin at points of generation. In order to preserve the quality of generated wastes and to reduce the expenditure in sorting at advanced stages of the chain, waste segregation must begin at the point of generation. Some of the resources can be reused for uses initially intended or unintended for the product. If the waste resources are to be used for the initial purpose, for example, glass bottles for packaging soft drinks, they may be collected from generators to depots and further to their factory for repackaging of new drinks. Furthermore, reusable materials may find new life through repair and change of ownership through gifting or second hand sale. Thus reused wastes are made into products by reassignment of uses and change of ownership [11]. If the waste resources are faulty, they may be repaired before reuse. Some waste resources may need to change form and shape through “Do It Yourself” (DIY) processes at the points of generation to transform them into new products. Yet, some owners of waste resources may have no need of reuse or recycling of such. They may only be in need of the energy stored in the wastes and thus could combust

them for the energy. Some waste resources might be of no use to their generators and will necessarily be collected and transported for further handling. Wastes at the point of generation can, therefore, be handled through reuse, recycling and energy reclamation.

The segregated wastes whose generators have given up their ownership are collected and transported using specialized trucks in order to maintain the quality of the waste resources. These resources are then transported to a standalone temporary handling and storage facility or to a final waste resources handling facility with such a section. At this facility, the collected wastes are further segregated into reusable, recyclable and true waste resources for energy or nutrient reclamation. Reusable resources will need to find their way to households, commercial and industrial enterprises through second hand and repair shops. Recyclable resources will need to reach manufacturing enterprises as raw materials while true wastes will be collected and transported in specialized trucks (depending on their types and final handling method) to the final waste resources handling facility. It is similarly important to note here that only waste resources that cannot be reused as is or after repair and those that cannot be recycled are the ones that need to proceed to the final waste resources handling facility.

