

Overview of the selective waste collection with pickers in Maputo municipality, Mozambique: challenges and perspectives¹

Panorama da coleta seletiva com catadores no município de Maputo, Moçambique: desafios e perspectivas

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Abstract

In Maputo, the selective waste collection is undertaken in a very limited way and is largely a result of nongovernmental projects or individual initiatives. The objective of the study was to analyze household selective waste collection in Maputo emphasizing those in partnership with the municipality, in order to evaluate their potentialities. The research methods were bibliographical and documental research and qualitative interviews. The interviews were with representatives from: Municipal Directorate of Cleansing and Cemeteries; coordinators of four pickers' organizations (*Recicla, Fertiliza, Amor and Pagalata*). In addition, there were technical visits to units for sorting recyclables and collecting/selling stations. The research showed that the initiatives are positive, in terms of social and economic capital, although altogether the projects deviate less than 1% of the urban solid waste produced daily in the municipality. One of the major problems for promoting selective waste collection in Mozambique is lack of local industries that transform recyclable materials in recycled products. It is therefore important to provide a legal framework for municipal selective waste collection service with pickers' and citizens' participation.

Keywords: Selective Waste Collection; Solid Waste; Recyclable Materials; Pickers' Organization.

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Resumo

Em Maputo, a coleta seletiva ocorre de forma restrita, majoritariamente como resultado de iniciativas não governamentais ou individuais. Este estudo apresenta um panorama desses projetos e enfatiza iniciativas em parceria com o município. O objetivo foi analisar experiências de coleta seletiva de resíduos sólidos domiciliares em parcerias com organizações de catadores em Maputo, Moçambique, a fim de avaliar suas perspectivas. Foram realizadas pesquisas bibliográficas e documentais e entrevistas qualitativas semiestruturadas com: representante da Direção Municipal de Saúde e Salubridade do Município de Maputo; coordenadores administrativos de quatro organizações de catadores (Recicla, Fertiliza, Amor e Pagalata). Além disso, foram feitas visitas técnicas aos galpões/usinas de triagem e estações de coleta dessas organizações. As iniciativas, embora, em conjunto, desviem menos de 1% dos resíduos sólidos urbanos produzidos no município, foram avaliadas positivamente em aspectos de formação de capital social e econômico. A pesquisa também demonstrou que um problema para a coleta seletiva e a reciclagem em Moçambique é a carência de um mercado local e um parque reciclador que utilize e transforme materiais recicláveis em produtos reciclados. Nesse sentido, faz-se necessário definir um marco legal de serviço municipal de coleta seletiva com a participação dos catadores e munícipes.

Palavras-chave: Coleta Seletiva; Resíduos Sólidos; Organizações de Catadores de Materiais Recicláveis.

Introduction

The population of Maputo, capital of Mozambique, is an estimated 1,094,315 inhabitants (INE, 2007). They are responsible for around 1,000 tons of solid domestic waste daily, which is collected and deposited in official and clandestine dumps and land fill sites without any type of treatment. Solid waste and urban cleansing therefore pose serious environmental problems in this city. Of the total waste generated, 60% could potentially be reused if separated and collected to be reused or recycled, thus saving natural resources, decreasing impacts on environment and on health, obviating the need for huge investment in landfill sites, as well as generating income and employment.

There are a limited number of initiatives collecting and selling recycled materials in the Mozambique market, due to a lack of economic incentives and the scarcity of processing industries. Local government Law 2/97 of 18th February made possible new proposals for municipal solid waste management, based on valuing social mobilization and incorporating socio-environmental topics. In addition to opening new democratic channels in the municipal decision making process, the opening of the market for recyclable material was another fundamental factor in the appearance of selective collection projects, as well as the increased visibility of issues such as the environment and recycling. Another issue that is fundamental to the success of selective waste collection is recognizing the waste pickers as the central actors in this activity.

