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Reforming the Solid Waste Management System: The Case of Rural Areas in Egypt /إصلاح نظام إدارة النفايات الصلبة: حالة المناطق الريفية في مصر

Ahmed El Masry ahmedalmasry@aucegypt.edu

Fatema El Ghonemy fatemaelghonemy@aucegypt.edu

Ibrahim AbuGazia ibrahimhamedabugazia@gmail.com

Raghda El Khater raghdakhaled@aucegypt.edu

The American University in Cairo
School of Global Affairs and Public Policy
The Public Policy HUB

THE PUBLIC POLICY HUB

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A Policy Paper

Prepared by:
Ahmed El Masry
Fatema El Ghonemy
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Raghda El Khater

Under the Supervision of:
Dr. Noura Wahby

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Ahmed El Masry
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Dr. Noura Wahby

Assistant Professor
Public Policy and Administration Department
The School of Global Affairs and Public Policy
American University in Cairo

** Names are listed in alphabetical order*

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List of Abbreviations

WMRA	Waste Management Regulatory Authority
NGO	Non-Governmental Organization
SWM	Solid Waste Management
SW	Solid Waste
SDGs	Sustainable Development Goals
CCBA	Cairo Cleansing and Beautification Authority
EEAA	Egyptian Environmental Affairs Agency
NSWMP	National Solid Waste Management Program
IPC	Intermediate Processing Center
SME	Small and Medium Enterprise
MoE	Ministry of Environment
CAOA	Central Agency for Organization & Administration
MoLD	Ministry of Local Development
GIZ	German International Cooperation
M&E	Monitoring and Evaluation
INGO	International Non-governmental Organization

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Executive Summary

The policy paper tackles the issue of managing solid waste in rural areas in Egypt. It mainly targets the reform of the solid waste management system. The authors deal with rural areas specifically due to its importance and significance. As for the social and economic context of the issue, despite the fact that over 50% of the population lives in rural areas, most of the poor and the extreme poor live there with percentages over than 78% and 80% respectively.

In this context, the policy paper's research demonstrated that the current solid waste management system in the governorates studied has a number of flaws and limitations. These issues show inadequate solid waste management technical performance at the governorate level in terms of institutional, technical, financial, economic, and environmental factors.

Furthermore, poor solid waste management methods have increased health and environmental dangers, jeopardizing the achievement of sustainable development goals. These shortcomings in local cleansing organizations have also resulted in extremely high rates of garbage accumulation in villages. These issues place a strain on local government, necessitating an integrated management approach.

In most cases, the lack of or ineffective solid waste management departments in local government has resulted in poor planning, execution, and effective control of solid waste management activities at the governorate, city, and village levels throughout Egypt. Delays in decision-making and institutional flaws have hampered the provision of efficient services due to dispersed duties among various individuals and departments. The current state of institutional frameworks at the local level frequently discourages professional growth, limiting the ability of local management to attract qualified employees to work in waste management.

Mapping stakeholders, previous and current legal frameworks were discussed in dealing with the solid waste management system in Egypt mainly, and rural areas specifically.
The papers reviewed the current Law #202 for 2020 about solid waste management, and the Environmental Protection Law#4 for 1994, and its effect on managing the solid waste in rural areas.

The policy paper has suggested four policy alternatives to handle the issue of solid waste management in rural areas. The paper sets five criteria to assess the policy alternatives including efficiency, effectiveness, political acceptance, equity and financial.

At the end, the paper provided a set of recommendations that are essential to support the successful implementation of the policy. However, out of all the policies, the researchers agreed on one core policy that is cost efficient and is considered the most important. The selected policy alternative will establish a national-wide campaign in the Egyptian rural areas that aims to raise the individuals' awareness on the economic, social and health aspects of the issue as well as how to reduce waste consumption, increase waste reuse, and facilitate the segregation of waste. The reason behind this choice in specific is that the researchers have found that the core problem behind the challenges in the solid waste management in Egypt is the lack of awareness amongst the citizens. Citizens are this topic's primary makers and shall be the primary source of the solution as well. Solid waste management can be entirely reduced only if citizens have been well informed about what to do from the beginning. That way, they will be supporting the government in tackling the issue as well as reducing the costs.

Intended Audience

The primary intended audience of this policy paper are the Ministry of Local Development, the Ministry of Environment, the Waste Management Regulatory Authority, the National Solid Waste Management Program, local authorities in the rural areas and informal and traditional private small-scale waste collection, and recycling enterprises (Zabbaleen).

The secondary audience of the policy paper are National Non-governmental Organizations (NGOs), the private sector, International Non-governmental Organizations (INGOs), and the public.

Introduction and Problem Background

I. The Different Aspects of the Waste Management Issue:

Solid waste management is a critical issue that has serious environmental and public health implications in many developing countries (Ibrahim & Mohamed, 2016). According to the Solid Waste Management Regulatory Authority (WMRA), Egypt produces approximately 50 thousand - 60 thousand tonnes of solid waste on a daily basis, accounting for 22 million tonnes per year (Abdulaal, 2021). Since 2000, Egypt's municipal solid waste has risen by more than 36% due to the population increase (Bain, 2020). Meanwhile, more than 80% of the collected municipal solid waste is not recycled, while the total recovery rate is only around 11.5% (Bain, 2020).

In this regard, Ibrahim and Mohamed (2016) pointed out that the Egyptian public sector has been incapable of sufficiently providing the required solid waste management services due to the lack of efficient regulations and local taxation system. Moreover, they also indicated the paucity of public funding directed towards solid waste management and protecting the environment. In fact, less than 60% of the produced waste in Egypt is managed by either the public or private sectors while the rest are left on the streets or managed by the illegal solid disposal sites, which highlights the deficiency of ineffectiveness of the solid waste management system (Bain, 2020).

