Grappling with Cairo's garbage: Informal sector integration as a means to urban sustainability

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Grappling With Cairo’s Garbage:
Informal Sector Integration as a Means to Urban Sustainability

A Thesis Submitted to
the Center for Sustainable Development

in partial fulfillment of the requirements for
the degree of Masters of Science
in
Sustainable Development

by
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“…the world system is simply not ample enough nor generous enough to accommodate much longer such egocentric and conflictive behavior by its inhabitants.”

- Club of Rome Executive Committee, 1972.
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Abstract

Sustainable waste management systems contribute to overall urban sustainability. In developing country cities such as Cairo, the informal sector plays a vital role in these systems, and policy to reform the waste sector must acknowledge that in order to achieve urban sustainability.

Cairo is a city that is undergoing rapid urbanization with a rising population, putting strain on resources and public services. An increase in informal housing areas and jobs was only natural to accommodate the growing underclass within the city. One community that developed as a result was the zabbaleen. This community, most of which resides in Manshiet Nasser, took it upon itself to collect municipal waste and recycle it for economic gain. The result was a highly organized and efficient informal waste management system for the city that provided jobs and livelihoods for thousands of families. However, the policy to privatize the sector excluded this essential actor and focused much on ‘modernization’ and ‘proper’ disposal, taking a more linear approach to waste management. This resulted in a less efficient waste management system as the amount of material recycled dropped, which a) had negative socioeconomic implications on the thousands of families operating in the informal sector and b) visible environmental degradation due to waste accumulation.

In order to build a more sustainable waste management, the successful integration of the informal sector in this case becomes a key issue. The problems with the currently implemented policy need to be thoroughly understood in order to devise a new policy that adequately addresses them. The government recently launched the National Solid Waste Management Program (NSWMP) to address these problems, acknowledging the need for informal sector integration. However, this is a program that is in the early stages of implementation and therefore requires continuous scrutiny. This thesis concluded that successful integration of the informal sector rests on three key factors: a) source segregation of waste, b) development of waste management entrepreneurship, and c) proper pricing of disposal. The new policy seems to account for these three factors, but it remains to be seen how they will be addressed in upcoming legislation governing the sector.
1. Introduction

1.1 Background

Cities have always been the drivers of development, which is why more than half the world’s population now resides in urban areas. Rapid urbanization is expected to continue with an estimated total of 5 billion people urban dwellers by the year 2030, with most of this growth happening in Asia and Africa. The Rio+20 summit set a mandate to establish the Open Working Group to draw up a set of sustainable development goals, or SDGs, to be considered in and integrated into the UN post-15 development agenda. With the growing interest in urban sustainability, it is no surprise then that one of the proposed goals explicitly focuses on the importance of cities in human development; to “make cities and human settlements inclusive, safe, resilient and sustainable” (UN, 2014). There is growing literature on what makes a city sustainable and definitions may vary. Any city must be mindful of its required inputs; such as energy, water, food, education, capital and labor, how they are processed to produce desirable outcomes; such as economic growth, improved quality of life, culture, as well as negative outcomes such as poverty, inequality and pollution.

Defining urban sustainability is as ambiguous as defining sustainability itself. This can be problematic for practical purposes such as policy-making or evaluation of an infrastructure project. However, having a loose definition can also be advantageous as it can give freedom for each city to prioritize socioeconomic processes to its specific and more immediate needs. Therefore, one can define urban sustainability as the result of the organization of an urban agglomeration on a social, economic and physical level in a way that promotes both inter- and intra-generational equity while preserving ecological systems (Vojnovic, 2012).

With rapid urbanization comes increased resource demands complimented by environmental degradation, and this is expected to be top priority for cities around the world, not least of which is Cairo. The role of urban infrastructure especially in developing world cities becomes increasingly important in the provision of basic services such as municipal solid waste management. As these cities continue to grow and expand, the amount of waste produced multiplies. Ineffective management and inequitable provision of the collection and disposal service lead to waste accumulation within unhealthy proximity of people, usually reaching unacceptable levels, especially in lower-income neighborhoods. It is estimated that two thirds of
Cairo’s residents live in informal areas - 65% of Cairo’s population as of the 2006 census (Sejourne, 2009). These areas are not officially planned, and occur in urban fringes on either privately owned agricultural land or state-owned desert land, to accommodate the rapid rise in the city’s population. Furthermore, the formal economy was unable to provide adequate employment for this growing population. Thus, it was natural that a community like the zabbaleen began to develop within these areas, creating an informal waste management sector that provided both much-needed employment and filled a vacuum in solid waste management (SWM) service provision. Cairo was almost entirely dependent on this informal waste sector in collection and disposal of municipal solid waste (MSW) due to the limited capacity of municipalities, at least until the introduction of international private sector companies in 2003, a policy that is now widely considered to have had limited success (Wilson et al, 2006; Fahmi & Sutton, 2010). This service project proved unsustainable because it excluded its most experienced and embedded actor; the informal waste worker.

Solid waste management is a basic service, which should be accessible to all citizens, as it has public health dimensions (Ahmed & Ali, 2004). This means that government cannot completely retract its role in the sector, as it is essentially a matter of public good (Ahmed & Ali, 2004). The accumulation of municipal waste leads to the degradation of the built environment, usually with varying degrees across the income scale of neighborhoods. This degradation can come in several forms; air pollution caused by open dump burning; spreading of disease from decaying organic compounds; possible water contamination; as well as foul odors and aesthetic pollution – all of which cause both physical and mental stresses on urban inhabitants. So how does the government ensure urban environmental justice?

The main reason the growing waste problem has been aggravated in the last few years was directly caused by a number of policies that excluded, and therefore negatively affected, the informal waste management sector (Fahmi & Sutton, 2010). The government was attempting to build a new system up from scratch, in parallel to an existent, functioning, informal system, as opposed to focusing on upgrading that sector’s capacity and technology in order to grow it with an expanding city. This caused a loss of livelihoods, and resulted in the inefficiencies we see today (Fahmi & Sutton, 2010).

Fortunately, there are indications that the country is learning from past mistakes. The Egyptian government, specifically the Ministry of State of Environmental Affairs (MSEA) and
its Egyptian Environmental Affairs Agency (EEAA), and the newly formed Ministry of Urban Renewal and Informal Settlements (MURIS), are currently working towards a more inclusive approach to waste management on a national level. This new policy has been dubbed the National Solid Waste Management Program (NSWMP). The latest draft of this policy, published November 2014, contains a set of directives, one of which specifically addresses the informal sector. It calls for the creation of a framework for integrating informal actors in the solid waste management sector, which entails participatory approaches to integrating informal capacities, providing informal workers with technical assistance, access to alternative forms of funding, and incentives to formalize such as healthcare and social insurance programs (NSWMP, 2014). While this demonstrates a step in the right direction, this directive is still at an early stage and its scrutiny should be an ongoing process that ensures its proper implementation.

This thesis sets out to propose an unconventional solution to urban environmental degradation, specifically that which is caused by evident municipal waste accumulation in Cairo. The idea is to create the right policy environment for SMEs to flourish across the waste supply chain in order to fix the inefficiencies that have manifested on the city’s streets. However, it would be unwise to propose a solution without recognizing the important role the informal sector already plays in the city’s municipal solid waste management system. Therefore the idea of developing entrepreneurship in the waste sector becomes synonymous with the proper integration of existent informal SMEs. As previously mentioned, past policy approaches to reform the waste management sector across the country excluded this main actor, mainly because the government viewed it negatively; problematic, unhygienic and undesirable, completely in contrast with their view of modernity (Wilson et al, 2006; Fahmi and Sutton, 2010; Nas and Jaffe, 2004). Not only is this view morally deficient, but empirically as well as this sector has proven to be capable of “great ingenuity and flexibility in unpromising circumstances” (Nas and Jaffe, 2004). The informal waste sector needs to be perceived more positively. It deserves recognition and upgrading, in order to successfully integrate it into the formal system. By appreciating the zabal as the entrepreneur he or she is, the approach to the solution becomes a different one. By looking at waste accumulation as a result of market inefficiency that can be solved by concepts such as waste valorization (Pongracz and Pohjola, 2003; Scheinberg et al, 2011) and environmental entrepreneurship (Dean and McCullen, 2007), policy directives take on new forms. The solution becomes one that builds up and improves the functionality of the
existent system, so that its capacity grows with rising demand, improving its coverage to less privileged areas of the city, and ultimately become a catalyst for urban environmental justice, social equity and economic opportunity. Fortunately, this notion is gaining recognition amongst policymakers. The newly proposed policy, the National Solid Waste Management Programme (NSWMP) acknowledges the need to integrate the informal sector. This thesis will analyze the policy currently implemented, identify the problems within it and relate it to the argument for informal sector integration; assess the policy being proposed and determine whether it is well developed and addresses the problems identified; and, finally, determine whether that leads to the successful integration of the informal sector and a more sustainable urban waste management system.

1.2 Research Problem

In light of the Egyptian government’s new waste sector reform titled the National Solid Waste Management Programme (NSWMP), specifically the directive on integrating the informal sector by providing technical assistance, financing facilities, capacity building and providing social insurance incentives to formalize, this thesis analyzes whether this new policy gives adequate consideration to the informal sector in its legislative, administrative, financial and intervention frameworks. It will investigate the specific mechanisms that are being proposed for integration of the zabaleen community and whether integration, if successful, leads to a more sustainable municipal solid waste management (MSWM) system for a rapidly growing, urban agglomeration.

Pending this new policy directive to formalize the sector, this thesis will attempt to analyze whether it paves the way for a more resilient, inclusive, and sustainable urban environment, with specific focus on how the informal sector’s enabled role contributes to the sustainability of the city’s MSWM system. Is integration of the sector crucial? And if so, what does it entail? Does it necessarily mean formalization? Are proposed incentives to formalize acceptable and sufficient? What do policymakers have in mind with this new directive?
2. Methodology

This section explains how the key research questions for this thesis were developed and the thought process involved in arriving at these specific questions. It also explains which methods were deployed in order to effectively answer these questions. It is worth noting that this thesis, while a complete stand-alone document, is part of a thesis-twinning collaboration with a colleague, John Estephanous, who will be tackling the same issue from an entrepreneurial perspective. Consequently, there were overlaps in the data collection stage of this research, and the one-on-one interviews were organized and conducted in tandem. The investigation of the entrepreneurial and business dimension of the formalization of the zabbaleen will undoubtedly enhance the policy framework analysis of this thesis and vice versa.

2.1 Main Research Question

The main question that this thesis sets out to answer is whether successful integration of Cairo’s informal waste sector improves the sustainability of the city’s MSWM system. This thesis initially set out to analyze the root cause of the evident waste accumulation one has become accustomed to see around the city, usually aggravating as you go down the income scale of neighborhoods. The general idea developed from the concern of how to develop the city’s waste management system in a manner that is efficient, economic, and does not exclude any important actors like the zabbaleen. Why does the waste problem seem to be getting worse in our city and who is responsible? It is clear that service providers are not able to cope with the rate of waste generated in the city and the initial hypothesis was that the encouragement of entrepreneurship in the waste management sector could be a possible solution to eliminate deficiencies across the waste cycle, from collection all the way to disposal. However, the solution is not that simple. A survey of the main players in the sector helps one quickly realize the central role the informal waste sector already plays. The initial assumption was that the waste sector needed an entrepreneurial solution when the entrepreneur was hard at work all along, albeit informally. This is how the initial hypothesis that entrepreneurship could solve the Cairo’s waste problem developed into a question of integration of the already-existing informal entrepreneur into the system. This issue of integration, and relevantly, formalization, of the
informal sector has been exhaustively debated and it is important to draw the linkages between it and the growing discourse on urban sustainability.

2.2 Minor Research Questions

While the main question deals with analyzing the relationship between informal waste sector integration and urban sustainability, there are a number of minor questions that the research will attempt to answer. What is the relationship between integration and formalization? What degree of formalization is sufficient for integration? What other mechanisms are there for integration of informal activity of any kind without necessarily formalizing it? If, in this specific case of Cairo’s informal waste sector, it turns out that both have the same meaning, what will it entail from a policymaker’s perspective? How do they define integration and what role do they see the informal sector playing in a vital urban infrastructure service such as waste management under this new policy directive?

On the other hand, it is equally important to investigate the informal waste worker’s perspective – are they even aware of a new policy that specifically addresses them? Do they welcome the idea? If so, what incentives do they need for them to formalize voluntarily? Identifying any gaps in both perspectives will help determine how planned integration of the informal waste worker contributes to the sustainability of the city’s MSWM system.

2.3 Research Design

The study undertaken in this thesis will be qualitative. There are three primary sources of data being used.

The first is a collection of reports and documents on the current waste policy and management framework. These reports have either been published by the government, specifically the Ministry of State of Environmental Affairs (MSEA) in collaboration with the German International Cooperation (GIZ), or from private sector consultancies with a proven track record and decades of experience in the field of waste management in Egypt. These reports include information on the newly proposed policy by the Egyptian government. Other more general reports published by GIZ or other organizations such as the UN-Habitat and the Woman
in Informal Employment: Globalizing and Organizing (WIEGO) on informal waste management are used as references, background information and case studies. However, this thesis does not aim to conduct a comparative analysis with any other country on the assumption that the waste problem evident in Cairo is one that is unique, even within the country, and thus needs to be seen from a local lens.

The second are a number of articles published in journals or parts of books that are a collection of essays. These are mainly used to explain some of the key concepts used in this thesis, which are identified and illustrated in the conceptual framework and discussed in detail in the literature review. Concepts such as urban sustainability, sustainable infrastructure, environmental entrepreneurship and the informal economy are considered the key concepts that go into making a sustainable urban waste management system for Cairo. More articles with a specific focus on informal urban waste management were used, which are mainly used to back up the argument for integration of the informal sector as well as draw linkages with the key notions identified in the conceptual framework.