In Mozambique, however, waste pickers are seen as marginalized. The vast majority of those collecting recyclable materials are autonomous waste pickers. According to Ribeiro et al. (2009), by inverting the logic of the marginalization of the waste pickers, they become integrated, albeit in a way that remains fragile, into the solid waste management system. In Latin American countries, such as Brazil, Colombia, Peru and Mexico, for example, the increase in the groups of waste pickers' capacity to organize themselves was essential in the dialogue process and, together with social movements, opened a new perspective for organized groups of waste pickers to have a relationship with the local authority (Besen, 2014).

This study analyzes the panorama of selective waste collection in the municipality of Maputo, including partnerships between the municipality and selective waste collection and recycling organizations in the following categories: a) Political-institutional and economic; b) Operational and infra-structure; c) Socio-economic and organizational; and d) support networks. The research also aims to analyze the economic valuation of recyclable materials and the profile of social inclusion and income production as well as indicators that enable them to be monitored and improved from a socio-environmental and economic perspective.

Concern for the environment, which increased throughout the 1970s and 1980s, culminated with proposals for sustainable development. This topic was explicit in the 1987 United Nations report "Our Common Future", signifying development that met current needs without sacrificing the ability for future needs to be met. Notwithstanding the concept's limitations in attributing responsibility and guiding public policy, it indicates the need to rationalize natural resource consumption and ensure their reuse. This concept also "established a philosophy that acknowledges that development should bring together economic efficiency, social justice and ecological prudence" (Kuwahara, 2014, p. 69)

In developing countries, selective solid waste collection by waste pickers has been shown as an alternative to make municipal recycling programs viable, under the umbrella of sustainable development, uniting as it does economic efficiency, social justice and ecological prudence. However, market price depends on the possibility and viability of recycling products resulting from selective collection. The higher the market price, the greater the supply of material to be recycled and the smaller the quantity of waste that is not reused.

The participation of waste picker associations also depends on market value and on the supply of material to be recycled.

There are elements in the Mozambican experience that are significant in understanding and discussing the viability of selective waste collection programs in partnership with waste pickers. The lack of recycling industries in that country and the undervaluing of the social and environmental benefits of reusing waste limits the activities of waste

picker associations and, consequently, their social inclusion and the reuse of primary materials.

As Sachs (2012, p. 8) says, "now more than ever we need to learn to walk on two legs and combine social justice and environmental prudence" to bring an end to the scandalous inequality in living conditions and quality of life between populations. However, according to Sachs (2012), irrespective of how pressing environmental concerns may be, they should not be used to put off resolving urgent social needs. He continues: "the free play of market forces is, by its very nature, short sighted and insensible of the social dimension" (p. 10).

Nascimento (2012) considers that a sustainable society assumes that all citizens possess the minimum necessary to live with dignity and that nobody absorbs goods or natural or energy resources harmful to others. This means eradicating poverty and defining an acceptable standard of inequality.

This research is partially based on methodology used in the study "Coleta Seletiva com Inclusão Social", by Ribeiro et al. (2009), researchers from the School of Public Health, Universidade de São Paulo, Brazil, as it looked at the Brazilian reality, similar to that of selective collection and recycling organizations in Maputo. Firstly, the organizations that implemented collection and recycling activities in partnership with the municipal government were identified. Next, interviews were conducted and questionnaires applied. The study used a qualitative and quantitative approach. The qualitative approach consisted of interviews with different social actors connected with the process of urban solid waste management and identified in the local authority and in the selective waste collection organizations, namely, the representative of the Maputo Municipal Health Directorate and of the four organizations selected for the study: the Recicla cooperative- Plastic Waste Recovery Centre; the Fertiliza cooperative - Organic Waste Recovery Centre; Amor-the Mozambique Recycling Association; and the company Pagalata-a recycling center. The documental and bibliographic research was conducted using secondary data from studies, reports, publications and journals. The sorting plants/sheds and collection stations were visited and written and photographic records made. The field work took place between February and May 2012.