Regarding the regulatory and administrative reasons for the issue, Milik (2010) argued that the Egyptian solid waste management system is dispersed among different stakeholders and authorities which makes it difficult to maintain cooperation and planning among all the involved stakeholders. She also indicated that each ministry and government body is handling the waste management process separately. Accordingly, this leads to an unconducive administrative environment for waste management. For example, the planning process for waste collection is implemented independently away from the treatment and disposal plans of the non-recycled waste, and there is no coordination among the relevant authorities regarding the amount of waste collected, the needed recycling rates, and the number of the required landfills (Milik, 2010).

Meanwhile, Milik (2010) highlighted the importance of the citizens' awareness and behaviour as a crucial factor that could contribute to enhancing waste management in Egypt. She also argued that the government did not consider mobilizing and encouraging relevant institutions to design and implement public awareness campaigns on the best practices to handle solid waste on the community and individual levels. As a result, the improper waste management system created serious environmental consequences as the disposal of waste in drains and water canals has negatively impacted the water supplies, which harms the country's water resources and public health (Ibrahim & Mohamed, 2016). Furthermore, GIZ (2019) illustrated that a considerable amount of waste is disposed of in rivers, canals and open areas which leads to serious environmental risks that comprise human and animal health.

Introduction and Problem Background

The cost of waste management is one of the main challenges in front of establishing an effective management system. In lower and middle-income countries, the cost of collecting waste ranges from 30-75, approximately 480 - 1, 1122 L.E (Kaza et al., 2018). According to Enterprise (2020), the cost of waste collection in Egypt amounts to 480 L.E per tonne.

To solve this problem, the government issued a legislation in 2005 to introduce a fee on solid waste collection, which is collected as a part of the electricity bills (NSWMP, 2013). However, according to Enterprise (2020) this fee did not solve the problem as it was collected only in major cities while local councils in rural areas were in charge of funding the process or relying on local associations and civil society. Consequently, this made the collected fees cover only 20% of the waste collection costs (Enterprise, 2020).

In 2012, the government launched the National Solid Waste Management Program (NSWMP), aiming to establish relevant waste management units in some of the Egyptian rural governorates, namely Assiut, Kafr El-Sheikh, Gharbiya and Qena (GIZ, 2019). The project targeted engaging the private sector by providing incentives for companies to tackle the processing and recycling of waste (GIZ, 2019).

The government would give waste to the recycling companies for free as well as the required lands to build the recycling facilities (GIZ, 2019).

However, according to Enterprise (2020), this system did not fully work because only 20% of the overall waste was given to the designated recycling companies due to the shortage of adequate waste collection and transportation systems. This is because waste is only collected from homes in some areas of Cairo while the rest of the country rely on informal waste collectors.

II. The Problem Development

The dilemma of managing solid waste management has been particularly apparent across all cities in Egypt, but especially in rural areas. It has adverse effects as well as its direct and indirect harmful consequences on public health and environment. In addition, the issue is also becoming more complicated with deeper consequences as it affects the national economy especially as related to manpower and tourism. Recently, the issue has taken a favourable measurement with the rising public awareness and potential political will. The issue has been given priority and spiked political commitment at the highest levels of the government (Bushra, 2000).

Hence, providing households with the service is a prerequisite requirement to any public awareness campaigns. Currently, some Non-Governmental Organizations (NGOs) which have environmental issues at their core goals in general and waste management specifically, implement various public awareness programs. Nonetheless, their target groups might experience the ill effects of the absence of waste collection services all together or inadequate waste collection and disposal service.

Essentially, the National Program for Public Awareness in regard to the environmental effects of Solid Waste Management (SWM) is as yet in its earliest stages. It needs numerous perspectives which, if present, would add to the fruitful execution of the program. For instance, the joint effort and coordination with the local authorities and relevant institutions, networking on a cross country scale, financing, and other elements (El Sakka, 2014) can help alleviate the problem.

III. The Affected Target Group

The affected target group is the Egyptian citizens living in rural areas and governorates far from the delta area, mainly the governorates in upper Egypt. The need for storage bins in most of rural areas and villages makes the collection process exceptionally difficult, manual method gotten to be a must for collection particularly with narrow streets, leading to a substantial increase in collection cost, poor sanitary settings and pose health hazards to the workers and nearby population (Ibrahim et.al, 2020).

In the rural areas collection is low, where the primary means of treatment and disposal is burning. Nevertheless, burning waste can be harmful to groundwater, soil and planetary organisms. Burning has consequences for ecological and human health as burnt wastes comprise materials that produce poisonous gasses. Most uncollected waste ends up in drains, streams, rivers, sea, and illegal dumpsites (El Sakka, 2014). Moreover, uncollected waste can pile up on the streets and clog drains and canals, which might cause flooding (Ibrahim et al., 2020).

IV. Effects on Sustainable Development Goals (SDGs)

The lack of proper solid waste management affects many stakeholders and Egypt's ability to achieve several SDG goals. Proper solid waste management has an effect on SDG 1: no poverty, and SDG 8: Economic growth and decent work. SWM generates job opportunities through both the formal and informal sector. It also affects SDG 3: Good health and well-being. As mentioned earlier, exposure to waste has a major impact on health, as it results in different types of infectious diseases. Furthermore, as elaborated on earlier, it affects SDG 6: clean water and sanitation. In the long run it also impacts SDG 7: affordable and clean energy. Recycled materials use much less energy than is required to produce new products from raw materials. In addition, it contributes to SDG 11: sustainable cities where a better SWM system could lead to a better life in cities and rural areas, especially for poor people. On a global scale, it would contribute to SDG 13: climate action. SWM decreases pollution, recycling reduces carbon emissions and greenhouse gases.

