

# Inclusion of Waste Collectors in Brazil

A posteriori study of cooperative interventions



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## **Abstract**

In developing countries the informal waste collectors provide important social, environmental, and economic services to society, but are often not recognized nor compensated for the work. This research paper addresses the importance of the integration of informal waste collectors in waste management systems. This phenomenon is especially relevant in Brazil with a comprehensive urban solid waste law enacted in 2010 that promotes the integration of informal waste collectors, selective collection, and reverse logistics, among others. With a decentralized management, municipalities are the responsible executors of waste management. In the implementation of the legal framework, there are practical obstacles that still need to be overcome, such as engagement from all stakeholders and adequate compensation for services by sectorial and industrial sectors, corruption and lack of institutional capacity.

This paper, a posteriori evaluation, discusses the integration of the informal sector of waste collectors in Brazil as a mean to improve waste management and poverty reduction resulting in greater social, environmental and economic benefits to society, the key cornerstones to sustainable development. By applying an analytical framework and the rapid assessment tool InteRa to a number of cooperatives in the South Eastern region of Brazil, and interviewing key stakeholders, the current situation in Brazil is brought to light.

**Keywords:** Integration, Informal sector, Waste collectors

## **Executive Summary**

Brazil is the 5<sup>th</sup> economy in the world and has experienced considerable economic growth in the last few decades. While there is a growing middleclass, over 21.7% of the population still lives in poverty. The growing Brazilian middle class is identified as a new emerging market and potential consumers who are eager to increase their consumption, resulting in increased waste generation. This paper was written during a turbulent period in Brazil with large-scale demonstrations in most cities across the country, where millions of people expressed their anger and frustration towards the government's mismanagement of public funds, corruption scandals and extravagant spending for the upcoming international events of the World Cup in 2014 and Olympic Games in 2016. People are demanding more investments for and improved educational and health care services.

Literature reveals that recycling of urban solid waste can be considered a new platform for sustainable development, since it can achieve positive economic, social and environmental results when the right conditions are in place. It is important that the discussion and public awareness are raised in the context of Brazil.

Over a period of two decades, Brazil embarked on a process of developing its waste management framework and a new National Law for Urban Solid Waste was enacted in 2010. The law has been widely recognized for its holistic approach including selective collection, reverse logistics putting the producers, importers and distributors responsible for their waste generation, and, more specifically, for its integration of informal waste collectors. The new law has a strong element of social inclusion of waste collectors where the municipalities, who are responsible for waste management, must give priority to cooperatives. International studies show that the informal waste collectors often operate in precarious and hazardous conditions, where they collect, separate and sell the recyclable waste. These studies also show that integration of informal waste collectors into cooperatives and to the formal waste management system can increase the recycling rates. The Ministry of Environment, responsible for the execution of the new law, has conducted studies on how waste cooperatives can be duly compensated for the various services they provide to society, in order to provide sustainable solutions for the cooperatives.

This thesis sheds light on how the inclusion and integration of informal waste collectors to the municipal waste management system has worked in Brazil. By doing so, this study contributes to an increased understanding of challenges and opportunities for future developments and interventions. Three complementary research questions have guided this study. These are: (1) What are generally recognized measures for a successful integration of informal waste collectors? (2) What measures have been taken in Brazil to integrate the informal waste collectors, and what is the present situation? (3) What social, economic and environmental effects on society at large have been found from the integration of waste collectors in Brazil?

The informal waste collectors and the intermediaries work as micro-entrepreneurs, organized into various forms, such as cooperatives, involved in a string of activities where waste is collected, sold onwards, and eventually reach the formal industry for recyclables. By collection, sorting and selling waste, the informal sector therefore contributes to the handling of a potential community problem. The informal system complements the formal that would not be sufficient by itself. When not organized properly, the intermediaries reap the large value while the collectors only receive a small return.

In developed nations, waste management is increasingly recognized as an environmental concern as well as the need for resource conservation. This ignites the great interest in

recycling. In developing countries, on the other hand, recycling is still primarily associated with economic needs, although the environmental importance is acknowledged.

There is no consensus on the numbers of waste collectors in Brazil, ranging from 400,000 to 1 million, where 10-20% are members of cooperatives and considered to be “formal collectors”. Brazil’s present situation, when 90% of its informal waste collectors are still not integrated into the formal sector, can be seen as little progress and market failure, due to an inadequate waste management system where huge amounts of resources are lost.

Brazil is facing a challenging situation of overfilled dumps and landfills where most of the urban solid waste is destined. Currently, only 2.4% of regularly collected waste is recycled through selective collection. Provided a number of policy instruments and market conditions were in place, and if all recyclable waste was recycled, the resources recovered from the waste could potentially constitute a yearly revenue of BRL 8 billion (EUR 2.6 billion) to the economy. Instead it is contributing to environmental degradation, such as land degradation, global warming, water pollution, air pollution, among others.

To address the objective and research questions, an analytical framework and its rapid assessment tool called “Integration Radar” (‘InteRa’), for integrating the informal recycling sector in waste and resource management systems in developing countries was used in this study. This framework was recently developed by academics, practitioners and workers with support from the International Solid Waste Association (ISWA). The framework takes four interfaces between the informal recycling sector and its surrounding environment into consideration, including access to waste, material and value chain, social acceptance, and organizational empowerment, where a holistic approach for an increased integration of waste collectors is used.

For this study, the research included a literature review of articles, reports and books, and interviews with the company Tetra Pak’s office in Brazil and government officials in Brasilia. In addition, nine cooperatives were interviewed during the months of July and August 2013 in the cities of Rio de Janeiro, Itú, Campinas, and São Paulo, located in the South Eastern region of Brazil. Most of the cooperatives selected have been operational for a decade, have reached a level of formal organization and could provide a historical perspective of the development in Brazil. For the field interviews with cooperatives, the ‘InteRa’ tool was applied. The issues in the questionnaire were also used when interviewing representatives from the company and other respondents.

Studies show that for a successful integration of the informal waste collectors, interventions must recognize the organizational and empowerment interface which can be seen as an enabling condition for an integration to take place, the social interface where waste collectors and their work are recognized and accepted by society, the waste management interface where the role of the collectors in the formal waste management system is acknowledged, and finally the material and value chain interface where the collectors have access to waste in a controlled manner. These generally recognized “musts” can be found in the framework used as a tool for this study.

It is concluded that it is imperative that the time aspect is carefully considered in the progression of the waste management system. The framework is neither static nor one-dimensional, but a progressive and evolving work where an element such as financial sustainability must be especially considered which is a challenge in the Brazilian experience.

Waste collectors are highly encouraged to organize themselves into formalized cooperatives as a first step, and forming networks of cooperatives as a second step. This can bring improved working conditions, larger volumes of waste that can be sold directly to the recycling industry for better return, and better access to funds that can help them scale up their businesses by entering into a higher level of the recycling chain. However, formalizing into cooperatives may not necessarily be the solution since cooperatives still face many challenges, such as operational and managerial capacity.

Brazil has taken important steps to develop a comprehensive legal framework. Even though it is too early to make a proper evaluation of the impact of the new National Law, it can still be concluded that the Law constitutes a platform for the integration and promotion of waste collectors to cooperatives with positive environmental, social and economic results.

It was found that the organizational development of cooperatives was largely achieved with the support of NGOs, Government, and corporations. Although much remains to be done, and challenges of corruption and lack of capacity are still obstacles, a key conclusion is that significant improvements have already been achieved.

From an economic perspective, it is concluded that integration of informal collectors into cooperatives and to networks of cooperatives provides economic and environmental benefits to society through tax revenues, less waste to inadequate disposal sites, among others. But after consultations with several stakeholders, it became clear that it is too early to provide more information about specific impacts, since the new legal framework is still in its early stage of implementation across the country.

There is an on-going debate about the efficiency of cooperatives from an environmental and economic perspective compared to a modern Western style technological approach to waste management. Few studies have been found to do this comparison, thus little is known. However, in a country like Brazil where poverty, urbanization and unemployment prevail, more socially inclusive solutions must be considered. This study therefore concludes that the Brazilian government is taking the correct steps by investing in the integration of waste collectors at this stage, and with the aim to continuously evaluate the performance of the applied legal framework.

Specific recommendations to policy makers are to (1) find flexible mechanisms for gradual integration of informal waste collectors as implementation of the legal framework continues, recognizing that this group of people often needs more time to adapt, and (2) to develop specific data-capturing guidelines where a homogenous measuring system would support improved future interventions and investments. This is additionally an important tool for the Brazilian government to evaluate their efforts of attaining the targets of social inclusion and sustainable waste management.

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## Abbreviations

Abrelpe	Associação Brasileira de Empresas de Limpeza Pública e Resíduos Especiais (Brazilian Association of Public Cleaning and Special Residues Companies)
BRICS	Brazil, Russia, India, China and South Africa
Cempre	Compromisso Empresarial para a Reciclagem (Corporate Commitment to Recycling)
Comlurb	Companhia Municipal de Limpeza Urbana (Municipal Company for Urban Cleaning)
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Society for International Cooperation)
HDI	Human Development Index
INSS	Instituto Nacional de Seguro Social (National Institute of Social Security)
InteRa	Integration Radar
IPEA	Instituto de Pesquisa Econômica Aplicada (National Institute of Applied Economics)
IPTU	Imposto Predial Territorial Urbano (Urban Property and Territorial Tax)
MDG	Millennium Development Goals
MNCR	Movimento Nacional dos Catadores de Materiais Recicláveis (National Movement of Recyclable Material Collectors)
NGO	Non-Governmental Organization
UN	United Nations
UNDP	United Nations Development Programme

# 1 Introduction

## 1.1 Background

There are today approximately one billion people living in extreme poverty around the world (Earth Institute, 2013). The aim to fight this extreme poverty (Goal 1 of the Millennium Development Goals, commonly referred to as the MDGs) and to bring people up to a reasonable standard of living is a worldwide concern that involves many actors. Even though significant advancements have been achieved and extreme poverty has been greatly reduced between 1990 and 2010, there is still much work to do. The world's concern for environmental sustainability (Goal 7 of the MDGs) is valid especially since CO<sub>2</sub> emissions today are 46% higher than in 1990. In light of these challenges, the development goals must remain a global priority and the United Nations is together with stakeholders and partners working towards new goals and plans post-2015, called the Sustainability Goals (United Nations, 2013). With only less than two years left to reach the Millennium Development Goals in 2015, there is a serious need to find better solutions and greater efforts to achieve the set targets (Waibel, 2012).

The topics of sustainable development and environment were first raised as key topics during the United Nations Conference on Environment and Development in Rio de Janeiro in 1992. During the Rio+20 Conference in 2012, the environment was again the main topic of the agenda where also the subject of waste and its management was discussed (Gouveia, 2012).

The UN Secretary-General, Ban Ki-moon, expressed in the description of the Global Compact, initiated in 2000, the aim and need to engage businesses and corporations to reach the UN goals. The Secretary-General stated that (UN News Centre, 2010):

*First, business, civil society and governments will be increasingly called upon to build markets that provide better access for the poor. Second, a shift from short-term profit maximization to long-term sustainable value creation is necessary. Corporate responsibility must become the cornerstone of ethically robust markets. There is a strong case that addressing critical issues, such as poverty and climate change, can simultaneously spur growth and tackle long-term challenges.*

A widely used definition of poverty is “the inability to meet basic economic needs.” Absolute Poverty is defined as living under USD 2 per day, and extreme poverty is defined as people living under USD 1.25 per day. Poverty is identified as one of five main reasons for environmental degradation. The other four include population growth, lack of internalization of environmental costs into prices of goods and services, unsustainable resource use, and attempts to manage nature without appropriate knowledge. People living under the defined condition as “poor” often lack the possibilities to practice environmental sustainable solutions in order to support themselves and their families. Researchers state that in order to reduce poverty in the world, there is a great need for governments in developing countries to make necessary policy changes which are more devoted to poverty alleviation. One example is to invest in education aiming to establish an abled workforce ready to meet the new demands of the global economy (G. Tyler Jr. Miller & Spoolman, 2009).

When discussing the economic pyramid and the various fractions in these groupings, there is a grouping identified as the bottom of the pyramid (BoP). This grouping is described as:

*...the low-income socio-economic segment that lives primarily in the informal sector. Although the actual characteristics of informality can vary across different contexts, what remains consistent is that the BoP are not protected by established institutional rules found in the formal economy and that they tend to operate their businesses outside the official law.* (London, Anupindi, & Sheth, 2010).

The research for this paper was conducted in Brazil, a member of the BRICS countries (representing the emerging economies of Brazil, Russia, India, China and South Africa). Brazil is a country of approximately 199 million inhabitants (World Bank, 2013a) that has experienced a significant economic growth during the last decades, although the growth was limited to around 1% in 2012. Brazil is a leading countries in climate negotiations, and is committed to reducing its greenhouse gas emissions by between 36.1% and 38.9% until 2020 (World Bank, 2013b). Although Brazil is the 5<sup>th</sup> largest economy in the world, it still has very clear developing country features. Brazil is a country of contrasts and there is still much progress to be made. Brazil ranks as number 85 in the UNDP Human Development Index (HDI) out of 187 countries listed. There are still serious social, as well as, environmental concerns that need to be addressed (UNDP, 2013). Brazil is a highly democratic nation, but it still suffers from serious human rights abuses such as forced labor, violence and high crime rates, and government corruption (HDI, 2012). Since June of this year, Brazil is experiencing social movement and protests in all major cities of the country. Hundreds of thousands of people have gone out to the streets to show their discontent with poor public service despite high taxes, and endemic corruption (The Economist, 2013). Moreover, Brazil was in 2012 ranked 69 out of 174 nations in Transparency International's corruption index indicting that corruption is a significant problem in the country, costing up to USD 40 billion a year (Transparency International, 2013).

Between 2003 and 2009 approximately 24.6 million Brazilians came out of poverty (D. Sanches, 2012). But still, the poverty headcount ratio at the national poverty line was 21.7% of Brazil's population (World Bank, 2013a) while 11% are living in absolute poverty and 2.2% live in extreme poverty (World Bank, 2013b). In the last few years, Brazil experienced a significant transition of people moving out of poverty and climbing up the economic pyramid into a growing middle class (FGV, 2012). One solution and contributing factor to this fact was the program "Bolsa Familia" (Program Family grant), which supports vulnerable families with food, health and child education.

In Brazil, there was 201 thousand tons of solid urban waste produced per day, equalling 1.23 kg per person with an urban population of 164 million in 2012. Most of the waste is generated in the South Eastern Region where 46% of the urban population lives. In this region, the per capita generation per day is 1.30 kg/day which is slightly above the national average (abrelpe, 2012).

In Brazil, it has been proven through various studies that there are tremendous gains to be made from the recycling industry. There are estimates that it already generates a turnover of USD 1.2 billion per year. Authors, such as Sabetai Calderoni in his book "Billion Lost in Garbage", claim that BRL 4.6 billion (EUR 1.5 billion) is lost per year due to market failure and inadequate waste management systems in place where almost all waste end up in uncontrolled landfills and dumps. This loss may even reach BRL 10 billion (EUR 3.2 billion) per year by the end of the decade. This shows that there are environmental and also financial gains to be made. In this context, the informal waste collectors play a vital role (Fergutz, Dias, & Mitlin, 2011). Brazil is today the world leader in recycling of aluminum cans, reaching 98% in 2010. The main contributors for this amazing rate is the waste collectors who have economic incentives with good aluminum market prices (Tirado-Soto & Zamberlan, 2013).

In 2010, a study was made in Brazil to identify estimates for the economic and environmental benefits from recycling. One of the main reasons, from an environmental and economic point of view, is the much higher costs and need of energy to extract primary material in comparison with the costs to utilize recycled material (IPEA, 2010).

Literature reveals that recycling of urban solid waste can be considered a new platform for sustainable development, since it can achieve social, economic, and environmental positive results and gains when the right conditions are set in place, such as pricing for products and efficient waste policy frameworks. It is important that the discussion and public awareness is raised in these areas. It is also clear that energy and raw materials can be saved and therefore decrease the depletions of primary natural resources (Fergutz et al., 2011).

One of the population groups living in poverty and working in challenging situations is the informal waste collectors of municipal solid waste. This group of individuals and families provide society with an important service, especially in developing countries, but are often discarded by government and society. This group of people are operating in various ways such as individually, as family groups, working on dumpsites or streets collecting valuable waste. The waste cycle generally goes from the waste collectors selling to middlemen who later sell to the recycling industry when enough waste is accumulated.

Internationally there has been a great discussion about the challenges associated with inclusion and integration of the informal sector of waste collectors into a more formal waste management system so that the work performed is acknowledged and the benefits reaped by society (GIZ, 2011a). In Brazil, the government enacted a new solid waste policy and law in 2010 with a strong element of social inclusion of waste collectors where the municipalities, who are the responsible for waste management, must give priority to cooperatives (Government of Brazil, 2010a). With the new National Law, industries are given better incentives to give priority to secondary raw material. Incentives such as these can encourage the development of a new market focused on recycling. This will be further discussed in this study.

There are diverging opinions on how many waste collectors exist in Brazil, which can be explained with the high revolving nature of the activity. It is estimated that the number of waste collectors in the country vary from 400,000 to 1,000,000 out of which 10-20% are involved in a cooperative (IPEA, 2012; von Zuben, 2013). The members of a cooperative can be viewed more as separators than collectors (Seidel, 2013).

It has been proven that waste recovery in low- and middle income counties with the informal sector is a viable and important activity for generation of employment, but equally important for environmental protection (Gutberlet, 2009). A challenge in Brazil, as in many other developing countries, is how to find ways to combine the Western technology and the informal waste collectors (Scheinberg, 2011). In this study a deeper analysis will be provided.

In the Brazilian context, it is known that the amounts of urban solid waste are steadily growing (Pinto & Carmo, 2012). At the same time the existing garbage dumps are reaching their maximum potentials and all dumps are supposed to be closed by 2014. The law aims to close all the dumps and inappropriate landfills and promote final disposal in environmentally adequate sanitary landfills. The government and other stakeholders are working towards the increase of selective collection which will increase the recycling rates in the country (Ministry of Environment, 2012). The closure of dumps also entails a risk for the informal waste collectors who will have their source of livelihood taken away. At the same time, one of the main reasons for closing the dumps is the protection and security of these waste pickers who

work under very unsanitary conditions, and it is also common that children are involved in waste collection around dump areas. These issues are often shown in the news media. For example, the Brazilian national channel Globo News on 2013-08-12 at 18:49 aired the problem of increasing numbers of vultures in the area of dumps in Galeão in Rio de Janeiro, creating sanitary problems for the population and the air traffic. Interestingly enough, the reporter commented on the fact that it was not the vultures who are the problem, but the local government who must implement the new law.

The increase of waste and the closure of dumps bring the need for new solutions and technology to handle these valuable resources. An important aspect to take in regard is the fact that the developed countries often equals “good practice” by what technology is used in waste management and where the most environmentally friendly solution are prioritized. Some of these advanced technologies are being marketed in mid- and low-income countries with far less capacity to manage and maintain these costly systems. These systems, which for the Western eye may seem as the best solution, are most probably not so in less developed countries where other societal aspects must be considered. This gives the foundation for the need of a more integrated and holistic model where all aspects are considered from the perspective of the local context. It is with that contextualized perspective, a sustainable solution can be identified (Castilloberthier, 2003; D. C. Wilson & Scheinberg, 2010)

In Rio de Janeiro, the company responsible for waste collection (Comlurb) welcomed its new president, Carlos Vinicius de Sá Roriz, earlier this year. The President stated the main objective was to increase the collection of recyclable waste in all the 160 neighborhoods instead of the current 42 serviced, and especially the slum areas. A private firm is currently being contracted to provide a plan with a target for the operation in the next coming years. A challenge presented is that “today the resources applied to do the collection have a problem with inefficiency...where collections routes with our trucks follow a 20 year old study that need to be updated....we need to think outside the box” (Alencar, 2013). The city of Rio de Janeiro just began in August issuing fines for incorrectly disposing of trash in amounts between BRL 157 (EUR 50) and BRL 3,000 (EUR 960). This is part of the city’s “zero trash program” and gives an idea on how the waste issues are moving in a positive direction in the country, and increasing the awareness about the value of waste (Kaiser, 2013).

There have been plenty of development projects aiming to provide “help” to the informal waste collectors, but failing to look at aspects such as national economy, global environment related to their work, and more sustainable solutions. Authors like Scheinberg & Anschutz (2006) claim that waste collectors should be seen as a part of the solution for a problem in society instead of viewed as a problem. In today’s developing world, scenarios in poorer countries face the same problems as in the developed ones in terms of waste management. This issue is climbing on the agendas of mayors and governors due to the increase of waste. This trend goes along with the developing countries continuous battle for poverty reduction and environmental improvements (Scheinberg & Anschutz, 2006).

## 1.2 Problem, Objective and Research questions

When including the informal waste collectors into formal systems of waste management there are several aspects to take into consideration. Examples are the environmental outcomes, the economics of the system, number of employed people, how much they earn and what is the long term sustainability of these interventions. Governments and various institutions in Brazil strongly promote the informal waste collectors to get organized into cooperatives where waste collectors together can accumulate higher volumes of waste and sell directly to industry for better prices. The integration of waste collectors and investment in cooperatives would have direct social, economic and environmental impacts. A few examples are decreased poverty and unemployment through the creation of job opportunities, with formally registered citizens who contribute to society with taxes and waste management services. Such investments decrease waste volumes to landfills, increase volumes of secondary raw material to the industry and decrease the need for primary raw material. This has considerable effects on the environment. But an important question to ask is if the integration of waste collectors in Brazil is actually a viable and sustainable solution or, alternatively, if a more Western like solution with more advanced technology is a better option. A problem is therefore identified as the sustainability of the integration of informal waste collectors in Brazil.

This thesis will shed light on how the inclusion and integration of informal waste collectors to a more formal part of the municipal waste management system has worked in Brazil. By doing so, the study also aims to contribute to an increased understanding of challenges and opportunities for more sustainable waste management in Brazil.

