Entrepreneurship as a sustainable approach towards efficient waste management in Cairo

John Estephanous

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Master of Science in Sustainable Development Program

Entrepreneurship as a Sustainable Approach towards Efficient Waste Management in Cairo

In partial fulfillment of the requirements for the degree of Master of Science in Sustainable Development

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Advisor: Dr. Tarek Hatem       Co-advisor: Dr. Hani Sewilam

Submitted by: John Estephanous

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Chapter 1: Introduction

1.1. Background

Despite the many trials of the government to solve the waste problem, and various research papers analyzing the problem and arguing the economic value of waste, however the waste sector has always been an untapped area for economic development, although it has potential for growth and benefit for many stakeholders.

Through the last few years, the city of Cairo problems including the waste problem increased to an excessive level reflecting a problem with the management and control of the current waste management system. Moreover, when thinking of why Cairo have a persisting problem and about a better working new system, sustainability, entrepreneurship and innovation are very important aspects in devising a new framework for understanding the current, and building a different better future.

Although there were many researches that predicted the problems and many others that gave recommendations for solutions. The gap between the information available about the problems and actions taken to solve while the problems persist, raise many questions about the practicality of the practiced reform policies and the ways policies are being drafted and taken to action in Egypt, and how it can be turned into sensed positive change. In addition to the inequality in the urban development and greater effect of the problems the city suffer from on the lower socioeconomic class of the population, that lead to their suffering from many other problems such as health problems and structural poverty.

The degradation in the waste management as a problem has reached to a level where the city cannot endure anymore, if we are expecting a city to be a resilient and sustainable one for its inhabitants. Cairo is the country’s capital of which there is all the focus on its economic and touristic activities, and the waste accumulation is affecting the health of Cairo’s inhabitants as well as all the other functions of the city’s elements.
Through all challenges that face the country, a trend can be sensed with the current political and social changes in Egypt, that the government is starting to shift towards more regulation than execution, where it seems clearer now, that the government cannot solve all problems on its own and at the same time monitor its execution. In addition to, finding better working solutions and practices to execute efficiently and solve problems by the government itself.

Increased public participation in decision-making and delegation of problem solving to investors or public partners that can provide actions and support in many sectors started to seem as the solution. This can be seen in the new policies at the energy sector and the public-private partnerships on many projects that tackle services and new projects, and the creation of a new Ministry of Urban Renewal and Informal Settlements.

The role of entrepreneurship in cities like Cairo can be the practical solution to its problems, when entrepreneurship can see challenges as opportunities for growth and making business by solving problems, and sustainability can drive the values of entrepreneurship into green business practices that take into consideration environmental and social aspects.

Understanding the values of supporting entrepreneurship and building awareness and skills to support entrepreneurship development in Egypt is necessary now, and the challenge in creating entrepreneurship opportunities and making it sustainable, is deepened by the fact that in the neediest communities to entrepreneurship, are the least who have skills or education or money to grow and develop their businesses.
1.2. Research Purpose

This thesis investigates the main challenges that the waste sector in Egypt faces. After a thorough understanding of the factors affecting the waste sector in Egypt. Besides this thesis attempts to offer a prescriptive solution to some of these challenges. The thesis proposes the application of a new business model, in which all stakeholders in this sector will participate to ensure an effective implementation of this innovative model. In addition, the current policies that govern waste management and the impact of changing policies will be discussed, and gaps are identified.

Moreover, this thesis discusses the ecosystem for entrepreneurship in the waste sector in Egypt with a focus on how to overcome the challenges in the current system. Also will tap the previous research in the waste management sector, and how can green entrepreneurship value from it in Egypt, as well as the current practiced policies, and trying to understand most aspects of the waste problem and the factors playing a role in the waste management systems, formal management systems and informal management of the waste supply chain.

In addition, this thesis research the ways of finding practical sustainable solutions that can fill the gap between the current policies and reality on the ground, through opportunities for entrepreneurship in the waste sector, by creating feasible business practice that can empower people to take actions that lead to solving their problems and improving their quality of life.

Furthermore, this thesis discuss the evolution of the business models used in the waste industry in Egypt and how it changed overtime, and what can be a successful change and an evolution in the current and historically used business models to adapt the new policy reform and the increased challenge in controlling the waste management problem in Cairo. Furthermore, this thesis will go through the changes that the waste sector has seen over the years, how these changes affected the industry and the waste management systems.

This thesis argues that through understanding the supply chain of waste management in Egypt, practical sustainable business opportunities can be created at each stage of the supply chain. As well as understanding the challenges that hindered this from happening, and how to find solutions for these challenges, can promote local entrepreneurship and involve many stakeholders in supporting such businesses that solve community problems.
In addition, this thesis discuss in details the challenges of the current system and where the problems may be, in addition to industry and waste sector analysis towards understanding of how the system works now, and what can be a better working new system, and what should be put in consideration in devising the new system.

This thesis attempt to include views of different stakeholders, and how they vision practical ideas may evolve and turn into sustainable solutions. This can lead to the evolution of equitable sustainable solutions that take all stakeholders’ interests in consideration. Also how through integrating informal sector and people with the know-how and experience in the waste industry, a sustainable integrated system can be successful for everyone connected to the city.

In addition, this thesis discuss briefly the currently proposed solutions by the government, and how to ensure that these new solutions can be sustainable and efficient, taking into consideration the failures and successes in the recent applied plans and solutions that include entrepreneurship to solve the waste management problem in Cairo.

The change in perception for the value of waste and at the same time understanding how practical solutions can be taken into action using entrepreneurship, can lead to a sensible change making in the city problems. In addition to what are the needed thinking framework to perform entrepreneurial solutions and how to acquire them, in a way that applies sustainable development values and approach.

Applying the concepts of sustainability and entrepreneurship when thinking of solutions to the waste management problem in Cairo will lead to a more holistic and solid solution. This solution should take into consideration all stakeholders benefits, and provide incentives for the public to strengthen the fabric of such solution, which is different from applying one angled devised solutions that neither do solve the problem nor remain continuous in their effect.

Through understanding many different aspects such as: the ecosystem of the entrepreneurship in waste sector, the challenges and status of the waste industry, the current system and players in the waste sector, the importance of the informal sector and lessons to learn from them, and the future plans and solutions by the government. Then understanding how entrepreneurship can succeed and solve the problem and overcomes challenges in the future becomes possible.
1.3. Research Questions

The research questions focus on three main areas. The first is, how does the current system function, and what are institutional constraints that provoke ineffective waste management system? In addition, what are the challenges for entrepreneurship in the current system?

The second is what is the value for including the informal sector in the waste management system? In addition, how can the informal sector players have enough incentives and motives to share in a sustainable model that value their contribution and offer a win-win situation for all stakeholders?

While the third area is, how entrepreneurship can succeed and find opportunities within the increase in the waste problem size and magnitude? What is a successful sustainable innovative inclusive business model that can work inclusively for all stakeholders working in the waste management sector, and achieve social, environmental and economic benefit for all?

1.4. Research Hypothesis

Entrepreneurship and innovation in the waste management sector can be the key problem solver for the current imbalance, where understanding more about the different view angles of the problem, will help better apply sustainability approaches towards a resilient and socially, environmentally and economically acceptable solution. Policy reform only is not enough, if not accompanied by a working holistic sustainable approach that serve a benefit, fill a need and provide motives and incentives for all stakeholders. In addition, including the informal sector will offer a more solid approach to a sustainable system, as they have the skills and experience needed as well as the ability to control and function a newly designed holistic waste management system that learn from the past errors and mistakes of past applied approaches.
1.5. Research Significance and Motivation

This thesis is important for entrepreneurs who wish to work and invest in the waste sector, and who seek to understand the full picture of how the current system work and how can they fill a gap for a need in this industry. Moreover, it is important so that entrepreneurs can anticipate what type of challenges may arise in their business future, and how to mitigate these challenges before they happen. In addition, this thesis exposes the different opportunities for entrepreneurs and help them in creating new opportunities for businesses at the waste industry. Also, this research expose the different stakeholders to take into consideration while creating a new enterprise in waste sector and what are their roles, and how can affect or get affected by a new business in waste sector. As the waste sector is more than a normal industrial and business sector, but it is a unique and special sector with different challenges and opportunities at the same time, as how this research discuss.

This thesis is important for government entities and non-governmental organizations that wish to promote entrepreneurship in waste management, and solve the waste management problem in Cairo using entrepreneurship, in addition to understanding the problem from a different angle of sustainability. Moreover, this research provides a holistic understanding for the social and environmental aspects that contribute to the economic aspect of waste sector, in addition to the role of the informal sector through enterprises in waste industry, that all contribute to a better waste management system for the city.

In addition, this thesis is important for the public to understand the system and buy in new solutions that solve the problem, by being actors in the change within a new integrated system. Public role is very important in encouraging the entrepreneurs and successful new solutions that require behavioral change, so understanding the bigger picture is important for them. Besides, this thesis is important for the economic growth of the whole country, by tapping such an important industrial sector of an abundance of resources of waste, which can be seen as of economic value.

This thesis is only one small trial to better understand how the waste management system currently work, and how a future new framework would be successful for all stakeholders, including the citizens, the government, the investors, the workers in the field and other for profit and not for profit market players. Which makes this research useful for all stakeholders in a trial to understand the other angles of views, values, needs and visions for future for all.
1.6. Conceptual Framework and Scope of Research

- Understanding the current waste management system including elements, functions and management.
- Identifying who are the stakeholders and players involved, and how do they affect and get affected by the waste management system.
- Understanding the waste supply chain and different stages of the system.
- Understanding the problems in the current waste management system, previous tried solutions and future thought out plans.
- Understanding the role of informal sector, and understanding the value and incentives for them if formalized their activity.
- Analyzing the waste industry and opportunities for growth and entrepreneurship.
- Understanding the ecosystem of the waste industry and what are the challenges to entrepreneurship in this sector.
- Identifying challenges for entrepreneurs in the waste sector, and ways to overcome these challenges.
- Proposing recommendations for how to apply new, holistic, efficient and sustainable waste management plans and solutions using entrepreneurship.

1.7. Limitations of Research

To specify the scope of research to a specific research area, there is no detailed research on types of recycling lines of industry, or precise financial modeling and projections for businesses in certain lines of the recycling waste industry. Besides the research on benchmarking to similar models is not comprehensive. Because this will require the shifting of the research to be focused on only one certain level of the waste industry, rather than understanding wider level of the problems and broader vision and philosophy for the solution, and how can entrepreneurship overcome the current challenges.