Results and discussion

Selective Collection Projects in Maputo

The selective collection and recycling organizations (2 cooperatives, 1 association and 1 company) in Maputo focused on in this study, were supported by social movements, civil and religious social institutions and became strategic social actors in the dialogue process with the municipal governments. Based on these experiences, recognition of the waste pickers stands out as a central element of solid waste management projects. The recycling organizations focused on in this study are described below.

RECICLA - Plastic Waste Recovery Centre

Recicla is a cooperative that produces processed plastic for local industry. It was set up in Maputo in 2006, an initiative to profit from plastic waste. The project's motto is "A New Lease of Life for Plastic Waste". The Recicla initiative was supported by several NGOs, LVIA (*Lay Volunteers International Association/ International Association of Italian Volunteers*), Caritas Mozambique (a religious organization), The German Agency for Development GTZ (*Gesellschaft fuer Technische Zusammenarbeit GmbH*), the Netherlands embassy in Mozambique and the Maputo Municipal Council.

From 2011 onwards, the cooperative acted autonomously, except with regards the salary of its coordinator, who also coordinated the management of the Fertiliza cooperative. The cooperative was formally established in 2007, employing 20 individuals, both male and female, all ex-waste pickers, of which 14 are founding members. They are all registered in the national social security system, National Institute of Social Security (INSS), and receive one nationally set minimum wage monthly.

Recicla processes around 15 tons of processed Polyethylene (PELD and PEHD) and polypropylene (PP) each month. It buys plastic waste from the general public, mainly from waste pickers, in a simple commercial deal. The plastic waste is processed manually, separated by type, washed, cut up, crushed and re-sold to companies in Maputo interested in purchasing semi-processed material,

using the product as primary material to produce new objects, especially domestic utensils such as chairs, baskets and bowls, among other things. So far, the results obtained in terms of production, are promising, meeting expectations.

Since the project was established, the partners have developed a training course, aiming to reinforce the project's sustainability, not just in economic terms. Starting from basic education (literacy), a series of participatory groups courses have covered topics such as hygiene and health education in preventing infectious and non-infectious diseases, in particular HIV-AIDS, among others. The training dynamic was then extended to the professional area, covering topics connected with managing small businesses, accounting, personnel management and, of course, recycling techniques. According to the cooperative manager, the women are more diligent workers than the men.

FERTILIZA- Organic Waste Recovery Centre

In January 2008, the Caritas and LVIA NGOs, in partnership with the Municipality of Maputo and others, set up Fertiliza (a limited company cooperative). The aim of the project was to properly dispose of vegetable waste from markets, converting them into fertilizer through composting. Since August 2008, part of this vegetable waste has been collected from strategic points and transported in hand pulled carts and wagons to a nearby piece of land provided by the Municipality of Maputo, where Fertiliza operates. Initially, there were 11 founding members, all ex-waste pickers and/or unemployed housewives.

According to the e-bulletin "Wanted Worldwide"², the unit was financed by the Netherlands embassy in Mozambique and Caritas Mozambique and Italy, as well as the LVIA, Regione Veneto organizations (Italy) and CAFOD. Installed in an area of around 700 m², the infrastructure is located in the Ferroviário neighborhood, close to the Xikhelene market. Formed of two areas producing compost, a warehouse for the finished product, an office, toilet and a plant nursery, Fertiliza has the capacity to produce around 700 kg of fertilizer per day. The cooperative became self-sustainable, producing revenue in order

² Organic fertilizer factory opens in Maputo. *Wanted Worldwide*, St. Helier, 9 Feb. 2009. Maputo local news. Available at: <<http://maputo.wantedworldwide.net/news/5454/organic-fertilizer-factory-opens-in-maputo.html>>. Accessed: 13 June. 2014.

to function autonomously after the experimental stage began in 2008. It became an officially established cooperative in June 2011. The construction of the team and their educational route was similar to that which had been a success in Recicla.