In order to fulfil this aim, a posteriori study of interventions to integrate informal collectors has been implemented by using a framework developed by practitioners and scholars from various countries, with the purpose to identify key aspects necessary for a successful inclusion of informal waste collectors. A review of an international selection of related literature, and a similar review of the prevailing conditions for waste collectors in Brazil was conducted. Moreover, stakeholder interviews and specific interviews with cooperatives were conducted. This provided a stakeholder perspective about challenges and opportunities based on the new urban waste law in Brazil.

This study has been guided by a few research questions to assure that the aim of the study could be reached. These are:

- What are generally recognized measures for a successful integration of informal waste collectors?
- What measures have been taken in Brazil to integrate the informal waste collectors, and what is the present situation?
- What social, economic and environmental effects on society at large have been found from the integration of waste collectors in Brazil?

## 1.3 Method

This study is based on qualitative research guided by a number of interviews for primary data. This has allowed for the exploration of the topic in order to understand the phenomena currently occurring in the world in general, but in Brazil in particular. This research approach provided a comprehensive understanding of the addressed challenge. Although the author of this thesis lives in Brazil, is fluent in Portuguese and has many years of experience of community development work among poor populations in Africa, it is still important to acknowledge that there is always an ethical challenge to correctly translate what is said in interviews with individuals from a different cultural and social group. This has been

considered throughout the performance and analysis of the interviews. The author's experience in development work has also guided this thesis.

**Literature review:** During the timeframe of the study numerous articles, reports and books have been reviewed to shed light and understanding into the actual situation and conditions of waste management in Brazil as well as to bring knowledge from authors on the international arena. A number of former master theses have also been reviewed to provide ideas and inspiration to this study.

The literature review has mainly been focused on social science related to social inclusion of waste collectors, but also about economic and environmental impact on recycling, waste management, and policy development since the issue at hand encompasses all these areas. Several national reports have been reviewed providing an understanding of the more specific and contextualized situation in Brazil. A map of the country is presented in Figure 1-1.

**Interviews:** In order to test the literature studies, a number of interviews have been conducted. The company Tetra Pak has worked with social inclusion of waste collectors in order to improve the recycling rates for long life post consumption food and beverage packages and in this work been engaged with cooperatives recycling urban solid waste. Tetra Pak supported this study by aiding in the process of selecting cooperatives to be interviewed, according to the utilized framework. For the interviews, a specific questionnaire was used to structure and analyze the interviews. The questionnaire is developed as a rapid assessment tool, also called InteRa, to visualize how a certain location addresses key necessary elements for a successful integration of informal waste collectors. The InteRa tool is presented in Appendix 5 reflecting the four interfaces of the analytical framework used for this study. This analysis can be done priori to allow a good planning for a future intervention. The second alternative is a posteriori analysis where already implemented interventions are assessed. In this thesis a posteriori analysis has been conducted. The framework will be further discussed in Chapter 3 where the applicability of the InteRa tool will also be discussed.

The cooperatives were selected by Tetra Pak after communication with the author who requested a variety of cooperatives. Tetra Pak staff then aided through the selection of a range of cooperatives from the less developed ones to cooperatives that are active members of networks. Apart from the cooperatives, several other actors in relation to integration of waste collectors were interviewed. These included Tetra Pak staff from the environmental department, members of Government, the National Movement of Waste Collectors, an NGO and a representative from a waste collector network in São Paulo. These interviews provided an understanding of the situation from different perspectives. The interviews with the cooperatives were structured in the sense that it followed the questionnaire while the other interviews were semi-structured and often more of a conversation addressing the research challenge based on the questionnaire. In most cases the interviews were done personally but in a few cases they were done over Skype or telephone. The respondents are specified in Appendix 1 and specific details about the interviewed cooperatives are found in Appendix 2.

All interviews were recorded and later transcribed for a closer analysis. The interviews not only complemented the researched literature, but also confirmed what many authors have suggested. The interviews provided additional information about the context of the informal sector in Brazil in general and the context of cooperatives operating in the South Eastern part of the country. This proved to be quite different than in many other parts of the world described in the researched literature.



## 1.4 Limitations and scope

Brazil is a country consisting of 27 states which are further divided into a total of 5,565 municipalities. Most of these municipalities have their own way of organizing and implementing their municipal waste management system. This research has been limited to a few municipalities in the states of São Paulo and Rio de Janeiro. Even though this reflects a geographic scope, the author has in a few cases drawn experiences from other locations in the country that are worth mentioning.

The choice of Rio de Janeiro was primarily because the author was residing in the city during the time of the study. The choice for the interviews in Campinas was the fact that Tetra Pak's office for environment and sustainability is located in that city. This made the two chosen locations convenient and allowed the study of a few cooperatives that have been successful. This does not mean that the challenges addressed are not a reality in these cities. The informal sector of waste collectors, or "catadores", is existent in these locations.



Figure 1-1 Map of Brazil

Source: Map of Brazil (2013); Retrieved from Google Maps

## 1.5 Audience

When conducting this study, it has been clear that one of the main audiences is the municipalities who are responsible for waste management in the country and the efforts necessary to include the informal into the formal waste management system. Additionally the national government and policy makers may also find this study of interest.

The cooperatives can also be considered as an audience since the results can bring valuable findings for future discussions for improvements. The study can shed light into aspects that can be addressed and since the aim and common interest of the new law is to allow for a continuous flow of information, the cooperatives can be supported by academic studies such as this one.

Another potential audience can be national and international aid agencies and NGOs that have interest in research about corporate social interventions and their impact on people at the bottom layers of the economic pyramid. This study can be a support to their arguments in future collaborative designs of new interventions.

Other important stakeholders such as corporations could also find it interesting to read this study. Even though a company such as Tetra Pak, who has been deeply involved, and to a large extent contributed to the positive policy development here presented, it is also possible that ideas can be of use in future interventions and discussions. This is especially true considering that multinational companies such as Tetra Pak are such important actors for change and a sustainable development.

## 1.6 Disposition

**Chapter 1** reminds the reader about the poverty situation in the world and in Brazil. It also provides a general overview of the problems with solid wastes and the social, economic and environmental benefits society can draw from including and integrating the informal waste collectors into the formal waste management system. This introducing discussion leads to the objective of this study and the guiding research questions. This is followed by a description on what research method has been applied and how primary and secondary data have been searched and obtained.

**Chapter 2** provides a literature background of the general context of Brazil that is relevant to the researched topic such as the development of a new legal framework, the development of a new socio-economic class and the description of the national waste and recycling situation. The chapter further gives a view of the international research field related to waste collectors and the informal sector, as well as, more areas of importance such as the importance of organization and networks for integration of waste collectors, the effect of the informal sectors operations on the environment, the idea of an inclusive waste management system and policy development, and the importance of capacity-building and training. The chapter further provides a clearer description of the integration of the informal sector in Brazil where important stakeholders are described.

In **Chapter 3**, a description is made of the utilized framework along with the rapid assessment tool InterRa, which was used for this study. The Chapter also briefly discusses the reason for the choice of this framework and alternative frameworks that were contemplated.

**Chapter 4** provides a description of the findings of the literature research, the observations of the author, and the interviews conducted. In this Chapter a more general description of findings are first made. This is followed by the findings directly related to the answers and results from the InteRa questionnaire (Annex 4). Finally a few thoughts about the InteRa tools applicability in Brazil are briefly analyzed.

In **Chapter 5**, an analysis and discussion of the findings is conducted regarding identified areas of interest such as the organizational structures of the informal and formal waste collector sector, capacity-building and remuneration of waste collectors, and the operational capacity of cooperatives. Other areas described are technology development and corruption. The chapter ends with a few concluding comments.

The final **Chapter 6** presents the conclusions drawn from the literature analysis, observations, interviews, analysis and discussion. The chapter provides answers to the research questions that have been guiding this research and the main objective of this study.

## **2 Literature Review and Background**

This chapter will begin with a short description of the Brazilian waste situation and the new urban solid waste law that was recently enacted. The chapter will also discuss new trends in the country related to waste generation and management. Section 2.2 will provide an overview of the international literature analysis with various aspects related to the informal sector. Section 2.3 will give a more specific presentation of stakeholders and details related to the informal sector in Brazil. This chapter therefore aims to provide an understanding of the international view of the informal waste collector sector as well as the current situation in Brazil. In the following chapter a presentation and discussion of the framework and rapid assessment tool InteRa will be conducted.

### **2.1 Context of Brazil**

In August of 2010 an important mark was set for Brazil when the President signed the new National Law of Solid Waste Nr. 12.305 (Government of Brazil, 2010a). The Brazilian waste policy development has been viewed as very progressive. This is because of its comprehensiveness and inclusion of the informal sector (Martin Medina, 2008). The law recognizes the work of cooperatives and social inclusion (Article 7) of waste collectors is one of its main objectives. The law also extensively discusses shared responsibility putting all actors in society responsible for waste generation, collection and proper disposal (Government of Brazil, 2010a). However, municipalities are the key responsible agents for waste collection in the country. The law is expected to be updated every four years (Ministry of Environment, 2012)

The law addresses the non-generation, reduction, reuse, recycling and treatment of solid waste, and its final disposal. The reverse logistics approach was adopted making producers, importers and distributors responsible for their waste. The law also directs the closure of all open dumps in the country until 2014 (Government of Brazil, 2010a). Selective collection is also an important component of the law and distinguishes recyclables collected by municipal administration and waste collectors affiliated to an organization such as a cooperative. The informal selective collection is distinguished as recyclables collected by autonomous collectors, disbursed in the cities where the collected recyclables are not counted in the municipal systems but sold to middlemen (Ministry of Environment, 2012).

An important point in the development is that the policy was altered in the last minute when incineration was favored. This was disputed by the national movement of waste collectors as well as the Ministry of Environment (Dias, 2011b). In Article 18, it directs the “implementation of selective waste collection with the participation of cooperatives or other forms of associations of waste collectors of reusable and recyclable materials, formed by people of low income.” The law furthermore promotes financial support for the development of cooperatives which are articulated in Articles 42 through 44. Cooperatives are given priority and incentives. For example, they do not have to be part of a contracting and bidding process, like private companies have to be, and are to be given preference (Government of Brazil, 2010a).

Two years later, in 2012 the Brazilian Government made public the National Plan for Solid Waste, after public review in a number of open public debates. The Plan discusses the implications and necessary actions to be taken and sets directives, strategies and targets for the next coming years. The Plan acknowledges the shared responsibility of Federal Government, states, municipalities, production sector, consumers, and general public. Important elements in the Plan are the involvement of all stakeholders and the environmental education of society in order to reach the targets set forth. The Ministry of Environment and the Inter-Ministerial

Committee of Social Inclusion of Waste Collectors and Recyclable Materials have the primary responsibility to monitor the implementation, and the revision of the plans, but should do this in close cooperation with the federation, states, municipalities, industrial sectors, waste collectors and the civil society. The plan sets clear directives, strategies and targets for an improved waste management system. One example is the inclusion and strengthening of the organization of 600,000 waste collectors, especially those working at dump areas.

For the implementation of reverse logistics, a sectorial agreement which represents “an act of contractual nature signed between the Government and producers, importers, distributors, and merchants, having in view the implementation of shared responsibility of the product life cycle” is necessary. Without this agreement, the national plan risks not reaching its targets (Ministry of Environment, 2012). An important prerequisite described for the plan is the inclusion of waste collectors since they are recognized by the Brazilian Government and the Ministry of Environment, as important stakeholders (Ministry of Environment, 2012).

### 2.1.1 Socio-Economic Information

Like other countries, Brazil is divided into various income classes. There has been an increase of the middleclass in the last decade which is shown in Figure 2-1. It clearly demonstrates that the lower end of the economic pyramid in Brazil is decreasing and the middle class is rising. Yet, over 20% of the population still lives in poverty. The specific income figures per year for class E and D, are BRL 0-1,085 (EUR 0-347), and BRL 1,085-1,734 (EUR 347-555) respectively (FGV, 2012).

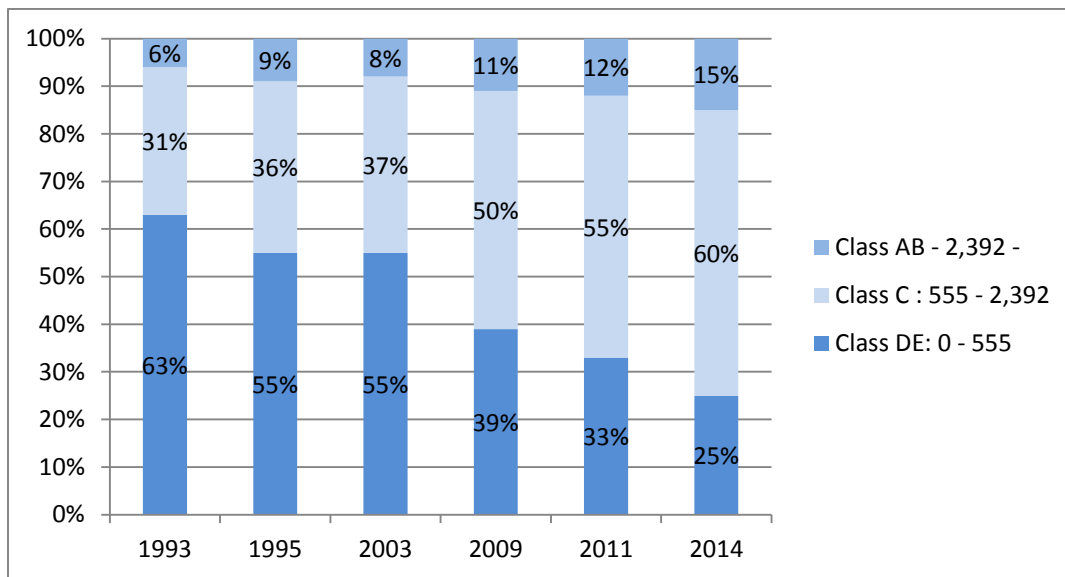


Figure 2-1 Evolution of Economic Classes in Brazil - Income Presented in EUR per annum

Source: FGV (2012)

Thus, it is clear that between 1993 and 2014 there has been a positive trend of the Brazilian population climbing up the economic ladder. With the rising middle class in Brazil, it is important to expect that there will be changes of behavior in terms of consumption and waste generation. (FGV, 2012) This phenomenon is confirmed by Campos (2012) who claims that the increase of population in class C, deriving from classed D and E, have resulted in higher consumption rates and increased waste generation.

## 2.1.2 Description of Waste Situation

The new solid waste law in Brazil (Government of Brazil, 2010a) distinguishes urban solid waste as domestic waste originated from domestic activities in urban homes, as well as the residue of urban cleaning activities from e.g. road sweeping, public parks and public roads. Selective collection is defined as recyclables previously separated in categories according to their constitution or composition. Municipalities are responsible for the solid waste management and supposed to implement selective collection as a mean to better send the collected waste to its adequate destination, according to the principles of the waste hierarchy (Government of Brazil, 2010a). The waste hierarchy, viewed in Figure 2-2, visualizes the destination alternatives for waste. Prevention is the most desired since it brings the least environmental consequences for society, while incineration and landfills are the least desired alternatives since they are the least environmentally friendly option.

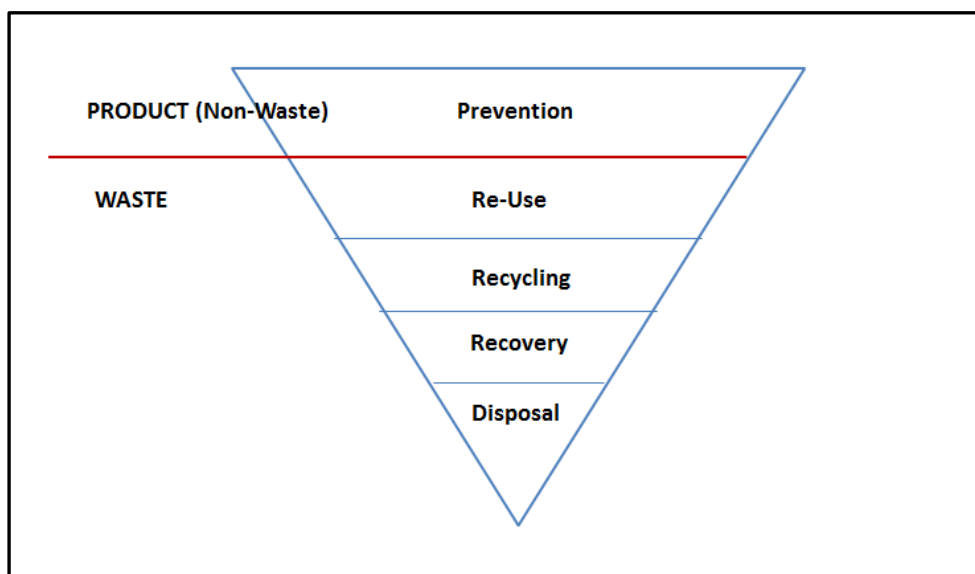


Figure 2-2 Waste Hierarchy

Source: European Commission (2013)

A prioritized area of waste management in the legislation is the recycling of waste, which is defined as the process of transformation of waste involving the modification of its physical, physicochemical or biological properties aiming to transform this material into new products (Government of Brazil, 2010a)

A current challenge in Brazil is how to handle the increase of waste volumes. According to a recent study by the Brazilian Association of Public Cleaning and Special Residues Companies (Associação Brasileira de Empresas de Limpeza Pública e Resíduos Especiais - ABRELPE), the solid urban waste increased by 1.3% between 2011 and 2012, which is higher than previous years. The population growth in urban areas was 0.9%, less than the waste generation. The collection increased by 1.9% during the same years. The composition of the solid waste is portrayed in Figure 2-3, including organic fractions (abrelpe, 2012).

Brazil is still working on the implementation of selective collection but many municipalities are still not practicing it. Municipalities have the authority to govern their own plans and budgets funded by municipal taxes, state and federal support. They are encouraged to partner

with neighboring municipalities in order to acquire technical competence which many municipalities do not have. This is an important obstacle (Amorim, 2013).

An important aspect of waste separation in Brazil is that it is only separated as recyclable waste and organic waste. All recyclables are collected in one container and all the organics in another. The differently colored waste containers are more used in order to increase awareness about waste separation (von Zuben, 2013). Some of the recyclables are then sent to cooperatives where separation into waste categories such as plastic, paper, and others, takes place, while the rest is sent directly to landfills or dumps. The level of separation depends on who the client is. If it is the recycling industry with higher demands for specific waste, the separation is done accordingly. In these cases, it becomes even more important to establish networks of cooperatives in order to accumulate sufficient volumes (A R L Vieira & R B Pulca, 2013).

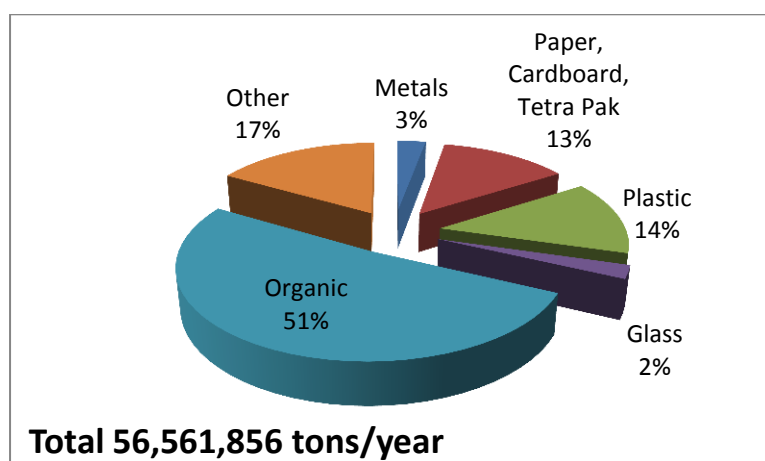


Figure 2-3 Solid Urban Waste Composition of Collected Waste 2012

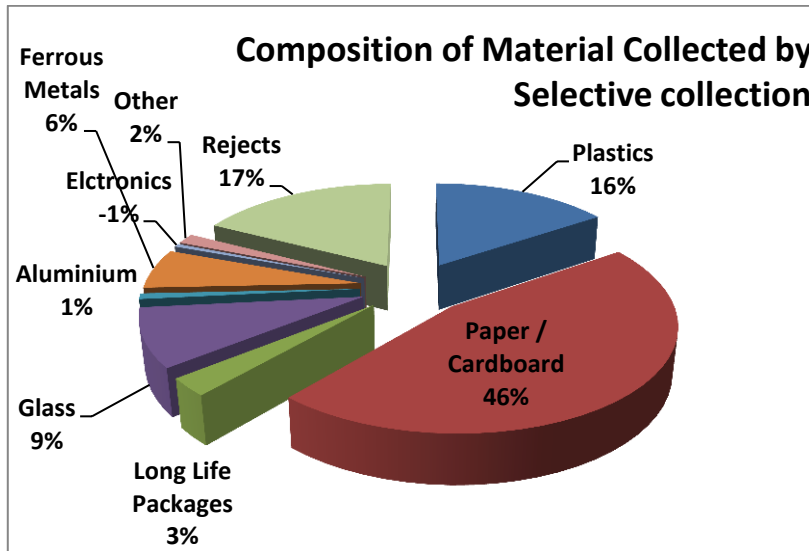
Source: abrelpe (2012)

According to Cempre (2012), the collected waste through collective waste initiatives, and without the organic waste included, is composed as portrayed in Figure 2-4. An interesting observation is the inclusion of the waste category Long Life Packages<sup>1</sup>, or Tetra Pak aseptic packages. This is a quite recent distinction which still causes some confusion. This was specifically observed during site visits where the instructions on one public recyclable waste collection container indicated that Long Life Packages are not recyclable, while the container just next to it indicated otherwise. This is shown in Appendix 3A. The corporate sector, and especially Tetra Pak, worked hard to make certain this distinction was rectified and beverage carton is now included as a recyclable component (Fernandes, 2013).