Also due to this thesis being a part of a twinning thesis, where the other thesis focus on policy, this thesis is not discussing in detail the policy factor, rather focused on entrepreneurship, in order not do duplicate efforts and cover different angles of research.
1.8. Methodology

This thesis used primary and secondary data to achieve its purpose. First, the thesis used an integrative literature review method that incorporate and integrate the literature related to the thesis topic. Second, a fieldwork that collected qualitative data was integrated in the thesis to provide support for data analysis. This thesis take a descriptive research approach with a focus on qualitative data, which will depend on the following methods in the data collection:

1.8.1. Secondary Data Collection Method

1.8.1.1. Desk research

This stage focused on integrating and investigating the literature available on the research topic. This literature review stage is the initial step to investigate all the already historically existing resources and secondary data, and then identify the gap in literature and the scope of the thesis. The main aim from this phase is to investigate the following issues;

- Research on understanding waste management processes and challenges involved in the general practices.
- Researching literature on waste management in Egypt and any special cases and quantitative data on Cairo.
- Investigating policy evolution and effects of policy frameworks in solving the waste management problem in Cairo.
- Research on the current waste management model and historical evolution for groups of people who worked in this sector, and how each group was different.
- Research on entrepreneurship solving city problems, with specific focus targeting green entrepreneurship.
- Understanding and comparing Egypt to the different processes held in different developed countries or developing ones, which may have already solved the challenges of waste management, and successful case studies.
- Researching who are all stakeholders who affect or the get affected by the process of waste management in Cairo, and what are the interests and controls of each group.
- Understanding the future plans for problem solving by the government and any trials for application.
1.8.2. Primary Data Collection Method

The primary data collection stage came after the secondary data collection stage to fill the gaps identified in the literature review by fieldwork collected data to achieve the thesis purpose. In the secondary data collection, the thesis used two main methods as follows;

1.8.2.1. Face to Face Interviews

This method was used to collect primary data from face to face interviews with different individuals working in the waste management sector using pre developed questionnaire/interview guidelines questions. Whereas, the pre-developed questionnaire used a semi-structured approach to provide flexibility in the discussion. The main aim behind these interviews is to provide deep understanding to the waste management process in Egypt from the people who have first hand-on experience and expertise. The face to face interviews is used to interview;

- Employees of governmental entities, who have the executive arm for planning and execution of waste management strategies, and who are directly involved with the new solutions that are planned to be executed in the future.
- Private sector companies working in the waste management field, and who have performed work for themselves, or with either the government or international donors’ agencies related to waste management projects.
- Civil society and non-governmental organizations working in the field of waste management development, who have a direct relation to the challenges and values of this field, and who can give an insight for a different angle looking at waste management sector.
- Experts and professionals in the field, who have long experience with the waste sector in Egypt, and who can refer to experiences and lessons learned from their long years of experience in their work with waste management.
- Informal sector workers in waste management, who have the hands-n experience and practical view over the waste management sector, and who represent a very important stakeholder of the waste management sector, like garbage collectors and experienced among them who are involved with the association for garbage collectors.
1.8.2.2. Key Informant Interviews

The key informant interview was used to understand the current view of the government, which is the key formal controller of all waste management activities, and what are the current and future vision for their work. For this a meeting with the Minister of Urban Renewal & Informal Settlements was set and data was gathered through semi-structured interview questions and discussion about the ministry’s studies on the ground and future plans.

All the methods used overlapped and evolved through the process of gathering data, as further referral to literature was happening throughout all the stages, and there was referral for new people from the preplanned interviewees who referred to other experts or cases, which were later on studied and interviewed.

Some persons who were not interviewed shared literature and resources for done work or plans through e-mail, and some persons were not planned to be interviewed but were interviewed when met at certain locations like in garbage collection areas or at the ministry of Urban Renewal and Informal Settlements.

Semi structured interviews and the questions were focused on defining and understanding the current practices, and challenges in practice, as well as visions for new solutions and cooperation between different stakeholders and what can be the value and benefit for each stakeholder in order to be part of a new solution.

After understanding a fuller picture from the literature review, and then the primary data collection, analyzing the data and assessment was the next step. Then after deeper analysis, recommendations and conclusion for the research was the last step to devise a useful outcome from all the research that took place, and to connect all the different parts of the holistic sustainable approach for a future framework in understanding waste management in Cairo.

Ethical considerations were made in order not to expose any of the sources of interviews, and in the methodology, general reference is made to the sector or stakeholder of which the interviewees work at.
Chapter 2: Literature Review

2.1. Introduction

In a highly populated city like Cairo, some problems might seem unsolvable and sometimes even seem neglected and unnoticed, due to how long it has been persistent and how long inhabitants became accustomed to living with it. This is not only the state in Cairo city, but also many other cities worldwide have major problems that the governments could not solve by traditional control and regulative actions of centralized government authorities.

Entrepreneurship have not only increased the world’s wealth, but also solved many of the world’s problems that existed in the past, and understanding how to use entrepreneurship in solving the city problems, can help identify new innovative solutions to solving old persistent problems that the government was not able to solve.

Adding the scope of sustainability to entrepreneurship provides a new dimension for continuity and social justice in developing countries like Egypt, and towards the development of the poorest among its population, and that’s when the waste management green entrepreneurship come in place.

2.2. Waste, informal sector and urban sustainability

In this thesis, referring to waste will mean municipal solid waste that homeowners discard, and will not interfere with the study of industrial, hazardous, agricultural, demolition, radioactive and medical waste. Municipal solid waste is the second in place after agricultural waste in terms of generation per year, while the rest of waste types contribute to a much lower extent to the overall waste generation per year (SWEEPNET 2010).

The understanding of all parties of what is waste and the perceptions around waste to be something unwanted, and of no value that only needed to be discarded is increasing the problem. There are different definitions and classifications of waste, and when this become clear all the next process of waste management will become easier (Eva Pongrácz 2003).
While most parties involved see waste as a problem there is a segment of the city’s population that see it as an opportunity and informally have an efficient way to perform many operations involved with waste collection, sorting and recycling. This can be found in Zabaleen area for example (Wael Fahmi 2010), or in other areas around the world of developing countries where the informal sector play a very important role in the waste management equation of the city (David C. Wilson 2006).

The waste problem in Cairo is of a high magnitude that is increasing by time, where the municipal solid waste generated daily is 15,000 tons/day of which 56% in organic in nature and this amount is expected to increase, five landfills only are public while twelve are random landfills (SWEEPNET 2014). While the generation of waste is 0.8 kg/capita/day in rural areas and 1.5 kg/capita/day in hotels and touristic areas (Milik 2010). With this challenge facing Cairo every day, solutions have been drafted to mitigate the problem, the government have tried to gain the support of the private sector only to replace the informal sector but this did not work well when the informal sector was excluded (Fahmi 2005).

With the inability of the government to solve the waste problem through privatization, furthermore complicating the waste problem more, and decrease of recycling rates and increase of uncollected municipal waste in the street, with 6,000 tons/day of deficiency in collection (Milik 2010). Which lead to serious accumulation of waste in the streets and so new thinking around partnerships between public sector and private sectors evolved as well as new thinking of integrating the informal sector in the process of waste management and formalizing their role through the system (GIZ 2010; GIZ 2011).

2.3. Cairo’s informal waste sector and its importance

Cairo’s informal sector is a unique and outstanding waste workers sector; they are very efficient and have been working as industrial zones for years. This sector has been collecting, sorting and recycling quietly and generating revenue and value for waste with no help or support from the government.

Their interference with the government was mostly negative and there is a low degree of trust between both parties, with no incentives for this sector to formalize their activity, and with no ability of the government to replace it.
There are four main garbage collection settlements in Cairo, each is unique in the nature of its inhabitants and the history behind their settlements and their social fabric, but they all share many commonalities in terms of their activity, needs and hopes for the future (Butter 2006). Moreover, the ability to understand and appreciate the social presence and value added from this informal sector in the key to devising new sustainable solutions.

The relation was always confrontational and competitive, where it should not have been so. This complex relation was always affected by political, economic and sometimes religious factors, where the informal sector can be a very important base for a new solution and the corner stone for sustainability and entrepreneurship in waste management. As this sector contain the people with the best experience and know-how for the business sector in waste, in addition to devising urban sustainability through formalizing their activity and value to the economic system (Chen 2006; Cherunilam 1981; Kupping 2013; Didero 2012)

With new thinking towards inclusion of stakeholders and starting to see the value of more holistic approach, a new business model is needed to fulfil sustainability of solutions, which can be found through entrepreneurship in the waste sector. This can lead to old stakeholders starting to think of themselves as entrepreneurs, also the government starting to treat them as so, in addition to attracting new players to the market from the local communities to benefit and share in being part of the solution at the same time.

2.4. Politics and public participation of stakeholders in decision-making

This environmental, economic and social degradation raise a question of how the public level of participation was taken in drafting such policies for growth and environmental impact of projects, and how public can control solutions or voice their opinions at least (O'Faircheallaigh 2009).

Public participation balance is important in drafting working suitable solutions for the inhabitants, while proper mapping of stakeholders and how should they share their opinions and interests with public sector can sustain plans and maintain public buy in and greater good without causing paralysis for decision makers (Bishop and Davis 2002).
Politics and political decisions have been an important factor in the waste management system, and decisions taken either to privatize the waste sector in year 2002 or to slaughter the pigs after swine flu in year 2009, have affected this sector negatively. Especially the informal sector, which managed most of the operations at these cases and suffered from the most of the damage, which lead to accumulation of waste in the streets because the decision makers did not study the decision from all aspects (Milik 2010).

Cairo inhabitants seem to be always on a side and the government on another opposite side, where both parties may be placing blame on the other with no clear understanding on how the problem of waste evolved and how it can be solved.

2.5. Entrepreneurship and innovation for sustainability

Entrepreneurship can function and achieve results in these territories by creating value beyond traditional economic activities and the expected market relationships (Santos 2012), while creating opportunities for growth within the currently possible resources, policies and systems, by seeing gaps in the environment and using it to provide a service or a product that innovatively fills this gap (Boyd Cohen 2007).

Entrepreneurship was a very important element in building developed economies worldwide, and in founding the base for market growth and value addition to communities, where those developed economies relied on supporting SMEs and providing the needed eco-system for entrepreneurial growth (Endeavor Egypt 2009).

In addition to building eco-systems and support mechanisms for entrepreneurship, developing countries need to understand the value of entrepreneurship beyond economic growth and wealth building, as entrepreneurship solve community problems through innovation and provide a sustainable environment for economic growth and social justice at the same time. Where the new ideas can solve problems of each unique community’s needs and value creation for all socioeconomic levels of the nation, by creating new and innovative business models relying on the challenges facing each community (Wagner 2012).
Sustainable entrepreneurship can be defined as doing business and at the same time giving the community its right in social, environmental and economic considerations while making profit (Jeremy K. Hall 2010). It can provide a strong role in communities to solve problems and provide higher standards of living for people who suffer the most. This can happen by putting the social and environmental dimensions within the economic equation, when classic economics may fail to create maintained profit and at the same time fail to serve the greater good of all people (Parrish 2010; Muhammad Yunus 2007).

2.6. Sustainable entrepreneurship towards city problems solving

Entrepreneurship can help solve environmental degradation problems by reframing such circumstances as market inefficiencies that need an economic solution (Thomas J. Dean 2007). This thinking can be applied on problems such as the waste problem, where regardless if the governments do officially recognize or not, there are many entrepreneurs who work in the informal sector, solving problems for the cities and the government especially the waste management problem (Rogerson 2001)

Environmental degradation problems affect developing countries, among which are garbage accumulation and sanitation risks (J. E. Harody 1991), whereas the level of concern, awareness, blame and action varies (Nicholas S. Hopkins 2003). The health risks of such problems on population and which parties are involved also varies, but the most vulnerable population to waste problems are the poorer segment, and they are the most affected by the degradation, while they work in solving the cities problems for others of higher socioeconomic levels (Anwar 2003).