V. The New Waste Management Law

In October 2020, Egypt officially issued the new Waste Management Law No 202 of 2020 which consists of 80 articles aiming to create an integrated management of municipal, agricultural, construction, and industrial waste (United Nations Environment Program, 2020). Moreover, the law also targets reducing waste generation, encouraging recycling, ensuring the safe treatment and disposal of waste, and eliminating the effects of waste on public health and the environment (United Nations Environment Program, 2020). For the first time, the new law establishes the Waste Management Regulatory Authority (WMRA) to be the regulatory public authority in charge of supervising and monitoring all the waste management activities in Egypt (Shehata, 2020).

Accordingly, the WMRA will have several regulatory powers over the other public and private bodies involved in waste management in Egypt in order to regulate, manage, follow-up, evaluate and monitor all the waste-related activities, aiming at ensuring sustainable development and following up on the waste management plans (Shehata, 2020). Meanwhile, the law targets encouraging private investments in the waste management sector by giving investment incentives for small companies, waste collectors, private contractors, and recycling centers to be part of the formal economy (Enterprise, 2020). The law indicates that all individuals and companies need to obtain the necessary permits and licenses from WAMRA before implementing any waste management activities (Enterprise, 2020). Moreover, the law also affirms that businesses generating waste are responsible for the safe management of their waste, which is known as the Extended Producer Responsibility. This new measure seeks to reduce the production of waste, encourage re-use, and decrease the harmful impact of waste on the environment and the public health (Shalakany, 2020).

Overall, the new law aims to tackle several regulatory and administrative issues that have challenged waste management in Egypt over the past years. For example, former legal provisions were general and not specific, and in some cases provided incomplete descriptions of conditions, legal articles or standards. Moreover, they failed to provide a clear description of the issues that the laws were created to tackle which led to gaps in legislation (Lynx, 2020). The overlap of power was another challenge as the responsibility of waste management was distributed between the Ministry of Environment, the Ministry of Local Development, the Ministry of Irrigation and Water Resources, the Ministry of Agriculture and Land Reclamation, the Ministry of Trade and Industry and the Ministry of Finance (Lynx, 2020). As a result, this caused an unclear distribution of institutional responsibilities and roles and affected the organizational, technical, and institutional capacity of all stakeholders working in the field (Lynx, 2020).

VI. Previous Legal Framework of Solid Waste Management in Egypt

The legal framework for Solid Waste Management where it is introduced in the form of bylaws, regulations and ordinances concerning Solid Waste Management, which includes enforcement responsibilities and procedures at local and national levels. In addition to regulations, we can find that economic incentives and non-economic motivations are very important instruments of Solid Waste Management.

Currently, the most updated law is **Law #202 for 2020** regarding Solid Waste Management, which was issued in October 2020 by President Abdel-Fatah El-Sisi. However, the main legislation relating to Solid Waste Management before **2020** was **Law #38 for 1967** as amended by **Law #31 for 1976**. The law regulates "the collection and disposal of solid waste (SW) from residential areas, commercial and industrial establishments, and public places". It also imposes a tax on cleanliness on all types of housing units, determined based on the rental value. It was decided by the law to represent **2%** of the total rental value. While **Article 6** of the **Law #38 for 1967**, stated that the local authorities should issue a license for workers employed as waste collectors (EEAA, 2020).

Other relevant laws and decrees are shown in the below table *(Table 1: Solid waste management laws, presidential and prime ministerial decrees in Egypt before 2020 law)* (Ibid, 2000)

Law/Decree	Focus
Law 106# for 1976	This law discusses "the organization of construction works and construction /demolition waste"
Law 66# for 1977	This law discusses "the traffic and auto motives deal with transporting litter and similar materials".
Law 3# for 1982	This law discusses "urban planning and the importance of having enough space for public services and utilities through environmental consultants".
Law 43# for 1979	This law discusses "the local governing body which deals with the responsibilities of the local officials in public services and their authorities in levying dividends and gate fees".
Law 137# for 1981	This law discusses "occupational safety and health". It only includes Article 117 which requires that "an employer should inform his workers of the hazards associated with his non- compliance with safety measures and that personal safety equipment, together with training on its use, should be provided to the workers".
Presidential Decree 284# for 1983	This decree established the mandates of Cairo and Giza cleansing and beautification authorities.
Law 4# for 1994	The Environmental Protection Law discusses "how to deal with the handling and circulation of hazardous materials, including wastes, and the prohibition of the installation of any facilities for treating hazardous waste, without a granted license from the government".
Prime Ministerial Decree 338# for 1995	This decree is to explain the Executive Regulations of Law #4 for 1994.

In terms of Solid Waste Management, before **Law #202 for 2020**, the most specific stipulations of **Law #4 for 1994** on "how to deal with the handling and circulation of hazardous materials, including wastes, and the prohibition of the installation of any facilities for treating hazardous waste, without a granted license from the government". The law stated that "the location and conditions of any such license is to be determined by the Ministry of Housing after consultation with the Ministries of Health and Industry and the Egyptian Environmental Affairs Agency" (Ibid, 2000). [1]

(1): More details about the Environmental Protection Law #4 for 1994 and previous laws are attached in the appendix.

Law #4 for 1994 required environmental impact assessments of any type of projects, including "new developments, including industrial projects". It also established the Environmental Protection Fund, for the purpose of funding various relevant environmental projects. The Fund was supported by the government, national and international donors, as well as the revenues collected from the fines paid by those who were "contravening environmental regulations".