In terms of the final destination of the collected urban solid waste, there was no significant difference between 2011 and 2012. In 2011, 32.24 million tons of waste, corresponding to 58.06%, reached adequate destination, while 32.79 million tons, corresponding to 57.98 % in 2012. The inadequate destination of waste was to locations such as dumps or controlled landfills. Controlled landfills, which are tentative ways to make dumps into sanitary landfills, are still not considered adequate destinations since they lack proper equipment to handle

<sup>1</sup> In Brazil packages such as Tetra Pak are named: "Embalagens de Longa Vida" which translates "Long Life Packages"

waste from an environmental and public health point of view (abrelpe, 2012). According to the national plan of solid waste, 50.5% of the 5,565 municipalities still had dumps in 2008, out of which the majority were located in the North Eastern region with 89.1%, compared with 18.4% in the South Eastern region (Ministry of Environment, 2012)



*Figure 2-4 Composition of Material Collected by Selective Collection*

*Source: Cempre (2012)*

The new law states that all involved stakeholders such as municipalities, states and companies should have developed a solid waste management plan by August 2012, which will allow them to access federal funding. Municipalities and states with well-defined plans are allowed to apply for funding for specific projects in their respective plans, such as final disposal solutions (Thais, 2013).

An interesting aspect of improved waste management system is the increase of work opportunities. In 2012, there was an increase of direct formal employment contracted by the municipalities, from 311,000 in 2011 to 321,000 employees, which equals an increase of 3%. The Brazilian market for urban cleaning was BRL 21.2 billion (EUR 6.8 billion) in 2011, while in 2012 it reached BRL 22.7 billion (EUR 7.3 billion). This equals an increase of approximately 7% (abrelpe, 2012).

Another obligation in the law is the closure of all dumps until 2014. This is not likely to be achieved. All dump closures must also include a plan of how to solve the situation for the waste collectors who will have their livelihoods taken away. It has been proven difficult to include informal waste collectors into more formalized cooperatives since they have been excluded for such a long time for various reasons. The process to include them is not as simple as just creating a cooperative, but the diversity and complexity of the people involved must be considered. This is a process that often takes time. Nevertheless, new law provides a great opportunity to integrate the informal sector (Thais, 2013).

According to the national plan for solid waste, 994 municipalities had developed selective collection programs in 2008 (Ministry of Environment, 2012). However, according to a study performed by Cempre, there are today 766 municipalities, corresponding to 14% of the municipalities in Brazil, working with selective collection, where the waste is collected and sent to cooperatives for separation and commercialization. Figure 2-5 portrays the increase over

time and an interesting factor is the considerable growth since the new law was implemented in 2010, in comparison with other years where growth was more limited. The increase between 2010 and 2012 was 73% which is considerably higher than the 9% increase between 2008 and 2010, although reasons for this can most probably be attributed to the financial crisis. There is a higher concentration of initiatives in the South Eastern region with 52% of the total amount of municipalities working with selective collection (Cempre, 2012). A general challenge present in Brazil is the data aggregation.

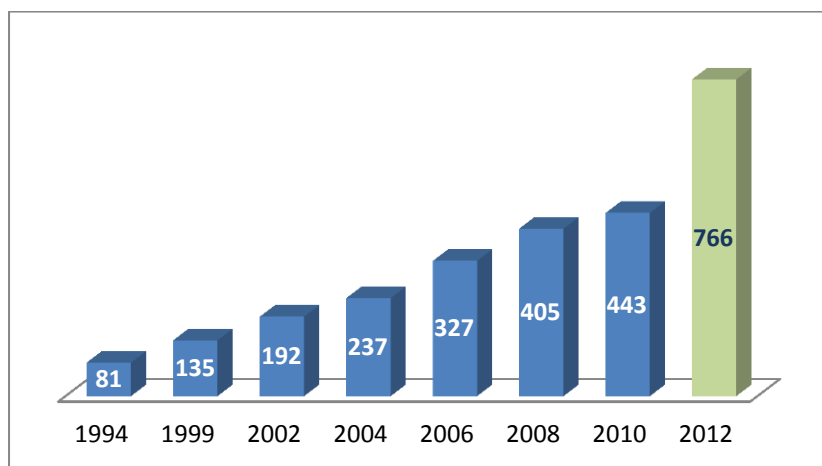


Figure 2-5 Development of Municipalities with Selective Collection Over Time

Source: Cempre (2012)

It is worth noting that out of the municipalities conducting selective collection, a combination of various methods are used where (1) 88% work with door to door collection, (2) 53% have voluntary delivery points, and (3) 72% support the integration of cooperatives as part of municipal selective collection work. In terms of who actually collects the waste, Cempre concludes that the municipalities often have a combination of collectors where 48% of the municipalities do the collection, 26% is collected by private companies, and as much as 65% of the municipalities work with cooperatives of waste collectors and provide support such as equipment, storage, water and energy, trucks, and capacity-building. In Figure 2-6 the grade in which the cost for selective collection is higher than conventional collection is shown. It is also clear that it has been a declining difference, except for an increase in 2012. This means that in 1994, the cost for selective collection was ten times higher than the conventional collection, while in 2012 this difference has decreased to 4.5 time higher (Cempre, 2012).

The higher costs for selective collection include more costs than just the collection and transportation of humid and dry waste. Other areas are investments in public awareness campaigns, communication, education, and other costs (Amorim, 2013). Today, the municipalities calculate their costs for selective collection in different ways, including aspects as the ones mentioned by Amorim above. But it generally includes maintenance of warehouses, municipal support to cooperatives, and costs for caged trucks versus compacting trucks who can take larger amounts of waste. The primary reason for these higher costs is the lack of a homogenous reporting system specifying the costs to be included. It is however believed that the new law and the currently developed municipal plans will provide a better guideline on how to calculate costs related to selective collection. Cempre plans to conduct a new study in 2014 which will address this challenge (Milani, 2013).



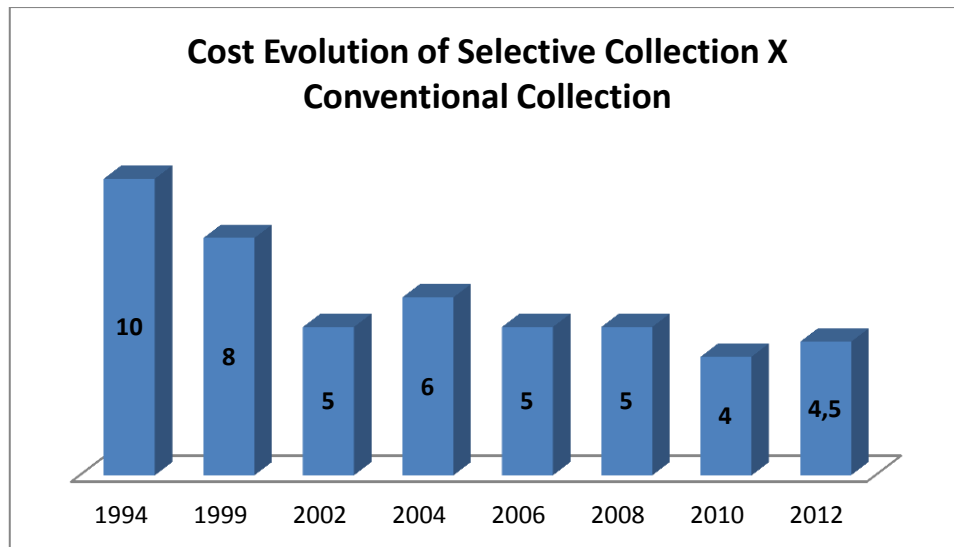


Figure 2-6 Cost Evolution of Selective Collection  $\times$  Conventional Collection Over Time

Source: Cempre (2012)

When discussing the initiatives taken in the Brazilian municipalities in favor of selective collection, it is important to point out that many of these initiatives occurred through the cooperatives of waste collectors. Since the new law came into effect, Brazil has shown clear improvements in its waste management system where the urban population has shown a desire and willingness to support a responsible waste management. An example of this is the increased commitment to waste separation at source. The collection rate of urban waste has increased, the final destination is improving, and the number of municipalities utilizing open dumps has decreased and is expected to continue decreasing (von Zuben, 2013). It was, however, not clear if this willingness could be attributed to any specific demographic part of the population in terms of income classes.

The solid waste in Brazil has until lately just been dumped into open dumps or into landfills and only a few of the Brazilian municipalities had in 2011 developed selective collection recycling programs (Lino & Ismail, 2012). This inadequate destination of waste still represents a large amount contributing to environmental degradation (abrelpe, 2012). Some studies show that only 1.2% of recyclable waste is reused in Brazil and approximately 169,000 tons per day is sent to landfills. Only small amounts are incinerated or composted (Lino & Ismail, 2012). Another study, performed by IPEA, claims that selective collection in Brazil is only 2.4% of the regular collection. A challenge is the capacities of the municipalities that often are limited, especially when dealing with areas such as selective collection (IPEA, 2010). This is also supported by Kruljac (2012) who claims that municipalities in developing countries cannot be responsible due to their low capacity why public-private partnerships are therefore necessary.

Worldwide, economic instruments are used to finance the waste management services, guide stakeholder behavior (public managers, population and productive sector) to reach targets, and internalize the impact per generated waste volumes. This is almost inexistent in Brazil where 61.4% of the municipalities do not have any sort of waste handling charge, and the vast majority only charges the urban property and territorial tax (*Imposto Predial Territorial Urbano - IPTU*). This makes it difficult to allocate a portion of these funds, since no consideration is made for generated waste volumes, where households and producers have incentives to change behavior following the polluter pays principle, where payments are directly related to the generated volumes of waste (Ministry of Environment, 2012).

The national plan mentions a few possible examples for instruments that can be combined in Brazil and are currently evaluated, such as cost per generated unit and cost depending on final destination. Another important option is the agreed tariffs for packages and materials in the reverse logistics which could give priority to cooperatives who already are the main contributor of recycling rates in the country. (Ministry of Environment, 2012) One of the reasons for the slow implementation of the law is the lack of funds from the federal government. Although the municipalities are responsible for their waste management, the federal government also provides some funding. The funds expected by the Ministry of Environment to implement various programs were never made available. The states are still working on developing plans for waste management but there is also a lack of capacity in how to develop the plans (Margulius, 2013).

## 2.2 The Informal Sector of Waste Collectors

A description of the international literature related to the informal waste collector sector will be presented in the first part of this section. Later in the section the Brazilian context will be presented including the description of national key stakeholders.

### 2.2.1 A Global View

Waste can be viewed as an environmental threat, risk to health and a general nuisance for society. But waste can also be seen as an income opportunity which is the case of the waste collectors who live out of waste (Sembiring & Nitivattananon, 2010). Waste collectors are not new phenomena. They are workers who for centuries have cleaned urban areas even though the work has not been recognized (de Pádua Bosi, 2008). There is a wide consensus that recycling has gained increased importance as it directly contributes to sustainable development (Fergutz et al., 2011).

In developed nations, waste management is increasingly an environmental concern and resource conservation is what ignites the great interest in recycling (GIZ, 2011a). In developing countries, on the other hand, recycling is still associated with primarily economic needs, although the environmental importance is acknowledged (Fantoni de Lima Alexandrino, Caputo Ferreira, de Lima, & Cardozo Makkai, 2009).

Developing countries are often characterized by large growth in population rate which also results in people moving to urban areas in search of job opportunities and better future. This migrant population often gets involved in waste picking since they normally have a limited level of skills resulting in difficulty to enter other work markets. In urban areas where the management system is poorly and inadequately operated, or sometimes even absent, there is room for this group of informal workers to get involved in scavenging and waste collection (Downs & Medina, 2000).

The existence of poverty in most of the Latin American countries has led to millions of people being involved in the 'despised' work of namely waste collection. These people are called recicladores, cartoneros, pepenadores, recuperadores, buzos, gancheros and cirujas, or in Brazil, catadores (Fergutz et al., 2011). In developing nations, around 1% of the population earns their livelihood as waste collectors (Martin Medina, 2008). Other authors claim that as much as 2% of the urban population in developing countries is involved in this economic activity (GIZ, 2011a). In a study made by German Society for International Cooperation (GIZ) across cities worldwide, it was evident that the informal sector provides a larger contribution in material recovery and recycling than the formal system. This is shown in Figure 2-7.

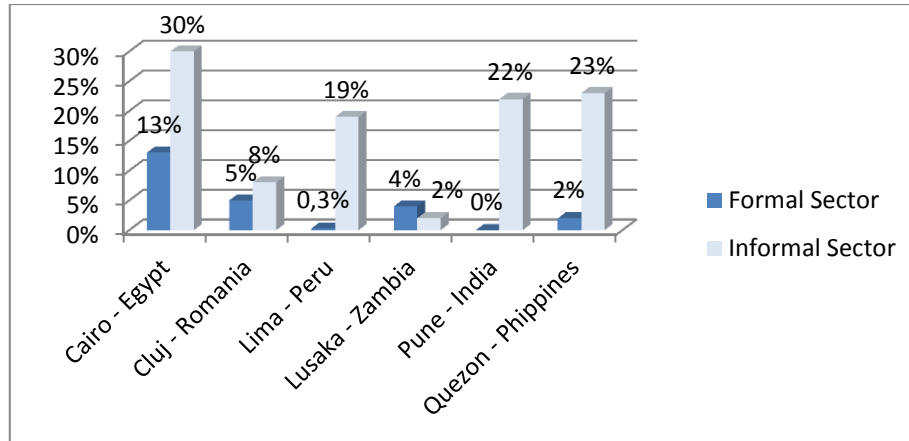


Figure 2-7 Comparison of material recovery by formal and informal sector, baseline scenario (Percentage of total waste generated)

Source: GIZ (2011b)

The growth of the waste volumes, which is happening in Brazil, is a global phenomenon due to increased populations, production and consumption. Developing countries are more seriously affected since they have poorer technologies to handle waste. An important part of the system is therefore informal collectors who collect up to 40% of the recyclable material and these rates have been higher in developing countries than in industrialized countries (Moreno-Sánchez & Maldonado, 2006). According to other researchers, such as Sonja Diaz, the informal sector is responsible for 50% or even up to 100% of waste activities in certain cities in developing countries and it produces a higher level of recycling than the formal sector (Dias, 2011a). Thus, the informal sector provides an important service to society by making cities cleaner, reducing waste to uncontrolled dumps and not adequately prepared landfills, and reducing greenhouse gas emissions, argues Fergutz et al. (2011). This informal sector of the municipal solid waste management is often operating in parallel with the formal waste management system (Pinto & Carmo, 2012). This makes the formal system less efficient since a combination and improvement of all forces working with waste collection could bring up the rates of recycled material (Scheinberg, 2012).

Due to rising numbers of unemployment and the advancement of the recycling market, the numbers of collectors have risen in Brazil (Fergutz et al., 2011). It is not unusual that waste collectors carry 300 kilos per day in dense urban traffic with all the hazards that it involves. The choice of this type of work is mainly due to lack of other skills. Generally, they do not get remuneration from the formal waste management sector but rather from intermediaries who pay them prices way below market rates. This is mainly due to the fact that the informal collectors cannot collect sufficient volumes allowing access to the more formal system and recycling industry. The middlemen, on the other hand, can pay a lower price than the industry, collect sufficient volumes and then sell it for a much better price.

The informal sector of waste collection is often identified as a marginalized group in society consisting of illegal immigrants who are stigmatized from the rest of society and viewed upon as dirty, unhealthy, criminal, and a nuisance to society endangering traffic with their horse wagons and other means of transportation (Martin Medina, 2008; Sembiring & Nitivattananon, 2010). This sector is often described as small-scale, labor-intensive, to a high degree unregulated, not registered, with close to no technology available. The informal sector does not pay taxes, does not hold licenses to operate and does not pay social security fees,

excluding them from the welfare network of society (GIZ, 2011a; David C. Wilson, Velis, & Cheeseman, 2006). The informal sector is often falsely seen as unskilled. On the contrary, the sector often possesses skills such as identifying high value waste. By collecting the waste and sorting, washing, balling, value is added. The deeper the separation goes, the more valuable it is on the market (David C. Wilson et al., 2006).

Waste picking has often been performed by people seen as outcasts and marginals. Examples are immigrants, gypsies, rural migrants, religious minority groups such as the Christian Zabbaleens who are the main waste collectors population in Cairo (Castilloberthier, 2003). The informal sector is also a group that is highly exposed to negative health impact where the proper handling of waste contains numerous risks such as broken glass, faecal matters, toxics, chemicals, hospital residue, pulmonary hazards from inhaling fumes from burning materials (Scheinberg, 2012; David C. Wilson et al., 2006).

## 2.2.2 Organization and Networks

There are different views about how the actors in the informal sector operate and how they are organized. General methods are: curbside collection (pre-sorted waste is picked up by collectors using trucks and separated in warehouses), drop-off system (citizens drop off their separated waste in containers later collected by city trucks), and finally collection with pushcarts by cooperative members or informals (Scheinberg & Anschutz, 2006). According to Velis et al. (2012), the informal sector is often organized in forms such as:

- Organized associations/cooperatives who perform door to door visits and collect separated waste or mixed waste that is later separated by the collectors;
- Adults and children working in open dumps, garbage bins in city streets and other locations collecting waste.

Although this informal sector is not included in the official waste management system, there would not be economic viability of waste management in many developing countries without them (Pinto & Carmo, 2012). The authors characterize this group operating as:

- Regular collectors but not affiliated to cooperatives;
- Members of cooperatives;
- Individuals who have other work but collect waste as a way to make ends meet.

Furthermore, the informal sector is also divided into categories according to the way they collect their waste. According to David C. Wilson et al. (2006), this can be seen as four main categories, namely:

1. Door to door collectors with some sort of transportation means and with some sort of storage where separation takes place.
2. Street collectors who sort the street or waste in bins before the collection by formal sector.
3. Waste collected from waste vehicles at municipal disposal sites before final disposal in landfills
4. Waste collected directly at dumpsites where most valuable waste categories are recovered prior to covering.

The authors name three organizational forms for waste collectors namely: (1) microenterprises, 2) cooperatives, and (3) private-public partnerships (David C. Wilson et al., 2006)

The informal waste collectors and the intermediaries work as micro-entrepreneurs involved in a string of activities where waste is collected, sold onwards, and eventually reach the formal industry for recyclables. By collection, sorting and selling waste, the informal sector therefore contributes to the handling of a potential community problem. The informal system complements the formal that would not be sufficient by itself (Lindeman, 2012). When not organized properly, the intermediaries reap the large value while the collectors only receive a small return. Partnerships can increase the access to waste and the possibility to sell for better prices (David C. Wilson et al., 2006). This would bring many benefits such as reduced poverty, conserve natural resources, and environmental protection in organizing waste collectors, according to Medina (2008).

By supporting organized groups and cooperatives, expected benefits for waste collectors include better self-esteem, household income, better quality of life, feeling of belonging in the society, improvement of health conditions and much more. It also provides support in the bargaining and direct communication with the recycling industry instead of being in the hands of intermediaries (Dias, 2012). By entering into partnerships with different actors, people have better access to funds and services which can be mutually beneficial for stakeholders and where win-win situations can be created (Fergutz et al., 2011; Sembiring & Nitivattananon, 2010). Important international developments in the areas are the creation of organizations supporting waste collectors around the world. The first ever World Congress of Waste Pickers was held in Colombia in 2008 as a result of national organizations seeing the need to work together. Another international body is the Global Alliance of Waste Pickers that works towards the development of more inclusive policy development (Dias, 2012).

Studies show that the level of efficiency of informal waste collectors is related to capitalization and available infrastructure and technology, such as storage space for the separation of waste. Lack of means for proper health, hygiene and material for protection hampers their safety. To solve this problem, waste collectors are today highly encouraged to organize themselves into formalized cooperatives which can bring improved working conditions and better access to funds that can help them scale up their businesses by entering into a higher level of the recycling chain, as shown in Figure 2-10. However formalizing into cooperatives may not necessarily be the solution since cooperatives still face many challenges, such as low access to funding and other resources (Fergutz et al., 2011).

One opportunity, often identified in the literature reviewed, is to support collectors to find ways in value-added products, such as processing the waste (not only separate and sell) to sell actual finished products, using locally sourced equipment and to find solutions that are more energy efficient than conventional equipment and with less environmental impact (Baillie, Matovic, Thamae, & Vaja, 2011). Some groups can reach the level of organization of a middle-sized enterprise which processes waste to new products available to the market and thereby increases income (Ahmed & Ali, 2004).

### **2.2.3 The Informal Sector and the Environment**

It is today acknowledged that the informal sector can contribute considerable economic gains for developing nations. This group is adapted to the local environment and able to provide a continuous stream of material to the industry which also encourages the industry to reduce the use of natural resource and instead use recycled secondary raw material. Another aspect is the reduced quantities to be collected and sent to disposal sites by the formal system with all economic implications that involves for a municipality. These benefits are gained at no expense to the tax payers (David C. Wilson et al., 2006) and supports poor, vulnerable and marginalized groups in society (Martin Medina, 2000)

It can be considered as common knowledge that the improper handling of solid waste has a direct negative consequence on public health and the environment. The latter through the climate change effects as a result of emissions from landfills, among others (Gouveia, 2012). When including the informal sector and supporting its organization, the municipalities can save major spending and also gain environmental benefits from their work resulting in a win-win situation (M. Medina, 2005).

One example is the estimated environmental costs associated with greenhouse gas emissions (t CO<sub>2</sub>/t) due to production of virgin cellulose and for recycled material cost of BRL 0.28 (EUR 0.09) and BRL 0.01 (EUR 0.003) respectively. The authors of a study about the payments for the environmental service concluded that if all the recyclable waste sent to dumps and landfills was recycled, the potential economic gains for Brazil would be as much as BRL 8 billion (EUR 2.6 billion) per year. The same study acknowledges the tremendous important contribution of the national waste collectors (IPEA, 2010). Figure 2-8 portrays the idea that recycling will decrease costs and emissions related to extraction of virgin material used for production, transportations, energy utilization, where instead secondary raw material is reintroduced to the value chain and the waste would not end up in dumps or landfills where they would contribute to further emissions.