Those who are in the deepest side of the city problems are the most needy for entrepreneurship and innovation to sustainably solve their problems and offer them better life standards, while they are the least to be able to understand the needs and skills to support their ideas.

This degradation of most areas of the city and the risks to its inhabitants, raise the question around if Cairo is resilient enough to disasters, and if disasters are actually natural or manmade by our inability to plan solutions and execute good management for our city (Phil O'Keefe 1976) (Godschalk 2003). As well as our disability to control the environmental degradation within our city that only increase to worse by time (Donald R. Nelson 2007).
The fast degradation with the urban city problems was due to the poor planning and execution of a vision for a very fast growing city from the nineties of the last century to the new century (Sutton and Fahmi 2001). While it was all expected and alarmed against with all the informal settlements that started back in the nineties and grew fast due to the inability of inhabitants to afford the housing being built for them at that time (Denis 1996).

2.7. Supporting the entrepreneurship eco-system

With how significant is to support entrepreneurship to solve city problems and provide sustainable development for the population, it is very important to support the eco-system that the entrepreneurship strive within for survival and growth.

The World Economic Forum Report states eight aspects as important in the eco-system; these are “Accessible markets, funding and finance, human capital workforce, regulatory framework and infrastructure, education and training, major universities as catalysts, mentors advisors support systems and cultural support” (World Economic Forum 2013). While Aspen Network of Development Entrepreneurs states nine aspects as important for the entrepreneurial eco-system: “Policy, finance, infrastructure, markets, human capital, support / services / connections, culture, R&D / innovation, quality of life and macroeconomic conditions” (Aspen Network of Development Entrepreneurs 2013). Where both have similarities and common points when defining what important aspects of an entrepreneurial eco-system.

While Isenberg discussed creating an entrepreneurship eco-system with nine important ideas, and stated different aspects if the eco-system as “Public leaders, government, culture at large, success stories, knowledgeable people, capital sources, nonprofits and industrial associations, education institutions, public infrastructure, geographic locations, formal or informal groups, venture oriented professionals and local potential customers” (Isenberg 2010).

These aspects all show the importance of integrating different stakeholders, and thinking in integrity when devising solutions that involve entrepreneurship, which is very significant in the case of waste management problem of Cairo, and all aspects of an eco-system become very important when understanding the current problem, and designing for a new framework.
2.8. Entrepreneurship in the waste sector globally

Entrepreneurship in waste sector is not a unique practice to Cairo, but rather old, worldwide spread and have the same significance of informal sector. Entrepreneurship in waste management can be found in other cities around the world with different innovative ideas, which created jobs, solved problems and created revenue for many of the poorest population.

In developed cities, it takes the form of formal established businesses with the processes of recycling and following processes that are industrial in nature. While in developing countries, collection and sorting by itself can be an opportunity for entrepreneurial ideas and innovative business models.

For example in Latin America, informal waste collectors are responsible for most of the collection and recycling process along the supply chain, and conflicts are common between different stakeholders like public, private and informal ones, however, in Mexico Danone a private company helped the private sector work with informal sector in waste (Be Waste Wise 2015).

A successful example happened in Bogota, Colombia, as informal sector was able to function like any other formal private sector company after 27 years of struggle, and get payment from the government by the amount of waste they collect per ton (Be Waste Wise 2015).

Another example can be found in Lagos Nigeria, where a company called Wecylers created new jobs by collecting garbage from locals in return for points that they can change later to goods according to the weight of the trash, while jobs have been created in collection, other jobs were created in recycling these waste (Wecyclers Nigeria 2014).

One more example happened in Bangladesh where two entrepreneurs were able to solve the Dhaka’s city solid waste problem by creating small composting units for small local communities, where a 50 kg of good quality compost can be sold for 50 US dollars, which created revenue and incentives for informal areas to work on such project (Ashoka innovators for the public n.d.) (Center for Clean Air Policy n.d.).
Some cities of the developing countries have higher rates of recycling and retraction of value from waste than some of developed cities due to the work of the informal sector (UN-HABITAT 2010), and with seeing the informal sector as part of the entrepreneurial sector, conflicts should be minimized and value for all stakeholders will increase.

2.9. Conclusion

The literature is rich with information about quantification of the problem, and the history of its evolution, as well as the proposed policies and recommendations for actions. Cairo is a unique city; there is a lot to learn from the mistakes and experiences of past applications to solve the waste problem. There is room for entrepreneurial innovation and development in Cairo as much as there are problems and challenges, and finding an inclusive sustainable business model will help many people who need jobs and others who just need a clean environment.

Adding sustainability when thinking of waste management problem in Cairo, brings the social, economic and environmental aspects very clear in mind. The social aspect is significant when thinking of people who work in the informal sector and all poor areas of Cairo. In addition, the economic aspect bring the idea of entrepreneurship and waste as an economic value, and which activities should be allowed for best use of waste economically. In addition to the environmental aspect of waste as a pollutant for Cairo, and as a health hazards for people who work in this sector.

This thesis attempts to close the gap between the previous research on waste management, entrepreneurship and informal sector engagement, with adding sustainability as a factor when designing new solution that can work for the city and all stakeholders, to add value and increase wealth for the poorest of the city in many informal areas and poor neighborhoods.

This thesis is researching the question of how, in addition to understanding why Cairo as a city was not able to solve the waste management problem across the past years. With the help of past research and literature, and discussion with people who either were involved with past applied solutions and trials, or future thought out methods and new ideas for a new framework of waste management in Cairo. With further understanding the past and reasons for the present, shaping a better future can be possible.
Chapter 3: The current waste management system, market players and challenges to sustainable entrepreneurship

3.1. Analyzing Cairo’s waste supply chain, players and challenges within

The main concern after interviewing different stakeholders from the government, informal sector workers and experts in the field, was that the municipal waste in Cairo go through a long and complicated cycle from disposal until its final destination. What complicates this cycle is the fact that it is not only one path that the waste go through or one simple cycle. Which offers a challenging supply chain for any waste business at any stage of the waste sector, because securing and controlling this supply chain depend on many factors and market players.

3.1.1. Mapping the supply chain and market players

As how the figure above shows, waste is disposed by many ways, collected by many parties and then gets onto the next stages through many different methods as well depending on the area of collection and parties involved. All these complications of non-uniformity in collection affect the efficiency of waste collection as well as all sustainability aspects of waste management.
3.1.2. The unsustainability of the supply chain

In terms of the economic aspect for a supply chain, it affects the economic value of the waste collected and the incentives for each group of beneficiaries who work in the field. While in terms of the social aspect, it affects the people who work in this field and the degree of their involvement and incentives to clean the streets or not, as their living and support for their families comes first than any greater good specially when there is no uniform system that they work through. Moreover, the social aspect affects the people who live in these streets and who wish to have a cleaner city, where the degree of the problem is not equally divided, where poorer neighborhood suffer more from the waste accumulation problems. As for the environmental aspect, it is obvious in the dirty streets and health hazards that all Cairo inhabitants suffer from, in addition to the unhuman conditions all workers in the waste sector suffer from, and the danger of diseases and health hazards they suffer from, which connects again to the social and economic aspects.

3.1.3. The challenges and inefficiencies within the supply chain and complex stakeholders’ relationships

The challenges with the current waste management system comes from, how the waste is collected and the inefficiencies along the way, which affect all the later stages and the ability to generate a value out from the waste. The amount of municipal waste generated as per employees in the ministry of urban renewal and informal settlements is around 15,000 tons per day in Cairo (SWEEPNET 2014), of which more than half is organic waste. Without an integrated system for solid waste management, most of this waste is left in the streets for long times before it gets collected, which was not the case when the classic system in Cairo was that waste gets collected from door to door and gets sorted and recycled in the informal areas of waste collection in Cairo.

In some minority of cases, the classic door-to-door waste collection is still happening, when the classic waste collectors are the same contracted by the municipalities to collect from a certain line, and citizens agree to give them an extra amount of money than the amount they already pay over their electricity bill.
In majority of cases, the waste is taken to the street, either by the citizens themselves or through door attendants at the richer areas of the city, where waste is disposed in the streets but in certain areas of collection. This area of waste accumulation can be anywhere, like in front of a hospital or a school or a random point in a wider street. Then this accumulated waste is dispersed in the street until collected by another person or entity.

The waste is either collected by the private companies contracted by the government municipalities or by contractors of the municipalities or before that it gets dispersed by random scavengers who take the valuable items of waste and leave the rest. Each of these ways have its challenges and inefficiencies to the system.

The municipalities’ governmental entity Cairo Cleaning and Beatification Authority collects waste from the street, and most are from the shops and home wastes, in addition to building waste all accumulated in certain points of the streets, where there are garbage canisters or from the streets with workers who collect dispersed waste and clean the streets. The garbage canisters fitted in certain areas are not enough to host all the waste, also the municipalities’ cars pass one time a day or twice a day maximum in the cases where they pass daily. While in some areas, the private companies are the ones responsible for collecting waste from the street from certain points only.

During the time of accumulation, the scavengers come, tear the waste bags, and sort them in the streets, where they take valuable items and leave the rest to disperse in the street, by air or animals. The problem of random scavengers is critical in the waste issue, because they seek their living through taking the valuables out of the waste, and in return, they leave the rest to pollute the streets. Moreover, this show very well how not taking into consideration all angles of a problem can complicate the problem more, as after they do their work, the waste become less valuable to recycle and streets become polluted.

The other important player in the waste collection from streets is the independent contractors by the municipalities. The municipalities for each area select these contractors, and they take an amount of money to collect the waste from the streets and transfer them to handling stations. In return, those contractors are expected to hire a certain number of waste collectors and give them a daily wage, as the amount they take from the municipality cover for the number of waste collectors wage and all other expenses.
What seems like an organized plan is not what happens in reality, due to lack of supervision and corruption on both sides, the contractors hire less waste collection workers than what was planned and covered for in their contracts with the municipalities, in addition to giving lower wages to the workers than what is in their contracts. Which leads to waste not collected and left to accumulate in the streets, while they take all valuable items in the waste and sell for their own profit.

All the rest of the waste from the three routes of municipalities, private companies and contractors, are then transported to handling stations using small cars and medium sized cars, where they are then transferred to bigger cars and transported to landfills for dumping. Among the way many of the workers in different stage of the waste sector try to take some of the valuables in the waste to make use of for their own before they arrive to landfills.

The other route which waste go through is the house door collection, which was the main method until the privatization of waste collection happened. The process is very organized, every waste collector knows his line of service, and the collectors cannot interfere with each other’s lines. There are bids from the government municipalities for certain lines of collection, and the winner of the bid, pays an amount of money to the municipality to collect at this certain line, where he cannot collect from any other line or he can get suspended by the government. The collectors then earn their money and gain profit by taking a small fee from each house monthly, in addition to the sorting and recycling process at their informal waste collection settlements.