Fertiliza proved more complicated than Recicla as, before then, there was no market for organic compost in Maputo, and the project needed to create one. Part of the marketing strategy involved the cooperative installing a plant nursery for ornamental plants and fruit. The Fertiliza project was interrupted in the second half of 2011 due to conflicts with neighbors over the disagreeable odors emanating from composting. The cooperative reopened around a year later, mid 2012, in the same neighborhood, albeit in an area more appropriate to its activity.

The LVIA representative in Mozambique agreed to be interviewed for the study and emphasized that, in planning Recicla and Fertiliza, a lot of emphasis was placed on ensuring the cooperatives' sustainability, they were small scale projects, of low economic risk and pre-viability studies of the projects were conducted, partly because setting up sustainable businesses takes time and, also, because the cooperative members, originally waste pickers, needed long-term constant support and monitoring.

AMOR - Mozambique Recycling Association

The Mozambique Recycling Association is a not for profit organization dedicated to promoting recycling and to establishing selective collection of solid waste. Its activities are focused on buying recycled material for later sale. Amor was founded in July 2009 by Mozambican environmentalists, aiming to promote recycling and integrated solid waste management in Maputo³. Firstly, they installed three collection points for recyclable waste - Eco Points or voluntary delivery points in Maputo. These had increased to six collection points by mid-2012. Amor buys paper, cardboard, plastic, metals, glass and electronics for values between 0.75 cents and 3.00 meticaís per kilogram of recyclable waste.

The Eco Points are run by female members of a local association that buys recyclable waste from the public, weighs it and packs it into containers to be

sold to Pagalata. Waste pickers (male), on bicycles with trailers, go door to door collecting and/or buying recyclable waste. The income of those running the Eco Points and of affiliated waste pickers is around 2,500 meticaís, roughly US\$100 (half a national minimum wage).

The president of Amor estimates that the association supports more than 350 informal workers (90% women), who assist in collecting and processing the 400 tons of material sent to international markets for recycled materials (South Africa, Germany, China, etc.). The association also works on raising the population's awareness, and that of public and private institutions, of the importance of recycling, through communication campaigns, educational projects, workshops, leaflets and online⁴.

PAGALATA - Recycling Center

Pagalata is a Mozambican company that buys recyclable waste to export to the international market. It began to operate in December 2006 collecting, processing and exporting paper/cardboard, cans (aluminum, iron and tin) and glass bottles. It collects and buys material at source (restaurants, hotels, offices and others) as well as that brought by waste pickers to the sorting center next to the Hulene waste dump. Recyclable material is sorted, cut up, compacted and packaged.

Pagalata was the only formal company identified in the study. It sells recyclable material on a large scale to industry, mainly for exportation. In 2009, Amor originated from this company.

The partnership between the selective collection and recycling organization and the municipal administration is an association of entities (municipal and organization), aiming to develop an activity together, in this case, promoting selective collection and recycling, so as to dispose of solid waste more adequately.

Of the four organizations studied, all were in partnership with the municipality, and the collection method in each was mixed: household/door-to-door collection, at volunteer delivery points and/or sorting centers and sale/exchange points for waste pickers and private individuals. The coverage of

³ Association website available at <<http://www.associacao-mocambicana-reciclagem.org/>>. Accessed: 23 Dec. 2014.

⁴ Available at: <<http://www.associacao-mocambicana-reciclagem.org/>>.

the projects within the municipality is poor, as the majority of the population is unaware of them due to poor divulgation, a cost for the organizations. However, according to the director of the municipal health directorate, the municipality plans to expand the projects to cover more neighborhoods and make them known to the whole population.

Legal instruments of the partnerships between the municipality and the organizations

The selective collection partnerships between the municipality and the organizations were formalized through agreements. Three organizations had a partnership with the municipality and this consisted of providing land on which to install the waste sorting sheds and processing area (Fertiliza and Recicla) and providing public areas to install recyclable waste collection points (Amor) rent free. During the study, Pagalata informed us that it did not have any type of partnership with the municipality, although the latter had provided support in setting up the activity. When questioned on the motives for this lack of partnership, the company representative was unable to say why. The Pagalata sorting center functions on land rented from private individuals.