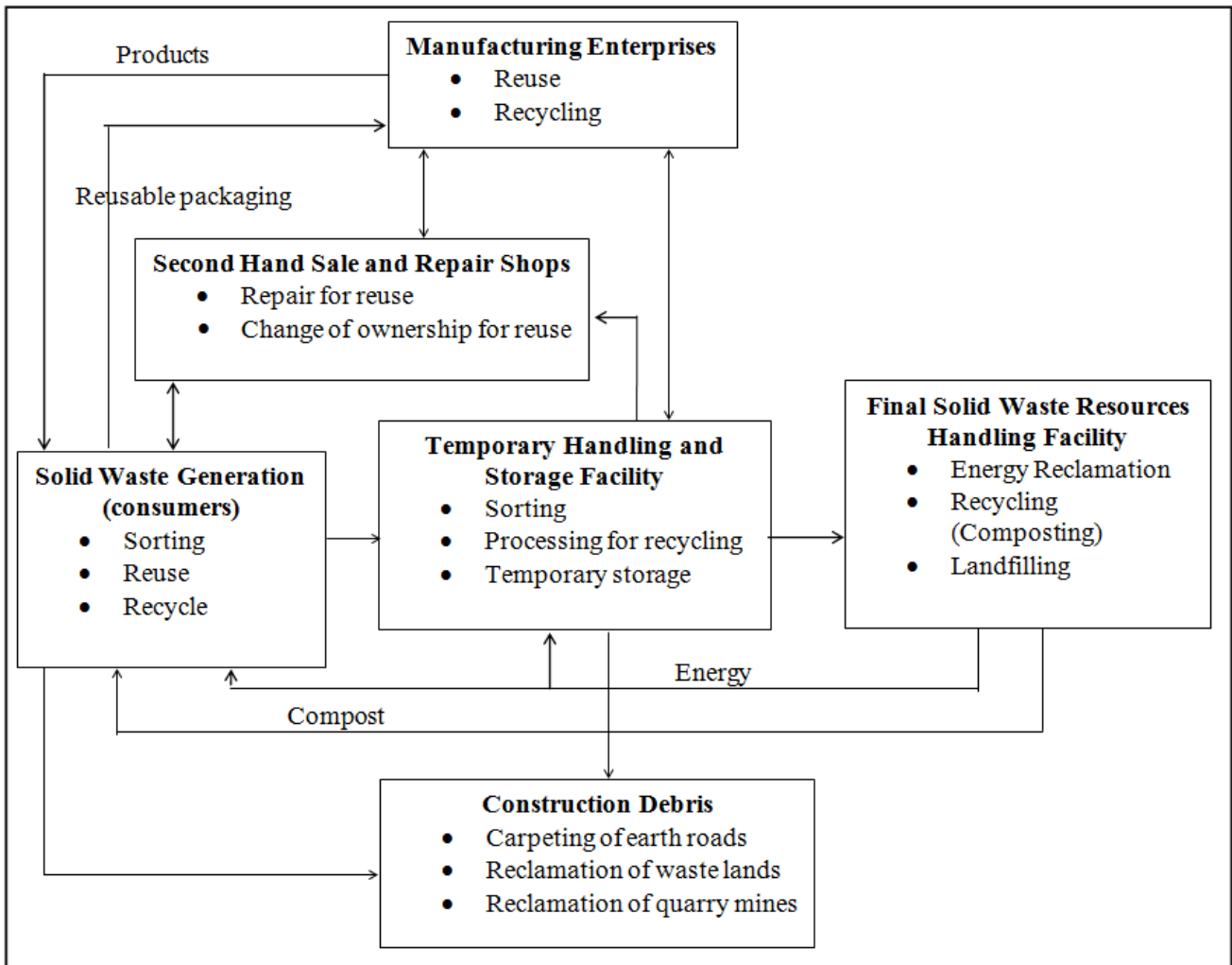


Figure 3. An ideal solid waste management system configuration (flow chain)

At the final waste resources handling facility, there is reclamation of energy from waste resources through a chosen waste to energy technology(ies). The technology of choice will depend on several factors such as rate of wastes generation, type of wastes, availability of land and skilled labor, type of energy needed by the society, and availability of capital for investment in the facility. Energy outputs demanded by the society could be heated water, electricity, gas or biomass (e.g briquettes). Alternatively, if the final waste is largely uncontaminated organic matter, it can be made into compost manure. Reclaimed energy and/or compost can then flow back to households, farms, commercial and industrial establishments as appropriately needed. This disposal chain when enabled with a good governance system should aim to rid the environment of all waste resources and supply back to households, and commercial establishments products and energy. This whole chain is summarized in [Figure 3](#).

### 3.2. Governance Framework

According to Integrated Solid Waste Management (ISWM) framework, solid waste governance has three critical components, namely; 1) Sound institutions and proactive policies, 2) Financial sustainability, and 3) Inclusivity or user and provider [12]. In this section we present our findings and discussion on the legal and institutional frameworks and the socio-cultural setting which influence governance.

#### 3.2.1. Legal Framework

A review of 16 national and county policy documents (The Constitution of Kenya, 2010; Kenya Vision 2030; The Environmental Management and Coordination Act, 1999 (amended 2015); Environmental Management and Coordination (Waste Management) Regulations, 2006; The Environmental (Impact Assessment and Audit) Regulations, 2003 (amendment 2015); Environmental Management and Coordination Act (Air Quality) Regulations, 2014; The Occupational Safety and Health Act, 2007; Public Health Act, [1986] (Revised Edition 2012); The County Governments Act, 2012; The Urban Areas and Cities Act, 2011; Kisumu County (Solid Waste Management) Bill 2014; National Waste Management Strategy 2015; Kisumu Solid Waste Management Program [KISWAMP] (City strategy); Kisumu Integrated Solid Waste Management Strategy: 2015-2025; Kisumu Integrated Solid Waste Management Plan (KISWaMP) 2017; Model County Solid Waste Management Policy, 2018 [draft]) indicate that there is a lot on governance

framework, existing and proposed. The issues covered include but are not limited to sorting at source, reuse, recycling, financing, institutional reorganizations, institutional collaborations, penalties for offenses, preferred final disposal technologies and private public partnerships (PPP). Noteworthy in the constitution of Kenya 2010 is that everyone has a right to a clean and safe environment. Non-reusable plastic bags were banned in Kenya in September 2017 and use of single use plastics in protected areas have also been banned since June 5<sup>th</sup> 2020.

Since the new constitutional dispensation in Kenya took effect in 2013, solid waste management has been the onus of county governments. The first county governments have had the difficult duty of developing legal frameworks of governing devolved functions which include solid waste management. With the teething problems of establishing such a system of governance, relevant policies, including that of solid waste management, have been slow to come by. As our findings indicate, it is now that policies are being developed. Current operations have been based on national documents such as the Environmental Management and Coordination Act [1999, revised 2012], and The National Solid Waste Management Strategy 2015, city council regulations inherited from defunct municipal council and mutual understanding. The Director of Environment in an interview indicated that it has been difficult to prosecute offenders due to lack of regulations. The Director further pointed out that even though private waste actors contribute to the management of solid wastes in the City, it is difficult to regulate them because of lack of regulations. They, therefore, operate on the basis of mutual understanding which involves the City issuing letters of recognition to enable waste entrepreneurs to do their business. Such a basis of operations can be subject to the whims of either party since they are not covered by law.