The challenges with the house door collection now are many. One is that the government stopped depending on these garbage collectors for some time when they contracted private companies. In addition, house owners do not want to pay an extra fee when they already pay an amount on their electricity bill. In addition to the competition over waste from the contractors, the private companies and scavengers, which make waste less valuable and not economic to collect. Because for house door collection to be economic it has to be whole and for all the houses in a certain line, or it will be a loss for the collector, who do the rest of the processes on his own with his family to generate income of the waste he collected.
3.2. Challenges to sustainable entrepreneurship in the waste sector

The significance of understanding the waste cycle and market players is two things: the first is to deepen understand the market inefficiencies and challenges in the system of waste management as a process for entrepreneurship to function within; and the second is identifying the gaps for entrepreneurial opportunities along the different stages of the cycle. As the challenges can be business opportunities for entrepreneurship to solve problems and inefficiencies within a new framework that overcomes the shortcomings of the current system.

Furthermore when analyzing the current system in reference to sustainability, the system does not provide a sustainable framework that fulfills the needs for today or will be possible to scale for the higher needs of the future, along with different social, environmental and economic issues.

3.2.1. On the social level

- The current system does not insure a uniform, fair and equitable system for collection of waste across all areas of Cairo, but the current system allows for a high degree of differences across areas, with some areas cleaner than the others depending on economical income of the residents of these areas.
- In addition, the current system does not support or help income generation or poverty elevation for the poorest of the city, but it wastes an opportunity for employment and increasing city’s resilience against poverty and crime.
- Moreover the current system does not provide a decent work status for the workers in the waste sector, wether they are formally employed or informally employed, they both work under unhuman conditions with high risks for health hazards for them and their families.
- Furthermore, the current system does take into consideration the social fabric and cultural dimension for the workers in this sector who have been working in it for decades and what are their needs to better perform their work and provide better results for all stakeholders.
- In addition, the current system put stakeholders in a competitive setting, rather than a complementary and cooperative setting to support each other’s roles towards a unified goal.
- Additionally the current system does not put into consideration the social habits and traditions for Cairo’s inhabitants in regards to waste disposal, but trying to bend these needs of the citizens towards a system that is not either convenient nor practical for the people.
3.2.2. On the environmental level

- The current system holds a serious negative effect on the environment on many levels, the simplest is the accumulation of waste in the streets of Cairo, as through the current system, the waste has to be disposed in the streets within the formal process for the next parties to start their work on the next processes. Which looking at the areas in the streets there is a serious degree of waste accumulation and dispersion in the streets, due to many problems like the timing of collection, availability of collection points, fitting and size of garbage canisters, scavenging and high amounts of waste disposed.

- In addition, the large dumping and landfilling processes are of a very negative effect to the environment, and even more damaging if not done well in the proper procedures, and with very little weight on recycling at the current system with privatized companies, the amounts being disposed to landfills in even higher and possess higher risk. With 5 official dumping sites and 12 random dumping sites, that is the end pathway of 7% of waste in landfills and between 80 to 88% openly dumped, out of the 15,000 tons daily of solid waste in Cairo (SWEEPNET 2014). This is a dangerous because the decomposition of this large amount of waste into the soil and aquifers, will lead to serious health problems on water and agriculture, which could be of a toxic effect for long years after decomposition, especially if the most proper isolation and sanitary landfilling processes are not done. When most of the waste dumped at dumping sites and landfills can be recycled or even controlled sorting and scavenging can be allowed and monitored to decrease the effect and increase the benefit especially at a developing country like Egypt (Diaz, et al. 1996). The urge to remove waste from one place in the street to another place away from inhabitants, without ensuring that this waste will be properly recycled, landfilled and decomposed to safe biological components to nature, is only accumulating a disaster for the future. That can affect water and food of inhabitants, in addition to not saving money if looked from a holistic economical view across the whole chain of the reaction, starting from waste not recycled until removal of harmful materials from the environment or paying the price for healthcare and food and water contamination. The layering and isolation processes of sanitary landfilling is a very complicated and costly process, and in a developing country like Egypt it is more challenging to provide the adequate and safest technologies, that’s why most of the waste go through open dumping, which is of a greater widely sensed effect on Cairo.
3.2.3. On the economic level

- All processes in the current system are income wasting operations rather than income generating ones, collection, transportation, dumping and landfilling are all costly processes that come from the money of the citizens and can be spent on services that are more efficient. Rather than spending on a service, that not only can self-sustain on an economic level, but also create employment and income for needing sectors of the population.

- In addition, there is a great economic loss with dumping recyclables, with constituents like paper, glass, plastics, metals, cloth, bones and organic material for composting. All these can form industrial processes with value added from creating valuable products instead of dumping and wasting money.

- Moreover, waste can create many jobs and employment for labor through entrepreneurship across the different stages of the waste lifecycle, as per the minister of Urban Renewal and Informal Settlements seven jobs can be created out of every ton of waste, so for 15,000 tons per day in Cairo, that’s approximately equals to one hundred and five thousand jobs created. Which increase when waste generation increase, and when entrepreneurship across different levels increase to innovative industries of recyclables.

- Besides the informal sector in Cairo is not only concerned with sorting, recycling and manufacturing processes, but they export materials from sorted and recycled waste either as production raw materials or products to other countries worldwide, so they generate foreign currency for the country. This shows that shifting to a more efficient system with more recycling will not only have an impact on narrow circles of stakeholders who work at the waste sector, but on a larger economic level of exports for the whole country.

- Furthermore, the waste sector can be a potential growing opportunity for small, medium and large enterprises on all levels of the chain, starting from collection to sorting then recycling, manufacturing and exporting. Different business models can be shaped to generate revenues and also close gaps in the system and integrate with each other’s, so employment and increase of income for the poorest can be created.
Chapter 4: The entrepreneurs of Cairo’s informal waste sector

4.1. Significance of the informal sector and understanding their operations

The Cairo’s informal waste sector is a unique working sector, in terms of organization, management and efficiency of achieving their business targets. They can be looked at as entrepreneurs rather than waste collectors, and their informal waste collection areas as industrial zones as well, they are completely independent and efficient with knowing the value of everything that can be considered as waste by the city’s inhabitants. They have been operating for decades, and there is much literature that discusses their work, lines of operations, and different settlements across Cairo and their history.

Looking at the Zabaleen settlement in Manshyet Nasser as the biggest and most established in terms of operations in the waste sector, the inhabitants of the area strive on waste, the live, sleep and eat where their business is. The whole family in the Zabaleen area is dependent on waste and the daily activities of the family are designed with the waste operations. As an example, a family can be living in a three levels building in addition to a roof, where the ground level is located for receiving and sorting of coming waste. The first level is for the family to live in and perform their daily activities as any other family. The second level can be for storing and packing paper, cartoon and plastic, while the third level can be for glass and metal storing and packing, with the roof for organic materials and bone drying, with a winch on its roof to carry material up and down for storing or loading on cars. The organization of sorted materials is different from a family to another depending on their operations.

Each family is responsible for a line of service in Cairo that they used to bid for through the local municipalities and divided across themselves internally as families for very long time, so either the government continued the same operations or not, every family still know which line of collection they work on. Moreover, the shifting between systems by government has affected their business model with time. In addition, some families either recycle themselves due to having capacities for machinery, or they only stop at the collection and sorting stage and they sell what they pack to bigger traders or manufacturers in the area.
The whole family work in the business, for example the father and possibly one of the older sons would collect in the morning, then after attending school if educated the rest of the sons and daughters would sort the waste with the rest. In addition to the mother who would sort the waste besides normal home charts like cooking and cleaning, they would all share in the industrial process besides anything else they do with their lives. Some of the members of the families who work in waste business have acquired high degrees like engineering and pharmacy, but they would still work in the family business besides their other study or job.

As per one of the old and established heads in the area, and someone who is very known and active in the association for waste collectors, every day the Zabaleen area receives six thousand tons of waste, three in the morning from normal collection, and three already sorted from upper Egypt and other places on Egypt from outside Cairo. Because the area is no longer a waste collection area for Cairo only as it used to be before the privatization of waste collection in 2002, but it is an industrial zone for the whole country.

Back before 2002, the Zabaleen area was enough along with the other informal areas of Cairo to collect all of the waste in Cairo and recycle most of it (Butter 2006). However, after 2002, their capacity has not increased but also decreased, and their business model started to shift from one that can do the job of serving collection in Cairo, to one that is seeking to survive in no connection to the new system of privatization.

4.2. The original business model

To understand the changes, analyzing the business model that the Zabaleen informal waste collectors adapted before the privatization of waste collection in 2002 by international companies is important, and it was as follows:

- Customer Segments: They had diversified customer segments, first segment was the people who wish to dispose their waste from home, and this was a mass segment serving all different income levels from all areas in Cairo. Second was the industrial segment who need raw materials from sorted waste directly or through middle traders, third were hotels and shops which sells ham products.
• Value Proposition: They got the job done for collecting waste from houses and streets, in addition to the convenience of door collection, as well as providing cheaper materials for industrial operations, in addition to food products for hotels and shops by raising pigs that feed on organic waste.

• Channels: The Zabaleen themselves owned the operation and collected the waste themselves directly from customers, then transported it through their owned cars, then sort it and pack it at their own houses.

• Customer Relationships: The waste collectors maintained a personal relationship with the people who they collect waste from, and people knew him in return, as the relationship was long and through generations on both sides. In addition, the personal side of business was very important when dealing with other traders and in business deals and division of business lines and industries. Because most deals were done under no legal papers, so the word of commitment and personal relationship shaped many of the operations.

• Revenue Streams: The houses gave a monthly subscription fee to the waste collectors every month for collecting waste. In addition to selling the sorted waste or further recycling depending on the dynamic price at the market for the goods every day. In addition, the selling of ham products that feed on organic waste.

• Key Resources: The key resources where access to houses for door collection and maintaining a relationship with them, people to work in the collection and sorting, transportation cars, simple machinery for compacting sorted waste, pigs to feed on organic waste, and a venue to carry out all these operations close to the area of collection.

• Key Activities: The key activities were collection of waste, sorting of waste, selling of sorted waste, raising pigs, selling food products and recycling and exporting at some cases.

• Key Partnerships: The Zabaleen needed important partnerships with the government, so they used to legally pay for the lines of collection, in addition to partnerships with bigger traders to sell their sorted waste, also the people who give them the waste supply every day, in addition to the hotels and shops to sell their food products.

• Cost Structure: The main costs of operations were on collection and transportation cars, sorting and simple recycling machinery. The cost increases if there is a more complicated recycling operation going on. As the recycling machinery can start from any figure around eighty thousand Egyptian pounds up to a million or more.
Also the cost would increase if the venue for recycling or sorting is not owned by the family, and is rented, because the rent for a room depending on size can be from ten thousand pounds per month up to eighty in case of a larger area for industrial operations.

Business Model Canvas adapted from the book Business Model Generation (Osterwalder and Pigneur 2009)

There are many challenges within this business model already, but it was capable of surviving and getting the job done, and provided revenue for the informal waste collectors.

4.3. Business model changes after privatization in 2002

The challenges increased after 2002, as many changes had to be done on the business model so that the informal waste collectors can survive the change. Changes were as follows:

- In terms of the customer segments, the customer base had been reduced because people were paying an amount of money added to their electricity bill, and did not want to pay an extra amount to the garbage collector. Some people remained to pay double for paying the government and the garbage collector, but these were few and this adds another problem for the garbage collector in terms of covering costs. In addition, a new customer segment was the private companies themselves, because they used to get the waste after being collected from the companies in the dumpsites, to be sorted and transported to their settlements.