The third is a number of semi-structured interviews conducted with a number of individuals carefully selected for their experience in the field and their position within the sector. They include private sector consultants, government officials, members of NGOs involved in waste collection and recycling activity and key members of the Zabbaleen community in Manshiet Nasser. Key interviewee for this thesis is the Minister of State of Urban Renewal and Informal Settlements (MURIS) and her team. This minister was the previous Minister of State of Environmental Affairs and has a wealth of experience in Cairo’s waste management system and with the Zabbaleen in particular, is (still) handling the waste portfolio on a ministerial level as of the time of writing this work, and provided the author and co-researcher with valuable data on the current framework and undertaken initiatives.

2.4 Limitations

There were a few limitations encountered when conducting the research for this thesis. First and foremost was time, which was especially needed to conduct more interviews that would give a more comprehensive perspective of all relevant stakeholders. Examples of stakeholders that would have been contacted given more time are the municipal agencies currently responsible
A second important limitation is that the NWSMP is still a work in progress. The recent policy draft seems to be a very good indication of what the final draft will look like, but it is still difficult to assess how this will be transformed into legislation. The much-anticipated SWM law, and the consequent establishment of a regulator (ESWA), is still in the consultation and drafting phase. Access to any information on the progress of this stage was difficult to obtain.

Another limitation was the lack of complete, accurate data, especially with regards to waste generation. The numbers available are based on estimations made at the national and governorate levels and seem to have been recycled from one report to the other. This lack of data makes it difficult to estimate numbers such as uncollected waste by geographical location within the governorate, to be able to quantify the disparity in service provision between more affluent and less affluent neighborhoods inside the city.

2.5 Conceptual Framework

The key concepts used to formulate the hypothesis for this thesis are illustrated below.

![Conceptual Framework](image)

Figure 1 identifies two key concepts that make a waste management more sustainable - the combination of entrepreneurship and waste valorization. As previously, stated the specific problem this thesis addresses is the evident waste accumulation around the city. The hypothesis
is that this waste, once assigned economic value, can be eliminated with entrepreneurial activity. By breaking up the waste cycle into smaller steps and splitting the city geographically into smaller fragments, small enterprises can operate more efficiently by focusing on smaller areas and a specific activity, e.g. collection and segregation, recycling, disposal. Ultimately this will significantly improve the provision of an urban infrastructure service that is desperately needed and simultaneously be a force for employment. The conceptual framework then acknowledges that this activity is already in practice in the informal waste sector in Cairo, and thus the logical conclusion is that the sector’s successful integration can only lead to a more sustainable urban waste management system, which contributes to the issue of urban sustainability.

The debate on formalization predominantly focuses on socioeconomic factors. It asks questions on who it ultimately serves in the end, the positive, or negative effects it has on livelihoods of informal workers and their social security. By focusing the debate on the urban waste problem, and its relationship with the informal waste sector, it brings in a more physical element, the environmental aspect of the debate. It is self-evident that there is a growing waste problem in Cairo that is not being dealt with adequately. The government’s past exclusionary policies played a part in that which has threatened the sustainability of the city’s MSWM system. However, that is not to assume that full formalization will simply happen overnight or is in fact the best solution. Much of the literature likes to romanticize Cairo’s informal waste sector without admitting it is not without its problems. This thesis will look at the problem of waste accumulation objectively and understand how the exclusion of the informal waste worker from the formal waste cycle contributes to the problem environmentally, as well as socioeconomically.
3. Literature Review

The following section delves deeper into the elements identified previously and helps bring the reader up to speed on the emerging concepts. The objective is to demonstrate the inherent linkages between them, especially the relationship between the informal solid waste management sector and overall urban sustainability.

3.1 Urban Sustainability

The overarching theme and the inspiration for this thesis is urban sustainability. The development discourse is increasingly giving more attention to urban issues as rapid urbanization occurs and more and more people around the world flock to urban agglomerations for better economic opportunity, social wellbeing and healthier living environments. More than half the world’s population already resides in urban areas, and it’s these areas that are expected to witness the largest growth within the next three decades (Vojnovic, 2012). However, the reality in some cases, especially in the developing world, can be somewhat disappointing; increased poverty due to a crowded labor market and high unemployment; which results in social inequity and division; and polluted environments due to crumbling infrastructure, and inadequate service provision. This all brings into question the survival of cities – how can these urban agglomerations become more sustainable?

The concept of sustainability first started to become popular around the 1980s when the Club of Rome’s executive committee stated that the world’s ecological system couldn’t simply accommodate the “egocentric and conflictive behaviors of its inhabitants” and proposed the solution of pursuing a society in a “steady state of economic and ecological equilibrium” (Vojnovic, 2012). This idea of balance between economy and environment resonated with the world and started to gain momentum, and hence saw the aim towards the marriage of the first two pillars of sustainable development. The third pillar, social equity, was also introduced around the same time at the World Council of Churches conference on Science and Technology for Human Development. The pursuit of social justice and equity became quickly aligned with the concept of sustainability, and a few years later the term sustainable development was coined (Vojnovic, 2012).
The publication of *Our Common Future* in 1987 by the World Commission on Environment and Development (WCED) claimed that industrialization had impacted our planet in a way that threatened the stability of our social as well as our ecological systems, and argued the need to pursue sustainable development. Today’s definition of the term largely follows the WCED’s interpretation; “development that meets the needs of the present without compromising the ability of future generation to meet their own demands” (Vojnovic, 2012).

Although the definition seems to have reached a loose consensus, the mechanism by which sustainable development can be achieved is still very much up for debate. This thesis will focus on sustainability in the urban context. It has become increasingly important and relevant to a megacity like Cairo, which has expanded into the Greater Cairo Region, and is likely to continue expanding into the desert in light of new government plans to establish an administrative capital to its east. The anticipated demand for resources, and therefore the environmental degradation resulting from this exponential population growth, the pressures on social and health services will likely be, or at least should be, top of every government’s agenda (Vojnovic, 2012).

So defining urban sustainability becomes even trickier. The term shares the same ambiguity of sustainability, but not only does it attempt to balance the interests of current and future generations but also the interests of local and global communities. Therefore, Vojnovic (2012) loosely, by his own admission, defines urban sustainability as the “outcome of a social, economic, and physical organization of urban populations in ways that accommodates the needs of current and future generations while preserving the quality of the natural environment and its ecological systems over time”. As with the concept of sustainability, the term urban sustainability receives criticism for being too vague for practical purposes, such as defining policy.

However, having a loose definition gives countries, and cities, the freedom to interpret it in a way that is aligned with their vision, their priorities and their more immediate needs. An urban sustainability initiative in Cairo will be quite different to one in New York or London, or even Nairobi or Rio de Janeiro. Public policy in wealthier nations often seems to adjust development to sustain growth, while in poorer nations; policies are not carefully designed and usually lead to increased environmental and social problems. This is why better urban policy design should be a priority for developing countries; whereby urban sustainability issues can encompass energy conservation, socio-spatial equality, land use and participatory governance (Iracheta, 2012;
Krause, 2012). Less government regulation and freer markets have had their ill effects on certain aspects of urban life, and this is why there has been an increase in demand by society for policies that engage all stakeholders and rooted in local issues (Krause, 2012). Cities are shaped by economic, social, environmental and political shifts, and these changes seem to have been more regressive than progressive, especially in developing world cities.

Urban areas consume over 75% of the Earth’s resources every year even though they only cover 2% of its surface area, and as such are the source of much of the global environmental degradation (Vojnovic, 2012). This is a problem because cities themselves have limited capacity to regenerate the food and energy they consume, to recycle waste produced, to clean the air and water from pollution. Cities by design rely on natural resources outside their boundaries for inputs necessary to sustain its function, sometimes beyond national boundaries as well, making them “parasites on the biosphere” (Vojnovic, 2012). Furthermore, the differences in levels of prosperity within countries are highlighted by the environmental condition of their cities and there are three general trends for urban areas, according to Vojnovic. The first type, in industrialized wealthy countries, where cities are defined by high-income levels, high rates of consumption, and thus, high ecological footprint per capita. It should be noted that despite the fact these cities hold the majority of the world’s wealth, there is a large and growing underclass within them. These cities mainly focus on repairing ailing infrastructure and reversing economic decline. The second type refers to industrializing cities, which are witnessing unprecedented rates of population growth, and thus, exponential rates of consumption. These cities mainly focus on expanding their urban infrastructure networks. Vojnovic argues they have little to learn from their industrialized peers due to the unprecedented rates of growth, the accelerating rate of advances in technology and rapidly shifting markets, which meant they have had to carve their own path of development (2012). The third group consists of cities that are non-industrial, economically stagnant or declining, and generally poor, yet also experiencing rapid population growth (2012). These cities typically lack adequate service provision and the majority of the population lives in very poor conditions (2012). Vojnovic admits this classification is an over-generalization. For example, the recent trend of global cities that position themselves based on knowledge, technology and capital, without necessarily industrializing, do not get a mention in this classification. However, if one had to choose, Cairo seems to be a city that falls somewhere between the second and third categories; not industrializing, but growing service-based
economy, experiencing rapid population growth, while most of the city’s residents are poor and reside in informal areas.

However, there are many benefits (or at least there should be) to living in safe high-density areas with decent provision of services – such as education, healthcare, potable water, energy access, sewage treatment, public transit, waste collection and disposal. The more compact agglomerations are, the less costly the provision of services becomes. Municipal waste generation can reach problematic levels in cities, but it’s this high-density that makes recycling and waste reduction programs effective (Vojnovic, 2012).

Nevertheless, it is very important to underline the differences between cities in the global North and South. Iracheta (2012) uses Mexico City as an example of an underdeveloped city that cannot be considered a ‘sustainable’ model. He makes some observations, which are relevant to Cairo. He argues that while in developed countries, economic growth and environmental policy are considered complementary, in developing countries, rampant poverty makes the use of natural resources in a sustainable manner almost impossible as people are forced to meet the needs of the present and sacrifice the needs of the future (2012). Coupled with lack of economic growth and increasing social inequity, the result is a growing urban population of low- and very low-income groups, which then puts more stress on the city’s infrastructure, giving birth to the urban informal sector to fill the vacuum in service provision. Informal housing, jobs and services such as waste management, transportation, appear around the city. The relative withdrawal of the state from planning, both spatially and environmentally, leads to land speculation, which expels the poorest groups from the formal city into informal areas on its fringes, leaving them to fend for themselves (Iracheta, 2012). Therefore, public policy should be geared towards redirecting access to resources towards these underprivileged groups within cities, because, despite the huge social and environmental problems associated with informal areas and economies, they have served as a solution to these groups and curbed social unrest. People living in informal housing should be given land tenure, and informal workers should be incentivized to formalize or integrate with the formal systems of service delivery, which gives these groups social security, dignity and the ability to grow economically.

In developing world cities like Cairo, the issue of sustainability becomes a debate that is skewed in favor of intra-generational equity instead of inter-generational equity. To echo Iracheta’s concerns regarding Mexico City, there is a genuine risk that policy makers in Cairo
will no longer be able to address its problems. Urban environmental justice, or rather injustice, was used by Gelobter to explain the effect of institutionalized racism evident in urban policies undertaken by the United States government (1993). These policies have shaped cities and created social divides between its residents. Proponents, such as Gelobter, argue that urban environmental justice, whether it is based on health, spatial, or economic factors is an essential foundation for urban sustainability (1993). While Gelobter focused more on racial issues in the United States, this concept helps frame urban problems elsewhere. Rio de Janeiro’s favelas for example, display how unsustainable urban growth is a result of urban environmental injustices such as displacement, inadequate and unaffordable housing, lack of basic infrastructure services such as access to clean water, electricity, waste and sewage treatment (Godfrey, 2012). Godfrey stated that the critique of US urban policy was equally applicable to the Brazilian city: “institutional racism and discriminatory land-use policies and practices of government—at all levels— influence the creation and perpetuation of racially separate and unequal residential areas for people of color and whites” (2012). This notion can equally be applied to Egypt as well, but from a social class perspective rather than a racial one.

The concept of urban metabolism, the idea that cities are like living organisms that need certain inputs to survive, resulting in unwanted waste, is also an important theme and directly related to the main topic of this thesis – urban waste management. Herbert Girardet states that a city’s sustainability can be gauged by its efficiency and renewability of its metabolism (2004). This means that cities need to behave more like natural ecosystems, with circular metabolism in which the flow of resources through the urban system is inside a continuous loop of inputs and outputs with little being wasted (2004). Unfortunately, most modern cities adopt a more linear approach with little concern of where inputs originated and where outputs are terminated, and this is why urban ecologists such as Girardet have stressed the importance of reusing and recycling materials, rather than dumping so-called externalities in landfills, incinerators and waterways (2004). This is an important characteristic of sustainable cities that needs to be framed within a broader, more comprehensive definition. According to Vojnovic (2012, 26), there are six main criteria that define a sustainable city. They include:

a) cities that satisfy basic equity criteria, providing essential social, economic, health resources for all income groups;
b) cities that minimize resource use, particularly reliance on nonrenewable resources;
c) sociopolitical organization that facilitates democratic participation and guarantees political and personal freedoms;
d) built environments that reflect the needs of all income groups, encourage community cohesion, and preserve the cultural heritage of population subgroups;
e) urban development patterns that encourage increased harmony with nature, preserving environmental quality and life systems over time;
f) and urban environments that eliminate and avoid the creation of health risks.

If these criteria were used to determine the sustainability of a city like Cairo, it would score very low. These criteria also indirectly highlight the important role infrastructure such as waste management systems play in urban sustainability. Looking at the waste management system of a city like Cairo, where formal overlaps with the informal, it is easy to observe it as a multi-dimensional issue in which policy has significant socioeconomic implications, in addition to environmental effects.

