

# Concrete Actions to Be Taken for an Efficient Management of the Public Municipal Solid Waste Management Service in Africa

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## Abstract

*This article proposes concrete actions that can promote efficient management of the public municipal solid waste management service in Africa; especially in Cameroon. The twenty proposed actions are based on a performance indicator, which is based on four modules (institutional, social, economic and environmental) and fourteen objectives. These include, among other things, improving access to solid waste management services for as many households as possible, ensuring proper spatial distribution of waste bins, effectively implementing sanctions against all polluters, improving the level of investment in waste management infrastructure, institutionalizing pre-collection and composting with financial participation from households, and respecting the principles of sustainable development.*

**Keywords:** Municipal Solid Waste, Public Service, Households, Pre-Collection, Composting and Cameroon

## 1. Introduction

In many African countries, the provision of certain public services, such as municipal solid waste (MSW) management, is delegated to private sector companies. In recent years, we have witnessed the development of an organizational model for MSW management that leads to participatory governance involving the municipality, authorized collection companies, pre-collection structures, and households; and leads to a renewal of the public-private partnership (3P) (Sotamenou, 2017; Sotamenou, 2010; Bah, 2009) [1-3].

According to the World Bank's 2017 report, the 3Ps improve access to sustainable and quality infrastructure services, all of which contribute to the well-being of citizens. At the heart of the 3Ps is the contract or a public service delegation (PSD) agreement. In theory, the PSD can take many forms: concession, leasing, and public management. Among these different forms of PSD, concession and leasing are the most common contracts implemented in Africa for the MSW management.

The concession mandates a private company to provide the public MSW collection service under the control of the municipality, which has a right to oversee the management of the service. The company itself finances, at its own risk, the creation of the network,

which does not yet exist, and ensures its management. It is remunerated by a price paid by the service users, and generally benefits from a monopoly. Unlike the concession, in the leasing contract, the private company that performs the public service benefits from the facilities necessary for the operation of the service and receives a fixed fee in return.

Despite the convincing results in MSW management obtained in certain countries such as Rwanda, South Africa or Ghana (Sotamenou, 2017), it is still necessary to question the social performance of such an institutional arrangement in a context where interests diverge, since the State seeks to maximize the well-being of its citizens while private companies only seek to maximize their profits. It is therefore up to each state or municipality to put in place coordination and motivation mechanisms in order to reduce the distortions that can arise from this type of relationship.

Tirole (1999) suggests that solutions to these opportunistic behaviours include ensuring that detailed contracts are written, including indexation clauses on inflation or on the cost of supply and establishing clear procedures for review and recourse to arbitration [4]. Obviously, the renewal of this type of contract can only be done after a multi-criteria evaluation. The evaluation in question

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involves the definition of objective functions or performance criteria and the selection of performance indicators.

According to Boulanger (2004), an indicator is a measurable variable used to account for a phenomenon or an action. In this sense, it fulfils a basic information function for political decision-making, but also an evaluation or audit function, internal and/or external [5]. It can also constitute a set of elements of the collective definition of a public service (goals to be achieved, standards to be respected) and the means of achieving it (measurement of well-being).

Based on Sotamenou (2018) who proposes a tool in order to evaluate the public MSW management service based on a set of criteria (objectives to be achieved) and indicators (action variables), this paper proposes concrete actions which seem essential to the establishment of an effective and sustainable MSW management service in the African context [6].

### **1.1. Main Constraints Facing Public Management of Municipal Solid Waste in Cameroon**

According to Sotamenou (2012), the public waste management service in Cameroun and in Yaoundé in particular, suffers from a number of constraints that are important to note. Financially, out of an annual budget estimated at over 15 billion, less than 15% of this budget is financed by municipalities, compared to 85% by the government, which, in a context of crisis, is struggling to provide the necessary resources on time.

The Household Waste Collection Tax (TEOM), withheld at source for public and private sector employees and for establishments paying business taxes and licenses, does not cover the majority of households, especially the informal sector, which represents a weakness. At the institutional level, numerous stakeholders are involved in the sector, with roles that are as confusing as they are unclear, with all the jurisdictional conflicts that this entails. We also note the lack of clear boundaries for the exercise of responsibilities by the various stakeholders through specific laws and texts.

The lack of coordination of the actions of the various stakeholders, the multiplicity of decision-making centres is a source of evasion of responsibility, or of competency struggles. Physical obstacles to the management of waste in Yaoundé include, among others: the rugged terrain made up of a series of hills and valleys, the inadequacy of access roads that open up certain neighborhoods and deprive them of waste disposal services, and the continuous expansion of the urban perimeter that increases the collection distances for waste. Waste collection equipment is not very often adapted to the very nature of the waste produced.