- While in terms of channels, they started bringing sorted waste from other places outside Cairo in order to keep their business cost effective, and to overcome the lost amount due to decrease in collection.

- In addition, in terms of customer relationships and key partnerships, they started having a relation with new segment of random collectors and scavengers from Cairo streets, where the waste have been accumulating. In addition to relations with the private companies themselves, so that they get waste from them after it is collected to the dump sites, which was not economic in anyway for the government to pay for private companies to do a job that the Zabaleen were already doing.
Moreover, in terms of the revenue streams, they have lost a major revenue stream that used to cover for the collection expenses from the small amount of money they get from each house monthly, to collect the waste. In addition, the amount of waste they could collect and secure became much reduced than originally. That is why many of the business owners started bringing sorted waste work from Upper Egypt and other areas outside Cairo to recycle and trade in at the Zabaleen area.

4.4. Business model changes after swine flu in 2009

The business model for the Zabaleen had to adapt for one more time in 2009, when the government decided to slaughter all pigs after swine flu epidemic, based on a random decision that its consequences were not studied very well. Because this lead to the accumulation of organic waste in the streets because the waste collectors did not need it. The business model changed as follows:

- In terms of customer segments, they lost their hotels and shops customer base that used to buy ham products from them, and instead started to import it from outside Egypt.
- While in terms of value proposition, they lost a major value of breading and selling ham products.
- In addition, in terms of revenue streams and key activities, they have lost a very important line of business and suffered from a huge loss.
- Also in terms of the cost structure, this was a very strong impact on their cost structure, because not only it used to cover for collection expenses for organic waste, but for the whole waste collected, especially when waste was collected unsorted and they have been already suffering for enough collection after the privatization of waste collection.

The organic waste can either be composted or turned to biogas, but the informal sector at that time was not ready for this drastic change, and the government did not study what will be the impact for such change with no prior planning of alternative. The result was a huge waste accumulation, especially organic one in the street, because the whole process now became not economic.
4.5. Lessons learned from different business models and adaptation techniques

Understanding this business model and how it survived through the changes, is very important for entrepreneurs who wish to concur this field, either they were from inside the current waste industry or from outside and wish to invest in a new field for them. To understand more how the original business model can be economic and generate revenue, and why it had to change after the privatization, so that the garbage business in Zabaleen can survive, and away from efficiency of cleaning the city or not, as the government expelled them from the new system. There are some points to keep in mind when thinking of entrepreneurship on all levels including collection, sorting and recycling to succeed:

- For the collection as a process to be economic, the collection has to be close to the area of sorting, otherwise it is not economic and will not cover the costs. That is why when the garbage collectors wanted to get more business from outside Cairo, they transported only ready-sorted waste, so that it remains economic, as they cannot transport unsorted waste or it will become not cost effective.
- Also for collection to be economic, the collecting business have to collect from a whole area, and cannot collect from few houses in several streets on a scale of a large area. But collection need to be uniform and whole for a complete area to cover costs.
- Moreover, one business only should be located to collect all waste from a certain line, and waste cannot be distributed across many businesses, or different ways of collection.
- In addition, waste collection has to be from house door to ensure convenience, and on short intervals so that it insure houses do not through it away in the street and at the same time remain customers.
- Moreover, collection need to be for all the waste, organic and inorganic, because both share in making the cost of collection possible to generate revenue at the end, because each type of waste has its line of business towards recycling.

One very important entrepreneurial value that is obviously seen in the Zabaleen informal settlements is the value of innovation. They innovated new lines of products from Cairo’s waste, and they even exported it. One simple example is that they have taken out the inner stuffing of baby dippers after washing it, and mixed it with recycled cotton from recycled cloth from waste.
They created recycled cotton that they used to make cotton mattresses and cloth products, which they then export to outside after recycling and industrial process, and there are many examples.

Looking at the many lessons learned after about thirteen years of privatization, and with two more years to go for the contracts with the private companies, it is important to understand now when thinking of entrepreneurship, what can be a new formula that integrate the informal sector in the waste management framework. The informal sector has been surviving all these changes and adapting to its business model many times, the members of this sector are the key to any new change or solution for solving the waste problem, or for entrepreneurship. This is because they have the expertise of the industry, and any businessperson who have a recycling factory away from this sector, still depend on it to get his supply of waste or even trading his products.

The value for integrating this sector and providing a fair and equal opportunity for its members, will benefit all stakeholders, and will lead to a more solid system for performing business in the waste sector. It is possible to provide them with enough incentives to formalize their activities by time and to eliminate the trust issue they have with the government. By closing the loop and filling the gaps in the current system, with their participation in devising new solutions, and so some of them can either be entrepreneurs in a formal system or helping entrepreneurs coming from outside this sector to do business.

In addition, the informal areas are changing now, there is a new generation now of well-educated youth, who wish to perform their fathers’ business in a better and modernized way of new machinery and formal practice. Moreover, the capacity of the informal areas is not enough for all the new generation or amount of waste generated by Cairo, there is a problem with renting spaces from people in the area who do not own a building and wish to do business, or enlarged families who wish to separate their business.

Therefore, these are all reasons to think differently of the informal waste sector as entrepreneurs, and the best opportunity for aiding a new system. With them helping entrepreneurs to work in this sector and scale it up to be enough to hold the waste in Cairo in addition to generating employment opportunities for many youth from outside the informal sector in other areas of Cairo. Because they have the expertise and the resilience of surviving and doing business no matter how the policy or environment change around them, they are entrepreneurs and deserve to be treated as so.
Chapter 5: Industry analysis of the waste sector

5.1. PESTLE Analysis (FME 2013)

The purpose of PESTLE analysis is to understand the external environment around the waste industry, which is very important for entrepreneurs to understand when planning to enter or scale up operations to a newer area in this sector. PESTLE stands for Political, Economic, Social, Technological, Legal and Environmental factors, which when analyzed give a complete idea of the factors that shape decision making in this industry, and the ones that need to be taken into planning new ventures or ideas.

5.1.1. Political Factors

- Government Stability: One of the main challenges to investment and business is the government stability, because each minister comes with a new vision and a new way of planning work. Therefore, if the current government is going into a new system of encouraging entrepreneurship and regulator role, still when planning for a new venture or an enterprise in this sector, the entrepreneurs need to have a self-working model that is not dependent on the government support, but more reliant on the market needs and unique value proposition.

- Government Leadership and Role: There is a trend for the current government, to start taking a more regulating role for the market, than an executive role for activities on the ground. With the understanding of the government, that it cannot solve all problems by its own, and a need for partnerships with private and civil sectors. This can be a good opportunity for entrepreneurs to form business models that take into consideration the role the government want to play, with solving the problem that need to be addressed by the government.

- Environmental Entities and Regulations: The current regulation is changing to a new one being devised, where there will be an independent entity responsible for waste management and promotion of entrepreneurship in this sector, it is still a draft, and the discussion is still vague. In addition, roles and responsibilities for entities in the government working in the environment were always vague and interfering.
Therefore, when devising an entrepreneurial venture the crucial entities that need to be taken into consideration should be assessed in terms of their importance.

- **Corruption Level:** One of the main problems of the current system that it allows for a high degree of corruption, due to leaks in the contracts with private companies and lack of supervision, in addition to a system that is not self-sustaining for formal players, and does not take into consideration in formal market players. Therefore, when doing business in the waste sector, taking all stakeholders’ interests in consideration, and devising a win-win situation for all, will decrease the corruption levels to the lowest level.

- **Bureaucracy Issues:** One of the most significant elements of the Egyptian government is that it is highly bureaucratic and slow. Which should be taken into consideration when planning especially for financial projections, within the pace of operations of the government, with activities that rely on the government.

- **Social Justice:** After the latest political changes, the government is highly mentioning of social justice and helping in poverty reduction. Therefore, entrepreneurial firms that take into consideration operations that serves this purpose will be highly supported by the government and media.

### 5.1.2. Economic Factors

- **Inflation Rate:** The inflation rate was 9.5% for 2013 as per the World Bank, which reflects on the value of currency and yearly price changes. This inflation rate have to be taken in consideration when planning financial projections and value of goods and services in the future.

- **Taxes and Duties:** The government has started a tax reform, in addition to changes on banning imports of products of cultural significance, which can allow a chance for recycling businesses in this field, especially in metals, glass and plastics.

- **Exchange Rate:** The government is a trial to combat black market for foreign currency, have changed the exchange rate for the Egyptian Pound in reference to the US Dollar, and is expected to keep controlling any rapid future decent of the pound, so that it protects businesses from sudden drastic changes.
• Gross Domestic Product: The GDP growth has been 2.1% for 2013 as per the World Bank, and the government is planning for future growth for the coming years to go back to the rates before 2011. This is an opportunity for businesses growth, with encouragement of investment and employment opportunities by the government to achieve their ambitious target.

• Growth Plans: The government is seeking a growth plan with many new settlements in place across the whole country, and a new capital, which all indicate an opportunity for entrepreneurship to fill the gap during this growth, with the limited resources of the government.

• Subsidy Reform: The government started a plan for elevation of subsidies in the energy sector, which poses a threat and an opportunity at the same time, for entrepreneurship in waste to energy field, where the final product of unrecyclable waste can be entered in the process of generating energy.

5.1.3. Social Factors

• Attitudes and Beliefs: There is a change in the attitude towards a more participatory approach, where people started to belief the country’s future is their future as well, and they can either support what is useful for the country or oppose what they think harmful to their country and future.

• Education: Is becoming a more important factor in the equation, with reform for the content and discussion of what should change in order to provide better education. In addition to discussion on vocational education and a new ministry for vocational education, and price of education. These all share in shaping a better-educated workforce.

• Civil Society: There is a high trend for work by the civil society in the field of entrepreneurship and promoting it for poorer and younger sectors of the population. In addition to work in the waste sector.

• Quality of Life: After many political changes, the quality of life and will to live a better life with better services, is a very important factor in thinking of new enterprises. These new businesses should solve a problem and fill a need for the population who need a better quality of life and more convenience.
Population Growth Rates: This factor is crucial when understanding how the future will look like if we remained on the current waste management operations, the problem will increase to uncontrolled way. “Egypt’s population will reach 116 million by 2030, with urban population growing twice as rural population” (Euromonitor International 2014). Therefore understanding the growth rates in population is a key factor when planning future solutions.

5.1.4. Technological Factors

- Internet and Mobile Operators: There is an increase in the use of technology and internet users and mobile phone users, as well as smart phone users. With a fourth license for a mobile operator, and the update of internet service speeds by the government, this is an indication of the future of technology growth.
- Smart Paying Services: With several enterprises working in the field of electronic payments and electronic signature, this is a positive indication for the future of doing business operations at ease.
- Government Services Automation: This is a significant change of how the government used to offer its services, where no some services can be offered online and the government is in the process of automatic more services in the future.
- Government Financial Tracking: The government while revising the current subsidy system, and that it does not reach the most deserving of the population, is in the process of linking citizens activities with the national identification number, so that it can track income and taxes.
- Government Cards: In the process to control subsidy systems, the government has issued many electronic cards to track subsidies and eliminate losses. Examples like the bread card, the fuel card, the subsidized commodities card. All these can be used in devising incentives to be added on those cards, by new enterprises in the waste sector, when thinking of including the public in the business model if possible in some of the ideas.
5.1.5. Legal Factors

- Environmental and Waste Laws: Since the first environmental law and the establishment for a separate environmental entity in 1992, the laws has been edited many times. However, the challenge was not in the laws only, but with the application of the laws themselves in reality. Therefore studying the current laws and future projected laws is important, but understanding that the performance of government entities involved and right division of roles in the management framework will be the challenge.