**Sustainable Infrastructure**

This thesis tackles waste management, which is an element of a city’s infrastructure. Against the backdrop of urban sustainability, a question arises - what makes infrastructure sustainable, and how does it contribute to the issue of urban sustainability? The infrastructure of a city can be in the physical form, such as road networks, electrical grids, sewage networks and so on, and the non-physical form, or services, such as education and healthcare, public transit. According to Koppenjan and Enserink (2010, 284) distinguish between social, environmental and financial sustainability when it comes to urban infrastructures as follows:

- “Social sustainability refers to the impacts of urban infrastructure on the affordability of and access to public service delivery by poorer groups within urban society
- Environmental sustainability refers to the impact of service delivery by public infrastructures on the urban population (health, well-being), urban environments (air quality, water quality, congestion), and the wider surroundings (ecological impacts,
depletion or maintenance of resources, impacts on downstream rural communities as a result of water pollution).

- Financial sustainability refers to the possibilities of (local) authorities to live up to the financial obligations that result from investments in infrastructures, both in the short and in the long run.”

While their research primarily focuses on public-private-partnerships (PPPs) and public sector participation (PSP) in urban infrastructure, and argue its merits, they do concede that it’s not without faults. What they propose is a conceptual framework in which to develop options for PSP and PPPs that are relevant and appropriate for the local setting. If these structures are transplanted from one setting to another with no regards to local needs and conditions, it becomes a formula for failure (Koppenjan & Enserink, 2010; Ahmed and Ali, 2004). This has indeed been the case when PPPs and PSP were introduced in developing countries’ waste management systems that have a vibrant informal sector, yet the models that were imported failed to integrate this sector effectively, or even account for it when devising new policies.

3.2 Environmental Entrepreneurship and Waste Valorization

As previously mentioned, this thesis is part of a twin thesis, which also tackles the issue of waste management but at an entrepreneurial level. While this concept definitely features heavily in the twin thesis, it is important to briefly introduce it here as it ties in with another significant theme, waste valorization.

What Dean and McMullen (2007) argue is that environmental entrepreneurship can exploit environmentally relevant market failures, which are opportunities that arise from unmet demand due to discrepancies between private and social costs. This exploitation involves the elimination of barriers that prevent markets from behaving efficiently, which reduces environmental impact and make markets more sustainable (Dean and McMullen, 2007). The barriers they have identified include resource non-excludability (Tragedy of the Commons scenarios), lack of market exchange for environmental resources due to prohibitive transaction costs, slow adoption of clean and sustainable technologies due to market monopolies, information asymmetry of
supply and demand and most importantly, public policy that provides inappropriate support for environmentally degrading structures (2007).

This view that environmental degradation is a result of market inefficiencies and can be overcome through entrepreneurial activity is central to waste management entrepreneurship. Another central theme is waste valorization, which means assigning economic value to what is considered waste, repurposing it into non-waste and therefore making waste management an economic activity (Pongracz and Pohjola, 2003; Scheinberg et al, 2011). What Pongracz and Pohjola (2003) argue is that unsatisfactory legal definitions of waste will lead to unsustainable waste management systems – when does waste become waste? How is it given another purpose and turned into non-waste? How does transfer of ownership of this material occur? The idea of waste ownership is central to waste management and therefore the role of legislation comes into play to monitor transfer (Pongracz and Pohjola, 2003). The role of government then is to set policies that establish property rights regimes that ensure the proper management of resources (in this case, waste), eliminating subsidies for environmentally degrading activities (like landfilling) and support more sustainable activities (like recycling) (Dean and McMullen, 2007).

By properly defining waste and accepting the way it should be handled, waste management becomes the control of waste-related activities with the aim of protecting the environment and public health (Pongracz and Pohjola, 2003). Furthermore, proper public policy enables entrepreneurs to internalize costs of public goods, therefore eliminating discrepancies between private and social costs and alleviating environmental degradation (caused by improper waste management) (Dean and McMullen, 2007). The combination of these two concepts provides a decent precursor to the role of the informal waste valorization entrepreneur in an integrated solid waste management system (ISWM) and the importance of integrating their activity to the sustainability of the system.

3.3 The Informal Economy

The ideas presented here provide the basis for this thesis, highlighting the most important aspect of developing world cities, that differentiates them from their more developed and industrialized peers – their vibrant informal economy. This is an aspect that must be taken into consideration when designing urban policies in this context. The term ‘informal sector’ is used to
refer to any economic activity that occurs outside existing legal and regulatory frameworks set forth by the government, that is usually non-permanent, on a small-scale and dependent on household labor (Ahmed and Ali, 2004).

According to Chen (2006), the informal sector is not going anywhere and is intrinsically linked with the formal economy, so what is required is a policy that promotes more equitable linkages between them. This policy should not only focus on the role of government but also the role of every stakeholder, including private sector companies and informal worker organizations (Chen, 2006). The informal sector has been a controversial subject for policymakers – some have treated as a problem that needs to be solved without recognizing its potential, others have viewed informal workers as entrepreneurs who have been hindered by government regulation, or producers who need some form of labor protection (Chen, 2006). Whatever the view is, it seems that policymakers tend to overreact to the informal economy, either try to eliminate it altogether, or glorify it as a solution to economic stagnation (Chen, 2006) – neither of which is a sustainable policy.

The issue of informality has centered around one particular question, one that is quite fundamental to this thesis – whether to formalize the informal economy or not? Policymakers understand formalization as the obtainment of licenses, registrations and the payment of taxes, while informal workers view these as the costs of entry to the formal economy (Chen, 2006). What informal workers want in exchange for paying these costs is enforceable and secure contracts, ownership of their premises and means of production, tax breaks, capital subsidies, trade union memberships and social protection (Chen, 2006). However, formalization is not simple, as most governments would probably find it more costly to take on such an enormous amount of informal workers and provide them with the same benefits their formal counterparts receive (Chen, 2006).

Whatever the definition is for formalization, again just like defining sustainability, it needs to be localized. The informal economy is made up of different sectors and not all of them can be formalized, although policymakers should attempt to do so. The trick is to increase the benefits of working formally while decreasing the costs of working informally (Chen, 2006).
3.4 Solid Waste Management in Developing Countries

Solid waste management (SWM) is an important environmental health service, and crucial element of basic urban infrastructure service provision (Ahmed and Ali, 2004). The waste generated by dense urban centers has increased per unit area, while the land used for its disposal has also diminished over the years, and this is why SWM has emerged as a vital service that keeps cities environmentally healthy and livable (Ahmed and Ali, 2004). The value of waste materials has always been a potential source of livelihood for the urban poor during the rapid industrialization of North American and European cities during the 19th century, and this still holds true today in developing countries (Wilson et al 2008).

Policy drivers for development

It is important to note the policy drivers behind waste management in developing countries today. Wilson (2007) provides a framework, which has been expanded on further by Scheinberg (2012), in which to contextualize these drivers. It is important to understand what mechanisms significantly impact the development of solid waste management, both past and present, in order to decide how best to move forward. The framework provides a comparison between drivers in the developed world and the developing world, but for the purposes of this thesis, the focus will be on the latter.

The first factor Wilson (2007) identifies is public health. Historically, outbreaks of disease and its impact on public health has been the first driver of waste management development (Scheinberg, 2012). Its objective is to maintain healthy cities by devising policies that organize public institutions and private enterprises in a way that upgrades and extends waste collection systems to cover urban areas (Scheinberg, 2012). What makes this driver important is the fact that diseases know no boundaries and therefore maintaining an effective waste collection system that extends to neighborhoods that cannot afford the service is key to containing disease outbreaks.

The second driver that Wilson (2007) identifies is the environmental protection driver. Collection is one challenge, and over time produces cleaner urban environments. However, with accumulating piles of waste, its disposal becomes another challenge altogether. The most common method of disposal seems to be moving this waste out of the city to be buried or burned, but this causes air, soil and water pollution, and therefore the most common solution has
been to upgrade dumps into sanitary landfills and controlled incinerators (Scheinberg, 2012). While this upgrade in technology has a positive environmental impact compared to open dumping and burning, and serve a large population, they are still expensive to build and operate. The trend recently has been to shut down city dumps, regionalize landfills that serve multiple urban areas, and pricing disposal in a way that transfers costs to waste generators (Scheinberg, 2012).

The third driver identified by Wilson (2007) is the resource value of waste, which has been touched on before. The livelihoods sustained by recovering valuable recyclable material and selling it upstream is still a major driver for the urban poor and the informal sector (Wilson et al, 2006). The problem with the reliance on disposal and incineration is that it counters resource recovery and therefore prevents materials from going back into the value chain (Wilson, 2007; Scheinberg, 2012). Scheinberg argues that this is a very important point that is poorly understood and requires better understanding. Modernization of waste management has made the process very linear from collection to disposal, whereas before that, resource recovery answered the environmental problem of resource scarcity and ‘closed the loop’ (Wilson, 2007; Scheinberg, 2012). This is mainly because disposal is improperly priced and does not discourage generators from finding alternative ways to get rid of their waste in agricultural or industrial value chains (Scheinberg, 2012). It is clear from her analysis that the financial aspect is a crosscutting driver in promoting a more circular waste management system. When disposal is properly priced, the value chain or resource value driver emerges. Recycling avoids “too much disposal at too high a price”, avoids the depreciation of natural resources including land, and promotes a more circular, and therefore more financially sustainable, waste management system (Scheinberg, 2012).

Informal Waste Management

It’s this point that is very characteristic of the informal waste collection and recycling – it is a purely value chain activity that does not rely on government contracts and service provision fees. Modernization has not been kind to the informal sector for several reasons. Firstly, it’s important to understand the characteristics of the informal waste sector in developing countries.

The informal waste entrepreneur is usually involved in some form of resource recovery, be it through collection or recycling, usually servicing low-income neighborhoods due to a gap in service delivery by the official provider, be it public or private sector (Rogerson, 2001; Ahmed
and Ali, 2004) - interestingly enough, that is not the case in Cairo, where the informal sector services high-income neighborhoods, sometimes preferring them due to the higher value of waste generated there i.e. more recyclable content. Informal SWM micro-enterprises find this niche and sometimes charge for services such as door-to-door waste collection from households. They sort through this waste and sell anything of value upstream to the formal economy, forming the base of the waste value chain pyramid (Ahmed and Ali, 2004; Scheinberg et al, 2011). They operate outside the legal and regulatory framework, and therefore pay no taxes on the profits they make, have no trading licenses, as well as being excluded from any social welfare or government insurance schemes (Wilson et al, 2006). Despite the income lost from a government’s perspective in tax revenues, the informal sector does save it the cost of providing an essential public service. By reducing the amount of waste that needs be collected, treated and disposed, the governments in turn ends up spending less on formal waste management (Wilson et al, 2006). The two sectors also intersect at various points in the waste cycle, whether physically or technically, because the informal sector impacts the flow of materials and therefore a great deal of mixing of informal and formal activities occur (Scheinberg et al, 2011). An example of this is ‘truck-picking’ when formal waste collectors skim valuable waste from the truck or container to sell upstream to informal recyclers (Scheinberg at al, 2011).

This hybrid between the informal and formal waste sectors has been dubbed a form of ‘modernized mixtures’, which has been applauded as a suitable model for developing countries (Ahmed and Ali, 2004; Scheinberg, 2011). However, governments have generally taken a very negative view of the informal sector – claiming it is primitive, unclean, problematic – and this has been evidenced in exclusionary policies that aim to modernize the sector (Rogerson, 2001; Nas and Jaffe, 2004; Ahmed and Ali, 2004; Wilson et al, 2006). This negative view has led to the repression of the informal workers involved in this sector through embarrassment and harassment (Wilson et al, 2006). Nas and Jaffe (2003) argue that this view is not only morally depraved but also empirically incorrect because there have been many cases of ‘rags-to-riches’ where even some of these micro-enterprises have successfully transitioned into formal outfits. Governments in developing countries underwent a modernization process for the two or three decades, where developed world practices and systems were imported as ‘best practices’ – privatization of the waste management sector without adequate consideration of partnerships with all levels of the existing private sector (Ahmed and Ali, 2004; Scheinberg at al, 2011).
Acceptance of the PPPs mechanism at face value highlighted the dependence of developing country governments on foreign aid to finance different aspects of its economy (Ahmed and Ali, 2004). This led to negligence of the fact that PPPs were fundamentally a developed world prescription (Ahmed and Ali, 2004) that did not account for an informal sector, because it quite simply did not have one. This led to two main problems. On a social level, the livelihoods of the informal waste workers were at risk due to increased competition for the waste they collect (Wilson et al, 2006; Fahmi and Sutton, 2005) as well as having their activities outlawed to protect the interests of the formal private sector (Scheinberg, 2012). This hostility can discourage the informal sector from this work altogether, but at great costs, as they are essentially entrepreneurs by necessity, and therefore have little in terms of alternative sources of income (Scheinberg, 2012). This interruption of the waste value chain also has an environmental impact. As more waste accumulates requiring disposal, the cost of collection rises. Couple this with the fact that ‘modern’ technology, such as huge collection trucks, could not serve low-income neighborhoods, such as slums or informal areas, which are densely populated and therefore have high rates of waste generation, the environmental impact was immediate and apparent (Nas and Jaffe, 2004).

There seems to be a consensus in the literature that PPP mechanisms that fail to integrate their informal sector in the waste management plan either fail or at great risk of failure (Nas and Jaffe, 2004; Ahmed and Ali, 2004; Wilson et al, 2006; Scheinberg, 2012). Fortunately, since 2006, there has been a genuine effort to focus more on the entrepreneurial aspects of informal waste management in developing countries (Scheinberg, 2012). Governments are waking up to the fact that ‘modern’ does not have to mean large, highly technological, centralized infrastructure systems that magically eliminate waste from urban areas (Scheinberg et al, 2011). They realize that through “innovative institutional arrangements, financing mechanisms, participation, resilient technologies and decentralized structures”, effective urban waste management can be achieved (Wilson et al, 2006). The emerging global best practice for dealing with informal waste recovery is to adopt unconventional methods that are usually linked with sustainable development (Rogerson, 2001). These methods usually go beyond the linear model of collect-transport-dispose to methods that incorporate a more circular model that is tied to resource conservation, social betterment and the promotion of entrepreneurial activity that creates sustainable livelihoods (Rogerson, 2001). This model, which incorporates recycling on a
high scale and therefore requires high levels of public participation, is best achieved through the existing informal sector, which are flexible and well adapted to the local situation (Nas and Jaffe, 2004). The approach of the informal sector is very demand-responsive, and emphasizes the importance of keeping materials away from disposal and directing them towards valorization for profits (Ahmed and Ali, 2004; Scheinberg at al, 2011). This is a model example of environmental entrepreneurship, where private gains have positive environmental externalities, and in this case, social as well (Dean and McMullen, 2007; Scheinberg, 2012).