Although the Solid Urban Waste Cleanup Posture in Maputo, (Maputo, 2008) states that it is up to the municipality to create economic and other initiatives to encourage the use of environmentally productive technologies and products, which implies reducing, reusing and recycling SUW, there are no municipal laws or decreed establishing partnerships. In the same document, cap. IV art. 15 states that the municipality should support the creation of cooperatives, small businesses and municipal associations participating in different areas and/or components of the municipal clean up system, producing profit and social and environmental benefits.

The agreement between the local authorities and the selective collection organizations is the instrument that actually established the bases of partnership and defines the duties and rights of each partner in carrying out the project.

Infrastructure and equipment

With regards the equipment used, Recicla has its own equipment, such as handcarts, an open top truck, a plastic crusher and manually operated

scales. Fertiliza has handcarts, shovels, scales, rakes and an open top truck (the same used by Recicla). Amor has 5 containers for collecting waste, 3 tri-cycles, scales and a truck. Pagalata owns its own equipment, such as electronic and manually operated scales, presses, sometimes rented out to soft drink manufacturing companies requesting their services to press metal and paper, hand carts, two 3 ton trucks which they own and one rented 1 ton truck. Most of the equipment was in used condition. Little reference was made to problems with use. None of the associations had a conveyor belt for sorting the waste collected. It was usually sorted on the floor or on tables. None of the organizations interviewed had a glass crusher.

Sorting system efficiency

The amount of rejected material was an indicator of the efficiency of the collection process and the quality of separating the material at source and in the sorting center. A lower rejection rate indicates higher awareness in the population, showing the effectiveness of campaigns and greater efficiency and recovery of collected recyclable materials. High rates of rejection indicate the need to intensify awareness and information campaigns (Besen, 2014).

It is worth noting that the data obtained indicate that although the majority of the organizations weigh the collected material, they do not concisely compile this information, and the quantities rejected were therefore not estimated. The data are presented as a scale of rejection rates in bands. The aim was to verify the efficiency of the collecting and sorting systems. Two of the associations, Recicla and Amor, were in the first band, up to 5% rejection (considered to be excellent); the other two, Fertiliza and Pagalata, were within the second band, between 6% and 10% rejection. The rejection rate observed, then, was very low, generally below 10%. The reality of the projects studied shows that, albeit estimated, the rejection rates were low due to the type of selective collection of the organizations in Maputo, which bought pre-segregated (clean) waste, unmixed with other types of waste.

Costs of the selective waste collection projects

It is only through data from publications that it was possible to obtain data on the costs of establishing the selective collection projects in Maputo.

The Amor association declared that, among other sources, investment for setting up its activities was through the donation of 3 containers (normal shipping containers, 20 feet in length by 8 in width and 8 in height), worth 225,000 meticaís (equivalent to US \$7,500) and financial support from a bank worth 966,540 meticaís (US \$32,218) (the exact destination of which was not declared in the document). The association was also supported by operational partners assisting in managing the Eco Points, providing institutional support and divulging the project, among others⁵.

Pagalata published⁶ information that between 2007 and 2008 it conducted business valued at 6,500,000 meticaís (equivalent to US \$216,666). This amount, provided by Pagalata, only refers to the volume of income and not the costs of implementing the project (Pagalata, 2008).

When interviewed, the manager of the Fertiliza cooperative was not able to give the costs of setting up the project. He could only tell us that, in 2011, the cooperative earned a monthly mean of 36,000 meticaís (US \$1,200) selling fertilizer. According to the e-bulletin “Wanted WordWide”⁷ report, implementing the Fertiliza project cost the partners 39 thousand euros (1,560,000 meticaís, equivalent to US \$52,000).

Unfortunately, neither on the internet nor in the interview with the coordinator were we able to find the costs of setting up the Recicla project.

To find the costs of setting up each project, the financial components for installing the infrastructure (sorting sheds, equipment) were considered, as was the fund for buying the recyclable waste, members’ salaries, social obligations and other costs for the cooperative (meals, etc.)