- Taxation: Tax laws are very complicated and running a small or medium sized business become more complicated with the absence of experienced legal tax auditors. The importance of having a clear and uniform tax system for businesses in the waste industry is very important, in addition to tax reliefs because this is a sector that need to be encouraged and grown for the greater good.

- Legal Bodies: The complication of responsibilities of legal bodies increases for new entrants to the business sector and small entrepreneurs who do not own the enough knowledge and expertise on which entity to go to for which case.

- Legal Cases: The long length of legal cases is a major challenge, especially in business sector, when fast and clear decisions need to be made every day, and a delay may cause major economic losses.

- Health and Safety: Health and safety laws are not realized due to lack of ability for supervision by the legal government entities, in addition to ability of solving all cases. So at the end workers may work at extreme conditions although by the law they are entitled to many rights. The workers associations and unions try to mitigate this health and safety issues but they remain as a major challenge.

- Monitoring: This is a problem with scaling up of responsibilities and number of businesses under certain government entities, with no capacity for real inspection or monitoring, except when a major problem happen. Sound and enough monitoring is very important to provide a safe and equitable business environment.
5.1.6. Environmental Factors

- Infrastructure: There is no enough infrastructure to hold operations in the waste sector in an environmentally friendly manner, all operations are random, and even what was planned theoretically to function in a sound manner, was not done in reality of operations in a sound way. Examples can be the collection operations with major pollution and dispersion of waste, reaching to the open dumping and landfilling processes that are very dangerous to the environment.

- Weather: The warm weather of Cairo is not offering any challenges to the industry, but during hot months of summer with open dumping, the air in certain areas of Cairo can be full with waste smell, and in certain times of rice straw burning is more dangerous.

- Energy Availability: There is an acute energy problem, but the government have announced several plans to overcome this energy challenge in near future to encourage investment and offer energy.

- Disposal of Materials: The current disposal of materials is one of the most harmful operations to the environment, with most waste open dumped, and very small amount landfilled in old landfills, there is a high risk for leakage to the soil and underground water reservoirs.

- Ecological Consequences: Future ecological consequences of the current waste sector practice is of negative ecological consequence, because it is not coherent or sustainable. Therefore, entrepreneurship that takes into consideration ecological consequences and footprints, need to have incentives so that it becomes a wider practice.
5.2. SOWT Analysis (FME 2013)

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>▪ People with strong expertise in the waste industry.</td>
<td>▪ The government encouraging investment.</td>
</tr>
<tr>
<td>▪ Good business management abilities and support.</td>
<td>▪ Availability of capital and financing bodies.</td>
</tr>
<tr>
<td>▪ Filling a gap with good value proposition.</td>
<td>▪ Availability of experts and mentors.</td>
</tr>
<tr>
<td>▪ Availability of literature and research in waste management and recycling.</td>
<td>▪ Different opportunities for businesses across different stages of the waste cycle.</td>
</tr>
<tr>
<td>▪ Ability to formulate business plans and financial projections.</td>
<td>▪ A strong market need for entrepreneurs to solve waste problem.</td>
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<tr>
<th>Weaknesses</th>
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<tbody>
<tr>
<td>▪ Entrepreneurs from outside the informal areas will lack hands-on experience.</td>
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<tr>
<td>▪ Lack of knowledge with all stakeholders and parties involved with the waste industry.</td>
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<tr>
<td>▪ Lack of understanding for the unique nature of waste industry than other industries.</td>
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<tr>
<td>▪ Difficulty for acquiring numbers and data on quantities and prices if entering the field new, or entering a new line.</td>
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<tr>
<th>Threats</th>
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<tr>
<td>▪ Heavy investment in fields like energy, which can disrupt the recycling industry by taking all waste as a whole for incineration for RDF.</td>
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<tr>
<td>▪ Changes of governments and laws.</td>
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<tr>
<td>▪ Political instability and economic crises.</td>
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<tr>
<td>▪ Energy crises if not solved soon as stated by the government.</td>
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<tr>
<td>▪ Corruption and beneficiaries from the old waste system to fight change.</td>
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5.3. Porter’s Five Forces Model (Porter 2008)

5.3.1. Threat of substitutes

The threat is low due to the current great need in the market for business in the waste sector, rendering the industry attractive, as the window of opportunity will remain open for long period of time before a threat of substitution is ready.
5.3.2. Threat of new entrants

There are significant barriers to entry, such as access to labor with the expertise in waste sector in sorting business. Access to waste supply, access to distribution channels and capital requirements in recycling business. Government and entities responsibility barriers in the collection line of business. That is why the threat of new entrants is low and making the industry attractive.

5.3.3. Rivalry among existing firms

The rivalry level is low because there is enough waste for all competitors, it is a matter of organization, so that everyone takes a fair share. With the current system and some not successful trials by the government, the business model failed because they have put different parties on a competition mode for the same waste resources, which is not necessary and can be avoided. The growth rate of the urban population and waste production will always mean new business for the industry. There are also different and diverse lines for business in the waste sector, where some choose to concentrate on certain types of waste than the other.

5.3.4. Bargaining power of the suppliers

This depends on the line of business across the waste cycle. For collection businesses, the bargaining power of the households will be moderate because the cost will be defined and fixed from the beginning for collection. While for the sorting and recycling lines of business the bargaining power of the supplier becomes more significant going up the cycle, for sorting although the price for sorted goods will follow market prices, still availability of such sorted waste will define the price. As for recycling, it is even more threatening, because the supply chain is not under full control and there is a threat of forward integration at any point of time, when anyone can join the recycling business from downstream if was able to get the enough capital, venue and waste supply.

5.3.5. Bargaining power of buyers

There is mainly a low bargaining power for buyers, due to the need for the products across all phases of the cycle. There are industrial, agricultural and domestic need for the products either locally or internationally.
When assessing the five forces exploration, I can assume that the waste industry is attractive, with certain challenges that can be addressed through associations and unions, with other parties and the government. However, the industry itself has a good potential for growth and for maintaining attractiveness for a long period.

5.4. Industry Type (Barringer and Ireland 2012)

The waste industry is an emerging industry, with opportunities for new ventures and potential for growth and the first mover advantage will be a very important element, as there are many uncertainties, there are many opportunities for the early movers (Barringer and Ireland 2012) p.187. Similar to the case of the energy industry now in Egypt. The government wants to change the current system and encourage new businesses in new sectors, and the waste sector is full of opportunities and have proved generating revenue for informal sector for very long time.

5.5. Competition Analysis (Barringer and Ireland 2012)

Direct competition will be clear in the same waste cycle level across the same business type, and without organization between business players to divide areas and different lines of industry, it will be very challenging to survive and generate revenue. That is why direct competition should be kept to a minimum level and cooperation in this early stage of the industry should be the key factor, as the market is big enough for all players. While activities like random scavenging should be eliminated with integration of people working in informal activities in the formal system.

Indirect competition will be from other sectors that compete over the waste cycle components and may disrupt the value chain of upstream business models, such as paper, glass and high energy usage industries like cement. The entrepreneurs need to closely monitor indirect competition and drag into the formal line of their business.

Future competition can arise from many players inside the industry or outside it, either by acquiring new lines of business, or by directly performing competitive activities like collection or recycling.
Chapter 6: Entrepreneurship ecosystem of the waste sector

Understanding and analyzing the current eco-system and the challenges within is very important when planning and looking at mechanisms to support entrepreneurship at the waste sector. This is important for an entrepreneur personally or entities who wish to support one. Some of the challenges in the entrepreneurship at the waste sector are on the macro-level, in terms of legislative framework, laws, management framework, government entities involved, political will and macro-economic status. While other challenges are on the mid-level, in terms of support institutions, non-governmental organizations, markets and finances. However, some other challenges are on the micro-level in terms of skills, training, education and workforce.

6.1. The ecosystem opportunities and challenges

Below are some of the aspects of the entrepreneurship eco-system in waste sector, including strengths that need to be built upon and weaknesses that need to be overcome:

1. Accessible Markets: For each level of the waste industry, the market is accessible either inside or outside Egypt. For the collection phase, market is available for the next sorting phase, and for the sorting phase market is open for the recycling phase, and for the recycling phase many markets are accessible for the products, either industrial or agricultural products, inside the country or for exporting.

2. Capital Sources, Funding and Finance: Sources of capital and finance is available for the waste industry, it is a matter of conquering the other challenges for investors to be able to invest money, either from the waste industry players themselves or outside. Investors from outside Egypt seek to invest in this sector, and several offers have been offered for the government with several industries, because of the opportunity in high supply for waste as a raw material and the problem of waste accumulation in the streets. The government need to support loans in this sector, and promote it through banks and social solidarity fund, so that there is an advantage for entrepreneurs seeking capital at this sector.
3. Human Capital Workforce: This sector is very fortunate with the presence of human capital workforce, either through the informal sector that is full of qualified and experienced labor or through youth in poor neighborhoods who will wish to have an employment opportunity in this sector, if the revenue and income is enough for them. There is a challenge with some other industries where qualified labor is a challenge for upscaling, while this is not the case for the waste sector, as the base for upscaling can be the informal sector workers who used to work in this field for decades.

4. Regulatory Framework and Policy: The current regulatory framework and policy is a main challenge for the entrepreneurship in the waste sector. The current framework does not offer an integrated policy to support entrepreneurship nor roles of different entities and stakeholders to help establishments of businesses in the waste sectors at different phases of waste supply chain. In addition, the current policy have multiple governmental entities involved, that sometimes their work is contradicting, which is very challenging for entrepreneurship to work through.

Moreover, there is a challenge with the mindset for thinking as a whole on the waste problems, and applying a win-win approach, when thinking of incentives for informal sector and tax legislation for waste industry businesses.

5. Public Infrastructure: There is a moderate degree of infrastructure available for transportation, but it is still challenging with the current roads infrastructure to establish industries around waste collection areas in Cairo, when the roads are very central and crowded, which waste money in terms of time and efficiency. In addition, the infrastructure for handling stations, landfills and dumpsites is very weak, and is not sustainable in terms of business, environmental or social friendliness. There is no current infrastructure for modern sorting areas, recycling plants, machinery plants or waste industrial zones, the only available example are the informal settlements, which is far from ideal for all workers in the field.
6. **Education and Training**: There is no vocational training in the waste field, which makes all workers in this sector knowledgeable by experience only, which does not offer the best practices in terms of health and hygiene or in terms of environmental conservation. In addition, the solid waste management study is part of environmental engineering study, which is not very wide spread across all Egyptian universities, similar to how entrepreneurship study is under business study, and most of the Egyptian universities does not have entrepreneurship as a separate branch. There is a need for adding more into the education system for waste management entrepreneurship at different education levels, due to the importance of this industry to the economy of a developing country like Egypt, with significant amount of waste that can be turned to great amount of opportunities.