Building a formal sector up from scratch is capital-intensive (Wilson et al, 2006). Upgrading an informal sector, which is less capital intensive and more labor intensive, is more suitable to developing countries’ economies (Nas and Jaffe, 2004). Additionally, informal sectors that are highly organized are much more likely to integrate into the formal waste management system, and in some cases eventually make the transition from formal to informal (Nas and Jaffe, 2004). Developing countries have a challenge to solve their mounting waste problem, but also an opportunity to build on existing structures by upgrading them, improving their effectiveness and efficiency while at the same time protecting livelihoods (Wilson et al, 2006; Scheinberg at al, 2011). Evidence shows that developing country municipalities neither have the resources or capacity to emulate the highly centralized and monopolistic structures in the developed world due to smaller margins for cost recovery of waste service provision (Scheinberg et al, 2011).

Furthermore, by building a formal system parallel to the existing one, on the false assumption that no collection or recycling is already happening (Scheinberg et al, 2011), with a focus on collecting waste in order to finance its disposal, increases the competition for the ‘gold in the garbage’ (Scheinberg, 2012). Formal private sector actors need to protect their investments and therefore have an interest in pushing the informal waste value chain actor out. According to Scheinberg (2012), trying to set up an exclusive waste strategy fails for three reasons: a) without significant investment, the cost per ton of recycled material becomes high due to low rates of recovery, b) increased competition intrudes on existing commercial paths for recovery, which means more material goes to disposal and the cost of the overall system goes up, c) the hostility between informal and formal actors closes markets for materials moving within their respective systems. According to Wilson et al (2008) a key challenge to integration is the lack of official recognition of the sector by the government as a functioning one that provides employment for
some of the poorest urban communities, while reducing the waste being handled by the formal sector, thus saving public money.

Across the developing world, what is evident is that the informal waste economy presents significant potential for entrepreneurship (Rogerson, 2001), and informal waste management is a topic quite relevant to sustainable urban development (Nas and Jaffe, 2004). Hostile exclusionary policies and obsessions with Western models of modernity have put this sector at risk. Not only are the livelihoods of the family’s working in the sector at stake, but also the health of the low-income urban families they cater to (Ahmed and Ali, 2004). What this suggests is that ‘modernizing’ the urban waste management sector is to upgrade these systems in “a sustainable way that involves adapting socio-material infrastructures” (Scheinberg et al, 2011). The first step governments have to take is to adopt a more positive stance towards the informal sector and recognize its potential. For large metropolitan cities in developing countries (such as Cairo), the informal sector should be brought into the formal economy for growth and be encouraged to participate in market expansion (Ahmed and Ali, 2004). While the general trend has been to set up PPPs, developing countries have the chance to link government, the informal sector and international organizations, where there is vertical integration of SWM activities between informal small-scale actors, formal industrial-scale actors and the public sector (Ahmed and Ali, 2004).

The interventions that create these partnerships should be designed with four aspects in mind, according to Nas and Jaffe (2003), which will determine their success: a) the level of organization of the informal sector, b) the socio-political context and attitude towards the informal sector, c) socio-cultural differentiation by social class or ethnicity, and d) the appropriateness of modern technology. The type of intervention and the entity responsible for implementing it is also relevant; sometimes a government intervention has the most impact while other times a civil society organization is better positioned to do so (Nas and Jaffe, 2004). Furthermore, in order for partnerships between the formal and informal sectors to be sustainable there must to be decent incentive for both parties to enter into it, as beneficiaries of the status quo are likely to resist change (Ahmed and Ali, 2004). Weak institutional, financial and legal framework present barriers such as lack of transparency, contract enforcement, fairness and accountability – this may present a need for an independent entity to organize and facilitate these partnerships (Ahmed and Ali, 2004). SWM agencies are still a nascent feature of developing
countries. This new form of governance is necessary to effecting successful SWM partnerships (Ahmed and Ali, 2004), and it’s through these partnerships that the informal sector is able to scale its operations, keeping pace with rapid urbanization as well as suburbanization (Nas and Jaffe, 2004). While the effectiveness and efficiency of service delivery improves, these partnerships help the informal actor make an organic transition into the formal sector, leading to a more sustainable urban waste management system.

3.5 Informal Cairo

At first glance, Cairo looks like a chaotic mess of a metropolis. It is a city of immense size, with a diverse population, and full of contradictions. It can be a harsh place, for both residents and visitors, with its notorious pollution and overcrowding. It can also be a place of hope and celebration, as its people have shown in the face of insurmountable circumstances time and time again. A closer look at Cairo reveals a method to this chaos. This section is intended to give some background on the informal side of Cairo, how informality is fundamentally embedded in it, and the hazy demarcation between formal and informal.

A bird’s eye view of Cairo quickly reveals clear lines differentiating neighborhoods that have been planned out and neighborhoods that seem to have sprung out randomly and chaotically. This phenomenon of so-called unplanned areas in and around planned parts of the city is a major characteristic of modern Cairo (UN-Habitat, 2010; Sims, 2010). Otherwise known as informal areas or settlements, they are best defined as areas that are ‘the result of an extralegal urban development processes that first appeared around 1950, and exhibit a complete lack of urban planning or building control’ (Sims, 2010). They are a direct result of the government’s failure to provide adequate, affordable housing for the city’s residents, who have taken it upon themselves to build their own homes, either legally or semi-legally, on state-owned or privately-owned, agricultural or desert lands (Kipper, 2009). As of 2009, out of the 17 million-strong population of Greater Cairo, which includes Giza and parts of Qalyubeya, an estimated 11 million reside in these areas – roughly two thirds of the city’s population (Sejourne, 2009; Sims, 2010). To give this number spatial context and to illustrate how densely populated they are, according to Sims (2010), informal areas, housing around 64% of the population, only make up
39% of the city’s surface area (and only 17% if it included newly developed desert towns such as 6th of October and New Cairo).

Although they have been around for decades, they seem to have come to attention recently, partly because they have become increasingly visible. The general public views them negatively as areas that are unclean, rife with crime and poverty (Sims, 2010). However, residents contest that view, claiming that it is not as dangerous as public opinion holds. While admitting that the areas are built in dangerous environments in an absence of proper building codes and traffic laws, when it comes to crime and drug use, they are not that different from other formal areas of the similar social levels (Gerlach, 2009b). Due to the social stigma they suffer, the communities within informal areas have managed to knit a tight social network (Gerlach, 2009a). They exhibit a significant level of participation inside these communities where services such as garbage collection, street lighting, cleaning and public landscaping are performed relatively successfully in narrow residential streets, which also restrict access to outsiders, thus creating a sense of ownership and safety (Shehayeb, 2009). However, this resident participation clearly evaporates towards the outer limits of these areas, especially towards main streets, which are considered more public, and therefore fall under the government’s responsibility. This is where the lines between formal and informal blur, which manifests in piles of garbage, poor street lighting and poor street conditions (Shehayeb, 2009). The residents’ sense of ownership fades towards these limits, which remain outside the formal infrastructure network and thus creates a vacuum that is neither filled by the residents nor the government.

However, there has been a gradual recognition of these areas on an official level, which is evidenced by the government playing catch up with the extension of municipal services to these areas, especially during the 1970s and 1980s. As informal areas grow, their residents are able, through strength in numbers, put pressure on the government to extend basic services to them such as metered electricity, followed by access to potable water, and eventually sewers (Sims, 2010). However, because these areas continue to become more densely populated, these services have become overburdened, which results in drops in voltage and water pressure, eventually leading to complete power and water cuts (Sims, 2010). Waste collection in particular in these areas has gotten worse, and not only due to higher population growth. After the government decided to enter the waste management sector during the 1990s, followed by the wave of privatization during the 2000s (Fahmi, 2005), the door-to-door collection system which residents
relied on and were satisfied with was replaced by an insufficient street container system (Gado, 2009). The containers were only placed on near main streets and were irregularly emptied by private company trucks, resulting in a ‘sea of accumulated garbage’ around them (Sims, 2010).

Not only has the formal city failed to absorb its surging population physically, but economically as well. Government policy has fallen short of creating enough jobs for the city’s residents as it has with housing, which has led to the creation of a vibrant and significant formal economy. Informal enterprises, which operate outside the legal and regulatory framework, are typically small in size, employing one to a few people at a time (Chen, 2006; Sims, 2010). They are essentially entrepreneurial ventures borne out of necessity, to generate income for families that have found limited opportunity in the city’s formal economy. There are no official numbers for the size of the workforce in the informal economy because it is very hard to gauge, but some estimates claim that 25% to 40% of workers in Greater Cairo are informally employed (Sims, 2010). As such, informal areas are home to such enterprises, for several reasons. Besides proximity to residence, the high-density of these areas provides a sizable market and creates business opportunities, which in turn makes them more attractive to live in, despite the fact the quality of basic services continue to suffer from government neglect (Sims, 2010). And while there are advantages to operating an enterprise informally, such as not paying taxes, working flexible hours, minimal working capital and expenditure requirements, there is little job security, working conditions are usually very poor and there is little to no access to formal sources of finance (Sims, 2010).

3.6 The Zabbaleen

One sector that is particularly unique is the informal waste collection and recycling system that remains a core part of the city’s waste management until this day. It’s unique because its services transcend informal and formal demarcations in the sense that it provides an important infrastructure service for the entire city. This sector, or community, is known as the Zabbaleen, which means waste pickers, has been the subject of much research on informal waste management, and has been applauded globally for its efficiency and entrepreneurial savvy in the face of harsh circumstances and social alienation. They have historically remained on the fringes of national waste management policy, which has endangered their livelihoods and threatened the
sustainability of the entire waste management system. Fortunately, the most recent policy directive taken by the government does acknowledge their importance and it is the topic on which this thesis hinges.

This section is intended to give a brief history about this community to understand how this sector came about. About 100 years ago, a group of migrants from the Dakhla oasis in the western desert, known as the wahiya, moved to Cairo and took it upon themselves to collect and dispose of household waste (Fahmi and Sutton, 2005). They were later joined by another group of migrants from Assiut, Upper Egypt, which later became known as the zabbaleen. They were initially known for pig breeding but then developed into garbage collectors and recyclers living on the city’s fringes, both physically and economically (Fahmi and Sutton, 2005). It is important to draw a distinction between the wahiya and the zabbaleen. The former were in control of the sources of waste, the households, which the latter bought and sorted into organic and non-organic materials. The organic component was used for pig breeding, which were later sold onto big tourist hotels and thus provided a decent source of income. The non-organic component was sorted into all types of recyclable materials and sold to middlemen (Fahmi and Sutton, 2005). This basic chain from household to wahiya to zabbaleen made up the informal, albeit only, waste management system in the city of Cairo until the 1980s, with an estimated total of 90,000 workers involved in the sector (UN-Habitat, 2010). They are scattered over seven communities in the Greater Cairo Region, which include Ein El Sira; Moatamadia; El Baragil; Tora; Ezbet El Nakhl; Helwan; and, largest of them all, Manshiet Nasser at the foot of the Muqattam plateau. The zabbaleen community in Manshiet Nasser is said to account for at least half of the entire workforce involved in Cairo’s informal waste sector (Fahmi and Sutton, 2005).

The zabbaleen of Manshiet Nasser became the focus of a World Bank program known as the Zabbaleen Environmental Development Program (ZEDP), which started in 1981 and lasted for 10 years (Fahmi and Sutton, 2005). This created awareness of the community’s problems and mobilized several actors to its aid. In 1984, the Association for the Protection of the Environment (APE) was created to integrate health, educational, recycling, training and business services for the community. Furthermore the Environmental Protection Company (EPC) was formed in 1989, a joint agreement between the wahiya and the zabbaleen, which was contracted with waste collection in several parts of the city, while the municipality attended to other areas. These were
crucial steps to establishing the informal sector as a key participant in the city’s plans to upgrade the waste management system (Fahmi and Sutton, 2005).

Despite significant improvements to their living conditions and better access to finance during that period, they were still unable to keep up with city’s rapid urbanization and accelerating population growth. Towards the end of the 1980s, the demand for waste collection began to exceed the zabbaleen’s capacity as the rate at which waste generated was quicker than its collection (UN-Habitat, 2010). The early 1990s saw the municipality become more involved in the urban waste management system. It had started imposing regulations on the informal sector such as requirements to use more ‘modern’ forms of transporting waste around the city i.e. trucks instead of donkey carts (Fahmi and Sutton, 2005). Without any financial, educational or technical assistance, the zabbaleen were forced to acquire the capital required to comply with new regulations, usually through selling land back home, credit loans and personal savings (Fahmi and Sutton, 2005).