Technical obstacles to the public management of waste in Cameroon include, among others: the high urbanization which in turn increases the quantity of waste to be collected and the poor spatial distribution of garbage bins which often does not take into account the needs of users.

## **2. The 20 Concrete Actions That Can Promote Efficient Management of The Public Municipal Solid Waste Management Service in Cameroon**

While many studies propose performance indicators for the public drinking water supply service (Mathieu-Makkaoui, 2009; Guerin-Schneider & Nakhla, 2003), very few similar studies exist in the field of waste [7-8]. However, performance evaluation methods in the waste sector have been proposed, notably in Italy (Chifari et al., 2017), Australia (Zaman, 2014), the United States (Greene & Tonjes, 2014), or France (Bertolini, 2008) [9-12].

The approach followed in this paper is inspired by the article by Bertolini (2008) which proposes a simple system of indicators for the evaluation of the performance of a public service for local household waste management in France. The tool he proposes is a dashboard made up of four components (economic/financial, user comfort, social and environmental) and ten performance criteria and indicators. At the end of his study, the author indicates that the proposed method is not necessarily adapted to the specific context of cities in developing countries. Based on the tool he proposes and the specificities of African cities, Sotamenou (2018) identifies concrete actions to be implemented for efficient management of the public MSW management service in Africa in general and in Cameroon in particular. These actions are included in modules, each consisting of objectives to be achieved.

### **2.1. The Institutional Module**

Three objectives have been identified for the institutional module: regulation and selection of partners, cost transparency, and state accountability. The actions to be implemented to achieve these institutional objectives are:

#### **2.1.1. Regulation and Selection of Partners**

*Actions 1 and 2: Regularly launching calls for tenders and periodically evaluating specifications*

A transparent and reasoned selection of service providers is crucial. As such, calls for tenders must transparently enable the selection of the most relevant offer and the awarding of associated contracts. In the event that the public sector engages the services of one or more private companies, as is the case in Cameroon, the parties involved must favour long-term agreements, given the scale of the required investments, with regular assessments of compliance with the specifications and revisions when necessary.

#### **2.1.2. Cost Transparency**

*Actions 3 and 4: Clarity of the contract; and incompleteness of the contract*

Transparency is necessary for the accountability of MSW public service management. A relevant estimate of the costs of a waste management action requires not only that the State or local authority know the investment and operating costs of the unit operations included in the action in question, but also that the specifications relating to the action (for example, on the quantities of waste to be collected and treated, the geographical areas concerned, etc.).

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Where possible, it is also important to consider the externalities generated by the treatment systems in question (landfill, composting, etc.) and to anticipate the hazards that may arise during the period. But the principle of transparency goes beyond the realm of costs. Indeed, local authorities and citizens are entitled to receive precise, up-to-date information on the performance of the MSW management system with regard to environmental protection and human health.

### **2.1.3. The Responsibility of the State and/or Decentralized Local Authorities (DLAs)**

*Actions 5 and 6: Strong involvement of the State and/or DLAs; and development of State and/or DLAs subsidies*

Given the characteristics of the MSW management field, particularly with regard to its impacts on health and social well-being, and its environmental issues, the government has a responsibility towards citizens to guarantee the protection of their quality of life, and this over the long term. To this end, it must clarify in advance the role of all actors involved in MSW management, because the generally noted imprecisions are a source of misunderstanding, power struggles, and underperformance.

The lack of coordination of the actions of the different stakeholders, the multiplicity of decision-making centres is also a source of responsibility leakage, or competency struggles. Since MSW production is positively correlated with urbanization, it requires a more significant and progressive involvement of the State and/or the DLAs.

## **2.2. The Social Module**

The social module is based on the principle of equity, which includes the following objectives: universal access to a MSW collection service, user participation in decision-making, the polluter pays principle, and intergenerational equity. The actions to be implemented to achieve these social objectives are:

### **2.2.1. Universal Access to a MSW Collection Service**

*Actions 7 and 8: The percentage of the population served; and the number and distribution of garbage bins*

The greatest number of households must have permanent access to the waste collection service. In Cameroon, for this to be effective, it is necessary to take into account the physical constraints (existence of hills and lowlands, low percentage of drivable roads, etc.) and technical constraints (collection equipment sometimes unsuitable for physical constraints, etc.) related to the MSW management.