7. **Innovation, Research and Development**: The problem with research and development, is across many industries in Egypt, and for the waste sector, the narrow trials by some research units are not enough to innovate new localized recycling techniques that can solve waste problems for municipal waste or related to construction and agricultural waste as well. There has to be an institutional interest by major institutes and the government for research and development in the waste field, and to innovate new ways and techniques for work on all phases of waste cycle, and in understanding how entrepreneurship can solve the problems by innovative ways, which create opportunities out of challenges.

8. **Major Universities and Educational Institutions**: The role of universities and educational institutions is very important in promoting entrepreneurship in waste management, and currently only few of them have an entrepreneurship support units or environmental centers that can educate and promote entrepreneurship in the waste sector.

9. **Mentors Advisors Support Systems**: This aspect is currently flourishing in Egypt, with many incubators and entrepreneurship support projects by private companies or non-governmental organizations, where access to mentors and experiences of motivated entrepreneurs is possible. However, these initiatives should start to see the value in entrepreneurship in the waste sector in Egypt, and focus on getting mentors and advisors from successful projects worldwide in the waste industry.
10. Cultural Support: The cultural support is very important when looking at the waste industry, and there is currently weak cultural support for workers in this field. How the people, media and government are looking at persons working in this sector is the key. The cultural support is very significant in promoting entrepreneurship for either young people who would form small enterprises to work on certain level of the waste cycle, or for rich investors who would invest a lot of money to do business at this sector. Both would need acknowledgment of the importance of their role and respect to their industry, and that they are not any less but the same as any workers in any other sector of industry. In addition to the need for general cultural support for entrepreneurship and risk taking, instead of normal stable jobs, which is the general current culture for stability.

11. Quality of Life: It is debatable if the quality of life have an impact on entrepreneurship, since entrepreneurship example are on both sides. However, it can be seen as an opportunity in Egypt, where there is many slums and poor areas, that entrepreneurship in the waste sector can help elevate their quality of life, by generating revenue through waste business. In a developing country and a very busy city like Cairo quality of life can be a motive for starting a business, and with the window of opportunity for waste is currently open, it is very important to link it to raising the quality of life for certain groups in the community.

12. Macro-economic Conditions: Egypt is a developing country with major problems on the macro-economic level, which can be seen as an opportunity to move the country from the solver and executive role to the regulator role in the waste industry. With this macro-economic conditions, it make more sense for the government, to stop paying money for a job not done by international private companies, and start investing in promoting entrepreneurship in the waste industry, that can save the government money and solve a long persistent problem. Entrepreneurship can boost the economic conditions for a country by economic growth, job creation and poverty reduction (Aspen Network of Development Entrepreneurs 2013)
13. Public Leaders: There are few known public leaders in the business sector that promote entrepreneurship, but very few at the waste sector. Moreover, there is a need for support units, media and the government to highlight the successful leaders that can promote entrepreneurship in general and especially in the waste industry. This is very important to have a supporting culture and provide mentorship and support for individuals who wish to start their own business in the waste sector.

14. Government Support: The current government support is not focused on entrepreneurship for small and medium sized companies, rather all legislative and institutional support is directed towards huge investments, while small and medium sized can form a very important entrepreneurial opportunity for economic growth and social justice mechanisms. In addition, there is no government institutions directly allocated to support entrepreneurship, and there is no incentives in the waste sector in particular at all. Moreover, there is no collective government effort to support green businesses, but different entities in the government might function in adversely to each other’s.

15. Success Stories: There are many success stories that can promote entrepreneurship in the waste sector, starting from the Zabaleen model that survived in very little support and with opposition from the government informally. In addition, to several non-governmental organizations, which worked in the waste sector for decades, helping in establishments of models for support of poor families through income from waste business and recycling. In addition, some private companies survived working in the waste recycling, regardless of the weak support, and unstable conditions that the country passed through.

These success stories are motivating, and prove that entrepreneurship is possible in this sector, and that even through the most unwelcoming conditions, doing business was possible, so it can be possible when better support conditions are put in place. In addition to places that entrepreneurs can learn from their experience and seek support from in this field.
16. Knowledgeable People: Egypt is full of experts and knowledgeable people in the entrepreneurship field and the waste field across many levels of the waste sector, like professors in universities, private sector business people, informal sector workers, non-governmental sector workers, practitioners worked at the public sector. Seeking people with experience and knowledge at this field is possible and easier in comparison to other competitive old established sectors of business. There are many people who work on promoting entrepreneurship and many others who worked on the case of waste management in Egypt, and both have the knowledge that entrepreneurs will be in need for when starting businesses in waste sector.

17. Nonprofits and Industrial Associations: Not for profit organizations working at entrepreneurship and waste sector are many, and they are diverse and welcoming to individuals seeking to meet or get support from them. There are nonprofits, which work on promoting entrepreneurship and incubating innovative ideas or ideas with a social dimension. While there are others who work in the waste field with workers in the industry or with activities that are concerned with waste and recycling, and some generate revenue from these activities to pay for their other activities. In addition to the association for waste collectors, which is very important when dealing with waste collectors and their issues. Moreover, many business, investors and industrial associations that can be found and joined for support and sharing experiences.

18. Geographic Locations: There are not many locations that joins entrepreneurs together in general or in the field of waste, like the silicon valley for example, but there are few hubs for entrepreneurs to seek support and mentorship, through incubators and accelerators. The only location with many working at the same field of waste business is the informal waste settlements, as all the people who live at the same area work at the same field, which is useful in terms of the industry coopetition and sharing of information and best practices.
19. Formal and Informal Groups that link entrepreneurs: Entrepreneurship hubs, incubators and accelerators managed by venture capitalists or non-governmental organizations, link entrepreneurs together and let them share information and network together on several occasions and for different reasons. This informal networking is the key to linkages for new ventures and innovative ideas. While for the waste industry the waste collectors association and environmental events link people who work at the waste sector, either on the development side or on the business side. However, a need for formal groups to link entrepreneurs in the waste sector is needed for them to grow and form stronger front to tackle the challenges they face.

20. Venture Oriented Professionals: This is a very scarce type of resource to be found in the Egyptian atmosphere, where businesses are mostly dependent on their internal employees. Although some individual consultants are available and companies that offer consultancy are available too, but it is not widely practiced on the small and medium sized business sector due to financial constraints and also lack of availability of individual consultants who are ready to help in the market.

21. Local Potential Customers: Local potential customers are available to support the businesses and operations of small and medium sized enterprises who wish to expand, but need the flexibility of local customers in terms of payments and supplies. The waste sector is connected with other markets and middle traders and brokers offer flexibility in terms of time and money when dealing with small businesses in the waste sector, and there is potential for more local and flexible customers.

22. Reliable Data: One of the most important aspects of business making is having reliable data so that assumptions for feasibility can be based on. In Egypt at some sectors, in general, this is hard to have, and in the waste sector, this is harder and is a challenge to entrepreneurship that entrepreneurs need to function within having less accurate and reliable data. For example, the date on waste generated, constitution and prices will vary from one study to another, as well as from an area of study to the other. Therefore, entrepreneurs need to do market research studies at the scope and area of their business.
6.2. Opportunities for Entrepreneurship

The opportunities for entrepreneurship lie across all the stages of the waste cycle, starting from pre-collection with innovative businesses in containers and waste separation bags, across collection stage with companies that organize fees and incentives between citizens and the government, to recycling businesses in every different waste recyclable material. In addition to post recycling businesses for exporting and industrialization of raw materials from recycling. Besides, business opportunities for aiding sectors like transportation, information technology, software and machinery.

The waste sector’s eco-system is full of incentives for entrepreneurship in many aspects that need to build upon, as well as challenges that need to be addressed for the eco-system to be welcoming to entrepreneurship in the waste sector. Some of the challenges are concerned with entrepreneurship in general at any sector, while other are only part of the challenges at the waste sector in particular. While some are challenges for both like the cultural support, where there is challenges with the cultural support for entrepreneurship in general and at the same time for working in the waste sector. Understanding all these by the entrepreneur is a key to growth in this field when taking all challenges as opportunities for filling a need and solving a problem.
Chapter 7: Assessment of the solutions proposed by the government

7.1. Entrepreneurship in the draft for National Solid Waste Management Policy

Private sector have been mentioned at the new national solid waste management policy draft at several occasions. However, the term entrepreneurship was not mentioned at all, but private sector term can be enough to indicate the same meaning.

When the policy was discussing the economic objectives, it mentioned “Expanding public private partnerships and incentivizing small and medium enterprises participation”. In addition to when discussing a new solid waste management law in policy action 1.1, the policy mentioned “Establishing mechanisms to guarantee fair competition among private investors”. While in discussing policy action 1.5 about discussing participation in solid waste management planning, it included private sector as one of the stakeholders. In addition when discussing developing strategies for special wastes in policy action 1.6, the policy mentioned, “Supporting the private sector opportunities through investment promotion programs”. While in policy action 3.1, discussing stakeholder specific capacity building programs, the policy mentioned private companies and small and medium sized enterprises for capacity building. In addition, at policy number 4, which stated, “Data related to SWM will be systematically and transparently collected and shared” it mentioned private sector participation in the data process. While when discussing policy action 6.1 the policy stated, “Develop local operator/business models to improve efficiency of service provision”

The new policy draft addresses many of the current challenges and place an importance for the private sector, and encourage businesses on all levels in the solid waste management system. Still it is a draft, and the law itself with the new entity for solid waste management is not yet formal. In addition to challenges with uniform practices towards common vision between the government entities involved. Will the whole government aim at one direction, by the same vision and mission, or it will be challenging when different entities of the government judge by different values.
As an example for the possibility of contradicting visions, there is a completely different approach when thinking of waste entrepreneurship as a way to elevate poverty and generate revenue for different business models across the chain of waste supply chain. While on the other hand, encouraging waste to energy technologies that generate refuse derived fuel (RDF), while both are mentioned at the policy, and the only criteria for RDF is financial feasibility.

Which entity will decide if there is a contradicting opinion, will it be the ministry of environmental affairs or the ministry of urban renewal and informal settlements or the ministry of industry? RDF and waste to energy technologies are very important for waste that are at the end of the chain not recyclable and should be landfilled. However, if waste to energy technology was used on recyclable waste material, even if it proved financial feasibility on the short run, it is not sustainable on the long run. Because it eliminate the value of employment opportunities, business generation and revenues from the sorted and recycled products, which all can be more feasible on the longer term when assessing sustainability of waste management.

7.2. Pilot projects for new policy implementation and creating entrepreneurship opportunities

7.2.1. Giza

The aim of the Giza pilot project was to source segregate waste from the houses into two categories organic and inorganic by the house owners, then hand to small companies formed by youth to collect, sort then sell the product and generate revenue. The pilot was a good learning experience to see why this business model failed.

There was a competition problem within the current system of waste management, because contractors from the localities are competing with the small newly formed business over the waste, which make the waste collected not economic to cover costs and generate revenue.

Another factor was the commitment of households to sort waste at home and finding the enough incentives for them to continue the practice. The importance of sorting is in providing safe non-carcinogenic organic waste for composting, so that it is not contaminated and reaches soil as so.
7.2.2. Port Said

This is an ongoing new project to devise a model for integrated waste management system, so that its success can be copied in other locations across Egypt like Cairo.

In this model, they have controlled all the chain and eliminated competition, by integrating the old contractors, informal workers and formal workers in one system to form companies and generate revenue for them. It is still early to judge the experiment, but it has taken into consideration the lessons learned from the Giza trial.

In the new model, small companies formed by youth from the close neighborhoods collect the waste from the house door and not from the streets. In addition to source segregation from houses sorted into two categories inorganic and organic. For the inorganic waste, it is sorted in handling stations then recycled, while for the organic waste it is transported to compost or biogas facility.

The households pay a fair amount for the service and the government provide support, cars and machinery for entrepreneurs in the waste sector. In addition, the households will be rewarded with points on their commodities subsidy cards as an incentive if they continue to source segregate.

7.2.3. Badr City

This is a plan to formalize part of the informal sector activities, by creating a formal industrial zone for workers in the informal sector, where they can invest in getting a venue and put their machinery in it, with the support of the government in Badr City. The industrial zone phase one can hold hundred recycling units.

There is an initial interest from the informal sector workers, but they are inquiring about the terms of usage, rent, taxes and costs to revenues. There is interest to invest from younger generations who need a new space outside their informal area of operations, also there is interest from older generation who wish to expand and invest in new machinery or lines of business.

This model will test the ability of informal sector to formalize part of their activities for the first time, with taxes and everything else they need to pay for the government. While taxes remain their main concern, because they are afraid that the government, ask them for taxes retroactively on their past business, after they know how much they gain now formally.
Chapter 8: Conclusion & Recommendations

The current system after practical trial is not successful, and there has been discussions on what a new system should look like by different stakeholders. A new system should overcome the challenges of the current system including the complexity between entities and laws, in addition to clearer defined role for the government.

Entrepreneurship in Egypt in general is within the focus of different stakeholders, and entrepreneurship ecosystem is getting better than before, with several opportunities in the waste sector. The early diggers in this field will gain the most while the industry is in the growth phase and the need for investment is large.

Entrepreneurship support and integration of informal sector is the key to devising a sustainable and feasible solid waste management framework. In addition, for such framework with entrepreneurship as its most important component to succeed there are important points to take into consideration:

- The solid waste management system need to planned and executed in integration between all government entities involved, including different ministries and local government entities like the municipalities. One entity only should be responsible for all waste activities, with full delegation and complete capacities.
- Entrepreneurship opportunities can be created and supported across all the levels of the waste cycle, starting from collection to sorting and recycling, for both organic and inorganic waste.
- Each entrepreneurial opportunity on every level, is different in terms of its industry analysis matrix, due to the difference in operations, and the background of the entrepreneur and the management team.
- Organic material of waste is close to 60% of the waste constituents and the line of business in composting is very crucial in maintaining value for waste, along with other known recycling lines like plastics and metals.
Source segregation is very important in providing clean and uncontaminated organic waste for composting, and according to the ministry of urban renewal and informal settlements there are currently 63 composting factories in Egypt that are able to receive compost material.

For people to source segregate, they need to receive incentives that encourage them to do so for prolonged times, the amount of incentives can be studied by pilot project to define its economic feasibility and exact amount.

For entrepreneurship to succeed it need to control the whole supply chain for whichever business, complex competition along the supply chain cannot produce an economic business model.

For entrepreneurship to succeed in the waste sector, it need to involve the informal sector in any system, either on the collection level or the recycling level, securing stable supplies in crucial to the business.

For informal sector to formalize their activity and help entrepreneurship entering the sector, they need to have the enough financial and stability incentives, and one of the ideas to guarantee their commitment and full work is to give them shares in new companies entering the sector, as per their own suggestion.

The informal sector is a key player in the entrepreneurship system, because its members are the ones who own the expertise and networks to making business in this sector.

A win-win situation is necessary between informal sector and the government, because if the mindset of the government did not change for about the role and importance of the informal sector, no stable entrepreneurship will survive, in addition to not solving the waste problem.

Support for small entrepreneurs and small and medium sized enterprises, is the key to providing new job opportunities for local youth at each area through waste entrepreneurship. Which can decrease poverty and increase quality of life for youth, in addition to removing a burden from the government side. That is why support funds should be better directed to smaller companies, than rich investors who need different type of macro level support.
• Encouragement and incentives schemes need to be given by the government for private companies that seek investment in the waste sector or do partnerships with other stakeholders, as well as small and medium new enterprises that enters the market, examples can be tax cuts and lower loan interests.

• There are many experiences to learn from when making decisions regarding waste sector and the stakeholders involved. Therefore mapping of all different stakeholders and participation of most of them, will lead to a buy in of different parties and sustainability of the solution, because it took all stakeholders’ interests in place.

• Political factors may play a very important part in the stability of a new integrated framework. Therefore, when devising a new system it have to be designed, to survive independently on which government or minister will be in place at the future, which is a key factor in promoting entrepreneurship and attracting investment.

Developing a sustainable approach towards thinking of the problems that face our cities is necessary to devise long-term solutions as well as involving the different stakeholders. Entrepreneurship that solves problems and create better social, environmental and economic future for the citizens is essential to be supported by all stakeholders.

Entrepreneurship can overcome the current challenges, and reach the untapped potential market in the waste sector to solve the main waste problem. The ability of entrepreneurs to function in this sector is dependent on their ability to read and analyze the current system, and find the opportunities for growth rather than opposing or fighting other stakeholders. Same for the government that need to understand and respect openly the needs values of different stakeholders.

It is normal that all stakeholders seek their own interests, when the role of sustainability is to devise a system where all stakeholders’ interests are in harmony for the greater good, and economic, social and environmental aspects taken into consideration. Where the ability to see the big picture, and the connection between seemingly unrelated things and ideas to create innovation that solve problems (Morris, Kuratko and Covin 2010), is the role of entrepreneurship.
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Appendices:

Appendix 1: IRB Approval

Institutional Review Board The American University in Cairo AUC Avenue, P.O. Box 74 New Cairo 11835, Egypt. tel 20.2.2615.1000 fax 20.2.27957565 Email: aucirb@aucegypt.edu

CASE #2014-2015-68
To: John Estephanous
Cc: Hakan Uraz
From: Atta Gebril, Chair of the IRB
Date: Jan. 22, 2015
Re: Approval of study

This is to inform you that I reviewed your revised research proposal entitled “Solving the city problems through entrepreneurship: Proposing a sustainable solution for the waste problem in Cairo,” and determined that it required consultation with the IRB under the "expedited" heading. As you are aware, the members of the IRB suggested certain revisions to the original proposal, but your new version addresses these concerns successfully. The revised proposal used appropriate procedures to minimize risks to human subjects and that adequate provision was made for confidentiality and data anonymity of participants in any published record. I believe you will also make adequate provision for obtaining informed consent of the participants.

Please note that IRB approval does not automatically ensure approval by CAPMAS, an Egyptian government agency responsible for approving some types of off-campus research. CAPMAS issues are handled at AUC by the office of the University Counsellor, Dr. Amr Salama. The IRB is not in a position to offer any opinion on CAPMAS issues, and takes no responsibility for obtaining CAPMAS approval.

This approval is valid for only one year. In case you have not finished data collection within a year, you need to apply for an extension.

Thank you and good luck.

Dr. Atta Gebril
IRB chair, The American University in Cairo
2046 HUSS Building
T: 02-26151919
Email: agebril@aucegypt.edu
إستمارة موافقة مسبقة للمشاركة في دراسة بحثية

عنوان البحث : ( نحو إيجاد حلول مستدامة لمشكلة المخلفات بالمدينة)

الباحث الرئيسي: ( جون أسطفانوس و حسين بكري)
 البريد الإلكتروني: john.estephanous@aucegypt.edu / husseinbakry@aucegypt.edu
 الهاتف: 012 27607622 / 01003551233

انت مدعو للمشاركة في دراسة بحثية عن إيجاد حلول مستدامة لمشكلة المخلفات بالمدينة.

هدف الدراسة هو فهم التحديات والمعوقات المتعلقة بإدارة المخلفات واقترح حلول بديلة من خلال فرض أعمال تستفيد من المخلفات بالمدينة.

نتائج البحث ستنشر في رسالة الماجستير للباحثين.

المدة المتوقعة للمشاركة في هذا البحث هي فترة مقابلة الشخصية فقط ولا يتطلب مجهود أو وقت إضافي بعدها.

إجراءات الدراسة: تشتمل على مقابلة شخصية والإجابة على أسئلة الباحث.

المخاطر المتوقعة من المشاركة في هذه الدراسة: لا يوجد مخاطر بدنية أو نفسية متوقعة عند المشاركة.

الإسناد المتوقعة من المشاركة في الدراسة: الاستناد عامة للمجتمع والمشاركة طواعية ولا يوجد أي أموال أو خدمات خاصة للمشاركين والمشاركة سوف تخدم المصلحة العامة لكل ساكن المدينة.

السرية واحترام الخصوصية: المعلومات التي ستندلي بها في هذا البحث سوف تكون سرية.

" أي أسئلة متعلقة بهذه الدراسة أو حقوق المشاركين فيها أو عند حدوث أي أصابة ناتجة عن هذه المشاركة يجب أن توجه إلى (جون أسطفانوس 01227607622 / حسين بكري 01003551233)

إن المشاركة في هذه الدراسة ما هي إلا عمل تطوعي. حيث أن الامتناع عن المشاركة لايتضمن أي عقوبات أو فقدان أي مزايا تحق لك. ويمكنك أيضًا التوقف عن المشاركة في أي وقت من دون عقوبة أو فقدان لهذه المزايا.

الإمضاء: ..................................................

اسم المشارك : ...................................................

التاريخ : ......./................/..............
Appendix 3: Research Semi-structured Interview Questions

1. May you please give us more information about the institution/company/NGO you work for? Examples can be mission of your organization and type of projects and activities you hold.
2. What do you think of the current waste management system? What are the main positives and drawbacks? How does the current waste management policy affect the efficiency of waste management in Cairo?
3. Are you aware of the National Solid Waste Management Programme being pushed by the government now? What do you know about it?
4. What do you think is a new reform or an idea for a solution that can increase the efficiency of the current system and solve the waste problem on Cairo streets? (is it a legislative/regulatory/implementation problem?)
5. There have been a number of changes in waste management policy. What in your opinion, were the biggest mistakes made in past/current policies? Biggest successes? How did they affect your institution/business/NGO’s activity?
6. Do you think there has been adequate consideration for the informal sector’s role in the SWM of Cairo in past/current/proposed policy? How so?
7. What should a new policy directive contain in order to make the current waste management system in the city better?
8. What are the biggest opportunities for startups and businesses in the city’s waste management system? What would a creative viable business model look like?
9. What are the biggest barriers?
10. What are the support mechanisms needed to make business models viable and attractive for investment?
11. What are the skills needed for startups and new businesses entering this kind of market?
12. Who are the important parties and stakeholders involved in the waste management current business model across the whole chain? (Is the informal sector one of them?)
13. What are advantages and disadvantages of integrating/upgrading the informal sector? What incentives would you put in place to formalize its activity?
14. Do you have further information that you would like to add? Are there any questions that you were expecting to be asked to you and were not asked?