It also advocated "setting up a system of incentives to be offered to different organizations, individuals, in order to carry out projects for environmental protection" (EEAA, 2019).

Additionally, **Law #4 for 1994** (the Environmental Protection Law) has affected Solid Waste Management. Not only the law, but also the **Prime Ministerial Decree #338 for 1995**, which explained the **Executive Regulations of Law #4**, and covered many areas of environmental protection (Ibid, 2019).

Methodology

This research project was planned to be executed through several research tools. Firstly, qualitative research methodology was chosen for this research paper. The reason behind choosing the qualitative approach in specific is because studying and analyzing the situation with regards to the Solid Waste Management in Rural Areas in Egypt's scope and its effectiveness is not very quantifiable. In fact, the effectiveness and efficiency of solid waste management implementation and its standards is considered a dynamic matter that is dependent on several variables.

To analyze the first phase of the research, the current situation of the solid waste management system in Egypt and the history of it, **desk research** was carried out. In this specific area of research, and to gain factual and solid knowledge, research participants were of less importance than the documents identifying this certain type of input. Yet, their input and responses were taken into consideration whenever relevant, especially as they were benefiting the group of researchers to reach conclusions concerning the courses of actions needed to enhance the solid waste management situation in rural areas and the standards needed to enhance its performance. Logically, the second phase of the research was based on an inductive anti-positivist approach using interviews, whereas the different research participants are considered as the key actors. The core of it will be an analysis of their insights and understandings regarding the solid waste management scene in Egypt and the ways to enhance it.

The sampling framework that was implemented in this study is the **"classical experiment"** where different phases of the research problem statement were examined in detail. To execute a clear strategy for the selection of the research interviewees, purposive, and non-probability sampling criteria were employed. The institutions, units and key actors that were selected to take part in this study could not have been selected randomly. On the contrary, they had to be selected based on their experience, level of affection and interest in the solid waste management work in Egypt. As it was challenging to identify all needed key actors or research participants from the beginning, the researcher had to firstly identify only a few of the interviewees and then all researchers agreed to perform the snowballing selection criteria, afterwards.

Last but not least, researchers tried to prove the reliability and validity to all research input and hypotheses claimed inside this research project. Conducting content analysis of the case studies within Egypt and the literature review about the global issues as well enabled the researchers to ensure triangulation.

The researchers were able to meet eight interviewees that were all experts on the topic. The interviews were conducted with the following participants:

- Former head of project, National Solid Waste Management Project at GIZ.
- The legal consultant for the Governor of Cairo for Informal Settlements Development Unit and the legal consultant for the "Participatory Implementation Project" at GIZ, responsible for the development of slums.
- Head of Solid Waste Management Unit at the Ministry of Local Development
- Executive Director of the Local Development Observatory at the Ministry of Local Development.
- Head of Solid Waste Management General Office at Qena Governorate
- Legal Consultant to the Minister of Environment
- Project Manager at Very Nile NGO
- Project Coordinator at Greenish NGO

Problem Statement

The data and information gathered demonstrates that the current solid waste management system in the governorates studied has a number of flaws and limitations. These issues show the inadequate technical performance of solid waste management at the governorate level in terms of institutional, technical, financial, economic, and environmental factors.

Furthermore, poor solid waste management methods have increased health and environmental dangers, jeopardizing the achievement of sustainable development goals. These shortcomings in local cleansing organizations have also resulted in extremely high rates of garbage accumulation in cities. These issues place a strain on local government, necessitating an integrated management approach, as shown in "Sustainable Solid Waste Management."

When it comes to the current institutional status of solid waste management at the governorate level, it was discovered that the majority of governorates lack a specialized department for solid waste management planning and management within their organizational structures. In fact, solid waste management regulations differ from one governorate to the next.

This is in addition to a range of various institutional configurations for solid waste management on a local level. Housing, engineering and utilities, environmental, and planning and monitoring agencies, for example, take on some supervisory obligations in addition to their primary functions.

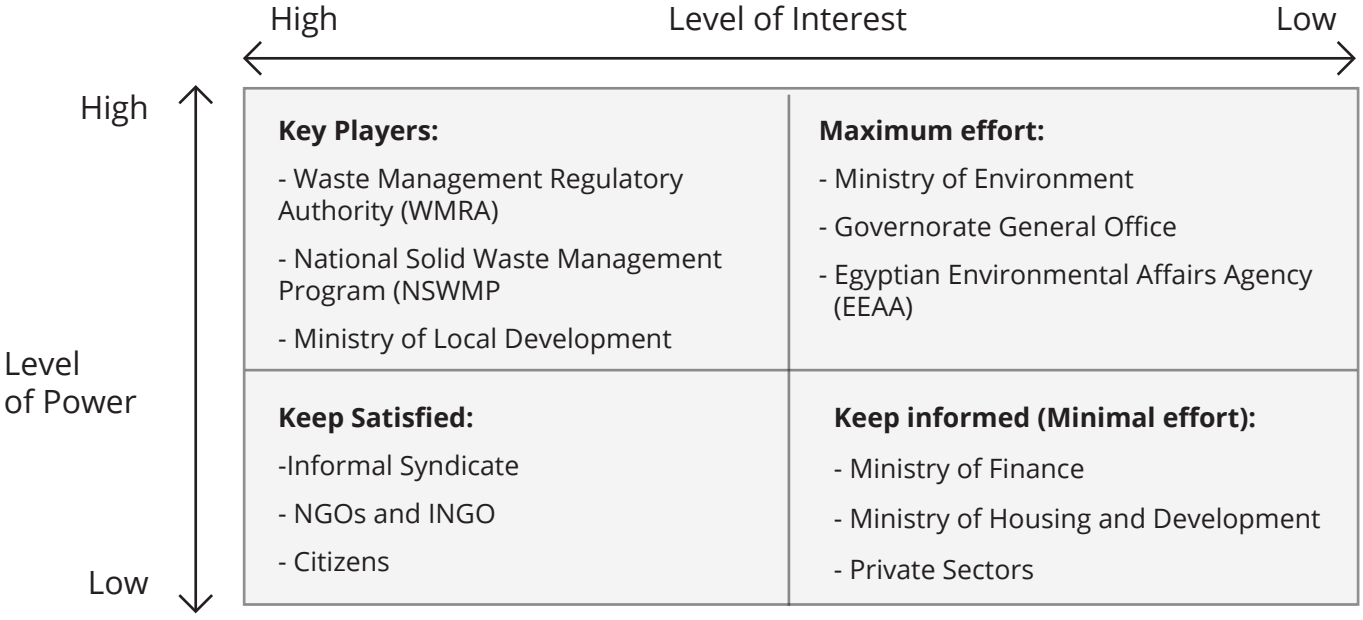
Some governorates have created organizational structures and procedures as a result of receiving support in solid waste management either from development organizations or from the civil society. However, these institutions lack independent organizations capable of thoroughly planning, supervising, and monitoring solid waste management services, indicating a lack of complementarity between the various phases of solid waste management at the city, district, and village levels. Furthermore, at the governorate and local unit levels, roles and institutional obligations are unclear, as well as technical, institutional, and organizational skills and poor follow-up mechanisms.