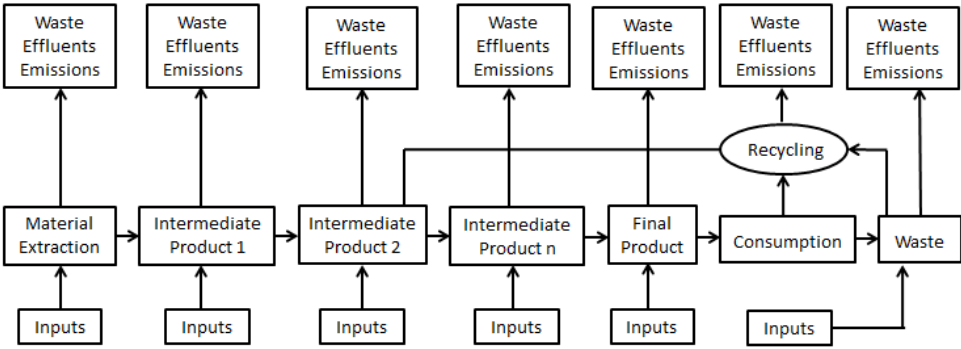


Figure 2-8 Flow chart of reduction of emissions with recycling

Source: IPEA (2010)

It has been proven that when provided with adequate assistance, waste collectors represent a good example of sustainable development since they provide work opportunities, alleviate poverty, contribute to pollution prevention, work with natural resource conservation, provide industry with material and assist in environmental protection. Since the recycled material is cheaper for the industry, the collectors also provide a competitive advantage for the ones who use it (GIZ, 2011a).

This is further demonstrated and discussed in a comparison made across a number of countries, contrasting the informal sector in comparison with the formal sector. In Figure 2-9, the results of this study are portrayed showing the savings from the avoidance of costs associated with factors such as less disposal, reduction of extraction of virgin materials, energy use, and more. By instead re-inserting secondary raw materials to the production cycle, carbon benefits can be aggregated due to less greenhouse gases emitted. It is clear that in low- and middle- income nations, the informal actors contribute to most of this recovery and thereby

contribute to the decrease of greenhouse gas emissions. It is therefore crucial to recognize the environmental contribution of the informal sectors in developing countries (GIZ, 2011a).

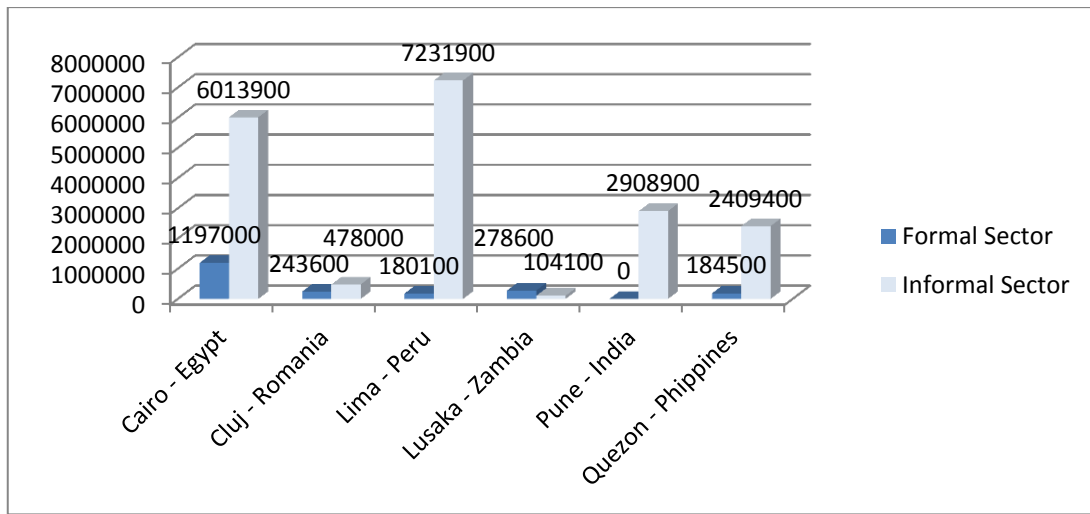


Figure 2-9 Environmental comparison associated with material recovery. Should be viewed as avoided negative externality costs in Euros

Source: GIZ (2011b)

Because of positive effects of services mentioned previously, such as prolonged life span of landfills and decreased need of virgin material, waste collectors contribute to positive externalities for society and should be adequately rewarded with incentives. Their contributions are exemplified as followed:

- Reduction of air, soil, water pollution, energy savings, reductions in need of raw material
- Reduction of municipal costs for waste management (transportation, disposal, collection, landfill lifespan, time, etc.)
- Economic opportunities and livelihood to vulnerable part of the population and contribution to poverty reduction (Moreno-Sánchez & Maldonado, 2006).

Technological and economic prosperity, population growth and urbanization often come hand in hand with behavioral change. Populations change their habits of production and consumption which also result in the augmentation of solid waste, especially in the urban areas. This results in environmental degradation (Gouveia, 2012; Gutberlet, 2010) Gutberlet discusses the need of a solidary approach where social aspects to the economy are valued through her model for participatory sustainable waste management where factors such as inclusion and development of recycling groups, equity with fair pay and social benefits for services provided, eco-health looking at public and environmental health, eco-efficiency where waste minimization through consumer and producer responsibility, and finally Sustainability where causes for unjust production and consumption are addressed.

Studies show that greenhouse gas emission could be reduced by up to 15% in developing countries, if a more sustainable waste management system would be adopted. According to the author, in these countries it could be done at quite low costs (GIZ, 2011a). This is also supported with a study performed by Tetra Pak where a Life Cycle Assessment (LCA) was

performed on long life packaging proving that emissions could be considerably reduced with the increased practices of selective collection and recycling. In this case, calculations were performed in five degrees of percentage rates of cycling between 25 up to 70% in order to show the reduction of greenhouse gas emissions. It was concluded that if 70% of post-consumer packages were to be recycled in Brazil, 48% of global warming potential could be reached (Mourad, Garcia, Vilela, & Von Zuben, 2008). A well developed solid waste management system plays an important role in the reduction of CO<sub>2</sub> emissions (Lino & Ismail, 2012).

By investing in commercialization of recyclables, new funds can be unleashed to be reinvested in newer and better technology and infrastructure development which can lead to further development of the waste management systems. This would create jobs, tax revenues, improved environmental sustainability, to name a few examples. To accomplish a successful advancement and results, it is of utmost importance to outline relevant national policies that pave the way for satisfactory outcomes (Lino & Ismail, 2012).

#### **2.2.4 Inclusive Waste Management System**

Factors such as growing urbanization, population growth and higher consumption have an increased demand on already strained waste management systems in developing countries. Many countries try to solve the problem by privatizing collection of waste and often exclude the informal sector, who instead continues to be seen as a nuisance (M. Medina, 2005).

The organization of the informal sector is an important point of discussion. The less people involved, the higher the risk for being abused by intermediaries. On the other hand, the more people are involved and the better they are organized, the higher the chance to add value to the recovered products. The informal sector is located at the bottom of the recycling chain as portrayed in Figure 2-10. The informal groups included in the first two steps in the hierarchy with collectors working on an individual basis or in family groupings. Further up, the organization becomes more organized and formalized.

The general aim with a more modern waste management system is normally to move waste upwards in the waste hierarchy, portrayed in Figure 2-2, by increasing recycling while reducing disposal in landfills or incineration. Since the informal waste sector is a highly contributing part of waste management systems in developing countries, it would be a mistake not to include them in a formal system. Combined with the goal to reduce poverty, this provides good incentives to invest in the inclusion of the informal sector (David C. Wilson et al., 2006).



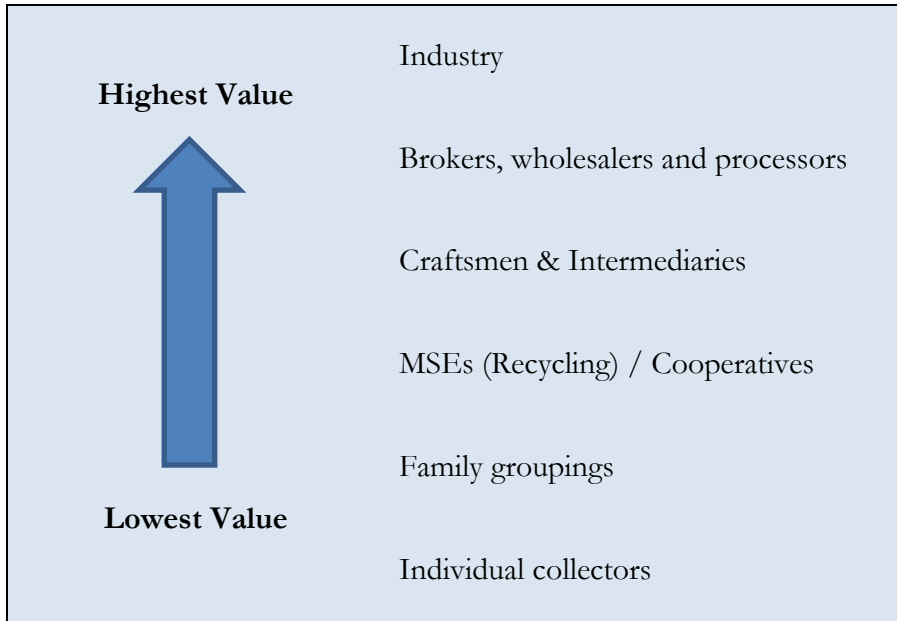


Figure 2-10 Recycling Chain

Source: David C. Wilson et al. (2006)

Another description of the hierarchy is done by Tirado-Soto & Zamberlan (2013) who portrays the informal sector in Figure 2-11, but in this case cooperatives are included in the informal category as level 1a. The authors argue that cooperatives do not add value to the recyclable materials due to lack of infrastructure, information technologies, and lack of public policies supporting selective collection. This is, however, contested since adding value is what they do with the segregation into waste categories. (Tirado-Soto & Zamberlan, 2013)

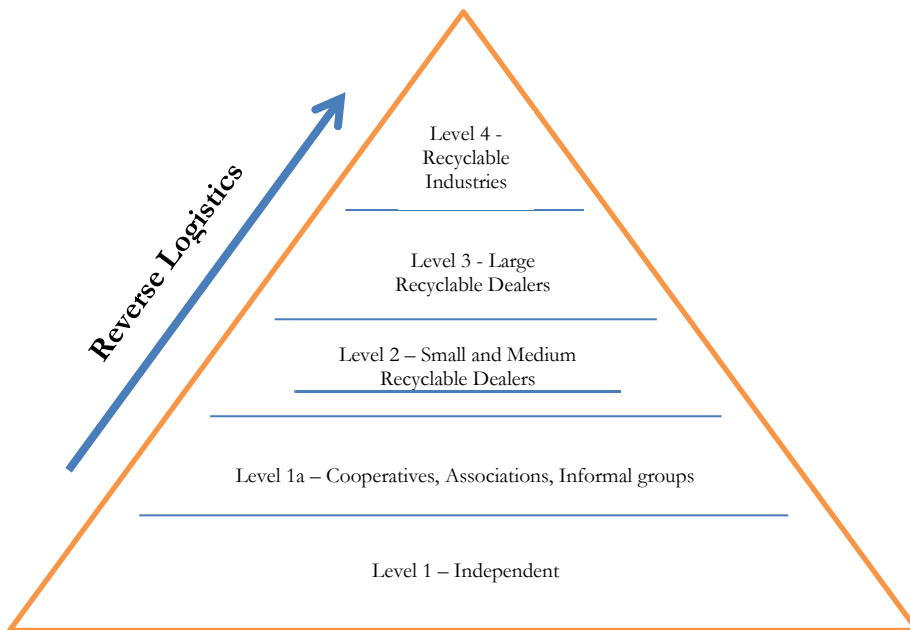


Figure 2-11 Structure of marketing of recyclable waste in Rio de Janeiro

Source: Tirado-Soto & Zamberlan (2013)

There are good reasons for cooperative to move up the pyramid and by-passing the middlemen. One of the reasons for the low gains is the incapability due to lack of technology to process waste and making it more valuable on the market (Tirado-Soto & Zamberlan, 2013).

In a study of waste management system in twenty cities around the world, the authors concluded that it is necessary to find strengths in the current systems. The informal sector in developing countries is identified as a particular strength that contributes to the main part of recycling rates. This strength needs to be built upon and improved even further since it often brings better collection rates than the modern and western countries, leading to cost savings of millions of dollars that would otherwise have been needed for collection and disposals. One example of such savings is in the city of Mumbai, India where it was estimated that more than USD 50 million was saved in 2009-2010 and USD 80 million in 2010-2011 due to the work of the informal sector (D. C. Wilson, Rodic, Scheinberg, Velis, & Alabaster, 2012).

According to (Scheinberg, Spies, Simpson, & Mol, 2011), the informal sector is often excluded from the integration in statistics even though it often outperforms the formal recycling sector in collection of recyclables. The informal and formal sectors are often intersecting each other even though working separate in a waste management system. In developing countries, there are usually competing actions within and between various sectors of society which bring a need to develop solutions to the problem that is different and not simply “copied and pasted” from developed countries. The solution must be contextualized to each unique situation where the informal sector is increasingly included. It is important to remember that recycling is primarily seen as an economic activity supporting millions of individual and their households (Scheinberg et al., 2011).

## 2.2.5 Inclusive Policy Development

When looking at the Millennium Development Goals for poverty reduction, it is important to consider the involvement and inclusion of the informal sectors in a way that makes recycling more efficient, the work more secure and contributes to increased income. A good reason for involving this group of society is that it could be counterproductive to develop policies and action plans without them. (David C. Wilson et al., 2006) In terms of policies, it has often been the case that there is a negative view towards the informal sector by repression (shame from society resulting in harassments), neglect, collusion (accepted only if they vote for a political party) (Martin Medina, 2000).

Given the contributions the waste collectors make to society, especially in developing countries, it is important to discuss the need and importance of tools such as policy instruments where waste collectors are included and welcomed into the formal system. There has been a positive trend towards the inclusiveness in policies due to the acknowledgement of social, environmental and economic contributions made by the sector. During the last two decades, there has been a significant improvement which has often been led and initiated by NGOs and CBOs (David C. Wilson et al., 2006).

Literature and experience reveal the importance of listening to the informal actors (Sembiring & Nitivattananon, 2010) and it is imperative that all stakeholders involved in a waste management system are involved in the design of its application. Let's remember that there is no cut and paste model that fits all but every context must have its own design and developers. Systems should be developed where citizens, cooperatives, formal and informal sectors are involved and where all actors can gain. By working towards the principle of the three Rs, to reduce, reuse and recycle, resources can be managed more responsibly (D. C. Wilson et al., 2012).

In her doctoral thesis, Sonia Dias discussed the importance of the participation of various actors through multi-stakeholder fora in order to provide a solid base for policy development and improvements of solid waste management, including social and environmental aspects. She concludes that the fora have a significant importance giving better visibility to social as well as environmental contributions the waste collectors bring to the table (Dias, 2009).

A challenge with modernization of waste management systems is to involve the informal sector since they often are banned from the landfills when these are closed. This results in the loss of livelihood since new systems are often mechanized and linked to latest technology which often results in less labor-intensive production. Waste picking is here seen as outdated and primitive. There is therefore a risk that when modernization fails to include the waste collectors, poverty increases for a considerable number of people. There is a need for a modernized mixture with coexisting systems that can be integrated into a win-win solution for all. It is therefore important to have inclusive policies, instead of repressive policies where waste collectors lose their livelihood. Through this, social acceptance, legal identity, financial compensations will be provided to the informal sector (Dias, 2012).

### **2.2.6 Capacity and Training**

An important aspect from a poverty reduction perspective is that poverty should not be seen as the lack of income but instead the lack of basic capabilities equipping and making a profitable integration in the market possible. When viewing poverty from that perspective, it is advisable to plan interventions aiming to increase the capacity of actors. There is an existing idea in the discourse and literature related to poverty reduction arguing that there is a need to support the creation of markets. It would instead be favorable to allow actors to create and organize their own markets through equipping and capacity-building (Lindeman, 2012). Capacity-building from this stance, would also be empowered, given capabilities, and access to public services of citizens, where these individuals have the skills to voice their needs and partake in the processes of decision-making (Dias, 2012).

The formation of a cooperative is often encouraged in the literature, however its organization brings new challenges in terms of management which is quite different than operating individually. This requires capacity-building in many fields, including administrative capacity (Lindeman, 2012). There is a need to invest in the capacity-building in cooperatives in areas such as technology, infrastructure, governance and various sorts of training interventions which would allow for a more environmentally friendly, socially inclusive, and sustainable waste management system (Tirado-Soto & Zamberlan, 2013).

## **2.3 Stakeholder Engagement and Development**

The development of laws toward a favorable inclusion of the waste collectors in Brazil has been a long and turbulent process which eventually brought the National Solid Waste Law into effect. This was a process over almost two decades which started at grassroots level with church and NGO support, followed by the development of municipal, state and national laws. One of the facts that has made the development in Brazil so successful is the support from members of parliament who have been very supportive and the strength of the national movement (Dias, 2011b). The Brazilian context is different from many other developing countries. This topic is very much in focus today in Brazil and the social inclusion of informal sectors in order to reduce poverty and improve the environment (Ministry of Environment, 2012).

### **2.3.1 The Brazilian Legal Framework**

In Figure 2-12, some of the key legal steps taken by the Brazilian Government to allow integration of informal waste collectors are portrayed (IPEA, 2012). The Brazilian National Solid Waste Law, nr.12.305, has gotten attention from other countries and is seen as a potential framework for countries in Latin America with similar contexts. The challenge in Brazil today is how to apply detailed implementation plans which will greatly determine its level of success. There are two committees working closely together to achieve this, namely the Interministerial Committee of Reverses Logistics and the Interministerial Committee of the National Solid Waste Policy. The work is going forward, but slowly (Thais, 2013).

### **2.3.2 The General Overview of Brazil**

The existence of waste collectors in Brazil is not a new reality but has been around for a long time and has been widely written about in poetry and literature. Aspects such as development of the recycling structure over time, validation of waste as a resource, new environmental legislations towards waste management, and steps towards collective waste separation has also contributed to a change of perception towards this category of workers (de Pádua Bosi, 2008). The waste collectors are considered to be the base of the recycling pyramid in Brazil and it is estimated that, as much as 90% of the recyclables collected in the country are done so by waste collectors (IPEA, 2012). Between 2003 and 2010, the Brazilian Government spent approximately BRL 280 million (EUR 90 million) destined to support cooperatives of waste collectors (Ministry of Environment, 2012).

Even though Brazil has taken some steps forward, it still has serious limitations in the implementation of its national waste policy according to Gouveia (2012). There is a great need to utilize the assets waste collector provide with their work by supporting and giving incentives for their organization into cooperatives where public policies must include important aspects such as health, citizenship, salary, market development, technology, and so forth. The objective is to provide these groups with a more dignified occupation with less risk, a guarantee of income, and the social inclusion of a workforce who contributes to a lessening of the ecological footprint. The aim is that waste collectors are not only seen as important, but as fundamental and central part of the solid waste system. Through them, a larger quantity of collection can be achieved where a lack of public logistical infrastructure still makes collection difficult (Gouveia, 2012).

**Classification of Occupation n° 5192-05**

It is worth saying that already in 2002 the title “Catador de Material Reciclável” (Recyclable Material Collector) was recognized as a job category and registered in the Brazilian work classification with the function to collect, transport, separate, press, store and negotiate the materials for their reuse (Gouveia, 2012). With the legal recognition of the working category and the classified activities of cooperatives, it became easier to monitor the development of these activities.

**Decree No 5.940**

One of the first documented steps towards social inclusion was the 2006 Decree 5.940 which obligated the federal institutions to separate their recyclable waste and direct it to cooperatives and associations. The primary objective was to generate work for waste collectors (Government of Brazil, 2006).

**Law 11.445/07**

This Law “establishes national guidelines for basic sanitation and for the federal policy of basic sanitation”. The Law made it possible to contract organized cooperatives without any bidding process. This made it considerably easier to provide cooperatives with waste. The Law states that the municipalities should pay the cooperatives for their services, but this is often not practiced (Government of Brazil, 2007).

**Law 12.305**

Described in section 2.1

**Decree 7.004**

Signed on December 23<sup>rd</sup> 2010, this Decree regulates the Law 12.305. In Article 11, it is stated that participation of cooperatives should be prioritized in selective waste collection and also in sectorial agreements related to reverse logistics (Government of Brazil, 2010c).

**Decree 7.405**

This Decree signed on December 23<sup>rd</sup> 2010 has the aim to “integrate and coordinate the actions of the Federal Government aimed at supporting and fostering productive organizations of collectors of reusable and recyclable materials, the improvement of working conditions, the expansion of opportunities for social and economic inclusion and expansion of selective collection of solid waste, reuse and recycling through the work of this segment.” (Government of Brazil, 2010b).

**Law 12.375**

This Law from December 2010 states that industries that use solid waste as their prime material can get tax incentives for industrialized products (IPI) but this is only applicable if the solid waste is purchased directly from legally operating cooperatives (Government of Brazil, 2010d)

**Law 12.690**

This Law was enacted on July 19, 2012 and is the updated Law regulating the work of Cooperatives and providing guidelines for its organization and functionality (Government of Brazil, 2012)

*Figure 2-12 Legal Framework Development in Brazil*

*Source: Author*

A downside of the new Brazilian legislation, from the waste collectors' perspective, is that entities such as large housing complexes, companies have incentives to make a business out of their waste and can sell it directly to intermediaries, therefore decreasing the amounts available for cooperatives. This is a problem since these entities often provide good quality waste that brings more value to the cooperatives for less amount of work. Further challenges identified by Fergutz et al. (2011) are:

- lack of networking between associations/cooperatives, which is true and found to be a problems much related to trust between cooperatives. Examples of this will be given in the chapter with findings.
- lack of general data about the waste collectors, making integration more challenging, lack of control, data of volumes, and specifics related social and environmental costs.

There are great discrepancies about available primary data related to the informal waste collectors in Brazil, and waste generation and collection in general (Ministry of Environment, 2012). Several institutions have proposed different results and numbers. In a recent diagnostic study performed by IPEA (2012), a number of these institutions were consulted in order to bring a better clarity to the topic. Various institutions and entities were consulted. These included:

**The Inter-Ministerial Committee of Social Inclusion of waste collectors and recyclable materials** (Comitê Interministerial de Inclusão Social dos Catadores de Materiais Recicláveis – CIISC). This is a governmental entity and will be explained further down in the document.