Studies have revealed that waste management systems fail because of weak organizational, financial, and technical limitations of local authorities [13,14]. Furthermore, quality control in terms of monitoring and evaluation are either absent or not properly activated leading to poor services, collapse of systems and facilities, lack of or poor accountability and the proliferation of corruption [10,15,16]. This is the case in most developing countries with poor solid waste management systems [17,18]. Studies have recommended an Integrated Solid Waste Management System to fix the solid waste management challenge in Kisumu [19,20]. We break this down to specific policy requirements along the solid waste management chain so as to address the governance gaps in Kisumu ([Table 1](#)).

**Table 1. Policy requirements for solid waste management in Kisumu**

Stage of the waste management chain	What is required / Policy requirement
1. Waste generation	<ul style="list-style-type: none"> <li>• Encouragement of sorting, reuse, recycling, reclamation of waste resources</li> <li>• Polluter pays principle (service fees)</li> </ul>
2. Collection and transportation	<ul style="list-style-type: none"> <li>• Return fund</li> <li>• Specialized transportation vehicles/trucks</li> </ul>
3. Secondary sorting and reclamation of waste resources	<ul style="list-style-type: none"> <li>• Temporary storage and sorting facility,</li> <li>• Repair and second hand shop (s)</li> </ul>
4. Processing for recycling and reclamation	<ul style="list-style-type: none"> <li>• Sustainable demand for goods and services produced</li> </ul>
5. Treatment and Final disposal	<ul style="list-style-type: none"> <li>• Vision on final waste disposal technology</li> <li>• Final waste disposal facility</li> <li>• Polluter pays principle (Disposal/management fees)</li> </ul>

**Table 1. Appropriating good governance principles in solid waste management**

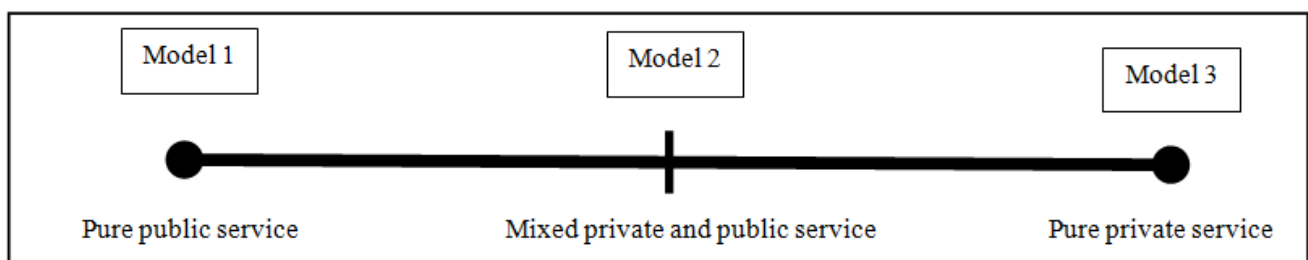
Main Principle	Sub-principle	Suggested Initiatives
1 2	Legitimacy and voice	Participation
		Consensus orientation
3	Direction	Strategic vision
		Responsiveness
4 5	Performance	Effectiveness and efficiency
		Accountability
6 7	Accountability	Transparency
		Equity
8 9	Fairness	Rule of law

Since the practice of governance is at the heart of solid waste management problems in developing countries, it is important that the aspects of good governance be addressed in Kisumu. It is universally recognized that good governance requires legitimacy and voice, direction, performance, accountability, and fairness [21]. These can further be broken into nine more specific aspects of participation, consensus orientation, strategic vision, responsiveness, effectiveness and efficiency, accountability, transparency, equity and rule of law. For the legal framework to meet its objectives, these aspects of governance need to be addressed. Indeed, our findings indicate that the Department of Environment was yet to formulate its strategic vision for solid waste management. Furthermore, private waste entrepreneurs occasionally complained of their views not being sought for in matters important to them (e.g where to take solid wastes after the decommissioning of Kachok dumpsite). Decision making which is key in governance is also hampered by lack of an updated and regularly collected data on solid wastes in the city. As a beginning, a few factors (Table 2) are suggested for consideration in order to improve the practice of governance.