In most cases, the lack of or ineffective solid waste management departments in local government has resulted in poor planning, execution, and effective control of solid waste management activities at the governorate, city, and village levels throughout Egypt. Delays in decision-making and institutional flaws have hampered the provision of efficient services due to dispersed duties among various individuals and departments.

The current state of institutional frameworks at the local level frequently discourages professional growth, limiting the ability of local management to attract qualified employees to work in waste management.

Additionally, there is a core challenge with solid waste management's financial model. After analyzing the given information through desk research and content analysis, the information clarified that the inability to perform a properly functioning model goes back to the deficits and financial shortage the system is suffering from. Since Egypt is a developing country, the financial aspect of the process contributes to the biggest factors of the inefficient implementation. Sustainable financial resources could be considered as a core pillar behind a successful solid waste management process. To sum up this segment, the researchers can state that the core problems are lack of information, health issues and impacts caused by the amount of solid waste, the institutional organization of the solid waste management authorities, and the overall ineffectiveness of implementation.

Mapping Key Stakeholders



(Figure 1: Mapping Key Stakeholders)

Interests and Power of Key Actors

Key Actor	Interest	Congruence with national objectives	Potential contributions / consequences for cooperation
Waste Management Regulatory Authority - WMRA	Perceived as a leading actor in the sector Attracting calibers for the sector Sustained/increased resources Human capacity and organizational development	Very high (++)	Up-scaling of measures
Project management unit - PMU	Independence from WMRA Harmonization of Technical components and financial components; the success of sector program Acquire and develop capacities and resources	High (+)	Possible delay in the implementation of some activities
NSWMP	Supports the MoE and MoLD with technical input and consultant expertise Increase of portfolio and services Recognition and public relations	High (+)	Might not have the ability to provide extensive financial support of financing agreements

Interests and Power of Key Actors

Key Actor	Interest	Congruence with national objectives	Potential contributions / consequences for cooperation
Solid Waste Management Unit - SWMU	The solid mandate for waste management at the governorate level Power and authority over local units Increased human resources Human capacity and organizational development	Very high (++)	Contribution to the achievement of results at the local level
Governorates General offices	Minimizing public pressure Improved relations with donors and international organizations Sustained and increased financial and technical resources	Very high (++)	Creating a political momentum conducive to achieving results
Ministry of Local Development	Responsible for implementation within the governorates scope Direct relationship with the Ministry of Environment and WMRA.	Very High (++)	Facilitating the process of waste collection, segregation, and safe disposal afterwards. In need of organizational and financial restructuring.

Table 2: Interests and Power of Key Actors

International Experiences

The Road to Zero Waste: Salacea, Romania

Salacea is a small town in the North-West part of Romania with a population of 3,181 inhabitants. In the past, Salacea had a very low rate of collection and recycling amounting to only 1% (Rastei & McQuibban, 2019). This low collection and recycling rates were due to the old waste collection approach which relied on a dual-stream collection system, and because of the low participation of citizens in the process of decision-making (Rastei & McQuibban, 2019). For example, out of 1, 000 households, only 84 households were sorting their waste, approximately 8% of the population. Moreover, Romania as a whole produced around 5 million tons of waste and recycled only 13% of the produced waste in 2016. Although the country had invested heavily in waste management infrastructure during the last 10 years, the results were slow because of the inefficient and outdated infrastructure and the lack of awareness and education provided for citizens (Rastei & McQuibban, 2019).

However, in 2018, the authorities of Salacea have developed a plan to turn it into a zero-waste town. The ambitious plan aimed to decrease waste generation by re-using 50%, recycling 90%, sorting 100% of waste and achieving 0% landfilling (Rastei & McQuibban, 2019). Therefore, the authorities started with transforming the sorting and separating collection systems. All waste bins and containers in the streets were replaced by a full door to door separate collection system consisting of 5 waste categories. The main factor that led to the success of this transformation was the engagement of the local stakeholders in the community including public authorities, civil society, private sector, and even academic institutions.

Moreover, the town also worked on preventing waste as a crucial step towards being a zero-waste town. As a result, the town established an urban mining center which facilitated the collection, reuse, repair, and recycling of different types of material including construction and demolition waste, furniture, batteries and textiles, and hazardous waste (Rastei & McQuibban, 2019). To encourage citizens to take part in the new separation system, the authorities created a financial incentive scheme which gave citizens the choice between being part / not part of the new tax system for local waste management services.