However, it was not long before this arrangement fell short of the city’s growing demands, and after several failed attempts to force the zabbaleen to expand and modernize, by the 2000s the government decided to privatize the sector by tendering to international companies (UN-Habitat, 2010). The government’s continued negative view of the sector as primitive and lacking in modern technology, its preference for capital-intensive mechanization, and its unwillingness to subsidize transfer of technology to it, left it squeezed. This created an opportunity for multinational corporations to enter the sector, threatening the socio-economic sustainability of the zabbaleen community (Fahmi and Sutton, 2005). Licenses to operate were redacted by the municipalities and collection routes were handed over to the new formal private companies. However, the zabbaleen have managed to survive in the face of such intense competition, and until 2009, were estimated to deal with one third of Cairo’s daily 15,000 metric tons of municipal waste, 50 to 60 percent of which was organic, and 80 percent of which was recycled (compared the 20 percent requirement for formal private companies). They typically served wealthier areas of the city where a) waste was more valuable, as opposed to poorer neighborhoods and quickly expanding informal areas where waste was routinely burned and left to decompose, and b) formal private companies were not operating adequately by covering main streets only (UN-Habitat, 2010). The situation became more complicated when the H1N1 ‘swine flu’ pandemic scare saw the government order the slaughter of around 190,000 to 300,000 pigs across the
country in April 2009 (Fahmi and Sutton, 2010). This rendered organic waste void of any economic value to the zabbaleen because there were no pigs left to breed and sell, reducing their income even further.

The privatization of the waste management sector, which saw the end of door-to-door collection and the introduction of the street container system, and the pig slaughter, which has left organic waste uncollected in the streets, has aggravated the waste accumulation problem in Cairo. The effects of these policies on the zabbaleen’s system, and thus the sustainability of Cairo’s waste management system as a whole, are analyzed in depth in Chapter 4.
4. Analysis Of The Current SWM Framework

This chapter aims to explain the sector’s current framework on a national level, how it came about, the policies undertaken thus far, and the resulting legislative, institutional, implementation, financial and regulatory frameworks that govern it. The data provided in this chapter was gathered from several reports and studies, which were generously provided by government officials and private sector consultants during the interview process.

4.1 MSW Generation in Greater Cairo Region

The population of Egypt, just over 88 million people as of March 2015 according to CAPMAS, almost entirely live in three major regions in the country: Cairo, Alexandria, and the Nile delta; throughout the Nile valley; and along the Suez canal. The Greater Cairo Region (GCR) is spatially distributed over three governorates: Cairo, Giza, and Qalyubeya. Its jurisdiction contains the cities of Cairo, Giza, Shubra el Kheima, as well as several other small towns, villages, suburban and agricultural areas as shown in Figure 2, with population estimates close to 20 million people (Iskandar et al, 2010). It is riddled by typical urban problems faced by other developing mega-cities around the world: inadequate public transit, drainage and sewage, public spaces and, last but not least, solid waste management (Iskandar et al, 2010). The informal waste sector is congruent with informal settlements.  

Figure 2 Map of Greater Cairo Region, showing informal garbage collector settlements (Didero, 2012)
as shown in Figure 2, which shows the informal garbage collector settlements in GCR.

According to the most recent data collected by EEAA in 2007, an estimated 16 million tons of municipal solid waste (MSW) were generated in Egypt in 2006, with an estimated annual growth rate of 3.4% (NSWMP, 2011). Based on these numbers an estimated 22 million tons of MSW will be generated at a national level in 2015. Based on data collected in 2012, Cairo, Giza and Qalyubeya alone generated a total of 23 thousand tons of MSW, which meant a total of 8.4 million tons for that year, accounting for 43% of total MSW generation in the country (MSEA, 2013). Table 1 shows the estimates for 2015 for the three governorates extrapolated from the data acquired, assuming the same annual growth rate and the proportions remain the same. Also, at the risk of oversimplification, it is assumed that 100% of the MSW generated at each governorate’s level contributes to the GCR’s total.

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<td>Cairo</td>
<td>16,583</td>
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<td>Giza</td>
<td>4,975</td>
<td>1,815,796</td>
<td>8%</td>
</tr>
<tr>
<td>Qalyubeya</td>
<td>3,869</td>
<td>1,412,286</td>
<td>7%</td>
</tr>
<tr>
<td>Greater Cairo</td>
<td>25,427</td>
<td>9,280,734</td>
<td>43%</td>
</tr>
</tbody>
</table>

Currently, the formal sector is responsible for collecting and disposing 80% of total waste generated in Cairo, while semi-formally subcontracting the informal sector to handle 15% of it. The informal sector handles the remaining 20% in addition to this 15%, i.e. effectively handling 35% of total waste generated. It is also estimated that around 30% of total waste generated is left uncollected and that only a fraction of this is treated and disposed in facilities with a less than satisfactory level of environmental standards, which means the formal sector effectively handles only 35% of total waste generated. The remainder however is openly dumped, burnt, on open land as well as along waterways, roads, railroads and so on (Iskandar et al, 2010; NSWMP, 2011).

There are obvious environmental threats posed by improper SWM such as surface and groundwater contamination, air pollution, proliferation of disease vectors and overall degradation of the environment. This signaled a need for a National Solid Waste Management Program...
(NSWMP) back in the year 2000 to address the environmental problems caused by the increasing amounts of uncollected and untreated waste. However, it was not properly implemented due to a dysfunctional institutional set up that could not support, guide and monitor implementation (NSWMP, 2011). Moreover, the stress on private sector participation whilst ignoring the already active informal sector meant the overall waste cycle was disrupted. Overall recycling rates went down and increased landfilling brought the cost of the entire waste management system up. The policy was revived in 2009 by the establishment of an inter-ministerial committee, which was charged with preparing a proposal for the future institutional arrangements to govern the national waste management sector (NSWMP, 2011). The main outcome of this process resulted in an agreement between all stakeholders that a national solid waste management entity needs to be established with the responsibility of setting policy, legislation, strategy, technological standards, as well as contracting and financing SWM activity. This proposal also, for the very first time, explicitly stated that informal sector integration is a key element of the proposed system.

First, it is important to analyze the current framework that governs the solid waste management sector, the problems with it, in order to understand how the newly proposed policy framework came about and assess whether it addresses current problems.

### 4.2 Policy Framework

Egypt has historically lagged behind in setting SWM policy at a national level. There is no published policy in the sense that establishes institutions, drives investments and sets regulation and performance standards. This lack of clear policy direction has had considerable socioeconomic impact, due to the untapped potential of this economic sector, which has the potential to grow and employ thousands of people of varying skill-levels and ages.

As previously mentioned, the government only started recognizing a need for such a policy recently, when the waste crisis started causing considerable environmental hazards and threatening public health. The Egyptian Environmental Policy Program (EEPP) that was undertaken between 1999 and 2002 was to support policy, institutionalization and regulation for the environmental sector as a whole. This included improving the performance of the SWM sector through strategic planning, public awareness and private sector participation. This gave
birth to the first iteration of such policy in June 2000, which was called the National Strategy for Integrated Solid Waste Management, and was set by the Central Department of Waste and Material and Hazardous Substances (CDWMHS) at the EEAA (NSWMP, 2011; MSEA, 2013). This strategy fell short of achieving its objectives due to an inefficient institutional set up that hindered implementation, despite some gallant yet scattered initiatives and efforts, which eventually led to the privatization of the sector in 2003. Most importantly, it failed to acknowledge the existence of the informal sector, let alone devise a specific policy directive for it.

4.3 Legislative Framework

Until this date, there has never been a unified law that governs the national SWM sector. Despite recognizing a need for clear policy direction, there had been remarkably little realization of the need to establish a unified and specific law in the last decade. The following is a summary of the laws that currently govern some aspects of the sector:

**Law No. 38 of 1967 regarding Public Cleanliness**

This is one of the most important laws regarding SWM and public cleanliness in the country as it was passed to protect public health, preserve city aesthetics and prevent outbreaks of fires caused by burning of waste. This law prohibits the disposal of waste in areas other than those allocated for that specific purpose by the local councils. It includes details about waste collection, transportation (such as specification for trucks, containers, etc.), regulations and specifications for dumpsites, as well as defining responsibilities for local authorities, citizens, shop owners and contractors regarding waste handling, collection, treatment and disposal. This law was clearly focused on the aesthetic element, and fell short of introducing any integrated waste management principles, let alone any recognition of the informal sector’s role in the system.

**Law No. 48 of 1984 regarding Protection of Water Resources**

This law was passed specifically to ensure the protection of Egypt’s freshwater resources, mainly the Nile River, from pollution. The law prohibits any waste handling, sorting, treatment or disposal near or along the waterways, unless with a special license from the Ministry of Water
Resources and Irrigation. Establishments on the river such residential, touristic or commercial boats are responsible for the waste they generate and are strictly prohibited from discharging anything into the river.

**Law No. 4 of 1994 regarding the Environment**

This law is the most recent of Egyptian legislature to govern SWM and is the single most important environmental law passed until date. As for the articles pertaining to SWM, the law emphasizes that treatment of waste must occur only at the designated areas far from any residential, agricultural and industrial areas. It sets requirements for incinerators, such as daily capacity and technology, and specifies their locations, such as distance from residential areas. The responsibilities of waste collectors are also set such as requirements for the use of trucks, street containers and frequency of collection. Law 9/2009 amends this law by prohibiting open burning of garbage and solid waste. Again, this law does not necessarily introduce any ISWM concepts, remains focused on ‘proper’ disposal of waste, without considering the possibility of integrating informal recycling activities into the waste management system.

**Law No. 10 of 2005 regarding Public Cleanliness**

This law amended provisions of Law 38/1967 regarding public cleanliness, replacing two of its original articles, to define appropriate monthly, waste collection fees for households. This is the law that controversially added the ‘cleansing fee’ to the electricity bill.

Additional legislation governing SWM include:

- Law No. 93 of 1962 prohibiting discharge of waste through the sewage system.
- Law No. 280 of 1960 regulates waste from ships and ports, prohibiting its discharge at sea, and designating specific containers for disposal at ports.
- Law No. 84 of 1968 prohibits disposal of waste in the streets.
- Law No. 48 of 1967 describes issues regarding working environment, which applies to waste collectors.

A fragmentation of the legal framework, with different laws, their amendments, relevant articles within irrelevant laws all, governing the sector means it will manifest into a fragmented institutional framework. Legislation is ineffective if not enforced, and it cannot be enforced without a well-coordinated set of institutions.
4.4 Institutional Framework

The fragmentation of the institutional framework mirrors the legislative framework. There has been no single institution established or tasked with the sole responsibility of handling the sector. In practice, the following institutions are involved directly and indirectly managing the sector:

- Ministry of State for Environmental Affairs (MSEA)
- Egyptian Environmental Affairs Agency (EEAA)
- Ministry of State of Urban Renewal and Informal Settlements (MURIS)
- Ministry of State for Local Development (MoLD)
- Ministry of Water Resources and Irrigation (MWRI)
- Industrial Development Authority (IDA)
- Ministry of Agriculture and Land Reclamation
- Ministry of Health and Population
- Ministry of Finance
- Ministry of Investment

The fact that there are so many entities involved in the sector means there are clear cooperation and coordination problems as well as unclear accountability and jurisdictions. To make matters more complicated, the MURIS, formed in 2014 part of a cabinet reshuffle and headed by the former minister of MSEA, has also become involved in the solid waste management sector. This ministry was created to encompass the Informal Settlements Development Fund (ISDF) and added waste management in poor and informal neighborhoods to its mandate. However, it seems that MURIS is involved in waste management decisions beyond its official scope, probably due to the fact that its current minister has not ceased involvement in projects that were initiated under MSEA. This undoubtedly compounds the problem of institutional fragmentation.

The central government is responsible for setting the overall national policy, the legislative and institutional frameworks while supposedly empowering local governments to implement the plans that are set. In the case of SWM, the MSEA spearheads policymaking, but still needs the approval of the more powerful ministries mentioned above, or, at the very least, their
cooperation. For example, if the Ministry of Finance does not allocate the necessary budget to carry out a national SWM program, the implementation will face financial constraints, which usually ends up affecting the more marginalized governorates. The EEAA is an executive agency under the MSEA, and its main responsibility is to ensure that Law No. 4 of 1994 and its provisions are being implemented properly, such as environmental regulations. It has both the authority and resources to plan and implement programs as well as oversee adherence to regulations. For example, the EEAA is responsible for carrying out Environmental Impact Assessments (EIA) prior to approving a project or granting a license to open a facility for SWM, such as controlled landfills. It also has the power to shut down such facilities and apply fines in the case of violations. Within the EEAA is the CDWMHS, which is responsible for the technical aspect of the system and provides assistance for local governments. Furthermore, the General Secretariat for Local Administration under MoLD, also known as AMANA, used to provide financial assistance to local governments to develop SWM facilities, mainly composting plants. Sixty such plants have been built around the country, with the majority of them non-operational or operating at a low level of efficiency, mainly due to intense labor requirements and low profitability (NSWMP, 2011).

The local government is responsible for setting local strategies and plans, selecting and assigning sites for SWM facilities, as well as contracting, supervising and monitoring operations of the private sector, making sure that laws and regulations are enforced. It is also responsible for raising local public awareness and capacity building. Unfortunately, the institutional framework on the local level suffers from the same inefficiencies observed on the national level. Most local governments do not have a department dedicated for solid waste management, and usually lack the technical and organizational capacity to provide adequate service. For the Cairo and Giza governorates, however, two special agencies were established: the Cairo Cleansing and Beautification Agency (CCBA) and the Giza Cleansing Beautification Agency (GCBA). These local agencies are tasked with providing solid waste collection services and street sweeping as well as supervising disposal at open dumps and ‘controlled’ landfills. In addition, they are responsible for keeping street containers clean and protecting them from theft. They also operate transfer stations where small trucks collecting waste from surrounding neighborhoods bring it to be taken by larger trucks to landfills outside the city. This collection and transfer service is either fully privatized and contracted to formal private sector companies in certain neighborhoods, or
operated by the agency, which directly employs licensed traditional waste collectors (Iskandar et al., 2010; NSWMP, 2011). These traditional waste collectors come from the informal sector, the *zabbaleen*, who are already active in door-to-door collection, sorting, transporting and recycling waste materials. They are actually responsible for most of the recycling that is done while the formal private sector is responsible for most of the composting activity. There are also non-governmental organizations involved around the city, serving certain neighborhoods, also involved in door-to-door collection and recycling. These NGOs typically advocate for the informal sector and sometimes employ traditional waste workers with the aim of keeping their immediate environment clean. However, with the increasing competition for waste across the city, these NGOs have expanded collection to cover areas outside their neighborhoods.