It was not possible to obtain data on the costs of implementing the selective collection projects, as the representatives interviewed were unable to provide this information. Nor was it possible to estimate the costs of selective collection per ton, cost per generation of jobs or income from selling the

recyclable waste, among other data. The lack of data meant we were, for example, unable to see whether the income the organizations gained from selling recyclable material exceeded the cost of the selective collection system, nor analyze the evolution of perspectives of the income generating projects with regards to public policy. However, it was possible to discover that the four organizations had partnerships with the municipality of Maputo, as well as having received support from non-governmental, philanthropic and religious organizations, in order to implement their projects.

As observed, despite the project coordinators at the time of the study having held their positions since the time the projects were set up (on average, four years in the position), they were not able to tell us about their costs. A poor level of monitoring on the part of the municipal authorities and the organization coordinators was noted, as was precariousness in the organizations’ financial evaluation.

Characteristics of the selective waste collection organizations

Of the 4 organizations, 50% were structured, legally speaking, as cooperatives (Recicla and Fertiliza), 25% as associations (Amor) and 1 as a limited company (Pagalata), with all being legal entities and subject to an internal regime. Constituting themselves as associations and/or work cooperatives was, at that time, the most appropriate legal option for organizing the selective waste collection organizations. It enabled them to reduce tax, to make decisions collectively and to legalize the sale of recyclable waste (emitting receipts).

Turnover

High turnover means there is a permanent need for training both in operational terms and in for associate practice. The main challenge is to guarantee that cooperatives members do not leave through more consistent admission criteria and management that ensures more even earnings.

5 Information available online, but later removed. The original address consulted was: AMOR - ASSOCIAÇÃO MOÇAMBICANA DE RECICLAGEM. Relatório de Atividades do ano 2010. Maputo, 2010. Available at: <<http://www.associacao-mocambicana-reciclagem.org/associacao-mocambicana-reciclagem-valorizacao-residus-transformacao.php>>. Accessed: 8 Oct. 2012.

6 Available at: <<http://www.piqiplay.com/piqi-love-program.html>>. Accessed: 21 Jan. 2012.

7 Organic fertilizer factory opens in Maputo. Wanted Worldwide, St. Helier, 9 Feb. 2009. Maputo local news. Available at: <<http://maputo.wantedworldwide.net/news/5454/organic-fertilizer-factory-opens-in-maputo.html>>. Accessed: 13 June. 2014.

There are four reasons that could explain high turnover: 1) the difficulties some people have in adapting to cooperative practices, as many waste pickers come from the street with bad habits in carrying out their profession; 2) problems in relationships between members, due to the fragility of the organization; 3) unstable income; some waste pickers do not agree with having to wait an entire month to sell their production and receive their salary, which previously, they had decided themselves; and 4) members not viewing the work as a permanent activity and the fact that formal employment is always more attractive. Those who do stay want the support the organization offers and society to recognize them, they no longer want to be viewed as marginalized.

Problems the organizations face

An analysis of the problems faced by the organizations showed that the four most commonly mentioned were: 1) lack of support and facility of payment to buy vehicles; 2) lack of vehicles to transport the recyclable waste; 3) lack of experience in associative practice, such as the difficulties ex-waste pickers have in sticking to timetables, recurring absenteeism and lack of commitment; and 4) lack of working capital. Other important aspects mentioned were problems associated with relationships; lack of business training; lack of awareness in population; problems divulging the projects; and little support from the municipality. Another aspect was fluctuations in the foreign currency exchange rate (American dollar and South African rand).

Positive aspects were those concerned with creating amicable relationships with those experiencing the same problem; improving income; being able to support their own families; better working conditions - no longer working on the streets, abandoning scavenging activities, environmental benefits from the activity and diversion / entertainment - relieving stress; fighting for their rights; support from other stakeholders; and secure employment.