Accordingly, those who do not agree to join the system have to pay a higher tax of 10 lei/ month while those who comply with the new system will pay only 5 lei/month (Rastei & McQuibban, 2019).

To raise awareness in the community, Salacea initiated a comprehensive four-week educational program, led by community leaders, religious leaders and education leaders. Sessions were organized at the church, schools, cultural and social centers to raise awareness among citizens on the new system and the importance of its outcomes (Rastei & McQuibban, 2019). Furthermore, volunteers were trained to answer the questions of the community on the new system, and they distributed the needed kits and information material to help the local community implement the new collection system. This engaging and transparent communication plan contributed to the establishment of trust among the community members and increased the citizens' participation from 8% to 97%. Overall, the new system decreased the waste generated from 106 tonnes to 47 tonnes, approximately 55% decline (Rastei & McQuibban, 2019). The waste ending in landfills decreased from 105 tonnes to 26 tonnes. Interestingly, separately collected waste increased from 1% to 61% while the recycling rates increased from 1% to 40% (Rastei & McQuibban, 2019).

Policy Alternatives Analysis

Criteria for Analyzing Policy Alternatives:

The policy paper will assess the proposed policy options based on five criteria to achieve the most convenient policy to the key stakeholders:

Criteria	Description and Assessment Rules
Efficiency Criterion	Efficiency achieves the intended outcome from the alternative with the least resources used. It also should ask whether the alternative is the best and most economic option.
Effectiveness Criterion	This criterion assesses whether the intended result has been accomplished or not. Effectiveness answers the question whether the alternative achieved the expected results.
Political Acceptability Criterion	Gaining political acceptability is an essential assessment before implementation to ensure that this alternative is feasible politically or not. It should answer the question whether the alternative is aligning with the 2030 vision of Egypt.
Equity Criterion	To avoid injustice, evaluating equity between the targeted group or stakeholders of the policy option is vital.
Economic Criterion	To be able to choose alternatives that are affordable, the alternative must answer how the cost will be paid and through which organization. Is it the most economic option to take? How to make this financially sustainable?

Table 3: Criteria of evaluating the Policy Alternatives

As part of this project's scope, several interviews were conducted with field experts, academics, civil society members, and public servants. Based on these interviews, several policy options were proposed which tackle the different administrative, regulatory, and behavioral aspects of the waste management issue in Egypt, especially in rural areas. The following actions are summarised as follows:

Policy Alternative (1): Decentralizing the Waste Management System

The local authorities in the villages could be in charge of supervising the waste collection process. Local authorities in villages would impose fees to cover the costs of waste collection and transportation. Meanwhile, Intermediate Processing Centers (IPC) could be established on the level of the Administrative Centers to collectively separate the recyclable refuse of the different villages. Moreover, the disposal of waste would be done on the governorates' level as the central authorities should provide the required financial and technical support to establish well-equipped landfills in the different governorates.

Advantages:

- The local authorities and decision-makers are more empowered.
- SWM will be more effectively run as one authority.
- Resources and decisions will be closer to the ground and to the implementers' hand; therefore, increasing accountability.

Disadvantages:

- A repetitive planning strategy will be done through the different villages.
- Wasting the efforts, resources, and time of each rural area to plan, implement and execute without the help of other rural areas.

Policy Alternative (2): Engaging the Civil Society and the Small and Medium Enterprises (SMEs)

Our new waste management system will engage the civil community and SMEs more in the rural areas. Therefore, the local authorities in the Egyptian villages could delegate part of the collection and implementation plan of waste collection to the civil community while remaining in charge of supervising the efficiency and outcomes of the waste collection services. SMEs should be encouraged to play a major part in the waste recycling and refurbishing the business model. Based on the type and quantity of material generated from each Intermediate Processing Center (IPC), a number of SMEs shall be given the rights to benefit financially from the generated material in return of specific fees.

Advantages:

- NGOs will work together on innovative solutions for the issue.
- The Civil Society can be beneficial in collecting data from the citizens about how they perceive the issue and work on awareness campaigns to make the citizens feel the ownership of the problem.

Disadvantages:

- The intersection role between civil society and SMEs might be unspecific.
- SMEs will work on having funds from their projects without giving attention to the **values.**

Policy Alternative (3): Increasing Local Community Ownership through Public Awareness Campaigns

Public awareness campaigns should be conducted to raise awareness among the community members on the environmental, social, and economic importance of the safe disposal and recycling of waste. These campaigns should rely on community leaders, religious leaders, and opinion leaders in the rural communities in order to promote the culture of waste recycling and reuse and spread knowledge on the best practices to enhance waste management on the community level.

Advantages:

- It can involve many community members, as well as gain a positive response from the community entities and members.
- It would also be effective when it comes to simplifying the solution from the fact that they speak the language of the people.
- It is also a good practice of transparency and trust of the community leader rather than outsiders.

Disadvantages:

- However, its disadvantages might be related to the technical, human, and financial resources needed to build the capacity of the community leaders first, as well as some of the expected reluctance of change from the community members. It might face some disorganization.

Policy Alternative (4): Establishing Monitoring and Evaluation Units

To ensure the efficiency and the continuity of the waste management system in different rural communities, monitoring and evaluation units should be established on the governorate level to supervise and monitor the performance of the local authorities in implementing the waste management system. Therefore, the best performing local authorities should be given financial and moral incentives.

Advantages:

- This alternative could be beneficial when it comes to the establishment of the efficient system for monitoring and evaluation, which would lead to better accountability and responsibility mechanisms of all the activities conducted in the solid waste management field.