- **The National Research of Basic Sanitation** (Pesquisa Nacional de Saneamento Básico – PNSB 2008) This is a governmental study of the basic sanitary conditions in the country related to waste and developed by the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística - IBGE)
- **The National Movement of Recyclable Material Collectors** (Movimento Nacional dos Catadores de Materiais Recicláveis) is a national NGO presented further on in the document.
- **The Pangea Centre for Socioenvironmental Studies** (Centro de Estudos Socioambientais) is a civil society organization working with issues of interest for the general public and especially of social, environmental, cultural and economic character.
- **The Corporate Commitment to Recycling** (Compromisso Empresarial para a Reciclagem - Cempre), described further down in the document.
- **The Recycling Route** (Rota da Reciclagem - Tetra Pak). This is a corporate intervention by Tetra Pak to create a database to bring awareness to the general public on how and where to work with selective collection and recycling. This will also be explained in more details further down the document.

The Government's results of the study was that there are today approximately 400,000 to 600,000 waste collectors in Brazil, out of which many are below the age of fourteen and the majority are women. They have a monthly income ranging from BRL 420 (EUR 134 ) to BRL 520 (EUR 166) (IPEA, 2012) which is lower than the Brazilian minimum salary of BRL 678 (EUR 217) (Portal Brazil, 2013). The majority of the waste collectors have reached fifth to eighth grade of schooling. The South and South Eastern regions are the ones with most cooperatives and waste collectors. An estimate of these numbers for 2010 showed 1,100 cooperatives with approximately 37,000 waste collectors (IPEA, 2012). Only 27% of municipalities acknowledge that they are aware of informal collectors operating in the local dumps, and only 50% of the municipalities are aware of urban informal collectors. Around

60% of the organizations working with, such as cooperatives and collectives, are at the lowest level of efficiency (Ministry of Environment, 2012).

According to the Ministry of Environment, between 30-35% are living in extreme poverty which in Brazil equals to BRL 70 (EUR 22) per capita per month. The category of waste collectors are included in the Brazilian national program “Brazil without misery” allowing waste collectors to have access to the monthly support plan “Bolsa Familia”. This support plan is mainly designed to support children to go to school (Thais, 2013). This policy has surely supported many families but in some areas in the country, especially in the North, it has been seen to create challenges, since people are relying on these grants and therefore found not willing to work as waste collectors (von Zuben, 2013).

### **The Case of Asmare**

A frequently referred project was Asmare in Belo Horizonte in the state of Minas Gerais. This cooperative was started out of the concern from the local church towards vulnerable people. The group later developed into a cooperative which also led to increase of income for its members. It was formalized in 1990 where the state government made an effort to identify the population living of this source. It was then discovered that 551 individuals in Belo Horizonte had this task as their main source of income. This was followed by the development of a legal framework 1990, the mapping and situation analysis, the signing of agreements in 1993, setting up of first recycling containers of separated waste at homes, community mobilization/inclusion. A recycling warehouse for the cooperative opened in 1994 and augmented in 1996, capacity-building of members 1994, increase of selective collection 1996-2001, participatory planning 2003 of future policies (Dias, 2011a).

In the case of Asmare, the cooperative managed to negotiate with the municipality for a warehouse for safer separation, end of police harassment, and the right to work in the city with better access to waste. The work of Asmare also changed the public opinion from being seen as disgraceful to an accepted and important contribution to the city (Lindeman, 2012)

The state of Minas Gerais is one of the more progressive states in terms of integrating waste collectors in the formal system, where cooperatives receive remuneration for environmental and collections services (Thais, 2013)

*Figure 2-13 Asmare in Belo Horizonte*

*Source: Author*

The new law highly encourages the informal collectors to get organized in cooperatives as seen in Figure 2-14, which illustrates the position of the informal collectors and the cooperatives. Incentives are access to funding opportunities for cooperatives and not for individual collectors, the access to waste delivered by the municipalities, access to several social services, health, security, and more. There are a large number of cooperatives who are still unable to meet the legal requirements such as labor and tax laws. Only 25% of the collectors pay the fees to the National Institute of Social Security (INSS) which indicates that there is a need to promote better public policies for improvements in this important area. Up to 60% of the cooperatives have a very low level of efficiency due to factors such as lack of capacities or equipment to ensure economic efficiency (IPEA, 2012).

In Brazil, the cooperatives work as small enterprises where the members are the owners, and have to follow established cooperative laws in the country (Government of Brazil, 2012). The monthly revenue is the total income minus the cooperative taxes and INSS, and then divided equally by all members. For the informal workers, there are no taxes or INSS involved at all and his/her income is completely related to number of hours invested in collecting, separating, and selling. The higher efficiency in a cooperative provides more money which minus the tax should still be better. This is true in some cases, but it is not always that the issue of money is the most important one. Issues such as security, dignity and others are also of important value (H R Silva & M R Arariba, 2013).

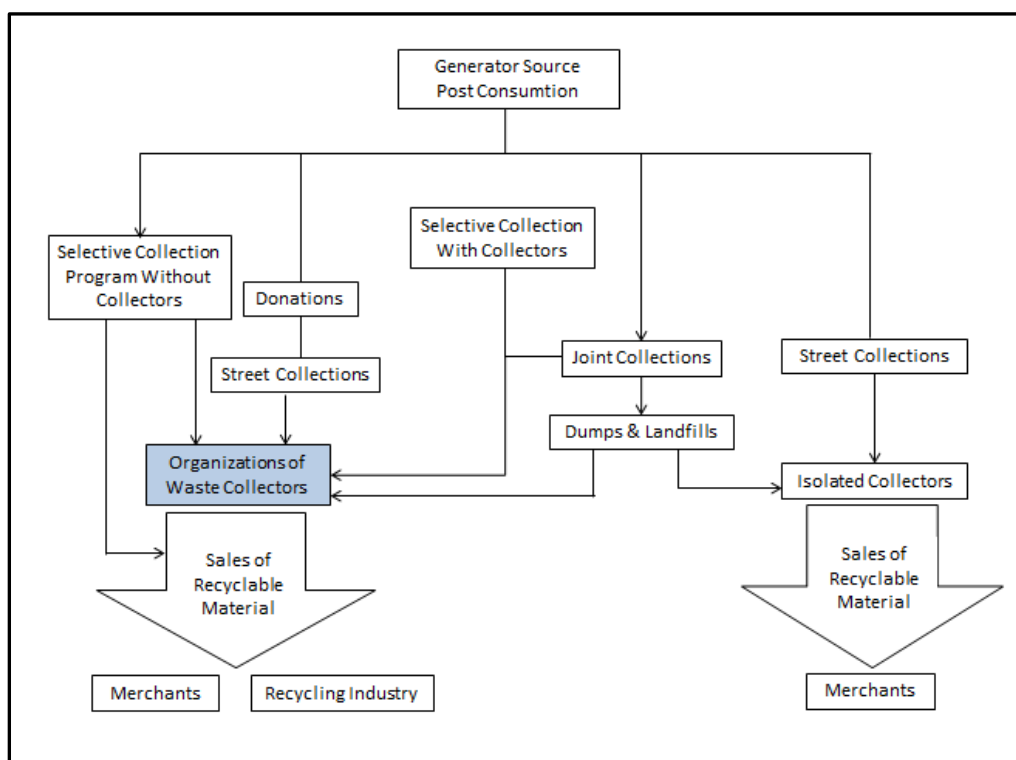


Figure 2-14 Flowchart of Brazilian Waste including Informal Sector

Source: IPEA (2012)

Dias (2011a) concludes that there is a known hesitance from the majority of informal waste collectors in Brazil to be integrated and stay in organized cooperatives. This is a problem since the legislation today only allows support to cooperatives and associations. An important question to ask is therefore how this problem can be solved and more waste collectors be included (Dias, 2011b).

The recycling market in Brazil can be described as a few buyers and a large amount of vendors. Economy of scale is needed in order to allow direct negotiations with buyers. For cooperatives working on their own, this entails a problem since the amounts of collected waste does often not reach sufficient amounts. The idea of networking between cooperatives is therefore interesting since it can bring market advantages where larger amounts of waste can be sold (Tirado-Soto & Zamberlan, 2013).



Networks have been shown to develop in three different ways in Brazil. The first is the spontaneous action of waste collectors in areas lacking selective programs but where the population is encouraged and educated by the waste collectors to contribute. The second is the induced networks where NGOs, universities, among others, take action. This form of network often shows difficulties in self-governance (Tirado-Soto & Zamberlan, 2013). A reason for this challenge can be the need to allocate sufficient time to support induced networks to create ties where members feel belonging (Martinho, 2003). It is important to strengthen networks with proper support over time where trustful ties are developed and social ties created which will increase the probability for success (Tirado-Soto & Zamberlan, 2013).

An important aspect considered and currently discussed by the Brazilian Government is the adequate remuneration of waste collectors for the contributions to society (Thais, 2013). In 2010, IPEA conducted a study about payments for environmental services and concluded that they should be considered since the collectors contribute extensively to these services in the country. More adequate payment would elevate the income of the collectors, reduce the oscillation of prices for recyclable material, stimulate the formalization of collectors into cooperatives and encourage increased efficiency, increase the chance for success for sustainability in these operations. Conclusions were also made that payments should be made to cooperatives and not to individuals in order to stimulate the cooperative and the payment should be done based on volumes of waste handled. The new law states that municipalities should give priority to cooperatives instead of private companies and that no bidding is necessary when contracting cooperatives but there is still uncertainty concerning the amount to be considered in these payments (IPEA, 2010).

### **2.3.3 The National Organization of Waste Collectors**

Founded in 1999, the National Movement of Waste Collectors (Movimento Nacional de Catadores de Resíduos - MNCR) became the voice of Brazil's waste collectors on a national level. It had started in 1992, but only formalized in 1999 when 1,700 collectors assembled at the National Congress. Today the MNCR has around 300 associations and cooperatives registered around the country. Still, the number of waste collectors associated to these associations and cooperatives are only around 10% of all the waste collectors in Brazil. The movement is recognized in the country and was the main contributor to the recognition of waste collection as a profession. One of the main issues that made the movement take off was the desire of the founders to create means for waste collectors to bypass middlemen who controlled prices for materials and sometimes even means of transportation. This also helped in the development of new policies contributing to positive change where especially in Brazil, the waste collectors have contributed to prioritize recycling before landfilling or incineration (Fergutz et al., 2011).

One of the many achievements of MNCR was the "Brazilia Letter" (Carta de Brazilia) in which the movement expressed their main concerns. This letter was written in 2001 and memorialized the need for (Fergutz et al., 2011):

- the recycling trade to be regulated
- the social inclusion to be ensured where collectors could expect housing, education, health, technological support, trainings in management and human development, etc.
- the support of collectors' participation in every aspect of processing of recyclables.

Other accomplishments of the movement include the contribution towards ending of dumpsites and the inclusion of collectors in the Zero Hunger Program developed by the national government (Fergutz et al., 2011). According to the National Waste Collectors Movement, only 7% of affiliated cooperatives are recipients of investment support of public funding for infrastructure and equipment such as presses, cranes, wagons, storage room, and the formality of the group (Tirado-Soto & Zamberlan, 2013). The Movement has also fiercely advocated against incinerators and several demonstrations have been organized throughout the country (Amorim, 2013)

### **2.3.4 The Interministerial Committee for Social and Economic Inclusion of Collectors of Usable and Recyclable Materials**

The work of the national movement resulted in former President Lula creating the Interministerial Committee for Social and Economic Inclusion of Collectors of Usable and Recyclable Materials in 2003 to address the social integration and economic inclusion of waste collectors (IPEA, 2012). The Committee did, however, not really gain power until 2007 and was later reformed in 2010 through the Decree 7,405 (Pro-Catador). This committee was operating under the Ministry of Environment but has now been elevated to the Presidential Secretariat where it has a better platform with more strength to articulate and implement necessary change (Thais, 2013).

One of the practical achievements has been the program Cataforte versions one, two and three, where cooperatives have gained support from the Government such as capacity-building, technical advice, provision of trucks, presses, equipment. This support also made financial support from the Bank of Brazil Foundation, Foundation for National Health (Funasa - Fundação Nacional de Saúde) and the Ministry of Environment, more possible and accessible for cooperatives. The version three, which is just fresh out of the press, is meant to bring the cooperatives to the next level by providing training, e.g. development of collection routes, and strengthening of networks. Another important work by the committee is the payment to cooperatives for their environmental services. These discussions began in 2009 and are still ongoing but not yet approved by the legislative branch in Brazilia (Thais, 2013).

### **2.3.5 NGO Engagement**

A recognized group of stakeholders in the work for inclusion of excluded groups in society are the NGOs and church groups. An example is the NGO Gaspar Garcia Center for Human Rights, which operates in the metropolitan São Paulo. This group has been active for more than 25 years and was started by likeminded individuals with a concern for the vulnerable population and groups in society. This group has worked with waste collectors who are often drug and alcohol abusers and who use the waste collection as a mean to achieve quick money to maintain their abuse. (Gonçalves, 2013)

Even though NGOs are considered to be an important stakeholder, there is an existing scepticism towards them since it is often considered that NGOs prey on vulnerable people for their own benefit. This became clear during the interviews in Rio de Janeiro, where it had to be made clear to the respondents that the visitor was not an NGO representative (Ribeiro, 2013).

The work of NGOs often has a different time perspective than other stakeholders since it is clear to them that the inclusion of these individuals into a cooperative is not an easy task. Gaspar Garcia often counts with at least six months to including failures and comebacks and still the success rate is around 40-50%. The work often focuses on a gradual integration where

building of self-esteem, trust and abilities to work collectively are important factors for a category of people who often have difficult backgrounds. The reason for Gaspar Garcia to start working with waste collectors was because they saw an already existing income generating activity that could be built upon. This work starts at a very early stage in the integration of collectors and it includes as much of social aspects as just providing a job. According to Gaspar Garcia a solution for the waste situation would be to work with a stronger social mindset but also create more cooperatives and divide sectors in which they operate with better logistics such as trucks and developed collection routes. The cooperative can also benefit from having a support group of local school leaders, priests, community leaders in order to involve more people in the process (Gonçalves, 2013).

### **2.3.6 Corporate Engagement**

The development of the new law was supported by various companies in Brazil. In 1992 The Corporate Commitment to Recycling (Cempre)<sup>2</sup> was founded by companies such as Nestlé, Unilever, HP, and Dell which are still maintaining members of this association. Cempre's mission is to promote the idea of integrated management of municipal solid waste, recycling of post-consumer waste, and to spread environmental education focusing on the three Rs (Reduce, Reuse and Recycle). In order to do this, the organization has spear headed several research projects and studies in the area, created training materials, and publications, to name a few examples. Cempre has also been active in the support and establishment of cooperatives throughout Brazil. Tetra Pak was one of the companies that drove the process of developing Cempre, and has been strongly involved in the development of the national solid waste law and the integration of waste collectors.

Tetra Pak is a multinational company with its headquarters in Sweden and now operating in 170 countries in the world. It is present in Brazil since 1957 with 23 billion packages produced 2010/2011 to 97% of Brazilian households. In 2011 the company produced twelve billion packages out of which 6.82 billion were Forest Stewardship Council (FSC) certified (Tetra Pak, 2011). The company managed to increase the post-consumer rates of recycling because of its work with its supply chain. This resulted in the reduction of greenhouse gas emissions primarily due to the decreased amounts of virgin material needed (Mourad et al., 2008). In 2011 27% of all the produced packages were recycled representing 59 thousand tons of material. The progress of recycled long life packages is portrayed in Figure 2-15. One of the latest products to improve the packaging is the cap made of polyethylene made out of ethanol from sugar cane. This substitutes the traditional oil based plastic cap (Tetra Pak, 2011).

Tetra Pak produces the machines for the production of packages for food and beverages. In order to secure and safeguard the contents, the packages are made of a combination of carton, plastic and aluminium. The production of this package is done at Tetra Pak's plants according to customer requirements and then shipped in rolls to the client where the food and/or beverage is inserted in the package with the Tetra Pak machine. The constitution of the package has historically made it challenging to properly recycle all the components. A package contains six different layers. The first layer coating from the outer layer is polyethylene protecting the exterior, the second is paper providing resistance and stability, the third in polyethylene as a fixer, the fourth is a very thin layer of aluminum foil to protect against smell, oxygen and light, the fifth polyethylene as a fixer, and finally the sixth as a protective layer for the product in the package (Zuben, Orsato, & Wassenhove, 2007). Today there is only one company working with the total separation of the plastic and the aluminium. This company is

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<sup>2</sup> <http://www.cempre.org.br/>

however closed due to the need of greater volumes to keep the factory productive. The technology exists but the volumes are still too low (Pinheiro, 2013).

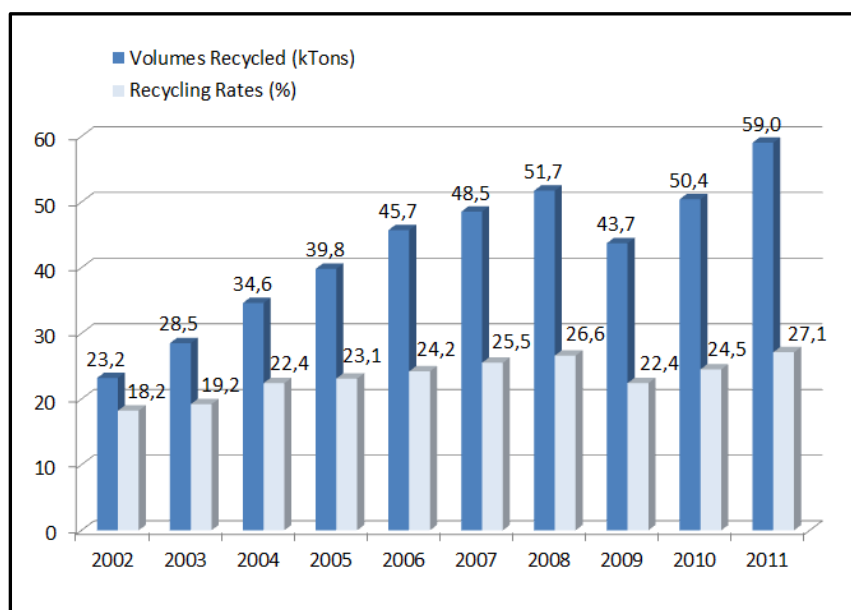


Figure 2-15 Tetra Pak Recycling Development 2002-2011

Source: Tetra Pak (2011)

Tetra Pak Brazil began its work with developing selective collection in 1995 and the recycling of post consumption packages on the Brazilian market. Already at that time, the idea with cooperatives was integrated in the work of Tetra Pak. This was not due to incentives from the government but a decision by the President of Tetra Pak Brazil and the overall commitment to sustainable development at headquarters level where selective collection should be promoted in all the countries where Tetra Pak operated in.

In 1995 very few cities practiced selective collection. Tetra Pak learned by working with the cooperatives and saw that there was a great opportunity to aggregate environmental and social inclusion in the same model. In 1996, considerable efforts from the environmental department were invested in the development of selective collection through the development of cooperatives. This was done together with Cempre. Several technologies were developed to make use of all the recycled Tetra Pak packages. The technological development was an investment done by the company and was passed on to local entrepreneurs who are now running them. The selective collection process grew and there are now more than 35 factories in the country working with Tetra Pak recyclables of long life packages separating the paper from the polyethylene and aluminium. Up until 2002, the factories threw all the polyethylene and aluminium in landfills for costs but is now instead recycled and creating a new market of products. The technologies Tetra Pak invested in were in low cost production of products such as roof tiles and bricks made of polyethylene and aluminium. Today twenty factories work with tiles and bricks (von Zuben, 2013).

The Brazilian Association for Technical Norms (ABNT) developed a quality label for the products. Roof tiles are even being tested in Sweden to see how they withstand the weather conditions (Tetra Pak, 2011). This process have been exported to the Latin American

countries of Argentina, Chile, Peru, Ecuador, Colombia, Costa Rica, Venezuela, Dominican Republic and now inaugurating in El Salvador and Mexico, as well as in South Africa, India, Pakistan, Indonesia and Thailand (von Zuben, 2013).

Tetra Pak made customer inquiries and saw that customers wanted to do selective collection but did not know how and viewed it as a very complicated process. At this time the long life packages were not collected at all. The internet function Google maps was starting in Brazil and a staff member came up with the idea to develop a mapping system where collection points, drop off points and cooperatives dealing with long life packages should be located. The site “Rota Reciclagem”<sup>3</sup> was developed in cooperation with the University of Campinas (von Zuben, 2013). The page is also translated and used in other Latin American countries<sup>4</sup>.

Tetra Pak established a team to work directly with the cooperatives, instead of outsourcing the work to NGOs. Apart from its own staff, Tetra Pak had 24 consultants working throughout the country visiting cooperatives and identifying what support they needed. This made it possible to develop a database with important field information about localities, cooperatives, equipment used (scale, pressure, trucks, etc.), waste quantities, the membership of the cooperatives, training needs, buyers, type of material separated and so forth. Many cooperatives open and close and the site is constantly updated. This provides an opportunity for the general public to easily find and access points of interest. A screenshot from the website showing locations visited in this study can be found in Appendix 4. Through the information in this database, Tetra Pak estimates that there are approximately 400,000 waste collectors out of which 20% are affiliated to cooperatives. The collector is defined as the person who lives out of this occupation and not the ad hoc collectors. Tetra Pak’s work toward the Millennium Development Goals is not only to include people in cooperatives, but also to see an improvement of their lives and skills (von Zuben, 2013).

Another form of support from Tetra Pak is the Recicoleta<sup>5</sup>, managed by a Tetra Pak consultant in Rio de Janeiro, where the population can sell their long life packages for fixed prices. Apart from cooperatives, it is common that church groups bring their packages and exchange them for tiles and/or bricks. Other recycled products such as pens, rulers, notebooks, folders, agendas, frames, candleholders, among others, are shown and the site also serves as an informative site about recycling. This support is to facilitate and secure the collections of sufficient volumes of long life packages needed in order to be sent directly to the industry. In the North of the country, there is a lack of recycling industry available and Tetra Pak has given support to cooperatives in transportation (Pinheiro, 2013).

Tetra Pak focuses its work on already established cooperatives and on the business aspects of the cooperatives rather than the social aspects. The idea is that successful cooperatives will attract informal collectors. During the crisis in 2009, prices for recyclable material dropped, but Tetra Pak bought and stored collected cycles in order to avoid letting cooperatives collapse. This resulted in the company keeping their recycling indexes even through the crisis (von Zuben, 2013).