Sustainability of selective waste collection projects

In this study it can be seen that one of the challenges to the selective waste projects' sustainability lies in establishing indicators and indices with which to measure the projects' sustainability so as to improve

them. This study shows that the recovery rates for recyclable materials were very low in relation to total household waste collected by the municipality, demonstrating that, in terms of environmental results, they have little effect. With respect to the social aspect, benefits remain limited, although the projects have generated employment. Concerning the economic aspect, the municipality did not tax the organizations' waste processing services, although nor were they remunerated for the services they provided to the municipality, industries or the community. The research also showed that the proceeds from selling recyclable material were not enough to be able to build up working capital to modernize technology or for other important investments such as acquiring vehicles or crushers. As for the sanitation aspects, working conditions in the sorting centers were found to be regular, with little use made of protection or safety equipment and the occurrence of work place accidents.

Conclusions and considerations

Beyond the correlation between the idea of recycling and conserving the environment, selective waste collection also involves areas such as infrastructure, urban planning, public health, education and social action. Overall, selective waste collection projects were established and supported by the municipality of Maputo as a strategy to involve the population with environmental policies. The poor coverage and divulgation of the projects demonstrates the weakness of the relationship between the organizations and the municipality.

The projects' poor level of expansion accompanies low growth in the market for recyclable waste in the country. Only a small part of society is aware of recycling issues and, moreover, the country's low level of technological advancement makes it difficult for profitable deal in the various recyclable materials. Although expansion is poor, the growth in value of recyclable waste has encouraged the multiplication of autonomous waste pickers, giving selective waste collection greater visibility.

The type of selective waste collection practiced by the organizations in Maputo does not form part of municipal solid waste management, nor are the

cooperatives remunerated for the collection and sorting services and their revenue comes from selling recyclable materials. The successful experiences of partnerships between the organizations and the municipality show the potential for changes to prevalent practice, as long as the authorities prove themselves to be sensitive to the demands for more flexible administration including values based on solidarity and shared waste management. In such cases, the authorities play the role of facilitator, encouraging social co-responsibility in order to better direct flows of material and human resources and establish policies and social projects centered around the social inclusion paradigm.

A series of conclusions drawn from analysis of the four case studies can serve to assist formulating political actions and initiatives aimed at improving the situation of recyclers and solid waste management policies in general, especially in municipal terms.

The cases analyzed show that developing recycling organizations largely depends on creating a normative framework to facilitate their being recognized as actors with the capacity to take on legal and institutional commitments.

It was also concluded that municipal leadership is important in drawing up integrated plans to formalize the sector. If the municipality established municipal selective waste collection projects that included recycling organizations in a formal SUW management system, the sector would be formalized within the Integrated Waste Management Plan, increasing the ability of a marginalized sector to produce employment and income, to recover material resources and improve the urban clean up system.

Such innovative actions are specific, locally viable options responding to local needs and are successful in guaranteeing efficient management of solid waste. In the urban centers of Bangalor and Madras, in India, in Tshwane-Pretoria, South Africa and in Zabaleen, Egypt, such innovative practices were initially related with population participation in collecting, separating and disposing of waste through the formation of organized groups, encouraged by the NGOs involved to participate in environmental projects, including public education on the importance of improving SUW management;

with the development of public-private partnerships leading to the privatization of some aspects related to collecting, recovering/reusing and final disposal of waste (Samson, 2010).

Although there is no single formula for structuring selective waste collection projects, the cases studied show the importance of a series of variables to consider when drawing up the projects. The municipality can extend or create selective waste collection and recycling projects anchored in a legal framework with which the waste pickers should be associated. Thus, the waste pickers can be contracted and paid based on the work, as happens in companies that collect household waste. Establishing such projects implies profound change in the way this activity is understood and managed. Moreover, recycling projects pave the way to more sustainable development and can serve as a model for other municipalities in Mozambique, still lacking in sanitation infrastructure and services.

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Authors' contributions

Buque conducted the field work, systemized the data and drafted the article. Ribeiro guided the concept and design of the research and contributed to revising the article.

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