Disadvantages:

- The main disadvantages of this alternative are related to the need of much financial resources to establish the M&E Units, as well as the technical support needed to build the capacity of those who are in charge of these units.

Policy Alternatives Analysis

	1: Decentralizing the waste management system	2: Engaging the civil society and the Small and Medium Enterprises (SMEs)	3: Giving Sense of Ownership among the Community Members	4: Establishing Monitoring and Evaluation Units
Efficiency Criterion	• Decentralizing the process, having each governorate's SWM unit responsible for its SWM process. • The main problem lies with the inefficient communication channels between the central level and the governorates level.	• Efficient. SMEs have big capacities and resources that the government can capitalize on, in terms of implementation and finalization. • Accelerating the civil engagement which will eventually lead to less pressure on the government as well.	• Raising awareness is considered the core of the entire process. • The SWM challenge needs to be addressed and resolved from the source, and by investing in the citizens. • The total amount of the waste from the origin will decrease, putting less effort on the government.	• Creating M&E units requires a financial burden. However, its overall outcome is definitely efficient. • Ensuring a continuous work of monitoring and evaluation ensures good standards of performance and the overall quality of work.
Effectiveness Criterion	• Effectiveness here depends mainly on the financial willingness and competence of the government and the volume of financial capacity allocated to serve the purpose.	• SMEs effectiveness is guaranteed the moment they are formally recognized as a key player in the process.	• Civil society engagement is the most effective scenario currently possible due to its readiness and the ability of the government to start awareness campaigns through its media agencies.	• Since hiring and creating operational M&E units requires further recruitment phases as well as testing phases and rounds of checks, its effectiveness can only be guaranteed after receiving results that the government views as beneficial and as per the financial allocations given towards investing in this direction.

Policy Alternatives Analysis

	1: Decentralizing the waste management system	2: Engaging the civil society and the Small and Medium Enterprises (SMEs)	3: Giving Sense of Ownership among the Community Members	4: Establishing Monitoring and Evaluation Units
Political Acceptability Criterion	• This alternative could be politically accessible based on the decrees and bylaws intended to be issued by the government. • The overall alternative can only be seen as politically binding based on the government's decision.	• It is politically feasible as well. The government would have preference towards delegating a part of the work to some expertise due to the desire to reduce the overall workload and burden positioned on its side.	• This alternative is already taking place in some governorates which proves it is already politically accessible. • It could have more emphasis based on the political dialogue used to market it and how the government shapes its social dialogue with the civil society.	• This could be very politically feasible within the context of the by-laws and decrees issued to serve the SWM topic. • M&E is a concrete form of practice that is needed to ensure the success of any newly introduced model.
Equity Criterion	• This recommendation will ensure equity as it will allow the governorates to have the same share of participation as the central level, which will eventually guarantee the inclusion of all concerned actors.	• SMEs' inclusion in the cycle of SWM in a more formal way, will enable them to be officially recognized as partners in this model and this will boost their loyalty and sense of belonging by default.	• Will accordingly integrate the neighbourhoods and civil society in the SWM process. They are the main producers of waste and generalizing civil society engagement amongst all governorates will achieve the equity pillar.	• Equity will equate between all governorates in the level of monitoring and supervision they receive. To leave no governorate behind. • The creation of M&E units should cover Egypt's governorate to ensure an overall harmony and a unified scheme of model supervision.

Table 4: Policy Alternatives Analysis

Policy Alternatives Analysis

	1: Decentralizing the waste management system	2: Engaging the civil society and the Small and Medium Enterprises (SMEs)	3: Giving Sense of Ownership among the Community Members	4: Establishing Monitoring and Evaluation Units
Financial Criterion	• The government will need to hire additional staff in all governorates with specific backgrounds and interests. • This recommendation can be implemented gradually so as not to cause a financial crisis in the existing budget line.	• Encouraging more SMEs to integrate themselves in this sector will be a win-win situation. • This will decrease the overall volume of unused waste, generate income to those SMEs, and ensure more engagement and employment rates.	• Engaging the civilians in the SWM process will for sure decrease the financial burden on the government. • Civilians can easily get integrated in this model with much less fees ensuring eventually an efficient financial model.	• M&E units might be somewhat costly within the governorates level because it is totally absent. However, on the central level it will a financial burden. • However, the government will benefit from its effective results in the long run.

Table 4: Policy Alternatives Analysis

Policy Alternatives Analysis

	Efficiency	Effectiveness	Political Acceptability	Equity	Economic
Policy Option 1	■	▲	●	■	▲
Policy Option 2	■	●	▲	■	■
Policy Option 3	▲	▲	●	■	■
Policy Option 4	▲	▲	■	▲	●

● *Low* ▲ *Meduim* ■ *High*

Table 5: Simplified Policy Alternatives Analysis

Conclusion

Due to the significant impact of waste management on the environmental and health condition in rural areas, this paper calls for the necessity of establishing an integrated waste management system that fixes the deficiencies of the current one. The new system should successfully generate sustainable sources of funding for waste collection and recycling, clearly outline the roles and responsibilities of the involved stakeholders in the system, and effectively spread awareness among citizens on the best waste management practices. Otherwise, the new system would face several administrative and financial challenges that could compromise the system's ability to fix the issue.