Indeed, the spatial distribution of garbage bins does not often take into account the needs of users (quantities of waste produced per person or per household, accessibility to collection trucks, incivility of populations, etc.). The distribution density of garbage bins is also an important criterion since the distance separating a household from a garbage bin significantly influences the delivery of MSW to the collection point.

### **2.2.2. User Participation in Decision-Making**

*Actions 9 and 10: The presence of local elected officials and asso-*

*ciations on the board of directors of the collection company(ies); and the size of the communications budget of these company(ies).*

A MSW management service must take into account the wishes of the population when implementing any collection strategy. In this sense, the presence of elected officials and representatives of associations on the management or monitoring committee of the collection company is necessary; because they would act as a transmission belt between the company and the population.

The frequency of communication and awareness-raising operations, environmental education and even public health campaigns also make it possible to measure the degree of commitment of the collection company to social issues.

### **2.2.3. The polluter pays principle**

*Action 11: Effective implementation of sanctions (fines) against any polluter*

This principle is generally accepted as a fundamental principle of fairness. Poor MSW management can have harmful consequences not only from an economic point of view but also from a health point of view. In order to address the pollution problem, the polluter pays principle is very important. According to this principle, the user pays for the waste he produces.

Everyone is therefore encouraged to control his own production and reduce the nuisances linked to his activity, it is therefore a fairly reliable incentive mechanism. This principle can help to overcome the shortcomings linked to the financing of MSW management, by involving households as in many West African cities where their contributions sometimes cover up to 50% of the overall cost of MSW management.

For example, the population of Yaoundé, which includes one million households (the National Institute of Statistics estimates the average size of a household in Yaoundé at nearly five people; while "World Population Review" estimates the current population of Yaoundé at nearly 5 million), a monthly contribution per household that varies from 500 FCFA to 1000 FCFA (between one and 20 USD), depending on the type of housing, would make it possible to collect between 500 million FCFA (one million USD) and one billion FCFA (two million USD) every month.

Considering an average monthly contribution of 750 FCFA (1.5 dollars), this represents 750 million FCFA (1.5 million USD) per month, or nearly nine billion FCFA per year (18 million USD); which represents nearly 60% of the current public budget dedicated to MSW management in Yaoundé. Revenues from the sale of compost and recycled waste, will also contribute to increase the budget of this alternative financing system. The polluter pays principle could also consist of finding a fine mechanism to be paid by any citizen who disposes of their waste in an anarchic manner.

### **2.2.4. Intergenerational Equity (Access for All Generations, Present and Future, To A Quality Waste Management Service)**

*Action 12: The level of investment in MSW management infrastructure*

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This concerns the level of investment in the construction and development of landfills and collection centres, the renewal of collection equipment, etc.).

In the Cameroonian context where more than half of the daily MSW remains in the neighbourhoods, the development and construction in the lowlands of transfer or collection centres for waste which are spaces designed to receive and treat (sorting and composting) pre-collected waste. It is undeniable that future generations will be affected by the current MSW management.

Moreover, when investments in MSW management infrastructure such as garbage bins and transfer centres are very often neglected and postponed to the future, the risk of having to face a major crisis or having to repair at great expense the consequences that result from such negligence is increased. Similarly, the increasing evolution of the quantities of MSW produced implies a regular renewal of collection equipment.

### 2.3. The Economic Module

The economic module includes the following objectives to be achieved: the implementation of pre-collection and composting, allocative efficiency and statistical efficiency. The actions to be implemented to achieve these economic objectives are:

#### 2.3.1. The Implementation of Pre-Collection

*Action 13: The degree of support for pre-collection (remuneration of pre-collectors, purchase of pre-collection equipment, medical care for pre-collectors, income from the sale of recovered objects, etc.)*

Given the importance of pre-collection in the MSW management systems in Cameroon, it is urgent to institutionalize it. Pre-collection associations must be recognized as being of public utility. Indeed, the relevance of pre-collection in a context marked by the physical and technical constraints mentioned above, allows many households to make a living from the recovery and recycling of pre-collected plastic, glass, and aluminum objects. Pre-collection activities also provide employment for young people in the neighbourhoods and thus improve their living standards.

Due to its importance, the implementation of pre-collection is therefore a major element to be taken into account in the public MSW management service in Cameroon (Sotamenou et al., 2019a) [13].