The biggest challenge today is to end the dump sites and the hope is to do this within the next 5-6 years. Just by achieving that, the law will have gained a lot of success. The second point is to develop the cooperatives into business organizations and suppliers of prime material (material prima). A priority is to educate the consumers to separate waste. The consumers are

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<sup>3</sup> Rota Reciclagem: <http://www.rotadareciclagem.com.br/index.html>

<sup>4</sup> Ruta Reciclado: <http://www.rutadelreciclado.com/index.html>

<sup>5</sup> Recicoleta: <http://www.recicoleta.com.br/index.htm>

more than willing to do it today, but many municipalities are still not implementing it, which is a problem. In relation to incineration Tetra Pak is in favor of it, but does not promote it. It would be especially interesting in large centers, since the amounts of waste in the country are so vast and there is enough of waste for cooperatives and incinerators. Unfortunately the perception is negative due to past experiences but technologies today are very advanced and much more environmentally friendly (von Zuben, 2013).

Tetra Pak invested, in the form of grants, EUR 1.7 million in Brazil to support recycling factories by providing layout, and equipment. The result is a capable industry providing Tetra Pak with paper. In 2013, the budget for the environmental department is approximately BRL 10 million (EUR 3.2 million) allocated for training of cooperatives, salaries, staff, transport, equipment to industry, etc. The environmental education alone is BRL 4 million (EUR 1.3 million). An example of the public education was the popular Brazilian TV Series (Novelas) “Merchandizing” which included recycling. This increased the recycling rates notably. The results allowed for a similar marketing campaign in 2011 with the main “novella” actress Irene Ravashe<sup>6</sup>.

The process to achieve a national law has been slow, but it is moving forward. When the process started in 1995, the amounts of formalized collectors and cooperatives were far from as many as today (von Zuben, 2013). Recycling is a process that is moving forward in a positive way in Brazil and the contribution of Tetra Pak has been recognized as “fundamental in order to make recycling of long life packages economically and technically viable” (IPEA, 2012). Like other stakeholders, Tetra Pak alone will not solve the problem, but it is a part of the solution (Seidel, 2013).

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<sup>6</sup> Irene Ravashe: <http://www.youtube.com/watch?v=xBRDTYxqup0>

### **3 Framework for Social Inclusion/Integration of the Informal Sector**

One important actor in the global arena for solid waste management is the International Solid Waste Association<sup>7</sup> whose mission is to promote and develop sustainable and professional waste management worldwide. The organization does this through various activities:

- Promoting resource efficiency through sustainable production and consumption
- Support to developing and emerging economies
- Advancement of waste management through education and training
- Promoting appropriate and best available technologies and practices
- Professionalism through its program on professional qualifications.

The International Solid Waste Association has developed an analytical framework with a rapid assessment tool called “Integration Radar” (InteRa), as a tool for the evaluation of a planned or existing social integration performed in different locations. The development of this tool was done in cooperation with practitioners, experts and various stakeholders in the field of waste recycling bringing together previous experiences (Velis et al., 2012). This framework derives from the understanding that several aspects must be considered to integrate the informal sector in a successful way.

This framework provides an understanding of how current interventions are done and what actions are lacking in order to provide a more holistic action plan for entities who are aiming to better integrate the informal sector. The tool was developed in order to achieve a higher success rate for the integration process, benefiting various stakeholders.

The framework includes four interfaces between the informal recycling sector and its surrounding environment of operation. These interfaces are shown in Figure 3-1. These four interfaces provide a holistic view of areas needed to be addressed, and subdivided into groups of interventions under each main point (1-4) that inform more precise intervention points and specific actions that need to be taken into consideration. The interfaces with the related subheadings are:

1. The formal solid waste management system providing the informal sector with recyclable material
  - a. Access to waste
  - b. Recognizing the role of the informal sector
  - c. Protecting public health and the environment
  - d. Strengthening interfaces
2. The value chain where the informal sector sell their recycled and processed products
  - a. Improving quality of material for recycling at their source
  - b. Adding value to the secondary raw materials/products sold
  - c. Improving linkages along value chain
3. The general society which involves the acceptance of the informal sector
  - a. Facilitating recognition and acceptance of the informal sector
  - b. Work towards children, education and gender equality and inclusivity
  - c. Occupational health and safety
4. The way the informal sector is organized and capacitated

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<sup>7</sup> International Solid Waste Association: [www.iswa.org](http://www.iswa.org)

- a. Organization of informal sector
- b. Financial viability
- c. Capacity-building

The three interfaces portrayed in circles are the specific areas which often overlap to a certain extent, while the organization and empowerment is an interface that underpins all three interfaces, enabling them, and providing conditions for a good functionality. These headlines inform the development of a questionnaire (Appendix 5) that results in a radar diagram which describes the current situation. With a scoring system of: key point (K) = 1 point, just considered (C) = 1/2 points, ignored (I) = 0 points or no information available (n.a.) = 0 points an average score per intervention point is achieved. By then adding the total score and then dividing by the number of specific actions, an overall score can be given. These overall score points are then inserted into the radar diagram visualizing the result of the specific interviewed entity.

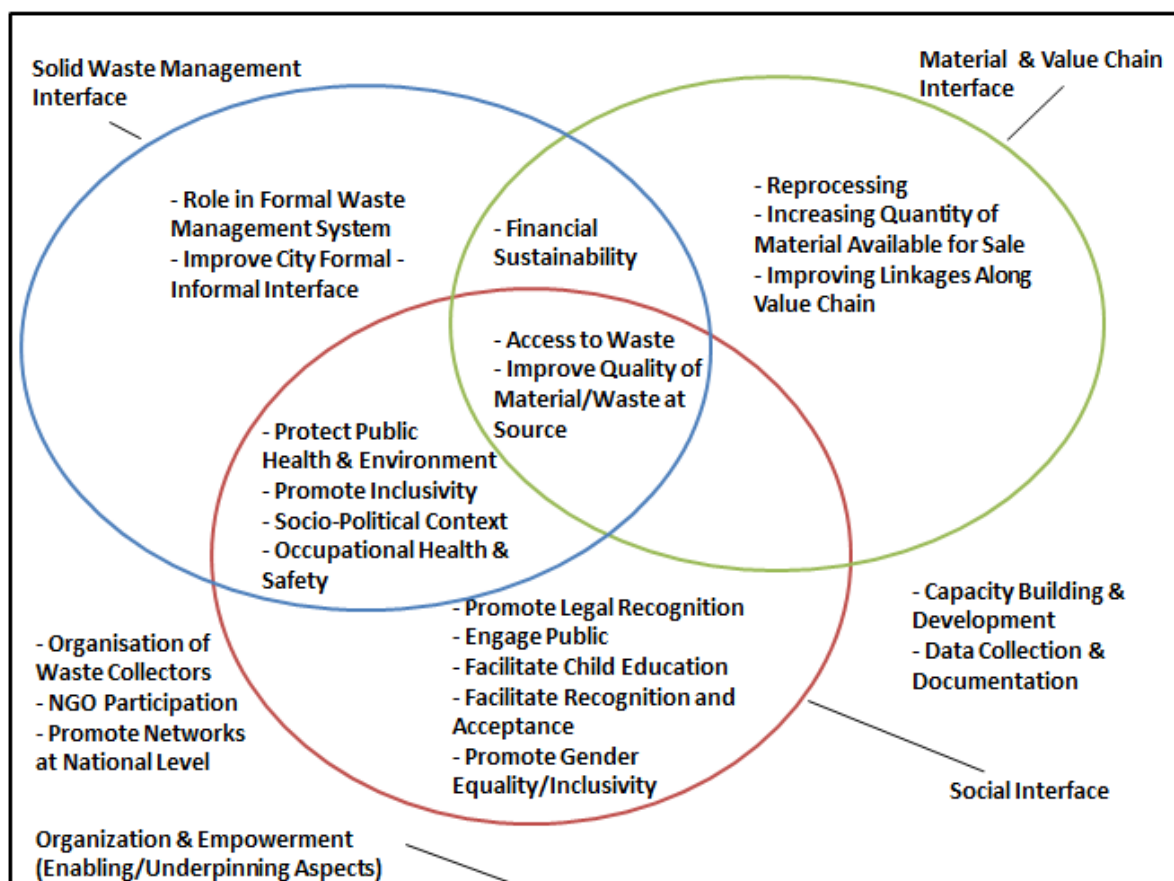


Figure 3-1 Analytical Framework Model

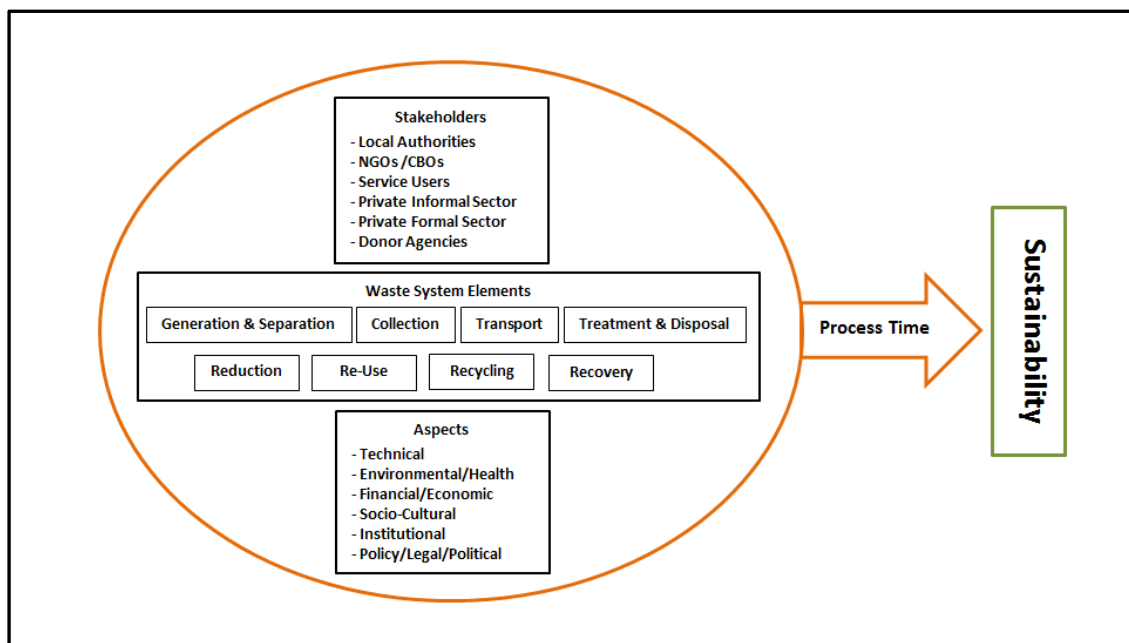
Source: Velis et al. (2012)

The InteRa tool has been applied in a number of countries as it was being developed. Some of the countries involved were the Philippines, Brazil, Egypt, Argentina, and Thailand. The results varied, showing that different focus is applied or allowed by society to the interfaces of the framework (Velis et al., 2012). In this study, the questionnaire was used in nine cooperatives in the cities of Rio de Janeiro in the state of Rio de Janeiro, and Itú, Campinas



and São Paulo in the state of São Paulo. All cities are located in the South Eastern region of Brazil which is considered to have the highest number of operating waste collectors (IPEA, 2012). The issues in the questionnaire were furthermore used when interviewing representatives from the company Tetra Pak and other respondents. By looking at the differences of the perceptions of social integration of waste collectors, challenges could be identified and some recommendations brought forward to the audience of this study.

Another framework considered for this study was the inclusive model portrayed in Figure 3-2. A key aspect of this framework is to understand the process, apply it to the contexts where the waste management system shall be studied (Scheinberg & Anschtz, 2006). In this process, the development of policies is important and, even more, the inclusion and participation of all actors in society. Policy-making must thus involve all the targeted groups (GIZ, 2011a; Scheinberg & Anschtz, 2006).



*Figure 3-2 Model for an Integrated Sustainable Waste Management*

*Source: Scheinberg & Anschtz (2006)*

In 2010 the authors (D. C. Wilson & Scheinberg, 2010) won the International Solid Waste Association (ISWA) Publication Award for their paper about good practices in waste management in the world’s cities. In their study, the Integrated and Sustainable Waste Management (ISWM) framework, which was first developed in 1996, was used. This framework was developed primarily to look at solid waste management in low- and middle income countries. Their conclusions were that aspects such as public health, environment and resource recovery are necessary to achieve a successful waste management system.

The authors of this framework were, however, also contributors to the ideas and the concept of the framework used in this study. It was therefore found that the utilized framework was a newer, comprehensive framework that included theories, practises and ideas from a large number of sources which led to the decision to use it for the study.

## 4 Findings

In this Section, the key findings from the literature review and field interviews conducted in the states of Rio de Janeiro and São Paulo during the months of July and August are presented. The findings are divided into two categories, general findings in Section 4.1, followed in Sections 4.2 to 4.5 by specific findings directly related to the interfaces of the framework, and the respective interventions and specific actions described in the interview questionnaire, found in Appendix 5. In these sections the interventions and specific actions are written in bold and italics. The headings found in these sections are the same as the ones found in the InteRa tool. In Section 4.6, key findings and challenges related to the InterRa tool are presented.

### 4.1 General Findings and Observations

Nine cooperatives were interviewed, with a total of 415 members out of which 67% were women. Most of the women were reported to be the main contributors to the household economy and, therefore, the main providers of the family. The monthly income spanned between BRL 400-1300 (EUR 128-416). In addition to the cooperatives, the Network Catasampa was also interviewed. The network, with eighteen affiliated cooperatives in the city of São Paulo, has 600 members, of which 70% are women. The interviewed cooperatives were formalized in the time period of 1999 to 2007.

Out of the nine interviewed cooperatives, seven were initially created by collectors who started with the support of a local organization such as a church. An interesting finding is that the informal waste collectors often chose not to be formalized into a cooperative. Most of the original members have left and today most of the current members are formally unemployed housewives, domestic cleaning ladies and other people with a skill set that made it difficult for them to get formal work. Informal collectors are found not to want to be involved in a cooperative mainly due to factors such as rules needed to be followed, working hours obeyed, salary received on certain dates, and more importantly that they often claim to earn more on the streets than in a cooperative. Most of the informal collectors were reported to be abusers of drugs or alcohol, making integration difficult. Cooperatives actively try to incorporate more people, especially informal collectors. In one specific case, the cooperative “Transforming” (Transformando) which operates in the same premises as the Company for Urban Cleaning in Rio de Janeiro (Companhia de Limpeza Urbana), local scavengers had to leave due to the closure of dumpsites. After explaining the benefits of being part of an organized cooperative with better working conditions and social status, still only 40% of the approximately 45 scavengers chose to enroll. Reasons found for those who chose to be part of a cooperative was “a better life, more dignity and better self-esteem, better access to social services, access to a bank account and credit”, among others.

The organizations were in general found to be very dynamic in nature due to high turnover of members. This is clearly a struggle for managers who often have little formal education and training. It was found that although the cooperatives are supposed to be owned and managed by all members, the administration and leadership are perceived as higher than the rest which creates internal problems. Other forms of organizations also exist, such as nucleus consisting of grouped informal waste collectors. These supply cooperatives with waste and thereby they together accumulate larger amounts of waste that are sold for better prices. The cooperatives can in these cases not be seen as middlemen which would have been the case if they had bought the waste from the nucleus for a lower price than they sell it for.

It was also found that many cooperatives are operating illegally and many simply do not want to get fully organized since that would mean an increased transparency which is not of interest

for operators with dubious intentions. The term “copergato” was often used describing “make believe” cooperatives where an owner has people working for him/her for personal gain.

Although a law has been enacted, it is still far from being implemented all over the country. One example is the municipality payments for sanitation services (Law 11.445), where only in a few cases this is practiced. One example was the state of Minas Gerais and especially in Itaúnas where cooperatives are well structured with compensation from the municipality for sanitation and environmental services. This is however not common. Even though the new law was signed in 2010 there are challenges in allowing the momentum needed for the implementation of the law to reach the desired revenues that studies have anticipated. As referred to earlier, a report by IPEA provided evidence that Brazil could gain USD 8 billion on an annual basis if all recyclable solid waste that ends up on landfills was to be recycled.

The Brazilian Government is therefore seemingly committed to inclusion of waste collectors to the solid waste management shown by the development of laws and decrees, investing in staff, and organizational capacity such as the Interministerial Committee for Social and Economic Inclusion of Collectors of Usable and Recyclable Materials. However, it has been claimed that the Government fails to provide the necessary funds allowing states and municipalities to develop plans for its implementation in important areas such as the closure of dumps (Margulius, 2013). On the other hand it is also claimed that municipalities do not abide to the law and are not doing their share of the work (Amorim, 2013). This shows that although there is a legal framework in place, there are limiting factors from the governance side for the implementation of the law.

The national law has brought attention from other countries in the developing world and is considered to be a potential framework due to its holistic approach in the current society. The law provides a great opportunity for the society, if adequately implemented, since it can bring social, environmental and economic benefits. Even though there are many identified challenges and barriers for its success, much has been, and is being accomplished (von Zuben, 2013).

The cooperatives were found to be more than ready to increase and develop their businesses. With better equipment, more space and improved technical knowledge, the cooperatives would gladly increase their operation leading to increased job opportunities and recycling rates. In order to do this, the municipalities must provide greater support than what they do today. The municipalities are however often viewed as an obstacle for the development of the recycling industry in Brazil. A tremendous challenge found was the change of municipal governments where the new one does not want to acknowledge the work or commitments of the former, which often affected the cooperatives. Other reasons mentioned were the lack of support with better storage and space, support with maintenance of own trucks favoring private companies, and more. Another reason was the lack of support. An important finding is that the cooperatives view incineration as the most obvious risk for their operations. Another threat is the implementation of large-scale mechanized waste separation industries which would decrease the need of cooperatives considerably.

An aspect found to seemingly create a great obstacle for cooperatives was the waste mafia in the country where municipalities for example prefer to contract private companies instead of supporting the cooperatives that are supposed to be prioritized. This was also debated in relation to the maintenance of cooperatives’ trucks instead of contracting private companies who often provide lower value material. Another explanation for contracting companies was found to be that the municipalities simply may not feel comfortable enough with the quality of the service the cooperatives can supply. Although this study does not provide any evidence

about these activities, it is still a general consensus by all interviewed stakeholder that this is a huge obstacle for the development of selective collection and recycling. There are however recent cases in the country where municipalities have been accused for giving multi-million dollar contracts to companies.

A challenge, in terms of private sector inclusiveness, is that many establishments such as condominiums, commerce, agencies, etc. now send their waste straight to intermediaries. This challenge is of course from the waste collector's point of view, since it reduces the potential volumes that could be handled by cooperatives. There have been a number of initiatives taken to support cooperatives in favor of the intermediaries such as encouragement of consumers and cooperatives to give their recyclables to cooperatives, direct purchase from cooperatives or the creation of networks of cooperative to accumulate larger volumes, and support to cooperative with capacity-building and equipment, such as scales, safety equipment, presses, etc. These actions are often taken by corporations as part of their corporate social responsibility policies (Fergutz et al., 2011). The results of initiatives such as capacity-building have been that supported cooperatives have a better recycling rates, better organization and a more secure production (von Zuben, 2013).

## 4.2 Solid Waste Management Interface

First, in terms of *access to waste*, and the *role in the formal solid waste management system*, it was found that waste collectors not only have access with their own means of transportation, but the municipalities have a *legal obligation to include* and give priority to cooperatives by taking waste directly to them with municipal compacting trucks or via third party companies. Cooperatives have *controlled access*, also through directly established relations with supermarkets, housing complexes, private households and other types of generators to acquire waste. Cooperatives often provide the collectors to go along with the trucks and collect waste according to self-established routes for collections on certain week days to private homes, firms, with whom the cooperatives have agreements. According to the interviewed stakeholders the informal workers will be more and more forced into the formal system since the access to waste is increasingly moving towards cooperatives and sanitary landfills.

Second, when it comes to *socio-political context towards the informal sector*, it was found that Brazil has elaborated *institutionalizing policies* regulating cooperatives rights and duties in the society. Furthermore, it is *by law required* to include the informal collectors, who are operating at dump sites, as an integrated part of the plan to close the dumpsites. The Brazilian government has invested resources to investigate and *document the benefits* the informal sectors bring to society and the need to integrate them into the formal waste management system concluding that the inclusion of the informal sector is beneficial.

Third, in terms of *promoting inclusivity*, it is by law required that all municipalities hold public meetings inviting all stakeholders, including the informal sector, when elaborating a solid waste management plan in order to assure inclusivity. There are therefore clear *policies improving the formal/informal interface*, where selective collection and *recycling is promoted* by government, the general public, cooperatives, and more.

Fourth, for *protection of public health and the environment*, the Brazilian government takes action to improve e.g. with the plan to close dumps and uncontrolled landfills. Selective collection is being advertised and progressively increased with a greater participation by the general public, although the necessary infrastructure is still not in place with much still needed to reach satisfactory levels of urban cleaning. In some areas, such as Rio de Janeiro, there are

expressed plans to focus on the promotion of collection and waste disposal in low income areas.

### 4.3 Material and Value Chain Interface

First, when it comes to the *improvement of the source materials and reduction of cross contamination*, there is an increase in selective collection source in the country where organic waste is *separated at source* from recyclable. The recyclables are sent to cooperatives for further separation into categories. A challenge for the cooperatives is that municipal trucks often bring compacted waste that is too mixed and is therefore not separated but forwarded to landfills as rejects since it has less value. When the cooperatives collect the waste themselves in cage trucks from *generators with whom they have agreements*, the waste comes in better condition and is easier to separate and sell.

Second, the visited cooperatives all had their own *storage space available* with large bags and basic equipment to handle larger volumes of waste and with different levels of separation where a few were considerably better organized. It was, however, observed that increase of volumes could easily be achieved by organizing the space where waste is stored and separated. In order to *increase their quantity available for sale*, the issue here was therefore more related to capacity-building in operational management where it was found that specific training increased production considerably.

Third, it was noted that none of the cooperatives had any *reprocessing* operation apart from *compacting*. Only one cooperative showed a potential product that could be developed to a new product, but wasn't doing it. The value adding operation was limited to *separation and compacting* of collected recyclables. It was found that the main business idea of the cooperatives was the collection, separation and sale, while other business ventures were not considered. Only one cooperative had a possible business idea, but did not feel it had the extra time and capacity to do it since it would require different skills than the current business.