Any residual waste is taken to controlled dumpsites operated by the formal private sector or directly by the authorities. These dumpsites or landfills also attract informal waste workers to sort and pick what they deem valuable to take back to their informal recycling micro-enterprises.

It is noteworthy to mention that despite the increased competition for waste in the city, and the country, there has been a noted increase in the number of non-traditional informal waste collectors (outside the *zabbaleen*) who have resorted to this activity as a source of livelihood due to increasingly dire economic conditions.

### 4.5 Financial Framework

Despite limited information on the financial cost of waste management in the country, the CCBA and GCBA have established cost centers specifically for the service. It is estimated that it costs around 125 Egyptian pounds per ton of waste managed (collection to disposal). This does not account for the cost of resource recovery and recycling performed by the informal sector (Iskandar et al., 2010).

There are two ways in which waste management is paid for in the city. The agencies transfer the cost of their services to residents by collecting a ‘cleansing fee’ that was controversially added to the electric bill through Law 10/2005. The fees range from 1 to 10 pounds per household per month, depending on the neighborhood. While the fees are not tied to consumption of electricity, using electricity bills as a vehicle for fee collection means that failure to pay the full amount risks cutoff from power. This means that residents are forced to pay for a
service even if they do not want it or, at the very least, are not satisfied with it. The informal waste collector on the other hand collects a cash payment at the door as a result of an ‘ad hoc’ arrangement (NSWMP, 2011). While residents are generally satisfied to pay the informal worker his fee for the reliable door-to-door collection he performs, there are instances in which the residents end up paying twice for the service; once to the worker, and then again to the agency through the electricity bill.

The fees collected by the agencies are used to either finance their self-run SWM operation in specific neighborhood or for contracting formal private sector companies. Another source of revenue for the agencies are penalties collected due to violations as stipulated in Law 38/1967. As for the informal sector, whatever fees are collected usually cover a fraction of its costs, which includes the transfer of non-recyclables to treatment and disposal facilities, and the sector mainly depends on its sorting and recycling activities for revenue. Financing the overall formal system remains a challenge nationwide, with an estimated 35% funding gap in cost recovery (Sweepnet, 2010). However, the CCBA and GCBA are legally entitled to receive direct subsidies from the Ministry of Finance for SWM activities (NSWMP, 2011).

4.6 The Formal Waste Sector

The formal waste management sector in Greater Cairo comprises mainly of the following players:

a) Municipal authorities, such as the specially created CCBA and GCBA, are legally responsible for providing waste collection and disposal services. Disposal is mostly carried out in poorly managed dumpsites.

b) Collection and transfer services are contracted to formal private companies through tendering, while traditional waste workers obtain a license. The informal sector, which contains hundreds of micro-small-medium enterprises (MSMEs), also enters into agreements with the relevant agency. The collection routes are split accordingly with harsh penalties imposed when going beyond the licensed route.

c) NGOs, which perform collection, sorting and recycling in some neighborhoods. These community initiatives usually start out in underserved low-income areas, and informal areas, which get no service at all. They rely more on community participation and charity
to sustain their operations. They can employ traditional waste workers as well that used to operate in the same area but were initially muscled out by the private multinationals, which subsequently left a gap in the service once more.

d) The central government, which sets the institutional and legal frameworks for the sector as well as empowering municipalities through capacity building and budget allocation.

Post-2000, the government embarked on a campaign to bolster private sector participation in the sector under the National Strategy for ISWM, starting with Alexandria then moving onto Cairo and Giza. PPPs were the worldwide trend and it was a classic case of adopting a Western model for development in a developing country. International private companies were contracted to perform street cleaning, municipal waste collection and transfer, operation of composting plants, and operation of sanitary landfills. Although privatization was a core component of the strategy at the time, it was one policy directive out of five. The remaining directives addressed the following: strengthening the supportive capacity of the central government; implementing the polluter-pay mechanism; waste valorization; and enhancing public awareness and community participation (Iskandar et al, 2010). Unfortunately, the government failed to adequately focus on these directives, which are central to the concept of ISWM because it was overly concerned with the aesthetic component of waste management. Failure to visualize the entire system and linkages to the wider economy, society and environment meant that the sustainability of the entire system was compromised.

**Waste Cycle**

Starting at the source of municipal solid waste, the current system does not require generators to segregate their waste into organic and non-organic components. It occurs at a bare minimum through informal agreements between commercial generators and traditional waste collectors. Attempts to encourage household source segregation have largely failed. Collection has been almost entirely privatized in Greater Cairo since 2003. According MSEA (2013), Cairo is currently split between the AMA Arab Environment Company (Italian), FCC (Spanish) – both of which are monitored by CCBA, and Al-Fostat Company (owned by CCBA). Al-Fostat was created by the CCBA to serve low-income neighborhoods in south of Cairo (such as Sayeda Zeinab, Mokattam, and Dar el Salaam), and typically sub-contract traditional waste workers. Giza is split between the Enviro Master Company, which serves the Haram district (previously
served by FCC), and the International Environment Services (IES) Company, which serves the upper-scale neighborhoods of Agouza and Dokki. They are both monitored by the GCBA. As for Qalyubeya, no privatization process has taken place, except in Shubra el-Kheima, which is counted as part of northwest Cairo. There are private contractors working in more specific areas such as Misr Service Company in El-Marg, Europe 2000 in Maadi and Torra, and Ertecaa in Manshiet Nasser. Official waste collection coverage estimates in Cairo, Giza and Qalyubeya range from 60% to 70% (MSEA, 2013). The remainder is openly dumped in streets and beyond formal collection routes. This is typical of underserved neighborhoods, especially informal areas, which are not even adequately served by the informal waste sector due to the low economic value of their waste.

Waste is mostly collected from neighborhoods and transferred to nearby collection stations. These stations serve as nodes scattered within the city and from them, bigger trucks transport the waste to sorting and composting facilities on the cities fringes. These collection stations and the facilities are either privately operated or directly operated by the CCBA or GCBA. Non-organic recyclables are mostly sold to waste traders while the organic waste is turned into compost and sold as fertilizer. Private companies are legally required to recover 20% of the waste they collect, which means around 80% is dumped into landfills. There is insufficient data on how much of the organic component is actually composted (usually accounts for 60% of total waste collected) but composting facilities seem to be operating at less than nominal capacity with efficiency rates ranging from 45% to 75% (MSEA, 2013). As for landfilling, what is actually legally dumped is considered less than the official figures, as there have been reports of private sector companies illegally dumping in sites closer or within the city in order to save on transportation costs (Iskandar et al, 2010).
Until 2003, waste management service provision was either carried out by the CCBA and GCBA, or the informal waste sector. While the informal sector’s methods were efficient in their own right, it focused on high and middle-income neighborhoods where waste generated was of much higher economic value. By 2003, the informal areas around Greater Cairo had multiplied and thus these low-income neighborhoods were typically underserved by both the informal sector and the municipal agencies, due to capacity constraints and economic unfeasibility. The introduction of private sector multinationals contracted by the agencies meant that low-income areas would be better served. However, the reality is that due to contractual complications and strained municipal budgets meant that these multinationals would pull out of certain areas around Cairo, leaving the waste problem worse than it was before 2003.

Another challenge for these companies was the inability to operate in low-income high-density neighborhoods with their modern collection trucks and containers, which had effectively replaced the highly efficient traditional door-to-door collection system (Fahmi and Sutton, 2010). While modern methods provide a much safer and sanitary working environment for waste workers, this over-mechanization eventually proved counter-productive and the companies had to rely on subcontracting informal workers for collection in a semi-formal arrangement. This
semi-formal arrangement necessitated the need for a license middleman as informal waste collectors were unregistered, which led to their exploitation in terms of labor rights and proper compensation. On the other hand, informal waste collectors in this arrangement were uninterested in being a mere collection crew, and used their access to formal private sector collection routes to acquire valuable recyclable waste for their own economic gain. This system also resulted in citizens having to pay twice for the service, once voluntarily to the traditional waste collector and another by force through the electricity bill.

Furthermore, vague contractual agreements between the municipal agencies and the private multinationals meant standards of service were ill-defined and environmental standards were not properly enforced. The recycling quota of 20% was significantly lower than the 80% rate achieved through waste valorization by the informal sector. This institutionalized sanitary landfills, which is expensive to operate and maintain, and due to slack regulation enforcement, inadequate data collection and monitoring by the municipal agencies and the EEAA’s EIA process, exhibited variable levels of environmental protection. This not only brought the overall economic cost of the waste management system up, but environmentally as well. As for the socio-economic impact on the informal collection and recycling sector, the zabbaleen, the loss of livelihood has been detrimental.

### 4.7 The Informal Waste Sector

The informal waste sector has existed in Greater Cairo for over 60 years now. It is mainly comprised of hundreds of family-owned MSMEs involved in collecting, sorting and recycling waste. These families are commonly known as the zabbaleen, and this name is sometimes used to refer to the entire informal sector. It is important to understand the different informal waste actors and their roles. The following typology is adopted from a 2006 study (Iskandar et al, 2010):

- Itinerant waste buyers, roamers, or sarriha, are traders who move around buying or collecting any kind of reusable or recyclable material, mostly door-to-door. The material can already be segregated at the source in the case of commercial establishments. They either buy, if the means are available (personal savings, borrowing from a middleman, etc.), or collect recyclables from households,
commercial establishments, streets and dumps. Those involved in specifically repurposing items such as clothes and old appliances are known as robabekkia.

- Middlemen, or ma’alleeen, are intermediaries who either rent or own small-scale depots and hire sarriha under them.
- Wholesalers, or toggar, are large-scale dealers who typically own large warehouses and specialize in a single type of recyclable.
- Recycling MSMEs are where the materials are taken to be processed into final recycled products such as plastic hangers, or manufactured into intermediate materials for further recycling activities (such as shredding or pelletizing of plastics).
- Pickers/scavengers dig through street dumpsters for recyclable material. After door-to-door collection was replaced with the street container system, waste was effectively left in the public domain prior to collection by company trucks, and this attracted droves of pickers from outside the organized informal system. This negatively affected both the zabbaleen as well as the private companies.

**Waste Cycle**

The whole informal waste cycle works based on the concept of waste valorization. This idea of taking accumulated waste and processing it to add economic value to it is how it moves from one step to the next. Assuming that enough waste is collected, the cycle sustains itself. The informal sector tends to collect waste from neighborhoods that have higher-than-average income levels due to the high content of recyclables in the waste generated there (which is not typically the case in other developing countries as highlighted in the literature review). The organic component was used for the breeding of pigs, which were then sold on to the local Christian community and touristic hotels for decent income. They are active all over Greater Cairo, perform door-to-door collection once every day or two, and get paid a small fee (1-5 pounds per month) directly by the household or commercial establishment. Collection routes are licensed by the CCBA or GCBA and typically serve around 1,000 households (Iskandar et al, 2010).

It is estimated that 80% of the total waste collected by the informal sector is recovered, making it one of the most efficient models of waste management in the world, and is the source of livelihood for around 50,000 people in Greater Cairo (Iskandar et al, 2010; Fahmi and Sutton, 2010). The sector performs numerous waste-related services such as collection, transportation,
sorting, processing, trading and manufacturing of recycled products. Collection is a major aspect of the informal sector and while it is primarily done door-to-door, it recently extended to scavenging from bins, dumpsters, other public spaces and landfills. Another major aspect of the informal sector is the recovery and recycling stage, which involves thousands of informal micro-enterprises specializing in one type of recyclable or the other. These enterprises are usually located within informal areas within the city, the biggest and most famous of which is Manshiet Nasser in Mukattam. This is where waste collected from around the city gets sorted into organic, which is fed to pigs or other animals, and non-organic, which is further sorted into recyclables. Needless to say, any waste generated within these informal areas that house informal waste operations is automatically dealt with. As for other low-income and informal areas that do not, the waste is usually dumped towards main roads and fringes, or any area that the residents feel they no longer own i.e. no longer their problem but the government’s. There is very little happening in terms of composting and animal feeding in these areas, and most of the waste is openly burned.

Challenges and Impacts

While the informal sector brings a number of advantages to the overall urban waste management it is not without its challenges. The general public view of the sector has been negative. Government has always seen the informal waste sector as primitive and unhygienic, which is true to some extent. The workers are exposed to health hazards from sorting through waste manually and have generally resisted using protective gear such as gloves and masks. The
informal sector has also generally been hostile towards government initiatives to integrate and have resisted formalization because they see these as attempts by the taxman to dip into large untold profits generated outside the formal economy.

However, the informal waste sector has clear positive socioeconomic impacts. It is labor intensive and therefore generates employment for thousands of the urban poor population. The sector has displayed resilience with quick responsiveness to market needs and the recycling industry now transcends the boundaries of Greater Cairo. Recyclable materials come in from as far as Alexandria, cities in Upper Egypt and the Suez canal cities to be processed at the numerous factories that make up what can be considered an industrial hub inside the zabaleen community in Manshiet Nasser. Over the years, the zabaleen have invested their own money into upgrading the technology they use, tweaking their products to suit market demand, built stronger houses, put their children through good education (some even traveling abroad for their education) and even expanded into export markets.