#### 2.3.2. Setting Up Composting

*Action 14: the degree of implementation of composting (remuneration of composters, purchase of composting equipment, medical care of composters, income from the sale of compost, etc.)* Just as important as pre-collection, composting, which is the transformation of the fermentable portion of pre-collected MSW into compost, must be institutionalized. It will also be necessary to ensure that the compost produced is of good quality. The relevance of composting in African economies in general and in Cameroon in particular, is justified by the very high proportion of the fermentable fraction contained in MSW (more than 80%). MSW transfer centres

in lowlands would facilitate composting operations and would make quality compost available to farmers at a lower cost (since the proximity of the compost production site to agricultural areas such as the lowlands means that transport costs, for example, are significantly reduced).

Compost also presents significant economic challenges (Sotamenou et al., 2019b; Thuries et al., 2019) [14-15]. As with pre-collection, the lack of composting operations, both centralized (at the landfill) and decentralized (in transfer centres) is a major handicap to the economic performance of the public MSW management service in Cameroon.

#### 2.3.3. Allocative Efficiency

*Action 15: Minimization and control of management costs (pre-collection, collection, transport and routing of final waste to the landfill)*

In economic terms, a method is said to be efficient if, and only if, there is no production technique that allows it to generate the maximum output (high collection rates) using fewer inputs (fuel, maintenance of collection trucks, labor, etc.).

While efficiency is said to be static when there is no waste of resources or the minimization of waste management costs, allocative efficiency, however, implies more than the minimization of costs; it also requires that the logistics related to the collection of MSW be greater in the most unsanitary areas.

#### 2.3.4. Statistical Efficiency

*Action 16: Collection rate above 75% and increasing over time* The MSW collection rate is the ratio between the quantities collected and produced. For Hebette (1996), this rate must be greater than 75% because below this threshold, the accumulated MSW becomes harmful to the environment and the health of the population [16]. To be able to manage MSW satisfactorily, the level of collection must evolve with the rate of production. The government can therefore, for example, index the waste collection rate to the rate of urbanization.

### 2.4. The Environmental Module

The environmental module includes the following objectives: eco-efficiency, reduction of greenhouse gas emissions and reduction of underground pollution. The actions to be implemented to achieve these environmental objectives are:

#### 2.4.1. Eco-Efficiency

*Action 17: Respect for the principles of sustainable development* Given the characteristics of the “waste product”, efficiency must also be seen from the perspective of sustainable development; hence the concept of eco-efficiency, which is based on the idea of respecting and preserving the environment. It is undeniable that MSW production is increasing and therefore represents a major challenge for the quality of our environment. In order to avoid a global crisis, it is essential to adopt a sustainable waste management strategy as soon as possible.

Sustainable MSW management refers to MSW management that meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of eco-efficiency implies the integration of the environment and the economy, the protection of people's health, the protection of ecosystems, compliance with international standards and the promotion of equity.

### 2.4.2. Reducing Greenhouse Gas Emissions

*Actions 18 and 19: The low rate of waste burial and the implementation of the biogas treatment system*

An effective MSW management system must integrate the objective of reducing greenhouse gas emissions. As mentioned above, MSW in Cameroon consists mainly of organic matter. Burying this waste causes toxic gas emissions such as methane, which contribute to global warming. Any effective MSW management system must therefore ensure upstream awareness among populations to reduce their MSW production and downstream implementation of biogas recovery systems in landfills.

### 2.4.3. Reducing Underground Pollution

*Action 20: Implementation of a leachate treatment system*

Leachate is the residual liquid generated by the percolation of water and liquids through a waste storage area, chemical products or simply soil contaminated by pollutants. This product of the dissolution of organic matter and trace elements (heavy metals, organic and chemical pollutants, radionuclides, etc.) is a source of pollution of soil and water, including groundwater. Given the high level of water contained in MSW in Cameroon (more than 50% of the total mass), they produce enormous quantities of leachate that infiltrates into the soil and pollutes groundwater. It is therefore essential to set up a reliable system for the recovery and treatment (decontamination) of this leachate in landfills or collection centres.

## 3. Conclusion

This article revisits the paper of Sotamenou (2018) and proposes concrete actions that can promote effective public municipal solid waste management service in Cameroon. It outlines the major actions to be considered. These include, among others, improving access to the solid waste management service for the greatest number of households, ensuring good spatial distribution of garbage bins, and the effective implementation of sanctions against all polluters, increasing the level of investment in MSW management infrastructure, and especially the institutionalization of pre-collection and composting; with the financial participation of households.

### Conflict of Interest

The authors declare no conflict of interest.

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