Fourth, in relation to the *improvement of linkages along the value chain*, it was observed that efforts are done by various stakeholders, such as Caritas, Tetra Pak and others, to promote a better *relation to recycling industries* in order to *bypass middlemen* and get better prices for products. This required cooperation through networking between cooperatives to achieve greater volumes of waste since industries often require minimum amounts in order to buy it. However, the relationship with intermediaries is still very important for cooperatives since they often help by paying in advance when times are difficult and often pay directly instead of up to 30 days later in the case of the industries. On the other hand, these loans can be counter-productive since they are often linked to high interest rates and where the middlemen could be considered loan sharks. In order to be able to sell the recycled material, many industries require that legal documents are in order. Many cooperatives are still not well organized and are therefore in the hands of middlemen.

### 4.4 Social Interface

First, the *profession as waste collector* has been *legally recognized* in Brazil since 2002. There are also clear laws about cooperativism, regulating their rights and responsibilities in society. Members of cooperatives do not have to pay *income tax* since they are in income classes DE, but are required to pay social security (INSS), which can be a constraint for many informal workers. In order to be a member of a cooperative all members are required to have their *identification and legal documents* in order. NGOs such as Gaspar Garcia Center for Human Rights provide support to get documents in order to become a member of a cooperative. Another interesting element is that the members of cooperatives are seemingly

more working as separators than as collectors since the waste is brought to them by the municipality. However, there are also cooperatives whose members still collect waste but in organized forms.

Second, when it comes to the **recognition and acceptance** most of the cooperatives had their members wear some form of uniform in order to be easily identifiable. Cooperative members claim that there have been improvements in **engaging the public** and much has already been achieved in the Brazilian society. More of a problem is the lack of necessary infrastructure to cope with the waste the general public is willing to **separate at home** and send to the cooperatives. This is especially visible when **awareness-raising interventions** such as Tetra Pak's TV soap opera campaign when the amounts of waste increase immediately, but most of it is sent to landfills due to lack of storage capacity. An interesting observation in one of the cooperatives was a music jingle used as the trucks passed communities alerting the community that the recyclables were being collected. The Brazilian law requires that the states and municipalities have to develop waste management plans indicating how their operations will be implemented. The law also states that all involved actors, including the general public, are welcome to participate in the elaboration of these plans. According to all the interviewed stakeholders, there is a great need of more cooperatives in the Brazilian society.

Third, the Brazilian government has invested huge efforts and finances in poverty reduction and support for **children to attend school** through interventions such as the family grant "Bolsa Familia". This is especially true for **waste collectors' children** who are included in the category of people who are eligible to this support. Child labor in the cooperatives is not allowed.

Fourth, considering that all of the nine cooperatives were **governed by women**, it can be claimed that women are highly involved in the work. Considerable amounts of **financial support** are given to cooperatives that are serious and providing work opportunities from institutions such as the Banco do Brasil Foundation, Petrobras, and the Brazilian Sustainable Development Bank (BNDS) in amounts up to approximately BRL 1 million (EUR 0.32 million) to one of the visited cooperatives. The **gender inclusivity** is more related to the involvement of men since the work is heavy and more men are needed.

Fifth, when it comes to the areas of **health and safety at work** it was found that most of the cooperatives have some sort of safety equipment but since it is at their own expense it is often not the first priority. There is however occasional support from companies such as Tetra Pak. The members have **access to health care** in public health centers, but interestingly enough, in some municipalities the members of cooperatives are given support to public transportation in order to go to work. Some cooperatives are negotiating private health care and dentist deals which show the strength the cooperative can have. This would be very difficult on an individual basis.

## 4.5 Organization and Empowerment Interface

First, the Brazilian Government strongly encourages informal waste collectors to become **organized into cooperatives** as an integrated plan of the Brazilian solid waste management law where selective collection is strongly incorporated. Cooperatives are, according to the respondent from the network Catasampa, the simplest form of organization in the country and it is difficult to find simpler legal solutions allowing for some sort of regulation. Cooperatives are by law a juridical person, but today there is also the second level of cooperatives where cooperatives are strongly encouraged to cluster into **networks** in order to reach higher waste volumes and thus have access directly to the recycling industry. As seen

earlier, there is a trust issue that makes this development difficult to achieve and time is needed to build that trust.

Second, the ***participation of NGOs*** has proven to be very important in various areas. One of them is to bring cooperatives up to a more professional level and to support network development, but also in the sense of social work such as in the case of the Gaspar Garcia Center for Human Rights. NGOs, operating on a local level, have even been a contributing factor for the development of the new law. NGOs' involvement is however questioned by some cooperatives, since it is considered that many NGOs have preyed on cooperatives for their own gain resulting in mistrust. NGOs which have a more social perspective in their work, would prefer a softer approach to the integration of the informal waste collectors since it is a time-consuming process. One of the key contributors to the development of the law and its inclusion of waste collectors is the ***national movement*** of waste collectors (MNCR) who organizes regular forums and meetings and voices the concerns of waste collectors to the Government and the society.

Third, regarding ***financial sustainability***, the Brazilian law states that ***financial support*** is only accessible to organized cooperatives of waste collectors. Stakeholders such as Tetra Pak took steps to ***reduce vulnerability*** of cooperatives by securing the price for long life packages as a way to decrease the risk for the collapse of cooperatives during the financial crisis in 2009, but this is a limited intervention by Tetra Pak. The cooperatives operate according to market prices and ***by their own strengths*** even though support is given by various stakeholders aiming to increase production. However, it was also found that cooperatives will not be sustainable only with the income from the sales of recyclable waste. Other services, such as environmental, selective collection and reverse logistics must be compensated in order to improve sustainability.

In relation to financial sustainability and the payment for community services it was further found that a coalition of 22 associations, including the Brazilian Food Association, PET Association, Plastic Association, Retailers Association, among others, have recently sent a three year program to the Government with a suggestion of a sectorial agreement for how the post-consumption packaging sector should operate in terms of reverse logistics. This corresponds to about 350 companies. They are now waiting for its approval. Companies will not pay cooperatives but will support with equipment, training programs, and keep the flow of material from collection and sorting to final recycling industries. Other areas such as promotion of selective collection and the installations of drop off centers will also be provided (von Zuben, 2013).

Fourth, the Brazilian Government, as well as various other institutions, such as e.g. Cempre, has developed ***capacity-building and training material*** for cooperatives. These materials were said to be mostly focused on the formalization of cooperatives. Tetra Pak has recently developed a new training material about process improvement called "cooperative in action" (Cooperativa em Ação). This material has been developed in co-participation with fifteen cooperatives, and is focused on operational management, how to structure the work space, and the ***data documentation and recordkeeping*** of volumes, costs and earnings. One of the involved cooperatives reported to have doubled revenue after the training.

Furthermore, the understanding of the ***buyer's requirements*** was found to be specifically important in relation to the recycling industry. It was found that this can make the establishment of networks difficult as seen in the case of Reciclamp in Campinas where several cooperatives chose not to participate for reasons such as lack of trust, lack of proper management, and lack of will to separate waste according to industry requirements. This

network consists today of six cooperatives and are operating successfully. Other cooperatives had been members of networks but left due to lack of trust. They did however show interest in participating in networks if it could be better organized as there were reports of 70-100% increase of revenue when working in networks.

#### 4.6 The InteRa Tool Results

The InteRa tool was developed to provide a comprehensive and integrated rapid analysis of key element necessary to increase the possibility of success when interventions are planned or already done, to integrate the informal sector of waste collectors. However, a few challenges were identified while implementing the tool in the field interviews. An important finding was that the tool was not very suitable for analyzing cooperatives in the Brazilian South Eastern setting due to the fact that this region is quite developed with well-established cooperatives that have surpassed the basic questions put forward in the tool. In the Brazilian South Eastern context, where this study was conducted, there are already favorable factors for the creation of cooperatives, where the elements for a successful inclusion are already adhered to.

It was found that a few questions in the tool, such as the one related to “organizing middlemen”, was put in a way that a high score (K=1) would have allowed for a better result in the total score. But since there was no indication found in the interview that “organizing middlemen” is a practiced activity in the region the question was taken away.

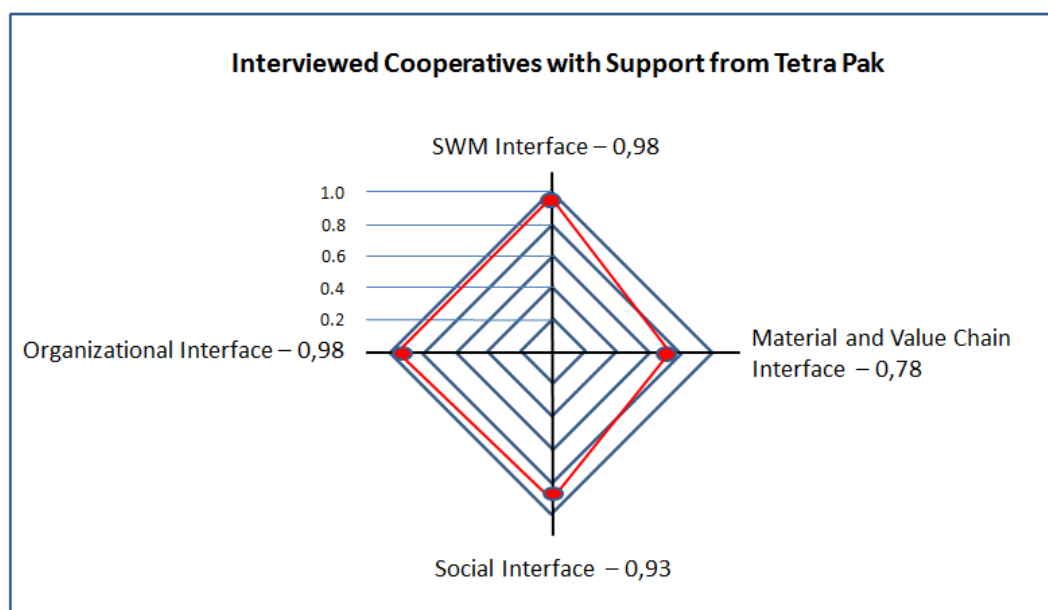


Figure 4-1 Radar Diagram result from interviewed cooperatives

Source: Author

The results from the nine interviews with cooperatives were inserted in the rapid evaluation tool respectively and thereafter an average of the interface result was calculated. This was done in order to get a general idea of the perceptions of all the nine cooperatives involved in this study. Although the answers were slightly different and the cooperatives had different capacities, they still provided basically the same answers.

This is shown by the results in the radar diagram in Figure 4-1 where three out of four interfaces score very high since the response from the interviewed cooperatives showed a



positive perspective towards what is currently happening in Brazil. This shows that the integration of collectors is welcomed and recognized by society. Only the Material and Value chain Interface scored lower than the others, which was mainly due to the questions in the tool about reprocessing of the material. The core business of the cooperatives was seen as collecting, separating and selling and not as creating new businesses since that would entail other skills and capabilities. There was, however, nothing preventing any of the interviewed cooperatives to do additional business development if so desired.

The InteRa tool was, in its developing phase, applied in Cairo, where a high level of organizational capacity within the waste collector group was found, but the social interface was almost zero. This can be explained by the fact that the waste collectors in Cairo (Zabbaleens) are Christians and often considered excluded in a Muslim society. There was low level of integration in the formal system and a reasonable level of value chain integration. Two cities in Brazil were also involved in that study.

The results found in the Brazilian cities Belo Horizonte and Londrina, showed quite different results than this study. Interestingly enough the case of Asmare, which is earlier presented as a success case in Figure 2-13, was rated with quite high organizational capacity, mid rating for solid waste management interface, low social interface, and low materials and value chain interface (Velis et al., 2012). The specific application of the tool in these cases is not known, but in this study the cooperatives were asked about their perception of the current situation in Brazil. Overall, it was found that the necessary elements for inclusion of informal waste collectors in Brazil are in place, and the legal mechanisms encourage the creation and integration of cooperatives with waste collectors. However, it was also found that the tool was too simplistic for this context, and other evaluation methods are needed to measure the implementation in Brazil. This will further be discussed in the next section.

## 5 Analysis & Discussion

This Section provides some indicative evidence and discussion in support of the proposition that formalized waste collectors perform better on average than informal ones, across a range of social, economic, and environmental aspects.

In order to establish a stronger case for confirming the findings, further analysis is provided below. The assessment clearly points to a number of interim conclusions that would justify more in-depth analysis and discussion. The framework used in this study was developed to provide a baseline for the generally recognized measures needed for a successful integration of the informal sector (Velis et al., 2012). Even though this may be true, it is contested in the Brazilian context where a legal framework has been developed and decades of work by stakeholders has been invested into the integration of the informal collectors in a more formalized waste management system via the creation of cooperatives (Seidel, 2013). Brazil which contributed to the development of the framework fits the profile for the generally recognized measures, but only at its basic level, as portrayed in Figure 5-1. Brazil finds itself in a more advanced level of development.

Although the vast majority of analyzed academic articles and the Brazilian Government strongly advocate for the integration of informal waste collectors in order to bring more efficiency to the waste management system, it is important to point out that the solution is not straight forward but rather complex. Still today, only 10% of the Brazilian collectors are integrated into cooperatives, selective collection represents only 2.4% of the regular collection (IPEA, 2010), and huge amounts of resources still go into dumps (Lino & Ismail, 2012). This is after almost 20 year of claimed efforts in developing a solid waste management framework. One should assess if these are the most appropriate and viable interventions.

Even though the law encourages the cooperatives, it does not eliminate other highly developed technologies which is the main concern for cooperatives since their services would be challenged (L C Salles, 2013). Most municipalities do not have the funds to pay for them, but this will most likely change as municipalities establishes their waste management plans giving them better access to state funds (Government of Brazil, 2010a).

### 5.1 Organizational Structures

With only 10% of the waste collectors organized, many of the informal collectors who started cooperatives did apparently not find the organizational structure appealing enough to stay. Most of them seem to have left for either better options or back to informal collection. One reason stated by almost all interviewed respondents can be that there is better payment, although harder work, to be gained outside cooperatives and no obligations to abide to cooperative rules. This informal work can also be viewed as a competition to cooperatives as the informal collectors often pick the most valuable waste categories from houses, containers, and other locations. Issues like this raise the question if cooperatives are actually a sustainable solution. But it is also common that in some areas, often designated by the municipalities, only cooperatives are allowed to operate resulting in improved quality collection and better financial sustainability. It is also common that informal collectors prefer working individually or in smaller groups called nucleus and either selling the material to middlemen or to cooperatives. The nuclei are often informal groupings that cooperate with cooperatives, often due to solidarity based on the cooperatives willingness to support other fellow collectors to get formalized in a gradual way (Amorim, 2013).

This shows that there is often a dynamic nature to the organizational structure with potential link to cooperatives that could be expanded and encouraged. Since one of the main issues,

identified by most interviewed respondents, is the daily compensation of money in order to have better results of integration, it would be advisable to look at other flexible models where a more gradual integration can take place. This could for instance be done through an affiliate membership to a cooperative with the payment of social security and possibly other important attributes related to the inclusion, but where a more limited membership is allowed and flexibility is maintained.

The benefits of a more flexible approach could for instance be that a higher number of collectors are registered. This would also allow for better data collection, which has been identified by several interviewed stakeholders as a main obstacle (IPEA, 2012; Seidel, 2013). More accurate data would allow for better planning of interventions and more efficient allocation of funds. The other aspect is that by involving more members and affiliate members to cooperatives, more waste volumes would be aggregated and sold directly to industry and thus providing more income to the collectors. A gradual integration could also allow for an increased amount of members to the cooperatives. Since waste collection in developing countries is an environmental, social and economic activity, it would be interesting to have more parties involved in the development of a softer model for the integration of these waste workers.

## **5.2 Capacity-Building**

Even though there are several training materials available to support cooperatives, most of them are more directed towards the initial steps of the establishment of cooperatives. The benefits have at an early stage been proven with cooperatives showing a considerable income development. In order for cooperatives to reach a higher level of capacity and development, new material such as the “Cooperatives in Action” developed by Tetra Pak is needed in order to bring existing cooperatives to the next operational level (Pineiro, 2013). As mentioned earlier, poverty should not only be seen from an economic point of view but also as the level of access and ability to learn, develop, and gain more knowledge (Lindeman, 2012). Capacity-building is therefore crucial for the development of the waste workforce for various reasons. Equally important to poverty reduction is the aim of establishment of a work force that is prepared to meet future needs as society and waste management systems evolve.

Since mistrust is such a problem, interventions are needed in order to overcome this obstacle in order to achieve more networks. This mistrust can also be a contributing factor for the unwillingness of informal collectors to get involved (Fernandes, 2013). This was also discussed by the NGO Gaspar Garcia and the respondent from the Ministry of Environment as a challenge in which the nature of this work is not only technical but largely social requiring time and patience (Gonçalves, 2013; Thais, 2013).

There is a need to find flexible models in which the complexity of the informal waste collector community is duly considered and not only count on former unemployed citizens, but where the informal waste collectors' expertise is taken advantage of and integrated. The progression of organizational development is portrayed in Figure 5-1.

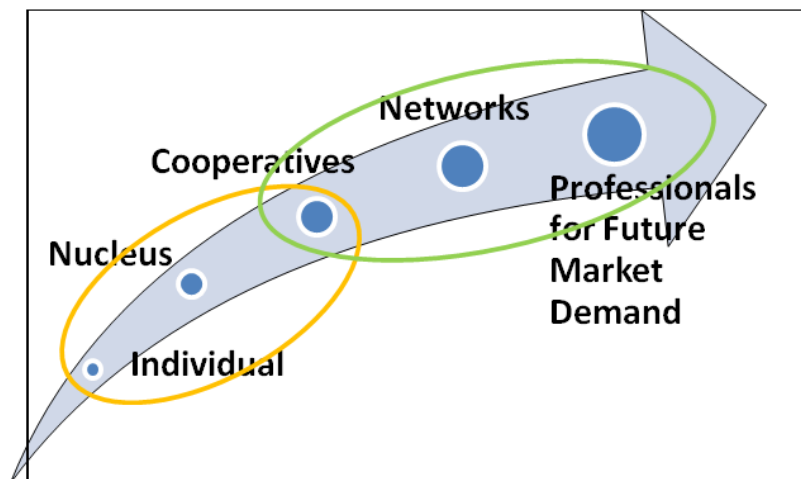


Figure 5-1 Progressive Integration of Waste Collectors

Source: Author

In order to allow this progression and attract more informal waste collectors into a formal sector, capacity-building is crucial. This capacity-building needs to be done with investments in knowledge as well as technology and infrastructure, allowing the evolvement of the cooperatives and setting up the cooperative members for the future technical demands that will be required from them as society and waste management systems develop. This would also benefit society as a whole with increased recycling, less emissions, more tax revenues, and more.

### 5.3 Remuneration

An important reason that the informal workers choosing not to be involved in cooperatives is that they often make more money outside, work unlimited hours, pick the most valuable waste (also called “cherry picking”) and sell it on a daily basis to middlemen. For the members of cooperatives, the income can be lower for reasons such as limited daily work hours, allowing just a certain amount of waste to be handled, cooperative taxes and INSS, and low efficiency in term of capacity and technology (Amorim, 2013). The author Fergutz et al., (2011) makes a correct analysis when claiming that the performance of cooperatives is directly related to the investments done supporting them with technology and capacity-building. This was also shown in several of the visited cooperatives who reported higher monthly incomes mainly due to better organizational capacity and equipment earned by good results that made investments possible.

A factor that would bring a higher attraction for informal waste collectors to the cooperatives is therefore assurance of better payment (IPEA, 2010). One aspect that is currently discussed but not applied is the payment for environmental services by the municipalities. Such payments could be a factor that would attract more collectors (Thais, 2013). Other options currently discussed are the remunerations for selective collection that should be paid by the municipalities since they are responsible for the municipal waste collection and disposal, and the payment for reverse logistics which should be paid by companies, importers and other for the proper disposal and handling of recyclables. This is also currently discussed in the sectorial agreements according to Thais (2013) and Amorim, (2013). Also von Zuben (2013) clarifies that a three year plan have been submitted and where cooperatives will not be paid but supported with equipment, capacity-building, and more. This sectorial agreement plan has not been reviewed in this study, but a question must be asked about how and by whom this

support will be regulated, so that it does not only become ad-hoc corporate social responsibility interventions, but more consistent and continuous support by all actors in that sector. This is not to contest the support with capacity-building and equipment, but how it is implemented in order to provide financial sustainability to the cooperatives. In general, it can be said that a more adequate payment would attract more informal waste collectors providing improved financial stability, decreased poverty and increased public tax revenues, as well as, bring environmental benefits to society.

## **5.4 Operational Capacity**

It has been made clear from most respondents from the Brazilian society are willing to respond to selective collection described in the new law. This is especially proven by the immediate increase of waste volumes sent to cooperatives after any commercial or specific campaign about selective collection. To their great frustration, the cooperatives often have to forward the valuable waste to landfills since they cannot handle the amounts. Cooperatives are apt to increase their production but in order to do so, they claim to need for more storage space and better equipment. It is also clear that considerable improvements can be done by building the organizational and managerial capacity in order to improve operations such as space management.

Moreover, the general opinion of most interviewed respondents is that more cooperatives are needed and welcome, but that they need to be given support and guidance in order to become successful and efficient actors in the waste management system. There is a clear gap between the public willingness and the existent infrastructure to absorb all collected recyclable waste. It is important that this is addressed rapidly or there is a risk that the investments made in awareness campaigns lose its momentum as the public will find it useless to do the extra work of sorting at source since the waste goes to landfills anyway (Ribeiro, 2013).

## **5.5 Technology Development**

The Brazilian Law was modified in the very last minutes before the signature of the President. This has been contested by several actors since the modifications opened up for the opportunity for the implementations of incinerators which is considered to be the biggest threat to the development of more cooperatives (Amorim, 2013). This was justified with the technological development of incinerators that today are considerably more environmentally friendly and with a higher grade of efficiency in energy production (von Zuben, 2013).