The informal sector’s business model proved efficient in its own right. This entrepreneurship was borne out of necessity in increasingly difficult economic conditions within Greater Cairo. This ultimately meant that a vital public service, considered the local government’s responsibility, was provided in large by the informal sector at no cost to this local government. In fact, informal waste collectors were charged by the CCBA and GCBA for a license to collect in certain areas and it was still economically feasible to do so. After the government decided to privatize the sector, these collection route licenses were not renewed for the informal sector and given to the multinationals in 2003. This meant the informal sector was muscled out of the middle- and high-income neighborhoods it depended on for high quality waste. Lower quality waste as well as lower amounts of overall waste collected meant that very little economic value was recovered. This made the informal business model less profitable, negatively affecting the livelihoods of thousands. To make matters worse, the H1N1 swine flu scare of 2009 meant that there was a nationwide pig slaughter. This rendered 60% of the waste generated economically worthless to the informal sector, which was left uncollected in the streets to rot. In more severe cases, some informal recycling MSMEs found it economically unfeasible to sort and collect non-organic MSW after losing their pigs (Fahmi and Sutton, 2010). It is rumored that pig breeding is discreetly making a comeback.
Such decisions increased the informal sector’s mistrust in the government. Despite privatization, the informal sector managed to survive by being sub-contracted for collection of MSW, which the new ‘modern’ formal private sector companies found difficult to do. The informal sector used their new semi-formal position to orchestrate several strikes and protests against the government’s exclusionary policies, further aggravating the waste accumulation problem within the city. One of the more popular strikes occurred in 2009 for three months, when collection was stopped for the majority of Giza in response to the pig slaughter, further aggravating the urban waste problem. This pushed the government to compensate the informal waste workers for their lost pigs (Fahmi and Sutton, 2010).

4.8 The Need for Integration

The case of the zabbaleen communities, the informal waste sector and how they fit into, not just the urban waste management system, but also the overall Greater Cairo community, illustrates a great example of how the three pillars of sustainability interact with each other. Public policy must take a more universal approach. When the Egyptian government set out to solve what was mainly a growing environmental problem, it failed to see the social and economic implications of its proposed solution, not just for the informal sector but the overall community. By focusing on the ‘aesthetic’ part of the problem i.e. the cleaning up of streets from garbage, more important aspects of the waste management system were ignored. Not only did it result in the loss of livelihoods for thousands of urban poor families, but also aggravated the environmental problem it meant to fix, therefore affecting the entire city. Furthermore, low-income and informal areas, which house two-thirds of Greater Cairo’s population on less than a fifth of the land area, remain underserved by both the formal and informal sectors.

Many authors have acknowledged the central role the informal sector plays within urban MSWM systems, and that to achieve sustainability the government must formally recognize this significant role. Some have argued for the need to promote alternatives to PSP models while upgrading the working conditions of the informal sector while others have indicated that the state’s failure to engage the informal sector means that policies to transform the waste management sector will eventually lead to failure (Fahmi and Sutton, 2010). The privatization of the sector focused on collection and disposal, and ignored the recycling activities already
happening. The government spent huge sums of money to contract large multinationals to collect MSW, and to construct and maintain expensive sanitary landfills, with a paltry 20% recycling quota stipulated in their contracts. By diverting waste away from recycling activities and towards disposal, this brings the total financial cost of waste management up. The socioeconomic costs borne by informal recycling entrepreneurs also go up due to less revenue from less recycling activities, and more landfilling means the overall environmental cost goes up.

The government’s policy of waste management privatization had literally been a ‘sweep-it-under-the-rug’ approach. This fixation on the public cleansing part encouraged landfilling. Even though it is expensive to construct, operate and maintain, it is not prohibitively priced. Landfills are either directly operated by the CCBA and GCBA, or sub-contracted to the formal private sector, with no system of cost-recovery in place. This is the result of the government’s continued belief that waste management is a net-cost activity, despite the informal sector’s recycling model proving otherwise.

The need to integrate informal recycling activities within the urban waste management framework does not necessarily mean overnight formalization of operations, such as registering companies and paying taxes. It will be crucial to identify a degree of formalization that does not bring up the costs of the informal waste management model. It is important to acknowledge that a major reason of the success of the informal model is that it has low operating costs such as low wages despite its labor intensity. Full formalization will mean the application of minimum wages and other types of social security that could make it economically unfeasible, despite its clear positive social implications. This can be offset by incentives such as tax exemptions and facilitating, even prioritizing, contractual agreements with municipalities over private sector companies, reducing the barrier of entry into the formal economy.

Ultimately, informal recycling activities need to be recognized as a crucial step in the urban waste cycle and policies should work to direct waste generated through these operations prior to disposal, as opposed to skipping it. Collection and recycling should be combined, as carried out by the same entity, because it means a lower overall cost to the beneficiary of the service – if this entity benefits economically from collecting the waste, it will require a lower fee. This encourages frequent door-to-door collection, keeping the streets clean from overfilled dumpsters, which also means less waste makes it to the landfills, having clearly positive environmental impact within the city as well as beyond it, where disposal occurs.
Furthermore, increased efforts to improve the informal sector’s public image and its working conditions, like enforcing more hygienic, aesthetic and healthy methods, will have a positive social impact on workers’ lives.

**Possible Interventions**

In order for integration to be successful and to shift from a linear model of waste management to a more circular system of urban waste management – which focuses more on resource recovery and less on disposal, thus resulting in less overall waste generated - there are a number of key interventions that can take place at each stage of the waste cycle:

1. **At source:** segregation of waste into a minimum of two components - organic and non-organic - should be implemented, especially at the household level, as most commercial waste generators already segregate and sell to recyclers. This will improve the quality, and therefore economic value, of waste generated, incentivizing more frequent door-to-door collection. Source segregation simultaneously increases the quality and quantity of waste. While public awareness campaigns help create this environmentally aware culture over the long-term, financial incentives or punishments should be explored to have an impact in the short-term (Iskandar et al, 2010).

2. **Initial collection:** the organic component represents the bigger portion of waste generated (60%) and needs to be collected more frequently to avoid the problems associated with decomposition. The non-organic portion can be collected less frequently. This necessitates the division of collection trucks and schedules to accommodate source segregation of waste (Iskandar et al, 2010).

3. **Transfer:** There are multiple transfer stations built around the city to act as collection nodes where MSW collected from the source is brought in by small trucks to be unloaded onto larger trucks for transfer to composting stations and landfills. If the waste comes in segregated, it will be easier to transfer to the appropriate destination. Organic waste will go to the composting facilities to be made into high-quality fertilizer while non-organic waste can be transferred to recycling MSMEs for processing.

4. **Processing:** This is the stage where valorization occurs. Composting plants operated by the municipalities or by the formal private sector are currently running at low efficiencies or shut down completely. This is due to the low quality and quantity of
organic waste that finally makes it way to these plants. Source segregation would help increase both quality and quantity of organic waste collected because it is not mixed with dry inorganic material. There can be a completely separate and more frequent collection schedule for organic waste before it decomposes at the source. This means better quality fertilizer is produced, which translates into more revenues and a more financially sustainable model for these plants. As for the non-organic component, again source segregation here plays a part. The non-organic waste is easier to sort and clean when it is not mixed with organic waste, making the process more efficient and dignified for the waste working involved in this stage. As the recycling stage is primarily carried out by the informal sector, one way to ensure quality control of the final products or materials they produce and sell upstream is to impose regulations on their clients in the formal sector. By imposing these regulations, clients are forced to buy a certain grade of recycled goods, creating downward pressure on informal recycling MSMEs to improve the quality of their products.

5. **Disposal**: This is where ‘entropy’ from this circular system ends up. Waste that is absolutely void of value that can be recovered can either be landfilled or incinerated. Depending on the calorie count of this waste, it can be turned into refuse-derived fuel (RDF) and burnt for energy. More importantly, landfilling should be priced in a way that discourages it and encourages waste management companies to divert waste into recycling activities, leaving disposal as a last resort (Scheinberg, 2012).

As illustrated in the steps above, the successful integration of informal waste recycling activities into the formal waste cycle hinges on three main factors: source segregation and priced disposal. However, this still does not entirely solve the problem of underserved areas with typically less valuable waste. The system explained above is built on the concept of waste valorization. Although source segregation does help bring up the overall value of MSW generated, in low-income and informal neighborhoods this still might not be enough. The solution would have to be one that specifically targets these areas and makes their waste attractive enough. While subsidization of waste service provision can attract service providers to these areas, it is not a sustainable model over the long-term. A more sustainable solution would be to localize the crucial first steps of waste management through entrepreneurial ventures. By setting up enterprises within these areas, run by members of the local community, that collect
door-to-door, sort and maybe even perform initial recycling of the waste they generate, the waste gains significantly more value and therefore becomes more attractive to intermediaries in the overall waste value chain. This has the potential to alleviate environmental degradation caused by evident waste accumulation on the fringes of these areas while generating modest employment within them.
5. Assessment Of The Proposed SWM Framework

There is increased recognition at an official level that the current SWM framework is unsustainable. Hence, the National Strategy for ISWM, which was born in June 2000 but improperly implemented, was revived under a new name, the National Solid Waste Management Program (NSWMP), in 2009. An inter-ministerial committee was formed and tasked with drafting a new policy for SWM that would: a) address the inadequate environmental and public health standards the SWM system currently has, b) tap into its huge economic growth potential, and c) generate employment for thousands of skilled, semi-skilled and unskilled workers, including youth, poor and disadvantaged people (NSWMP, 2013).

5.1 The National Solid Waste Management Program (NSWMP)

The current framework is riddled with challenges and the NSWMP has identified several key challenges that need to be addressed. As addressed in the previous chapter, there remains a lack of clear formal SWM policies, strategies and work plans, as well as inadequate institutional capacity that is too fragmented due to a fragmented legislative framework. There is a lack of financial resources and poor enforcement of the few laws and regulations that govern the system. This translates to poor inadequate technological capabilities, lack of efficient and compatible recycling and composting facilities, poor environmental standards in landfills and contractual problems with the private sector.

In response to these challenges, a coordinated effort for the sustainable development of the waste management sector is required. As stipulated by Law No. 4/1994, amended by Law No. 9/2009, the MSEA is responsible for policy-making and preparation of strategic plans required for environmental preservation. Therefore the NSWMP was developed under the leadership of the MSEA with the objective of protecting the environment, and thus public health, through a more sustainable national SWM framework.

The vision for this new policy is “a clean and aesthetic, inclusive and economically vibrant, well regulated and environmentally safe, sustainable community” (NSWMP, 2014). Based on this vision a set of ten strategic directives were formulated, the chief objective of which was to “gain control over generated waste through affordable, professional, sustainable, and inclusive
integrated solid waste management” (NSWMP, 2014). This overall objective is detailed by a set of themes – governance, economy, service provision, and community participation – with targets set for the short-, medium-, and long-term. The strategic directives rest on a set of thirteen principles.

The latest draft of the policy was presented to stakeholders during a forum in November 2014. For analytical purposes, this chapter mainly focuses on the sections in the policy that are relevant to the topic of discussion.

**Objectives**

The first theme, governance, is concerned with first a basic framework at the national level with adequate capacity, including legislation and regulation for SWM. Afterwards, planning and implementation at the governorate and municipality needs to be aligned with the national strategy, with proper attribution of responsibilities, authorities, and performance monitoring and evaluation. The key governance objective mentioned is the inclusivity of the policy; to account for all relevant stakeholders including the informal waste sector. The second theme addresses the economic aspect. Job creation and resource efficiency of SWM systems is a priority. The policy should allocate resources in a manner that ensures that basic waste management services are extended to all citizens regardless of their socioeconomic status and place of residence. There is specific mention of PSP as the expansion of PPPs as well as development of SMEs in service provision. The third theme addresses service provision itself, and aims to improve the efficiency of SWM activities to achieve proper collection, storage, transportation, treatment and disposal. It also aims to optimize the rate of recycling and reuse as well as ensuring that basic environmental, health and safety standards are met in the process. The fourth and final theme addresses civil society and community participation at every stage of the SWM chain, including awareness, planning, monitoring and service provision.

**Targets**

Based on the aforementioned objectives, preliminary targets were set for the development of the waste management plan in 2015. The highlights of these targets are as follows:

1. **Short-term**: creating a framework for integrating informal SWM actors, implementing technical and financial mechanisms to increase recycling and reduce
generation, increasing the efficiency of overall collection and resource recovery, as well as educational and awareness campaigns to communicate more sustainable SWM practices.

2. **Medium-term**: creating a comprehensive legal and institutional framework for SWM, enforcing environmental, health and safety standards, encouraging investment into SWM enterprises of all sizes, especially social enterprises and youth-driven SMEs.

3. **Long-term**: financial reform of the entire sector to ensure sustainability and cost-recovery is achieved, disincentives for waste generation, more environmentally-friendly treatment and disposal of non-recyclable waste as well increased overall investment into SWM infrastructure with consideration to rapid urbanization.

**Principles**

The national strategic directives produced by the NSWMP thus far rest on a set of principles, the most relevant of which are highlighted below:

- **Public good** – the first principle stated by the NSWMP and probably the most important, it acknowledges that SWM is a public service that benefits all members of a society and therefore its equitable provision has to be ensured. It is the role of public institutions to apply good governance first and foremost, with a shared responsibility and contribution by all stakeholders in service delivery.

- **Recognition of the Informal Sector** – this acknowledges the economic potential of recycling as a professional sector that employs thousands of skilled, semi-skilled and unskilled workers. This principle therefore recognizes the significant role the informal sector plays in providing employment and that its proper integration has a measurable positive socioeconomic impact.

- **Polluter Pays** – This extends the cost of managing waste to those who generate it. This is an important principle because it means that heavy polluters, especially generators of non-recyclable waste, can bear the costs of disposal such as landfilling and incineration.

- **Net-Cost Activity** – This means that government intervention will always be needed to financially sustain service provision. This is not exactly agreeable because if it means that SWM needs to be continuously subsidized, then it is not sustainable. This principle
directly contradicts the concept of sustainability, as well as other principles and directives of this policy, especially those that address financial reform of the sector. The informal sector model is evidence that SWM is a highly profitable activity when recycling is maximized.

- **Integrated SWM** – This principle is not new to Egyptian SWM policy by any means. However, it has yet to be translated into action. It basically means that sustainable SWM strives to maximize resource efficiency, reduce costs through economically viable and socially sensitive approaches. It can be argued that this principle of economic viability contradicts the preceding principle of SWM being a net-cost activity.

- **Proximity** – This principle means that waste should be managed as feasibly possible to its point of generation. This principle supports the idea of decentralizing waste management at the micro level in an urban environment, especially in underserved areas such as low-income and informal neighborhoods.

- **Hierarchy** – Usually referred to as the ‘waste pyramid’, this means that proper SWM practices are prioritized in a way so that waste is avoided, reduced, reused, recycled, recovered then disposed.

- **Appropriate Technology** – This means that technology should serve local needs and conditions. This signals that the government has learned from the past mistake of forcing the inefficient truck-and-container collection system, when door-to-door collection was clearly more efficient. This principle also ties in with the principle of hierarchy, as it means that fewer resources should be allocated towards expensive sanitary landfilling and RDF incineration and more towards upgrading recycling and recovery capacity.

### 5.2 National Strategic Directives for SWM

The NSWMP produced a set of ten policy directives that were announced to the public in November 2014. The underlying premise of these directives is good governance, which aims to create an effective and equitable SWM framework characterized with transparency and accountability. The following are key highlights of the relevant directives.
Establishing a national enabling SWM framework

A key outcome of the NSWMP was a consensus by stakeholders that a dedicated SWM law is needed as well as a central regulatory authority. This legislation aims to establish the principles of ISWM, the waste hierarchy and “polluter pays” principle into the SWM framework. An important aspect of this law will govern contractual procedures for PSP and the inclusion of the informal sector. The law will also establish the Egyptian Solid Waste Authority (ESWA), which will be tasked with setting national SWM frameworks, drafting legislation, financial regulation, investment planning, setting standards, as well as providing technical assistance to governorates. Institutional development at governorate and local levels will require the creation of SWM units that plan, manage, monitor and evaluate, provide and facilitate services. Decentralized decision-making and funding is a key feature here, with participatory approaches that include stakeholders such as SMEs, NGOs, private sector and educational institutions. Figure 5 illustrates the institutional arrangement proposed.

It is worth noting that the institutional framework illustrated above was published in an earlier report by the NSWMP, before MURIS was formed. It is unclear where MURIS lies within this framework despite its clear involvement in the waste issue. The ministry’s mandate is urban renewal and informal settlement upgrading, which has clear overlaps with waste management, and is spearheading a number of initiatives especially in underserved areas. It is worth noting
that the current minister of MURIS is the former minister of MSEA, and the foremost reference on the waste issue in the government.

**Establishing a framework for integrating informal SWM actors**

The main objective of this directive is to make operating formally more attractive for informal waste workers, who generally enjoy operating free of any formal restrictions. The newly formed ESWA will be tasked with engaging this sector in defining the main components for integrating their capacities into the formal framework. Integration and formalization are interchangeable here. It seems the government draws no distinction between both, that integration of the informal sector pivots on formalizing their operations, which is something what the sector has historically rejected. The terms of integration, how the government defines it, will be much clearer once the SWM law starts to take shape and is communicated to the public. There is always the risk that this law explicitly outlaws the informal sector’s activities, giving the state free hand to shut down their operations, eventually leading to more hostility and loss of livelihoods. Nevertheless, it is a positive sign that there is a dedicated policy directive aimed at integration, whatever that may mean at this point in time, and paves the way for open dialogue on the issue between the relevant parties. The directive proposes providing technical assistance and capacity building, alternative modes of financing for informal MSMEs as well as healthcare and social insurance for their workers as incentives to formalize.

**SWM infrastructure upgrade**

The newly formed ESWA will be responsible for ensuring that the proper infrastructure is in place for effective service provision, taking into account population growth, urban expansion and the aforementioned proximity principle. While this directive aims to establish a nationwide implementation plan, it will be interesting to see what this translates to on the ground in Greater Cairo, with two-thirds of its population living in informal, highly-dense areas that are mostly underserved, if at all.

**Improvement of basic SWM services**

Service coverage and quality as well as financial sustainability of SWM can be improved by developing local operator/business models. These models can be local-scale operators that are
public, private or community-based. Collection methods need to be improved as well, implementing source segregation of MSW as close to its source as possible. This directive addresses two key points highlighted in preceding chapters; the importance of developing entrepreneurship in the sector, and the importance of source segregation in appreciating the value of waste collected.

**Application of suitable technologies**

This directive addresses the need to understand the technological advancements in the field of SWM and to research what is suitable for application locally, whether it is new methods of collection, recycling or safe disposal, with clear economic, social and environmental goals upon implementation. Waste-to-energy (W2E) technology in particular gets some attention under this directive, which includes setting up a framework for RDF from MSW and plans to integrate it with high-energy industries such as cement production. While this directive states that W2E projects will be only implemented where financially feasible, it fails to address the socioeconomic implications of burning valuable recyclable waste for energy (For W2E to be feasible, it is known to require a certain percentage of high-calorie content such as plastics). This directive should explicitly account for the waste hierarchy, that W2E is considered a form of recovery that falls below recycling in terms of priority in the waste pyramid.

**Promoting behavioral change**

These directives deal with the public awareness and educational aspects of SWM. What is relevant here is how SWM practices at the household level will be improved such as introducing source segregation, a key factor in the sustainability of the whole cycle. Also, how the introduction of economic instruments can exact the required behavioral change at all levels, most importantly, the discouragement of unsafe disposal.

**Improvement of cost-recovery and financial sustainability of SWM services**

The final, and arguably the most important, directive produced by the NSWMP, it explicitly states that because SWM is a net-cost activity, the securement of needed funding is important. There seems to be a misinterpretation of what ‘net-cost’ means here, or maybe the government defines it differently. There is no doubt that the SWM will need significant
investment to fulfill capital requirements and upgrade its infrastructure (the CAPEX component). However, as an operation (OPEX) it has proven to be highly profitable as evidenced by the informal sector. There still seems to be a lack of understanding of the concept of waste valorization and how, once initial CAPEX requirements are fulfilled, the value-chain, circular approach to SWM sustains itself financially. The directive states the need to amend how end-users of SWM services are charged so that costs are recovered, and to create an investment-friendly climate for SWM enterprises of all sizes, with no mention of subsidizing the day-to-day operation of SWM. It seems the use of ‘net-cost activity’ here is misused, and should only indicate the large amount of investment initially required to fund SWM operations before they become cash flow positive. In addition, this directive will task the ESWA with identifying financial gaps and propose budget allocations to fulfill the needs at the level of the governorate. However, it does not seem that it will have the executive authority to allocate these funds itself, instead remain reliant on the central government to do so, most likely through the Ministry of Finance.

5.3 Undertaken Initiatives

There have been a number of initiatives undertaken by the government as pilot projects to test the implementation of new policies, both on a small and large scale.

Port Said SWM Project

Port Said has been selected as a pilot area to implement the framework proposed by the NSWMP. The project aims to reintroduce door-to-door collection that will be carried out by small enterprises, formed by new private sector actors or formalizing already existing informal actors. These enterprises will be directly contracted by the municipality and given technical assistance such as the provision of small collection vehicles (tricycles). 17 new entities have been established for collection with a total number of 852 employees, each responsible for collection in a specified district. This will help remove the inefficient street container system. Household source segregation will be incentivized through a joint-initiative with the Ministry of Supply. Households can earn points for separating their waste into non-organic and organic on their supply cards, which can be redeemed for household goods. Collected waste will accumulate
at transfer stations, already segregated, where the organic component will be transported to a nearby composting plant. The non-organic component will undergo further sorting at governorate-designated sites into different types of recyclables to be sold upstream to the relevant recycling companies. This project will serve as a replicable model for the NSWMP across the country if successfully implemented. However, it is important to note that there is a risk of failure to replicate such models in other governorates. The privatization that happened in 2003 was based on the temporary success story of Alexandria, which proved to be unsustainable in the long-term. What is important is to apply the methodology that led to the creation of a successful model, rather than the model itself. If Port Said proves to be successful, in order to replicate this, it is important to understand what made the mechanisms implemented there successful rather than copying the same exact mechanisms to Alexandria or Greater Cairo.

**Badr City Project**

Badr City is one of the numerous satellite cities orbiting Greater Cairo. Representatives from the MSEA and MURIS are currently engaging with the zabbaleen to try and convince them to relocate their operations there and move out of Mukattam in Cairo. So far, around 100 informal recycling operations have agreed to move there. MURIS claims that the younger-generation zabbaleen entrepreneurs heading these operations asked for this move themselves. Older generation zabbaleen, otherwise known as the ma’alemeen, are still resisting the idea of moving out of Mukattam. This signals a clear generational gap within the informal sector itself, where the younger better-educated generation is willing to move out and expand their operations. This is definitely a positive sign as it could potentially mean the organic formalization of informal waste sector activity over the long-term.

**Qalyubeya Participatory Development Program (PDP)**

This initiative was carried out in 2014 by GIZ in coordination with MURIS in two poor urban cities in the governorate of Qalyubeya, Khosoos and Khanka, with a total of 750,000 inhabitants (Behairy and Wehenpohl, 2014). Its main objective was to create local economic opportunities for the urban poor while improving the overall environment they live in. The key features of this project were to establish an ISWM strategy through stakeholder participation, raising their awareness on the existing problems and their roles and responsibilities in the SWM
system. The project helped build local capacity in sustainable waste management methods while improving the working conditions of informal waste collectors and recyclers (Behairy and Wehenpohl, 2014). This participatory approach is an example of what can be implemented in informal areas within Greater Cairo that typically receive little to no SWM services.
6. Conclusion and Recommendations

There is no doubt that sustainable urban waste management is an important part of what constitutes urban sustainability. In developing cities, such as Cairo, which have experienced rapid urbanization, waste accumulation has had visible impacts on the environment within the city and beyond it. The informal waste sector, the zabbaleen communities, has played a central role in the city’s waste management system, filling the gaps left by the municipalities over the years. The public service they provided in exchange for a basic livelihood had always been taken for granted by the authorities. Viewed as primitive and unhygienic, policies were designed to exclude them rather than integrate them into the formal solid waste management framework. It was clear that the recent privatization policy ended up aggravating the environmental problem rather than solving it, bringing up the cost of the waste management system in the process and having a negative socioeconomic impact on thousands of urban poor families.

There had never been a clear national SWM policy. The legislative framework was fragmented, with no unified SWM law governing the sector. This led to a fragmented institutional framework, with no clear definition of roles and responsibilities of the many ministries and agencies involved, leading to a lack of transparency and accountability, and wasted effort and money. The exclusion of the informal sector from official policies only compounded the problems, ultimately leading to an unsustainable SWM system – a linear system that focused on poor disposal, as opposed to reduction and recovery of resources. The need for a new integrated SWM policy led to the revival of a national strategy under a new name – the NSWMP. This new policy contains a number of strategic directives that address most of the problems hindering the current waste management framework. More importantly, there is a clear indication that the government is changing its view on the informal sector, recognizing the important role it plays, not only in the waste management system, but also in the lives of thousands of urban poor families. An entire policy directive dedicated to the integration of the informal sector into the waste management framework is definitely a step in the right direction.

Based on the research conducted for this thesis, one can conclude that successful integration of the informal sector into the urban waste management framework, and its ability to grow, rest on a number of key factors:
1. **Source segregation of waste**: separating the waste generated into organic and non-organic components as close to its source as possible means the value of this waste increases. This is the first key step of waste valorization, and policies should help implement that through tangible incentives in the short-term, while working to change a culture through awareness and educational campaigns in the long-term.

2. **Development of waste management entrepreneurship**: developing small enterprises in the sector to handle door-to-door collection and initial recycling phases is important. This model proved to be successful in the informal sector and policies should work to integrate them as well as develop new ones, especially in low-income and informal areas that are typically underserved. This will expand the network of MSMEs in the sector and increase the coverage of the service.

3. **Priced disposal**: landfills are expensive to build and operate, not to mention the huge negative impact they have on the environment. This impact can be mitigated by pricing disposal in a way that discourages it, and diverts waste collected to recycling operations. Policies should make disposal a last resort in order to reduce the amount of waste that reaches landfills, shifting away from a linear model of SWM (collection to disposal) and create a more circular system of recycling and recovery.

Based on the research conducted, one can conclude that source segregation and development of waste management entrepreneurship are at least on the current government’s agenda. Initiatives undertaken to segregate waste at the household level have had mixed results, but there is at least a recognition that this is a key factor that needs to be implemented. The development of waste management entrepreneurship is synonymous with integrating existing informal entrepreneurial entities in the sector, and having an official policy directive that addresses that counts as a crucial first step. Priced disposal is not explicitly mentioned in the policy. However, the “polluter pays” principle, which is expected to be implemented through the SWM law, should cover it. This factor is key to shifting towards a more circular waste management system, where waste material is encouraged to flow towards recycling and recovery, leaving proper disposal as a last resort.

This research is meant to link the extensive research conducted on the waste management system in Egypt, especially Cairo and its informal sector, to the NSWMP. It meant to highlight the importance of recognizing the informal sector in official policy, integrating them into the waste management cycle, devising policies that help them grow, and possibly formalize over
The NSWMP at the time of writing this thesis has only produced a policy framework for the waste sector. The legislative framework is currently being drafted, and it is unclear when it will be passed into law, whether in the absence of a parliament or not. This law is required to establish the ESWA, the executing agency required to plan and implement projects in the sector. The sector has long suffered from a fragmented legislative and institutional framework, and these are crucial steps to establishing a unified managerial framework for the sector at national and local levels. This law will also set the framework for integrating the informal sector, determine the degree of formalization required, and establish the specific mechanisms to be implemented by ESWA in that regard. It would be necessary to conduct further research once this law is passed to determine whether it stays true to the policy put forth, and identify areas for improvement.

As it stands, the proposed policy seems to be heading towards a more sustainable waste management system by explicitly recognizing the informal sector. The chance of successful integration will be higher if source segregation is adopted and waste management entrepreneurship is encouraged (whether by establishing new SMEs or integrating existent informal ones). However, the proper pricing of disposal remains a key factor that will need to be more explicitly addressed in upcoming legislation.
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