To tackle the complexity of the waste management issue in the Egyptian rural areas, the paper recommends developing an integrated system that adopts different policy alternatives. Firstly, decentralization could be an efficient way to allow local authorities in the Egyptian villages to take the lead in supervising the waste collection process. Therefore, local authorities would be in charge of imposing fees on citizens to cover the transportation and collection costs. Meanwhile, instead of leaving the waste collection process for the informal sector, local authorities could financially support the NGOs to make them gather the informal workers and organize the process of collecting the waste from the village and transferring it to the landfills and recycling centers. At the recycling stage, SMEs could be encouraged to play a significant role in implementing the recycling process. Accordingly, some SMEs could be given the rights to recycle the material gathered in a specific recycling center in return for fees that could be used in contributing to covering the collection and transportation costs. Meanwhile, this should go hand in hand with increasing the citizens' awareness of the best practices for waste management. As a result, it is recommended to establish a national campaign in the Egyptian rural areas that aims to raise the individual's awareness on economic, social and health aspects of the issue as well as how to reduce waste consumption, increase waste reuse, and facilitate the segregation of waste.

This could create a dynamic system that could enhance the sustainability of the waste management operations in the Egyptian rural areas by outlining the roles and responsibilities of the involved stakeholders and creating sustainable funding for the system.

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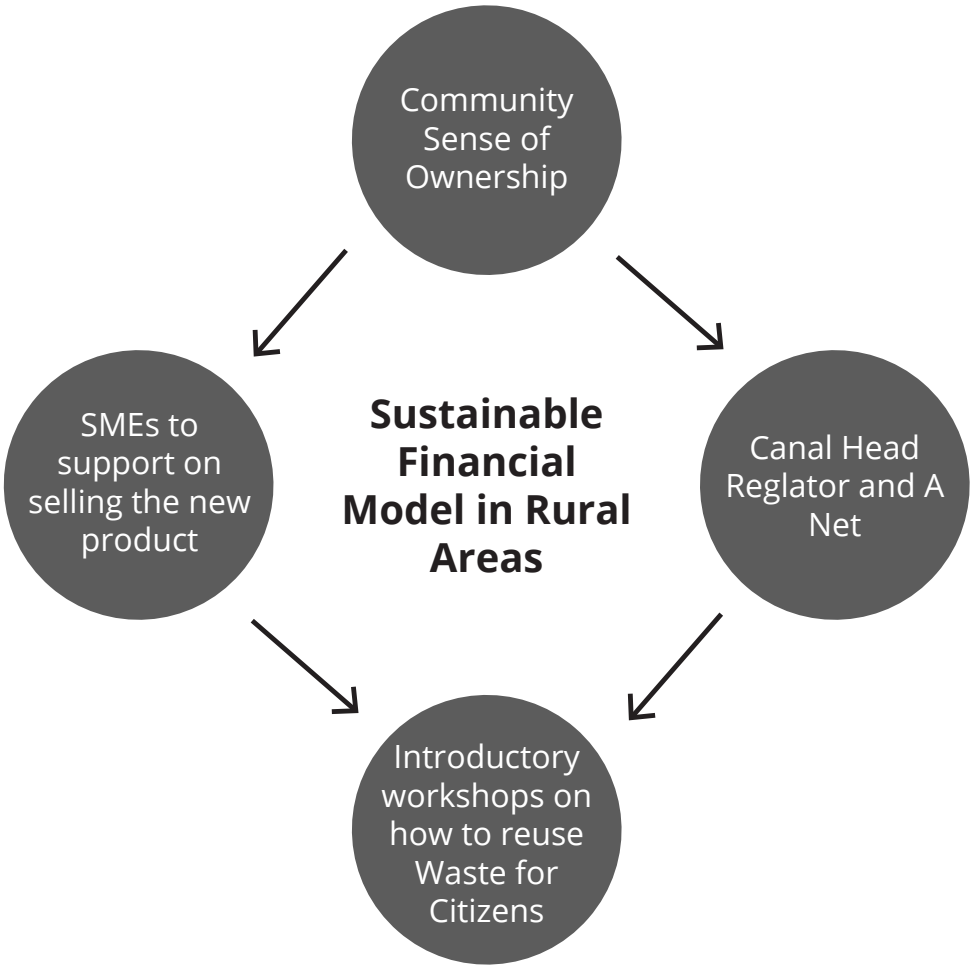
Appendix

More details about one of the recommended policies combined to explain the recommended policy



THE PUBLIC POLICY HUB

Where Rigour Meets Creativity

The Public Policy HUB is an initiative that was developed at the School of Global Affairs and Public Policy (GAPP) in October 2017. It was designed to fill in the policy research gap in Egypt. It provides the mechanism by which the good ideas, plausible answers, and meaningful solutions to Egypt's chronic and acute policy dilemmas that are proposed by the country's best minds, the experienced and the creative from different age brackets, can be nurtured, discussed, debated, refined, tested and presented to policymakers in a format that is systematic, highly-visible and most likely to have a lasting impact.

It is designed to develop a cadre of well-informed and seasoned policy developers and advocates, while simultaneously fostering and promoting creative solutions to the challenges facing Egypt today. The project provides a processing unit or hub where policy teams are formed on a regular basis, combining experienced policy scholars/mentors with young creative policy analysts, provide them with the needed resources, training, exposure, space, tools, networks, knowledge and contacts to enable them to come up with sound, rigorous and yet creative policy solutions that have a greater potential to be effectively advocated and communicated to the relevant policymakers and to the general public.

Since its establishment, the Public Policy HUB has been supported by Carnegie Corporation of New York, UNICEF Egypt, and Oxfam. The Hub had partnerships with different ministries and governmental institutions like the Ministry of Social Solidarity, Ministry of Planning, Ministry of Health, Ministry of Trade and Industry, Ministry of Local Development, Ministry of Education, Ministry of Environment, National Council for Childhood and Motherhood, National Population Council, and General Authority For Transportation Projects Planning.

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The American University in Cairo – New Cairo Campus
Jameel Building

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