### 3.2.2. Institutional Framework

In Kisumu City, the Directorate of Environment at the

City level is directly responsible for solid waste management in the City while its sister Department of Public health looks at the public health implications of solid waste management. At the county level, County Directorate of Environment is concerned with policy issues. At the national level, National Environmental Management Authority (NEMA) oversees and manages all matters relating to the environment. Last but not least, at the neighborhood level, there are resident associations which, though having no regulatory authority, may manage their solid waste challenges through consensus building and cooperation with the City Management and County Government. There are also academic institutions (e.g Jaramogi Oginga Odinga University of Science and Technology and Maseno University), non-governmental organizations such as Kisumu Local Interactions Platform and Practical Action to name but a few, and market associations like Kibuye market community based organization which through research and other initiatives have helped improve solid waste management in the City. In 2018, private waste entrepreneurs also came together and registered a cooperative called Kisumu Waste Actors Network (KIWAN) through which they organize and empower themselves to better offer solid waste management services in the City.



**Figure 4.** Solid waste management service provision models

The City has recognized that the work of managing solid wastes is too much for them to efficiently manage alone at the current level of facilitation and has opted to allow private service providers to complement their work. This scenario exists in many developing and developed countries. What differs is the mode of engagement with private waste entrepreneurs that cities employ to fulfil their mandate. For instance, some European countries and India contract the work to private business [22,23,24]. In Kenya cities largely manage public spaces while private entrepreneurs operate in a free market to manage wastes from private spaces. In small towns, and cities with adequate financial resources municipal and city councils can manage solid wastes without contracting private service providers. These arrangements represent three models of service provision, namely; fully privatized, a mix of public and privatized service provision and the last represents a fully public service provision (Figure 4).

Kisumu City operates between the first and the second model because solid waste management services is not solely provided by the City. Neither is it at model 2 because the existing involvement of private waste entrepreneurs is not captured by law. *Informally*, it can be regarded to operate at model 2. In this arrangement, public areas are cleaned by the City while private spaces (residences, industries, institutions, commercial buildings, schools e.t.c) are cleaned by the respective private entity or at their own cost. In its current informality, having considered the existing socio-economic and policy context, this model presents challenges to ensuring a clean and safe city. First, waste generators (households, businesses) are neither obligated to subscribe to solid waste management services, nor to demonstrate how they manage their wastes. Thus some take advantage of the situation and do not subscribe to solid waste management services but dump their wastes in places where they litter the environment and clog drainage systems. As reported by recognized waste entrepreneurs in our group discussion, some individuals dump their waste in public spaces or skips thus transferring their responsibility to the City. Second, this model does not ensure the coverage of the whole City by solid waste management services. Private waste service providers are in business and will only provide services in return for money. Thus poor neighborhoods, unless reached with pro-poor initiatives, and further, unless they stir themselves to manage their wastes responsibly, they will remain littered by wastes. Finally, with no policy and regulatory framework stipulating performance standards for private waste entrepreneurs, the market can be proliferated by service providers who are only interested in the collection of management of fees but not stewarding the environment by proper waste management. For this model to work for Kisumu city, these challenges must be remedied through the establishment of an appropriate policy framework and intuitional/stakeholder arrangements. In particular, the potential role of residential associations in awareness creation and coordination of waste management activities among members has already been recognized in literature [25,26,27]. Additionally, the employment opportunities it creates must also be entrenched and protected by law. In short, the model needs to be formalized. The successful implementation of the first model (full privatization) and the third model

(fully a public service) will require a higher financial capacity. This can sustainably be achieved through increased budgetary allocations and or a mandatory collection of service fees by adding it to bills of essential goods like piped water.

### 3.3. Waste Economy

Our findings suggest that even though there are efforts to reclaim waste resources in Kisumu city, they are still considered as wastes by a large part of the City's populace. According to our observations, this is not only attributable to a lack of awareness but also due to the absence of an enabling and motivating system that encourages the populace to think of wastes as misplaced resources. For instance, in some public spaces, there are bins for different waste streams (i.e organic, plastics and metallics), into which the public *try* to dispose their wastes accordingly, their efforts are, however, betrayed by the City which collects the same and transports them mixed in one truck. This is a challenge recognized by the City but which it is helpless or not geared to solve, at least not at the moment. As it were, it is waste pickers who rescue the situation by scavenging for recyclables in these bins thus preventing some of them from being mixed with other wastes. Another example is where soft drink companies, like Coca Cola and Pepsi, have a refund fund for glass bottles. Therefore, most of these bottles find their way back into reuse by the same companies. Nevertheless, such companies have no refund fund for their plastic bottles. Consequently, these bottles are destroyed or disposed of as wastes. A final, but not least, example to illustrate how the system is unsupportive of best practices is in the management of electronic wastes. Electronic wastes are best handled by repair, second hand sale and mining for spare parts [28,29]. Whereas there are repair shops in Kisumu city, shops for second hand electronics are non-existent. This may be occasioned by the fact that criminal risks are high in the sale of such products. Consequently, faulty and or old electronics are stored in homes and offices or dumped as wastes. Nonetheless, waste pickers and electronic repairers help by promoting the reuse of some of these wastes.

Cities that are successful in solid waste management have high rates of waste valorization since not all wastes are true wastes. When waste generators relinquish ownership of their waste resources by disposing them, the City assumes ownership and the responsibility of managing them. However, to help the City in managing them, the City has allowed solid waste entrepreneurs to make a living of them through the valorization processes of reuse, recycle and reclamation. Even though there are some efforts in the reuse and recycling of plastics, rubber, metals, charcoal, saw dust, paper, and electronics; fresh organic wastes still pose a management challenge in Kisumu. In order to integrate them in the waste economy, heat energy and nutrients for livestock and crops should be reclaimed from them on a commercial basis as suggested by some studies [30,31,32]. Composts might need to be augmented by inorganic fertilizers to meet specific crop soil nutrient requirements. Furthermore, they may need to be packaged well and labelled with their nutritive values for ease of marketing since farmers are

often reluctant to buy fertilizers whose nutritive content are not declared.

In order to increase the volumes of solid wastes circulating in the waste economy, it is imperative that sorting begins at the point of generation. The values of recyclables and reusables reduce as they get damaged or contaminated by other wastes along the chain of solid waste management. Accordingly, more costs are incurred in making them reusable or recyclable. Sorting also improves the value of organic wastes when done early enough in the solid waste disposal chain. Thus they can be fed to livestock and pets, fermented into biogas, burnt or incinerated to reclaim heat energy or composted to reclaim nutrients for plants. An undesirable exit from the circular economy is to have them dumped to rot as of no value. A challenge with the management of organic wastes in some markets as highlighted by the City Director of Environment is that some traders demand to be paid for wastes they have generated. They argue that if these people are going to make money from their wastes, they also need to be paid for generating them. While it is a good realization that waste is a resource from which an income can be earned, it should be emphasized that wastes dumped into the City's waste receptacles belong to the City, and if the City gives them for free to those who would manage them, then those who relinquished ownership of the same should not object. Those who wish to be paid should be encouraged to formalize their endeavors into businesses as in Hubli-Dharwad, India rather than oppose those who help the City to manage them [33].

For sorting to succeed, there is need for organized efforts in awareness creation, enforcement and provision of sorting bins in public spaces. Residences and residential areas should also have suitable places for temporary storage of wastes. Moreover, sorting bags should be easily accessible to the public for use in their private spaces. Furthermore, as noted by other researchers, compliance with regulations is hardly achieved without inducements or deterrents [34]. Consequently, these should be established for greater success than would be without them. An example of a deterrent is the non-collection of wastes by service providers as practiced in Bali [35]. Secondary sorting can be designed to take place at a temporary collection centre or at a final waste handling facility. However, secondary sorting at a temporary collection or transfer facility would only be meaningful if all that leaves it for the final waste handling facility are not going to be subjected to the same sorting again but rather be subjected to recycling, reclamation or final disposal. Otherwise, it would make a lot of economic sense for wastes to be transported from their points of generation directly to a final waste resources handling facility where they will undergo secondary sorting for reuse, recycling and reclamation before the remainder is treated for final disposal. In order to integrate private waste entrepreneurs in such a system, the City would sell the sorted wastes to entrepreneurs or get in a suitable agreement with them in order to manage the wastes at such a facility. Thus the facility would become a business hub for waste resources. This would have the double dividend of managing wastes and keeping private waste entrepreneurs in business.

## 4. Conclusion and Recommendation

In the creation or recreation of a solid waste management system, it is important to first visualize how the system will be configured. This layout is important because it helps map how waste will move from points of generation, through each successive step in the chain of management, until it reaches its final disposal point. Once this has been done, it will be easy to map stakeholders along this configuration and determine what logistical and infrastructural resources will be required for effective service delivery. Furthermore, with the background information on the socio-cultural and economic context of the society, it will be easy to spot possible challenges and opportunities that lie along the system configuration. Finally, once this hardware is in place, an appropriate governance framework can be designed and put in place to complete the system.

Kisumu city's final solid waste disposal facility, which reflects many such facilities in developing countries, largely operates like a cemetery for waste resources, where some, as it were, are buried "alive," even those that could be "resuscitated" through final sorting and processing for market. We recommend that the City's final waste disposal facility be planned to operate like a solid waste hospital where contaminated waste resources are treated for the waste economy and true wastes can be processed and temporarily stored in "waste mortuaries" or store rooms before they are finally disposed in a "waste cemetery." Such a facility will thus be a business centre rather than merely a dumping area.

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