This may be true but it is still highly contestable that incineration would be the best solution in a country like Brazil when there are so many other options available. In the case of Sweden, the country can still benefit from the heat produced during the cold winters, but this is not the case in Brazil. Moreover, Castilloberthier (2003) and D. C. Wilson & Scheinberg (2010) are a few of the authors arguing that developing countries still have too limited capabilities to invest in and maintain such technology.

Another threat is large-scale mechanized waste separation systems which could possibly make cooperatives less attractive since they require less staff. The cooperatives would rather prefer investments to be made in better storage and technology benefitting the cooperatives and allowing for augmentation of productivity. This would also be a factor that would increase the attraction for informal collectors since higher income could be gained. This is agreed by all interviewed cooperatives, the respondent from the Catasampa Network, and Amorim (2013). It may be argued that large-scale mechanized systems are better from a purely environmental and limited economic point of view. But when looking at the bigger picture and especially the nature of the country with its poverty situation and unemployment, it can be argued that

labor-intensive activities would contribute to lifting citizens from poverty. This would also have environmental benefits since poverty in itself is a factor that contributes to environmental degradation (G. Tyler Jr. Miller & Spoolman, 2009). Not to forget, large-scale industrial systems require considerable amounts of energy.

The industrial development does not necessarily have social interests, yet the society as a whole would be benefitted by the combination of the two in a modernized mix (Dias, 2012; Scheinberg, 2011). It is therefore imperative that the actors representing these areas enter into a dialogue to find best solutions. Authors like Pinto & Carmo (2012) and Scheinberg (2012) argue that these parallel system could actually work together instead as competitors. It can also be argued that as cooperatives evolve and develop they will need a higher degree of technology, capacity and more. Another argument can be that as more cooperatives appear, the more competition will exist alongside due to the increased demand of the waste. This is not necessarily a bad thing. The competition can contribute to refining the quality of the cooperatives operations, better quality recyclable waste to industry, more advanced workers fully aware of the true value of waste, and many other synergies.

Another positive side with investing in cooperatives is the avoidance of “lock in” situation which is often the case for incinerators. When large investments are done in this method, it becomes difficult to adapt to changing realities and municipalities will become dependent on burning waste. It is advisable for municipalities to learn from the experience of other countries, such as Sweden who invested in incineration, and today must import waste from neighboring nations. One could instead argue that Brazil has a good opportunity to make use of the capabilities, skills and experience of the informal sector.

As future research provides new technologies with even better environmental and economic solutions, it is possible that investments in the integration of the 10-20% of waste collectors involved in cooperatives, and the 80-90% of informal waste collectors could prove to be well invested money, setting up a better prepared workforce for future demands. A simple idea of this is shown in Figure 5-2 illustrating that the measures included in the framework actually happens in layers evolving over time, where the aspects of the interfaces have to be dealt with as society evolve.

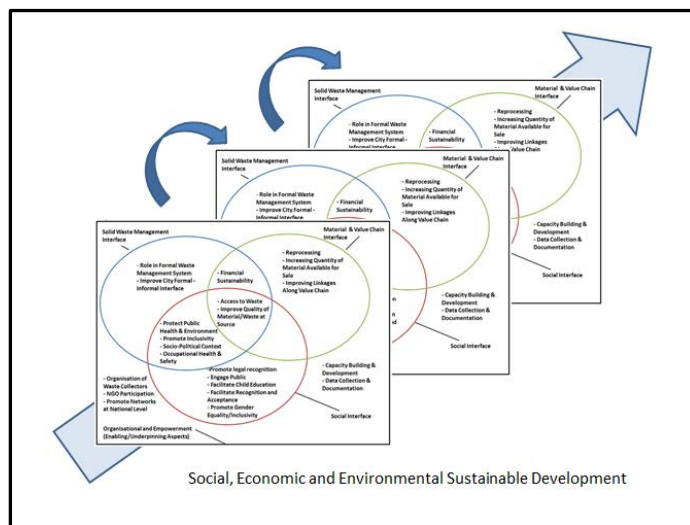


Figure 5-2 Flow Chart for Sustainable Integration

Source: Author

## 5.6 Corruption

A known fact is that Brazil is a country where corruption is a huge problem stalling development. Brazil is ranked 69 out of 174 countries according to transparency international's corruption index (Transparency International, 2013). This has also shown to be true in the last months as Brazilians have brought international attention to the country through demonstrations on the streets accusing the government of huge misspending of tax payers' funds. In the waste management sector, large investments in waste industry solutions such as incineration, mechanized waste separation schemes would most certainly be another opportunity for corruption and misuse of funds. It was a clear consensus that this was also a problem for the cooperatives that could not get access to funds for the maintenance of their own trucks, while the municipalities gave huge contracts to private companies. This happens frequently although it is clearly stated in the law that the no bidding process is required for contracting cooperatives and that they should be given priority as long as they adhere to the cooperative law. If cooperatives could get better support, they could use their own caged trucks providing better quality waste, than if they rely on municipal or contracted compacting trucks providing waste with less quality.

## 5.7 Reflections

The topic of solid waste management in Brazil and the implementation of the urban solid waste law are areas that are moving forward and are priority on the government's agenda. The new law requires plans from municipalities who are struggling to find ways to implement the law. This thesis is therefore written during a crucial phase.

An important question that arises as this study takes place is how this development will be sustainable over time. An important aspect of the law is that it is supposed to be updated every four years which will allow for the appropriate changes as society, demography, poverty, technical development, and more evolve. What is needed now is the elaboration of solid plans where the informal collectors are included and where the industrial investments take the informal sector into consideration.

From just an economic point of view, it is possible that large-scale mechanized separations systems would be more economically viable but they are socially questionable. It can be contested that the alternative to invest in cooperatives may not be the best way forward in Brazil. Instead, a waste management system more shaped by Western standards should be implemented in order to achieve higher environmental gains. But it can be further suggested that modern technological advancement and the investment in cooperatives do not compete with one another but are complementary. Brazil is on an exciting track but serious considerations have to be given to the limiting factors such as corruption control/eradication, adequate payment of waste collectors for their services, and further capacity-building.

In order to provide sustainability to the cooperatives, economic mechanisms must be put in place to finance e.g. environmental services to society through well applied regulations. It is however important that these mechanisms are developed in a way that does not encourage inappropriate handling of waste that would contradict the development of an improved waste management system. In order to achieve a well-designed form of financing IPEA (2010) suggests that such decisions should be made involving all stakeholders involved including the general society.

## 6 Conclusions

Brazil's present situation, with 90% of the informal waste collectors still not integrated into the formal sector, huge amounts of resources lost and only 2.4% of the regular collection through selective collection, can be seen as little progress and market failure due to an inadequate waste management system. Social problems, economic inefficiencies, and environmental damage could be avoided with a better solid waste management. Nevertheless, it is concluded that the conditions in Brazil are quite progressive due to important governmental measures and steps taken in recent years, such as the new legal framework, and the engagement and interventions by various stakeholders to address the situation.

The main conclusion is that in the Brazilian context, where poverty, urbanization and unemployment prevail, the **government's policy to support and invest in cooperatives as one aspect of its solid waste management system is a positive step**. This is especially relevant as the recycling industry is beginning to reach a certain level of organization and where labor-intensive industries are greatly needed.

Brazil has taken important steps to develop a comprehensive legal framework. Even though it is too early to make a proper evaluation of the impact of the new National Law, **it can still be concluded that the Law constitutes a platform for the integration and promotion of waste collectors to cooperatives with positive environmental, social and economic developments**.

Even though the Brazilian framework is still in its early stages, a lot has already been accomplished. The costs for selective collection were 4.5 times higher than conventional collection in 2012. Historically, it is evident that this figure used to be as much as ten times higher. Such figures can be contested since there is no homogenous system for what municipalities should include as costs for selective collection. The figure is exaggerated where only the costs, including indirect costs, have been looked at but not the benefits. Nevertheless, this cost diminishing trend is evident and expected to continue.

This study confirms that the measures in the framework developed by the international group of academic researchers, field workers and practitioners can be viewed as **the general measures for successful integration of waste collectors**. It is imperative that the time aspect when applying the framework be carefully considered in the progression of the waste management system. The framework is not static nor one-dimensional but progressive. Certain elements of the framework require more careful attention in the long term. This is for instance the financial sustainability which is a challenge in the Brazilian experience.

It is concluded that stakeholders from private sector and civil society, in addition to government are important actors. To a large extent, the progress in Brazil has been driven by corporations such as Tetra Pak, NGOs such as Gaspar Garcia, and the national movement of waste collectors in collaboration with the National Government. This provides the necessary conditions for the effective integration. This development has caught the interest of other countries facing similar challenges as Brazil. Thus the Brazilian experience is a valuable example and it gives opportunities for useful case studies.

Financial sustainability is still a challenge where economic mechanisms to finance the waste management system are in general lacking. The study concludes that in addition to the limited forms of payments currently discussed, complementary payment methods to cooperatives must be realized in order to make them more economically sustainable. It was found that as



cooperatives have been given support, such as directed capacity-building, revenue increased. Moreover, as cooperatives enter into network agreements with other cooperatives, more volumes of waste can be accumulated and sold directly to industries where considerably more revenues can be made. Consequently tax payments are made to the formal system, **benefiting society and unleashing funds for new investments.**

There is a positive development and trend on aspects such as increased recycling rates, higher public awareness, higher rates of selective collection, final destination improvements, among others. This is not only attributed to the new law, but most certainly attributed to the decades of invested work by corporations, NGOs and other entities.

Although many waste collectors are found to currently not completely embrace the concept of cooperatives, it is still concluded that integration of informal collectors has been effective in the sense that many individuals have found improved self-esteem, dignity, and a social identity inside cooperatives. If cooperatives are given support to develop and evolve with increased revenues, the incentives are greater and the probability is higher for additional informal workers joining.

It is concluded that integration of informal collectors into cooperatives and to networks of cooperatives provide **economic and environmental benefits to society through tax revenues, less waste to inadequate disposal sites, more waste recycled, and the closure of dumps, among others.** However, after consultations with several stakeholders, it became clear that it is still too early to evaluate more specific impacts, since the new legal framework is still being implemented.

This paper aimed to shed light on how the inclusion and integration of informal waste collectors to the formal waste management system has worked in Brazil, and it can be concluded that there is a present momentum with strong mechanisms in place incentivizing a positive trend. This study has also provided an increased understanding of challenges and opportunities for future interventions in the country.

An explicit recommendation for policy makers is to find flexible mechanisms for gradual integration of informal waste collectors as implementation of the legal framework continues, recognizing that this group of people often needs more time to adapt. This would further acknowledge their skills and contribution to society.

A second explicit policy recommendation is to develop specific data-capturing guidelines for the stakeholders involved in the shared responsibility of the waste management system. A homogenous measuring system would support improved future interventions and investments. This is an important tool for the Brazilian government to evaluate their efforts of attaining the targets of social inclusion and sustainable waste management.

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## Appendix 1: Personal Communication

Name	Cooperatives	Date for interview
Wanderson Sabino	President - Coop Tubiacanga Recycling Lives – Rio de Janeiro	2013-07-17
Hada Rubia Silva & Marilsa Reis Arariba	Administrator & President - Fantasia coopcarmo – Rio de Janeiro	2013-07-17
Maria Francisca de Paula Ferreira	President - Cooperativa Vitória – Rio de Janeiro	2013-07-17
Erika Abril	President - Transformando – Comlurb (Municipal Company for Urban Cleaning) – Rio de Janeiro	2013-07-17
Rosangela Clotilde da Silva & Rosival Soares da Silva	President & Financial Director - Cooperativa Materiais Reciclaveis de Itú – COMARI – Itú	2013-07-30
Ana Regina Lopes Vieira & Rosilda Basilica Pulca	Administrative Financial Director & General Coordinator - Cooperativa de Coleta e Manuseio de Materiais Reciclaveis Nossa Senhora Aparecida - Projeto Reciclar – Campinas	2013-07-31
Aparecida de Fatima Assis	Coordinating President and President of Network Reciclar - Cooperativa Antonio da Costa Santos - Campinas	2013-07-31
Luis Carlos Salles	President - Coopere Centro – São Paulo	2013-08-01
Lucia Oliveria da Silva & Maria de Lurdes	President & Accountant - Cooperativa Central Tiete – São Paulo	2013-08-01
<b>Government</b>		
Sergio Margulis	National Secretary of Sustainable Development at the Presidency & Former Advisor to the Minister of Environment	2013-07-24
Thais Brito de Oliveira	Infrastructure Analyst, Department of Urban Environment, Secretariat of Water Resources and Urban Environment at the Ministry of Environment. Currently transferring to the Presidential Secretariat to work with the Interministerial Committee of Waste Collectors.	2013-07-25
<b>National Movement / NGO / Network</b>		
Davi Amorim	Communication Sector at the National Movement of Waste Collectors in Brazil (MNCR)	2013-08-02
Renê Ivo Gonçalves	Coordinator of the NGO Gaspar Garcia Center for Human Rights	2013-08-01



João Ruschel	Project Coordinator Catasampa Institute – Network of cooperatives in São Paulo	2013-08-05
<b>Corporate</b>		
Fernando Von Zuben	Director, Environment Tetra Pak Brazil	2013-07-30
Juliana Seidel	Senior Specialist in Environmental Development Tetra Pak Brazil	2013-07-30
Luana Pinheiro	Specialist in Environmental Development Tetra Pak Brazil	2013-07-31
Renê Ivo Gonçalves	Coordinator of the NGO Gaspar Garcia Center for Human Rights	2013-08-01
José Fernandes	Consultant in Waste Management contracted by Tetra Pak	2013-08-01
Paolo Ribeiro	Manager of Recicleta Rio de Janeiro and Consultant in Waste Management contracted by Tetra Pak	2013-07-17
Ivo Milani	Project Analyst – Cempre	2013-09-09

## Appendix 2: Interviewed Cooperatives

Name of Cooperative	Respondent/ Position	Members		Income	INSS	Started	By?
		M	W				
Coop Tubiacanga Recycling Lives	Wanderson Sabino/ President	10		800-900	No, soon	-04/-05	Used to be informal but became a cooperative with the assistance of federal government. President and group of others informal collectors in the area started it.
		3	7				
Fantasia coopcarmo	Hada Rubia Silva /Administrator & Marilsa Reis Arariba/ President	14		800 gross (depending on the production and sales. Net always around minimum salary.	Yes and federal tax, municipal tax,	-03	Hada used to be informal collector for over 20 years but with support of a community Priest in a very poor community. She started the cooperative and invited house wives to work with her.
		1	13				
Cooperativa Vitória	Maria Francisca de Paula Ferreira / President	15		400-500	No	-00/-02	Used to be collectors at the dump “Marambaia” that was closed down and the Gov. provided new space. President got group together to collect waste in center. Later NGO came and helped to start a coop.
		11	4				
Trasformando – Comlurb (Municipal Company for Urban Cleaning)	Erika Abril / President	101		Gross 1000 - 1200 but up to 1600	Yes	2007	Failed coop restarted with support from Comlurb and at the premises of Comlurd with access to all equipment & separation lines
		30	71				
Cooperativa Materiais Recicláveis de Itú – COMARI	Rosangela Clotilde da Silva/President & Rosival Soares da Silva/Financial Director	73		900	Yes	2002	A local church initiative where a member invited collectors in slum area to work their waste in her home in 2000 to get them off the streets. Coop in 2002.
		22	51				
Cooperativa de Coleta e Manuseio de Materiais Recicláveis Nossa Senhora Aparecida - Projeto Reciclar	Ana Regina Lopes Vieira/Admin. & Financial Director & Rosilda Basílica Pulca/ General Coordinator	29		829.34 for 126 hours per month	Yes	1999	1999 group supporting unemployed. This group decided to bring a group from Cempre. Tried to get collectors without success and involved other people.
		6	23				
Cooperativa Antonio da Costa Santos	Aparecida de Fatima Assis/ Coordinating President & President of Network	30		900 for 5 hours. Extra hours = up to 1200-1300	Yes	2001	Unemployed people wanting to start something. Neighborhood president sought support from Cempre and Caritas.
		8	22				

Coopere Centro	Luis Carlos Salles/President	98		From 600-700 to 1100-1200	Yes	2003	Group of street collectors helped by NGO and procured by municipality to start cooperative.
		46	52				
Cooperativa Central Tiete	Lucia Oliveria da Silva/President & Maria de Lurdes / Treasurer	45		800-1100	Yes	2003	Started by street Collectors.

## Appendix 3: Field Pictures

### A. Two containers with mixed messages



### B. Tetra Pak consultant, 2 “coopere” workers, Coordinator NGO Gaspar Garcia



### C. Caged Truck at Cooperative Yard





**D. Waste outside Author's home in Rio de Janeiro**

**E. Waste separated at Cooperative in Rio de Janeiro**



**F. Capacity-Building Tetra Pak - Cooperative in Action**




**G. Cooperative Advertising for Employees**





## Appendix 4 - Image of Rota Reciclagem and visited Areas Indicated in Blue.







### ROTA DA RECICLAGEM: ONDE RECICLAR EMBALAGENS LONGA VIDA (TETRA PAK)


Entre com o Endereço:

por exemplo, "Av Paulista, 150 - São Paulo, SP"

Marque as entidades que deseja procurar:


**NOTÍCIA** 05/09/2013 - Projeto (Re)ciclo de Cinema completa temporada pelo Acre



Kartdata ©2013 Google, Inav/Geosistemas SRL, MapLink - Anvandarvillkor

A Tetra Pak não se responsabiliza pela conduta ética e profissional das cooperativas, empresas e locais aqui relacionados.

- O QUE É?
- BUSCAR
- BUSCA DE ENTIDADES
- RECICLAGEM
- DIVULGAÇÃO
- ROTA NA REDE
- RECONHECIMENTO
- COLETA SELETIVA
- OUTROS MATERIAIS
- EDUCAÇÃO AMBIENTAL
- NOTÍCIAS
- CADASTRE-SE
- DÚVIDAS



## Appendix 5: InteRa Interview Questionnaire

Interview Questionnaire						
Location:			City:			
Respondent:			Position:			
Date:						
Rating: K = Key = 1 point; C = considered = ½ points; I = Ignored = 0 points; n.a. = no information available = 0 points						
A	Overall score for interface	Intervention Points	Average Score per Intervention Point	Result	Level of consideration / in the intervention	Specific Action
Solid Waste Management	Access to Waste					Legal recognition of the right of pickers to collect waste, sell the materials separated and keep the income
						Waste pickers to have controlled access to waste at collection points
						Waste pickers to have controlled access to waste at transfer stations, disposal sites or other waste facilities
	Role in Formal SWM System					Inclusion into/ integration with formal SWM sector collection
						Inclusion into/integration with formal SWM sector transport
						Official role in providing recycling within formal SWM system
	Socio-political context towards informal sector					Institutionalizing policies regarding IRS (so that they become robust to political shifts)



						Documenting the role and advertising benefits provided by IRS within the wider SWM system (acknowledgment of their role and contribution)
		Promote inclusivity				Involve all stakeholders in SWM planning
		Protecting public health and environment				Institutionalize inclusivity of informal sector
						Control sorting in the street and ensure that residues after sorting are disposed of properly
						Regulate handling of hazardous wastes
		Improving formal SWM/informal Interface				Promote the collection and disposal of waste from marginalized/low-income areas
						Smoothing take over from households or from waste collectors to the IS
		National policies improving formal state/informal interface				Easing take over from IS to municipalities or private contractors for secondary transport and final disposal
						National policies/legislation to promote recycling (considering IRS potential contribution)
						National strategies for the inclusion of IRS within SWM
<b>B</b>	Overall score for interface	Intervention points	Average score per intervention Point	Resulting marking per intervention point	Level of consideration / I in the intervention	Specific action
<b>Value Chain</b>		Improving quality of the source materials/reducing cross contamination				Source separation
						Contracts with waste generators

		Increasing quantity available for sale				Use of larger containers/bags by IRS collectors
						Use of wheeled containers by IRS collectors
						Make storage space available
						Expanding the range of materials recycled
		Reprocessing				Segregating collected materials into distinct categories
						Washing/ removing contraries and contaminants
						Compacting (to decrease transport costs and increase density)
						Processing to Intermediate product
		Improving linkages along value chain				Manufacturing final Products
						Strengthening relation between IRS and recycling Industries
						Contracts with specific middlemen/ recycling industry
						Bypassing Middlemen
						Organizing Middlemen
<b>C</b>	Overall score for interface	Intervention points	Average score per intervention point	Resulting marking per intervention point	Level of consideration / I in the intervention	Specific action
<b>Social</b>	Promoting legal Recognition					Issuing of birth certificates and other legal documents
						Rights and duties: right to vote, land property rights, duty to pay taxes, etc.
						'Light' regulations
						Recognizing waste picking as a profession
	Facilitating recognition and acceptance					
						Provision of uniforms

		Engaging the public in the intervention				Through awareness raising campaigns
						Through involvement in planning the intervention
						Through promoting source separation
		Facilitating child Education				Work to eliminate child Labor
						Incentives to attend School
						Providing schools for waste pickers' children
		Promoting gender equality/inclusivity				Involve women in planning and delivering specific interventions aimed at women
						Loans accessible to Women
		Ensuring health and safety standards at work				Safety equipment
						Access to health care
						Ensure hazardous waste sorted separately
<b>O</b>	Overall score for interface	Intervention points	Average score per intervention point	Resulting marking per intervention point	Level of consideration / I in the intervention	Specific action
<b>Organization and Empowerment</b>		Organization of waste-picker				Encourage organization into groups, e.g. cooperatives, associations, CBOs, MSEs
		NGO participation				NGO participation helping the IRS to organize and help themselves
		Promote networks on national level				Organizing national forums and meetings
						Creating a national network of waste pickers
		Financial Sustainability				Access to capital for the IRS
						Reduce vulnerability to market shifts on prices of materials
						Dependent on market revenues rather than governmental/NGOs/project-related Subsidies

					Training Courses
		Capacity-building and Development			Literacy Courses
					Involvement in intervention steering committee
					Understanding buyer's requirements (secondary raw material specifications to be met)
		Data collection and documentation			Record keeping of workforce, tons collected, costs and earnings
When did this cooperation start?					
By who?					
How many members?		No. of women:		No. of men:	No. of under 14: