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# Public Policy for Solid Waste and the Organization of Waste Pickers: Potentials and Limitations to Promote Social Inclusion in Brazil

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**Abstract:** The management model for the National Solid Waste Policy to develop sustainable actions, proposes the social inclusion of recyclable waste pickers in the waste management system. Compliance with the law, the form of participation of the waste pickers, and incentive mechanisms are configured as a relationship open to analysis. Therefore, the aim of this work was to investigate the potentials and limitations of a recycling cooperative, in terms of social technologies and inclusion, to encourage local development. The qualitative approach was aided by structured questionnaires, semi-structured interviews, and participant observation. The resulting evidence suggests that the organization of a cooperative, enabled access to information on the legislation of the National Solid Waste Policy. It showed the need to strengthen relationships with education institutions and public authorities. Despite the low levels of education of the members of the cooperative, projects and knowledge could be developed to aid social technologies. No technological innovations were observed, nor the production of alternative artifacts for recyclable materials. This weakens the cooperative in terms of articulation among peers, most notably the integration of the Catamare cooperative in the network of Cataparaná, to support the sale of material produced for industry. It may be concluded that joining the cooperative improved the social, economic, and political conditions of the members, but there were also structural limits to the recycling production chain that were not considered in the National Solid Waste Policy; and to a certain extent this weakens the development of sustainable actions. Furthermore, the organization of the cooperative hindered the development of social technologies and the social inclusion of the waste pickers.

**Keywords:** recycling cooperatives; recyclable waste pickers; national solid waste policy; waste management; Brazil

## 1. Introduction

Since the 1990s, the number of studies on municipal solid waste policies [1], and discussions on cooperative organization or local impacts has grown [2]. Some studies were already concerned with the organization of the chain [3] and establishing a market for recyclable waste [4]. In this context, Curitiba, in Brazil, already stood out due to its solid waste policy [5] and raising awareness of the need for co-participation in recycling [6]. In the 2000s, studies addressed how these recycling organizations were structured, especially in developing countries [7]. Furthermore, public institutions and non-governmental organizations have prepared documents to strengthen solid waste policies [8]. Recent studies [9–11] have analyzed the optimization of the recycling chain, public policies, and the structuring of networks. The theme of lifecycles and the understanding of integrated management, are also pertinent to the theme of public recycling policies [12]. Finally, recycling cooperatives and their impact on waste management and social inclusion, are relevant themes for discussion [13,14].

The management model for solid waste, introduced by the National Solid Waste Policy in Brazil, proposes the generation of better results in terms of the development of sustainable actions in the country; and it is also an important factor regarding the social inclusion of waste pickers. The policy set fundamental goals to help eliminate landfills and dumps, through the constitution of planning instruments at the national, state, micro region, inter-municipal metropolitan, and municipal level. The policy also obliges the private sector to prepare solid waste management plans [15].

The aim of this work, was to analyze the potentials and limitations of a recycling cooperative located in Curitiba, regarding the development of social technologies and the stimulation of local development, following the sanction of the National Solid Waste Policy. The study concentrated on Curitiba, as its recycling policy is well known in Brazil and is a representative case that enabled an in-depth evaluation. Therefore, the study discussed the development of a cooperative system in a community in a situation of vulnerability and social exclusion, the Catamare Cooperative, and how it could be characterized from a theoretical framework of social technology, leading to social inclusion. This initiative was relevant because it enabled cooperation to understand the development processes of social technologies, and how the institutional context developed through these experiences.

The Catamare cooperative is representative of the empirical field of this study, as the experience of the cooperative members transcends the sanction of the National Solid Waste Policy, with the cooperative having officially existed since 2007. The cooperative is currently linked to the National Solid Waste Policy and the Eco-Citizen Project, both public initiatives that aim to promote social inclusion and generate employment and income for recyclable waste pickers.

## 2. Materials and Methods

To achieve the goals of this study, the methodology employed was the case study, with a qualitative and quantitative approach, the use of semi-structured questionnaires, unstructured interviews, and participant observation.

The technical procedure employed in the first stage was a document content analysis, which enabled a better understanding of the National Solid Waste Policy and waste pickers in Brazil. For four months, periodical visits were made to the cooperative for the purposes of participant observation. The visits were made periodically between July 2014 and February 2015, to enable participant observation two to six times a week. The other interviews were conducted in January 2015. At this time, interviews were conducted with the members who play strategic roles in the cooperative (the president, the sales committee, the treasurer, and the fiscal council). In these interviews, an attempt was made to seek information on: (i) How the work of the cooperative is organized; (ii) the process, methods, and techniques of the work; and (iii) the participation of the members.

In the second stage, a questionnaire was distributed to all the members of the Catamare cooperative. Of the 35 members, 26 were interviewed. The questionnaire sought information on: (i) The socio-economic condition of the members, (ii) the process and organization of the work of the members, (iii) how the members perceived the work they do, (iv) the relationships that the cooperative maintains with other organizations, (v) the importance of these relationships with other organizations to the cooperative; and (vi) how the subjects perceived the organizations with which the cooperative maintains a relationship.

The CATAMARE cooperative was representative of the empirical field of this study since: (i) The cooperative is linked to the Eco-Citizen Program, run by the Local Government of Curitiba; (ii) the experience of the cooperative members transcends the sanction of the National Solid Waste Policy; and (iii) most members were linked to the National Movement of Recyclable Waste Pickers.

Regarding how the research problem was addressed, the approach was qualitative as the focus of this study was on the process and its meaning [16]. According to Minayo [17], the intention of the qualitative approach is not to achieve the truth, but to understand the logic of what is practiced in reality, being concerned with the relationships between the world and the subject in a certain way that cannot be replicated or seen in this way, in any other place. In this sense, the study was a procedure

that did not seek to generalize results, i.e., it did not strive to create models with universal goals. According to Triviños [16], a qualitative study is only intended to “obtain generalities, prominent ideas, trends that appear more defined between the people that participate in the study”. In this sense, to answer the general question of this study, a qualitative case study was conducted of the Catamare cooperative. In brief, Yin [18] defines the case study as an empirical study that will seek to investigate a contemporary phenomenon in its real-life context, “when the boundaries between the context and the phenomenon are not clearly evident”. Therefore, for the present work, it was necessary to use multiple sources of evidence.

### 3. Solid Waste Management and Social Inclusion in Brazil

The management model for solid waste, introduced by the National Solid Waste Policy in Brazil, proposes the generation of better results in terms of the development of sustainable actions in the country, ensuring a better-quality service and social inclusion for waste pickers. The innovations introduced by the policy constitute a framework to stimulate these experiences, and the possibility of inclusion for recyclable waste pickers in the waste management system. However, compliance with the law, the form of participation, and the incentive mechanisms established by the policy do not guarantee social inclusion, and constitute a relationship that is open to analysis, as will be discussed in the next sections.

#### 3.1. National Solid Waste Policy and Social Inclusion in Brazil

Over time, there was a vacuum to be filled in Brazilian public policies regarding solid waste management due to the lack of a public environmental policy with directives and instruments, for the adequate environmental management of waste. For some time, a proposal was discussed with the participation of public agencies, representatives from the private sector, social movements, and civilian society. The central issue that hindered the process of passing the National Solid Waste Policy in Brazil, was the lack of consensus between the government, civilian society, and the private sector, regarding the model of post-consumption responsibility to be implemented, defining the responsibility of manufacturers, importers, distributors, consumers, and those in charge of public services that involved handling waste. After 21 years of deliberation, the Chamber of Deputies on 11 March 2010, followed by the Senate on 7 July 2010, passed the law. President Lula sanctioned Federal Law 12.305, of 2 August 2010, thereby enacting the National Solid Waste Policy [19].

It was in 2011, that a process was initiated to prepare the National Solid Waste Plan. Due to the complexity of the issues that it was to face, the proposal was directly related to other national plans: National Climate Change Plan, National Water Resources Plan, and the National Plan for Sustainable Production. It was also directly linked to the National Environmental Education Policy, through the proposal for the National Environmental Education Policy and the proposal of the National Basic Sanitation Plan [19].

The first action of the National Solid Waste Policy, was to set up the Inter-Ministerial Committee for the Social and Economic Inclusion of Reusable and Recyclable Waste Pickers (CIISC), created by Decree 7.405/10. The CIISC, coordinated by the General Secretariat of the President of the Republic, is made up of members of ministries of the Environment; Social Development and Combatting Hunger; Work and Employment; Social Security; Education; Health; Cities; Tourism; Mining and Energy; Economics; Science and Technology; Planning, Budget and Management; the Federal Heritage Secretariat; the General Secretariat of the President of the Republic; the Human Rights Secretariat and Legal Department of the President of the Republic; the Banco do Brasil Foundation; Caixa Econômica Federal Bank; Petrobras; National Health Foundation; and the Applied Economics Research Institute. It is implicit that other public policies are coordinated by the Committee, as waste pickers benefit from other programs of these ministries, such as the “Brazil Without Poverty” and “Family Allowance”, “Literacy Brazil”, “Green Brazil”, “My Home, My Life”, “Caring Brazil”, the “Stork Network”,

“Electricity for All”, “ProUni”, “Pronatec”, “Health Has No Price”, and other programs for families registered on the Single Register for Social Programs.

The creation of the CIISC, also led to the Pró-Catador (Pro Waste Picker Program), the Cataforte (Strong Waste Pickers), and to the National Center for the Defense of Human Rights of the Homeless and Recyclable Waste Pickers (CNDDH).

The Pró-Catador program has the purpose to integrate and articulate federal government actions, to support and improve the productive organization of recyclable and reusable waste pickers and improve their working conditions. It also seeks to create more opportunities for social and economic inclusion, and expand the selective collection of solid waste, encouraging reuse, and recycling through this sector.

The Cataforte Program, is the direct result of the demands from and negotiations with the National Movement of Recyclable Waste Pickers and the Federal Government. The aim of the project is to strengthen social and productive organizations, and self-managed and supportive economic ventures.

Law 12.305/2010 has 57 articles, and their essence has been maintained since the bill of law was introduced in the Chamber of Deputies, as highlighted by Grimberg [20]. The scope of the law is clearly defined, establishing directives, instruments, and responsibility for the management of solid waste.

In general, the PNRS has aimed to define strategies that add value to solid waste, increasing the competitive capacity of the productive sector, aiding social inclusion, and describing the role of the states and municipalities in solid waste management. In this context, the Federal Government, through the Ministry of the Environment, has set some parameters for the municipalities to enact the national Solid Waste Policy: reduced operational costs and values of investments; better use of technologies; the establishment of regionalized rules for the use of services; and efforts to integrate planning and shared management that include solid waste pickers.

The main guide is the Integrated Management of Solid Waste, which prioritizes a reduction in the volume of waste, more recycling, incentives to form cooperatives or other waste picker associations as a form of environmental action, and the concept of reverse logistics and shared responsibility; recognizing the need to participate in every link of the chain. This has led to the giant step of the Plano Nacional de Resíduos Sólidos (PNRS) in establishing integrated management, which is characterized by actions that seek solutions to the inherent problems of solid waste, whilst considering the political, economic, technological, environmental, cultural, and social dimension, with society assuming the role of monitoring compliance with the law. The main mechanisms of the PNRS are selective collection, reverse logistics, environmental education, scientific and technological research and accountability for the lifecycle of products, encouragement to participate and the strategic and incisive role of waste pickers, and incentives to create cooperatives and associations [19].

The general directives for the inclusion of waste pickers in the National Solid Residue Policy include: (i) Strengthening cooperatives and associations of waste pickers “seeking to raise them to a higher level of efficiency”; (ii) creating new cooperatives and associations and regulating those that already exist to “strengthen these work vehicles and socially include and formalize waste pickers that operate in isolation”; (iii) articulating networks of cooperatives and associations of waste pickers; (iv) creating mechanisms to identify and certify cooperatives; (v) strengthening initiatives to integrate and articulate federal policies, and actions to aid waste pickers; (vi) goals for the social inclusion of waste pickers, and to ensure that public policies provide alternatives for work and income for waste pickers, who cannot continue in this line of work after the extinction of landfills; (vii) goals for social inclusion, and to guarantee dignity in employment for up to 600,000 waste pickers; (viii) the participation of waste pickers in environmental education actions, and awareness in the separation of waste at the source, through adequate training and payment; (ix) bringing information systems on municipal waste and shared solid waste management up to date; (x) goals and criteria for municipalities to include waste pickers in the municipal management of solid waste; (xi) providing access for waste pickers, to urban solid waste collected selectively; and (xii) the integration of recyclable waste pickers into reverse logistics systems [21].

The role of waste pickers in local solid waste management actions can be seen in Article 19 of Federal Law 12.305/2010, which states that Municipal Solid Waste Plans should include their participation, in accordance with Article 11 of Federal Decree 7404/2010. Regarding the reduction of urban solid waste, the law includes 19 strategies for compliance. Concerning a reduction in the generation of Urban Solid Waste in landfills, the law has 22 strategies. An important strategy is to implement a selective collection, with the participation of the cooperatives as service providers, contracted by the public municipal administration, with due payment to the waste pickers to collect, sort, and direct the waste to an adequate final destination for recycling [19].

In addition to the initiatives described, the Article 80 of the Federal Decree, states that federal institutions finances should create special lines of credit for funding cooperatives and other forms of waste picker associations. These funds should be used for the acquisition of machinery and equipment, to be used in the management of solid waste, recycling, and the reuse of solid waste, and innovation and development for managing solid waste.

### *3.2. Recyclable Waste Picker Cooperative In Curitiba: The Eco-Citizen Project*

Eco-Citizen is a social inclusion project launched in 2007, through a partnership between the city of Curitiba represented by the Municipal Environmental Secretariat, and the Social Action Foundation, the Entrepreneurial Alliance Association, and the National Waste Pickers Movement. The aim of the project was to “guide, organize and support associations and cooperatives of recyclable waste pickers” in administrative issues, infrastructure and commercial interest, and promoting the inclusion and strengthening of waste pickers in the recycling chain to help them with employment and income, to enable economic sustainability and spur local development [22].

One of the objectives of the project is to implement a mixed technology model, which will help to minimize the generation and handling of solid waste, with sorting and recovery of waste as an economic asset with social value, and the final exclusive disposal of waste material in an environmentally adequate way. With an incentive for selective collection, reverse logistics, and the sorting of materials, there will be a reduction in the amount of recyclable material in landfills [20].

Today, the Ecocidadão Project is active in 40 municipalities in Paraná State, with 47 associations of recyclable waste pickers. The Municipal Environmental Secretariat is responsible for the management of the Ecocidadão project. Since 2013, the technical side of the project has been managed by the Pró-Cidadania (Pro-Citizen) Institute (IPCC). It also helps to form the cooperatives or associations, and helps to hire the support team, acquire the necessary equipment, and other correlated actions [22].

In keeping with the National Solid Waste Plan and the State Plan for the Integrated and Associated Management of Urban Solid Waste in Paraná State, Table 1 shows the Specific Directives and the Work Directives, for the Integrated Solid Waste Plan in Curitiba.

Like the PNSR, the Integrated Solid Waste Plan of Curitiba, seeks to encourage stronger participation by cooperatives and other associations of waste pickers as providers of services, duly contracted by municipal public administrations, and developed in partnership with society. This will increase their efficiency and sustainability, mainly in the handling and sale of waste and in the methods of processing and recycling. The project also includes the creation of permanent technical and managerial training programs for waste pickers and the members of their cooperatives, according to the level of the organization through technical, teaching, research, and extension institutions from the third sector and social movements [22].

Deficiencies in waste management in the municipality, according to the Municipal Sanitation Plan [22], included: locations rife with irregular waste disposal; a need for more inspectors and technicians to analyze the Managerial Plans; a low number of cooperatives and associations of waste pickers capable of being included in the recycling chain; cooperatives and associations of waste pickers with no economic and financial self-sustainability; poor economic conditions waste handling and urban cleaning services; distances between collection areas and final disposal points; lack of new technologies for final disposal of urban solid waste; resistance from generators regarding the internalization of costs

for disposal; lack of delivery points; and insufficient units for final disposal of vegetable waste and unusable wooden materials.

**Table 1.** Specific directive from the Integrated Solid Waste Plan of Curitiba [22].

| Specific Directives  | Work Directives  |
|--|--|
| Environmentally correct final disposal of waste  | To recover landfills, including the evaluation of environmental conditions.  |
| Reduction of dry solid waste in landfills and inclusion of recyclable and reusable waste pickers | To promote progressive reduction of dry waste in landfills;<br>To prepare and strengthen the organization for socio-economic inclusion of recyclable and reusable waste pickers;<br>To seek the continued reduction of urban solid waste, taking specific locations into consideration;<br>To adopt technologies that encourage renewable energy or other forms of using dry waste, considering technical, environmental and economic feasibility and the potential regional market. |
| Reduction of wet urban solid waste in landfills and treatment and landfill gas recovery          | To encourage composting, using the energy from biogas produced in biodigesters or landfills or other technologies to produce energy from wet urban solid waste;<br>To adopt technologies promoting the use of energy or other forms of using waste from through other processes, considering the technical, environmental and economic feasibility or the potential regional market.   |
| Training in solid waste management   | To strengthen urban cleaning management and the handling of urban solid waste by institutionalizing an appropriate instrument for monitoring and paying for urban cleaning and the handling of waste.  |
| Health service waste   | To strengthen the management of waste produced during health services.   |
| Industrial waste   | To strengthen the management of solid waste in industry;   |
| Construction waste   | To strengthen mechanisms for monitoring and inspecting generators.<br>To provide voluntary delivery points for construction waste.   |

#### 4. Social Technologies

In general, conventional technology can be defined based on a set of characteristics related to its effects on labor and on the environment, its large scale and production rate, the inputs used, and the type of control exercised over workers [23]. In conventional technologies, there is no emphasis on the process of technology construction or collective learning that results from it. These aspects are extremely important for social transformation because they are concerned with the engagement, participation, appropriation, and the production of knowledge of the social groups involved. The aspects of conventional technology are, in fact, efficient in maximizing private profits, but also limit their effectiveness as a strategy for social inclusion.

In this sense, as a response to the totalizing logic of capital existing in the processes of production and consumption of conventional technologies, the conception of social technology emerges as an inclusive, comprehensive, and possible approach [23]. The term social technology refers essentially to the development of technologies aimed at social inclusion, which have carried out criticism of conventional technology since its inception. Guided by a more sustainable perspective and less harmful to the environment and to the human being, social technology signals the construction of a society based on a distinct rationality, permeated by social values, such as cooperation and autonomy.

Social technologies, unlike conventional technologies, are qualified by low financial contributions, for its orientation towards the internal market, and for being able to economically make self-management ventures viable because they are exempt from a discriminatory power relationship; and above all, because they constitute a liberating potential of the direct producer. Social technologies are guided by the criteria of social inclusion, which allows the construction of more equitable socioeconomic systems in terms of income distribution, and more participative in terms of collective decision making [24].

According to Dagnino, Brandão e Novaes [23], it is possible to affirm that Conventional Technology reinforces the capitalist duality, restricting the workers to the retainers of the means of production, just as the peripheral countries are dominated by the developed countries, perpetuating

and extending asymmetric powers regarding social and political relations. On the other hand, Social Technology has as its characteristic, its adaptation to small producers and consumers of low economic power, through a type of control that does not reproduce the segmentation and hierarchization of the Conventional Technology in the productive unit. Furthermore, the orientation to produce and to be able to stimulate the potential and creativity of the direct producer, making it possible to economically enable social enterprises, such as popular cooperatives, family farms, incubators, and small enterprises [25].

Based on the assumption of Social Technologies, the development and use of technologies build on the understanding that men and women should be covered in a constant process of action and reflection, so that the technical action allows expression of visions of world, social values, and political postures in face of the dominant system [26].

According to Thomas [27], with the return of the thematic of development, especially in the sustainability debates, social technologies re-entered the agenda as a fundamental discussion for the preservation of the environment, culture, and economic viability. In this sense, according to Rutkowski and Lianza [28], this model of non-predatory economic development, requires the rational use of natural resources as a strategy to improve the quality of life of those who produce and of those who consume the technologies developed. There is, for the authors, an important search for a balance between development, preservation of natural resources, and regional culture in the construction of social technologies. Moreover, beyond the productive dimension, technologies can also be understood as the result of different epistemic interactions about a process, a method or artifact, in which the integrality of the human being, its socio-historical context, and the environmental preservation are privileged [26].

### 5. Results and Discussion

In this section, we present the results of the research at Catamare, and discuss the potentials and limitations of a recycling cooperative, to development of social technologies and social inclusion.

#### 5.1. Characteristics of the Case Study: The Catamare Recycled Material Cooperative

The cooperative presently has 35 members. They are organized using a hierarchical structure, as shown in Figure 1.

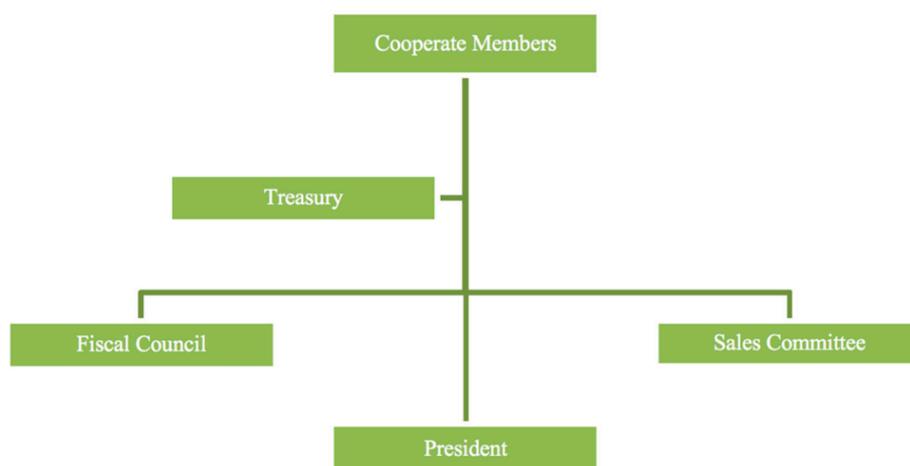


Figure 1. Hierarchical structure of Catamare.

According to the cooperative members, the group has greater decision-making power than the president and the members who hold strategic positions in the venture. The 26 members responded that all decisions of the cooperative are taken by a vote during an assembly, following a discussion.

It is at these meetings, that votes are cast to elect the members to strategic positions in the organization. Only members can attend the assembly meetings.

Every waste picker has the right to call an assembly, provided that they have the support of at least one fifth of the members. Regarding their participation at the meetings, 17 waste pickers stated that they share their opinions actively, whilst nine stated that they do not say much at the meetings, unless they are asked.

The president is legally answerable for all the activities of the cooperative. In short, he is the one who represents the cooperative at official meetings and activities and seeks solutions to the demands of the members outside the limits of the organization. The sales committee is a nucleus formed by CATAMARE members, but it is also part of a group of the Cataparaná, which studies the best options for the joint sale of the materials collected by the waste pickers, through a network to industry. The committee is responsible for participating in meetings with other associations and cooperatives in the Cataparaná. These meetings are held once a month to discuss and clarify issues, such as market prices, investments, and the costs of the network. The fiscal council is responsible for inspecting and providing guidance for the financial affairs of the cooperative. The treasury is responsible for the daily financial routine of the cooperative. It handles the cash flow, money to be received, and bills to be paid, and it applies the financial resources of the cooperative and operationalizes its financial planning.

The cooperative members agreed that each waste picker must contribute 20% of their monthly income. This money is used to pay for electricity, water, telephone bills, internet, and maintenance of machinery used at all the units of the cooperative. Some waste pickers do not agree with this arrangement. They believe that this weakens the cooperative nature of the venture and does not take the principles of the solidarity economy into consideration.

According to the members of the cooperative, those in strategic positions wish to adhere to the guidelines of the National Movement of Waste Pickers. To the members, it is only possible to build a more equal society if there are incentives for the development of solidarity ventures. Within the limits of the cooperative, this occurs through practices that combat competition and individualism through self-management and seeking mutual support between waste pickers and other workers.

The Catamare currently has two sorting units at a match factory, for safety purposes. The material is highly flammable and cannot be taken to the regular sorting units. The oldest unit is located in the Boqueirão neighborhood, and the other in Rebouças.

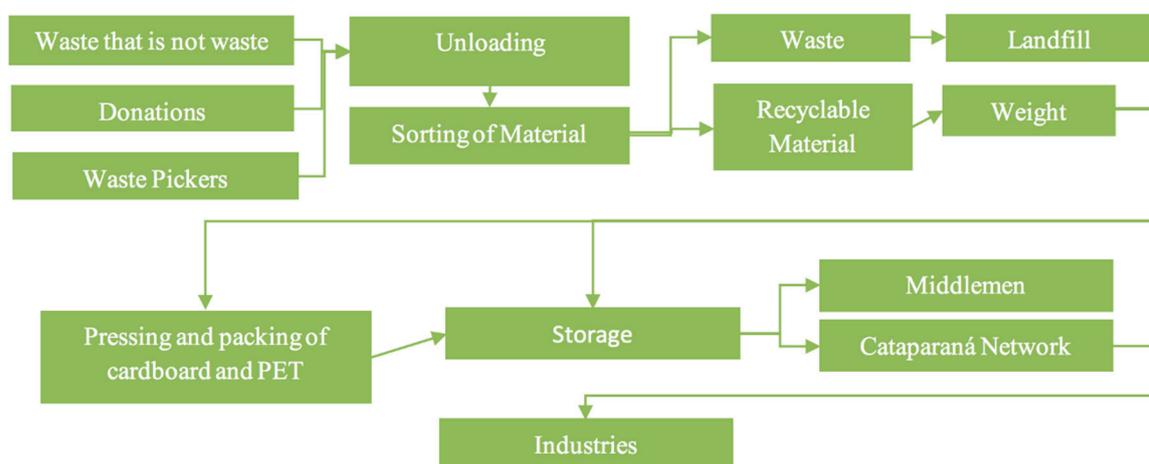
The cooperative has two presses, two scales, and eighteen worktables shared by all the waste pickers. In the patio of the Rebouças unit, there are electric carts (a project run by Itaipu in collaboration with the Ecocidadão Project). The cooperative has five electric carts, but the waste pickers do not use them. One of the members claimed that she does not like to use them because she thinks they are not strong enough. She said that the prototype overturns easily and cannot support the weight of the materials she collects. Therefore, she uses her own pushcart.

In the Rebouças unit, there is a conveyor belt that has yet to be used by the waste pickers. The conveyor belt has not been installed because the unit does not have the necessary electricity structure to run it, and because the waste pickers have not decided how they will use the equipment. According to the members, to sort material using the conveyor belt would mean establishing fixed working hours, the equal division of the value of the activity, and a study on the best type of material to be sorted.

For two years, the waste pickers have been divided into two spaces, rented by the local government. According to the interviewees, the cooperative members are spread over two units, because the local government was not concerned about renting one location with the necessary physical structure for all of them, after they had vacated their previous installations in the Parolim neighborhood. Several waste pickers reported this lack of concern by the local government over choosing the location of the unit because all the waste pickers that now work in the Boqueirão unit reside in Parolim or Vila Torres. It is difficult for them to go to work because of the long distance. Some

waste pickers walk from Parolim to Boqueirão every day because the bus fare is too high and weighs heavily on their budget.

In general, at both units, the main stages of processing the waste are: (i) receipt of material; (ii) unloading the trucks; (iii) sorting; (iv) pressing; (v) packing; and (vi) storage of recyclable materials. Following on the spot observations, a flowchart of the production process of the cooperative was prepared, as shown in Figure 2.



**Figure 2.** Flowchart of the production process at the CATAMARE Cooperative.

Every day, the cooperative receives material from the “Lixo que não é Lixo” (Waste that is not Waste) project, waste collected on the streets by the six waste pickers of the cooperative, and donations from companies and public agencies. CATAMARE has one large truck, one small truck, and a camper van for collecting donations.

According to the waste pickers on the sales committee, many donors do not act as partners of the cooperatives. The members understand that in most cases they use the cooperatives to dump what they do not want, and sell (illegally) the more valuable waste. According to the waste pickers from the Citizenship and Waste Institute, the cooperatives constantly report the illegal practices of some agencies and private companies to the Justice Department. The organizations that conduct these illegal practices are normally fined and the money is used to meet the requirements of the cooperatives in the Ecocidadão Project.

There is a certain amount of autonomy regarding the division of the materials that each waste picker sorts. At the Boqueirão unit, half of the waste pickers equally share all the materials that are donated or comes from the “Lixo que não é Lixo” program, irrespective of their origin. The other half of the waste pickers organize the separation according to the origin of the waste: Two waste pickers sort the recyclables from Hospital de Clínicas, three sort the material from the Regional Labor Tribunal, and two others sort the waste from the Polytechnic Center and the Unimed Health Insurance Company. At the Rebouças unit, all the donated materials and materials from the “Lixo que não é Lixo” are shared among all the waste pickers. Independent of this sharing, the waste is unloaded manually with the help of brooms, as neither of the trucks have unloading facilities. The materials are removed from the truck by two people and placed manually into large sacks made of raffia. The sacks are then taken to the sorting tables.

The sorting is done using a procedure where each sack of recyclable materials is opened on the table, whilst the waste pickers place several bags on the floor. Each bag is used for one type of material. During sorting, the waste pickers are exposed, as they are in direct contact with the waste, and consequently with the vectors that multiply in the unit. The members only wear gloves for handling the materials. At this stage, the presence of rats and mosquitos was observed, due to the accumulation of material, which makes the work environment unhealthy. This is because the unit does

not have the necessary infrastructure for the waste pickers to stock sorted materials. The waste pickers often need to accumulate many bags of waste after separation, until they can build up the necessary volume for a package of recyclables.

The waste is separated using the following criteria: nature, color, and quality (impurities and rejects). Different types of recyclable materials are separated. The most commercialized materials are paper, cardboard, glass, soft aluminum, plastics, steel, and sections of iron. All the materials are stored in large reusable plastic bags. Once the bags are filled, they are weighed.

At the end of the day, each waste picker weighs all their material, monitored by the waste picker in charge of weighing. At the CATAMARE, the treasurer is in charge of this process at the Boqueirão unit. At the Rebouças unit, the members take turns at this activity. The numbers are noted on a control sheet that specifies all the types of materials and the weight of each. One copy is always given to the waste picker, and the other is retained by the cooperative.

Every week, the treasurer adds up the weights that each waste picker recycled and calculates their value, according to the price parameters provided by Catapananá. This list serves two functions. It specifies the price that Catapananá can obtain through sales and indicates the average price that the cooperative can obtain by selling the types of material that have not been sold through the network, but which can be sold to middlemen. These prices vary and are constantly updated by Catapananá and the members of the cooperative.

After weighing, the waste pickers press and package the recyclables. All the packaged waste is transferred to storage bays. The materials are stored, following the aforementioned criteria (nature, color, and quality).

The packages are stored for a short period of time until their weekly expedition to Catapananá, the state network for processing and selling, which is managed by waste pickers, and where they stock and process waste. If the waste is not correctly packaged, the price paid will be lower and thus the cooperative members will receive less. As the network does not yet have the infrastructure for handling and processing some types of materials, the cooperative sells them directly to a company, which takes all the material to São Paulo or some other middleman or small company that purchases material directly from the unit. The rejected material is taken to a landfill by the local government.

## 5.2. Analysis and Results

Although the cooperative is one of the oldest in Curitiba, the membership has varied. Approximately 46% have been members for over 6 years, but only 15% of these have been in the cooperative since it was founded. Meanwhile, 31% joined in the last year.

When asked about shared techniques, 18 members responded that they shared their knowledge with colleagues. The waste pickers indicated that most of their conversations were about the quality and types of material they handle. Other members said that they try to talk about the rights of waste pickers, with other waste pickers. Two waste pickers claimed that they like to talk about new things they hear from members of other cooperatives, or discussions at the Citizenship and Waste forum.

When asked whether the cooperative seeks ways of improving the artifacts used in the handling of materials, 23 waste pickers said that the cooperative seeks to improve the objects and machinery required for the activity. In the opinion of 14 members, this occurs mainly through projects that the cooperative develops to earn subsidies from Banco do Brasil Foundation, Funasa, Cataforte, and Ecocidadão Program.

When asked about improving the techniques and knowledge used in the processes, 21 waste pickers said that the cooperative seeks to improve knowledge of the activities necessary for collecting, sorting, and recycling materials. According to the waste pickers, this occurs through lectures and courses publicized by the Catamare, and exchanges of information with other cooperatives through Catapananá and the Citizenship and Waste Forum. None of the waste pickers could provide concrete examples of previous experiences.

Although the waste pickers appeared interested in improving the processes at the cooperative, this was shown using an essentially instrumentalized logic. None of the waste pickers could provide alternative ways of solving the latent problems of the cooperative. According to one of the members, the lack of interest in seeking other ways of resolving the problems the cooperative faces, is one of the most worrying factors regarding the survival of the unit. Another claimed that although they all work a great deal to guarantee their income, few work with the collective of the cooperative in mind. Indeed, through observation it was possible to see the effort that the waste pickers make in their long, tiring workdays. At least three times a week the waste pickers worked over 12 hours.

When asked about the greatest difficulties in the daily life of the venture, 25 members provided a variety of answers. The recurring themes included the distance between their homes and the units, the weight of the pushcarts, and the physical strength required to carry the bags from the truck to the tables (many waste pickers were ill and felt pain caused by their work at the cooperative). They also mentioned the way people separated the materials at home (the recyclables were mixed with other waste and could not be reused), the limited space at the unit, the disorganization of the waste pickers, the physical structure of the units, and the shortage of presses, forklifts, and other machinery that could facilitate their work.

The classification of the main actors involved with the cooperative showed the importance of third sector organizations, the network is self-managed by the waste pickers and public organizations, and the general structural maintenance by the Catamare network. The organizations with a higher degree of centrality are Cataparaná and the local government. In third place, is the Citizenship and Waste Institute.

Of the 26 interviewees, 24 said that their income increased after joining the cooperative. Ten waste pickers said that they began participating more in social programs after joining the cooperative. Of the 26 members, 13 receive family allowance. Only one used the My Home, My Life program. One waste picker was a Young Apprentice at the cooperative. Five members used the Social Water Rate. Two used the Fraternal Electricity program and the Free Milk Program.

The monthly income of the waste pickers was up to one minimum wage (approximately 200 dollars) for 55% of the members, and 1.1 to 2 minimum wages for the others. Meanwhile, their family income was higher, with 27% over 1 minimum wage, 42% from 1.1 to 2 minimum wages, and 46% earning over 2 minimum wages.

Only three waste pickers claimed that their level of schooling improved after joining the cooperative, but all 26 interviewees stated that they benefited from the lectures, courses, and meetings publicized by the CATAMARE. However, 4% informed that they were illiterate, 71% said that they had up to 8 years of schooling, and the rest up to 11 years.

Of the 26 interviewees, 16 stated that their family situation had improved after joining the cooperative. The main reasons for this were higher income, and the fact that they no longer had to store waste material at home. Eight waste pickers claimed that their access to public services had improved. The main reasons for this included the exchange of information among the members, and some actions by the Citizenship and Waste Institute.

Of the 26 interviewees, 22 claimed that their working conditions at the cooperative were better than their previous situation, but only 14 said they had more free time for other activities. Furthermore, 24 claimed that their relationship networks increased positively after they became members. However, only 14 waste pickers felt that their work became more socially acceptable after they joined the cooperative.

### *5.3. Discussion on the Limits and Potentials of Recycling Cooperatives*

This study was done to analyze the limits and potential of the cooperative as an alternative for the development of social technologies, and to promote social inclusion. The relevance of this initiative lies in the possibility of cooperating to understand the processes of development of social technologies, as well as the institutional context that develops from these experiences.

Firstly, there are serious structural and historical restrictions on the recycling industry, which continue to hinder the social inclusion of waste pickers and the development of social technologies, even when cooperatives are transformed into a solidarity venture. When analyzing the historical relationship between recycling and waste pickers, it should be understood that it is not plausible to determine the composition of the workforce of waste pickers through the existence of cutting-edge technologies available for recycling waste materials [23].

Brazilian recycling only became possible on a large scale when the collection and sorting of waste were shown to be feasible at a low cost by workers whose pay compensated for investments in costly technologies, which led to the emergence of the recycling sector. Even today, despite the political gains for these workers, the cooperatives function as a kind of outsourced labor for big recycling companies, which exploit the precarious work of the members of these cooperatives. Irrespective of the organization of this type of labor, the profit rate has to compete with prices set by the world market, responsible for petroleum derivatives and aluminum and cellulose production. In other words, the work of waste pickers must be submitted to the variables of production and technological standards imposed by the recycling industry.

There is clearly an impasse between the conventional technologies demanded by recycling companies, and the reality of production on the part of waste pickers—who do not need conventional technologies—but end up depending on them because it is difficult to develop alternative ways of doing their work. Furthermore, it was observed that a minority of the waste pickers believed that the introduction of technology used by private companies at the cooperative would guarantee the economic progress of the members. Public policies also reproduced this logic.

In this sense, another important factor is the political and social awareness of the waste pickers. When asked about the meaning that they attribute to social inclusion, half of the waste pickers had a fairly wide-ranging view of the concept. In line with the definition presented in the theoretical development of the study, several waste pickers spoke of gaining rights. The most frequently mentioned were the right to education, healthcare, housing, work, and access to public spaces. Many waste pickers mentioned racial issues, and issues regarding respect for sexual orientation for social inclusion to be achieved. Others included in their understanding of the term, the right to take part in decisions that affect their lives.

However, during the interviews, the study identified that they work in a permanent condition of coercion from multiple social actors. These actors include some public authorities, the communities where the units are located, and the businesspeople that work with recycling or should donate material to the cooperative.

The relationship between the cooperative and the public authorities is highly contradictory in nature. While some public agencies comply with the law and donate recyclable materials to the cooperatives, there is no inspection or control over the diversion of resources by some institutions, and the public authorities do not pay for the service provided by waste pickers. If on the one hand, there are federal, state, and municipal projects that allow the funding of equipment and artifacts to improve the working conditions of the waste pickers, then on the other hand, this occurs within a totally determinist rationality [29]. According to the waste pickers, there are restrictions on the types of materials that can be obtained using federal funding. Normally, it is only possible to acquire certain kinds of machinery, and it is not possible to invest in technological research. If, indeed, the local government helps Catamare waste pickers by paying the rent on their units, it does not take the needs of the workers into consideration when it comes to the space they have to conduct their work. The structure is deficient and there is no maintenance. The units are small and cannot accommodate all the workers. There is a shortage of equipment for handling the material. In other words, while there is potential in the relationship between the cooperative and the authorities, this relationship imposes limits on improving the social inclusion of the waste pickers, and the development of alternative technologies to meet their demands.

The fluctuating prices of recyclable materials is another factor that compromises not only Catamare, but all waste picker cooperatives. According to the waste pickers, there is a seasonal decline in the values of recyclables and this fall in prices is related to the international market, with economic crises and currency exchange policies, which directly affect the price of the materials. The oligopolistic nature of the recycling industry, according to the waste pickers, also affects the prices paid for materials. This almost entirely limits their sales margin, and consequently, the amount they are paid for their work. Furthermore, there are situations in which the material passes through the hands of more than one buyer, which possibly reduces the prices paid to waste pickers; in order to maintain the profit margin on recyclables acquired by companies [30].

In this situation, it is perfectly admissible to declare that the organization of the work, the working hours, and the income of the waste pickers are completely determined by the price of recyclable materials. A point in question are the materials that continue to be sent to landfills because there are no buyers in the region.

Therefore, the political organization of waste pickers is a potential for empowering these workers. The main forms of organization are the National Movement of Recyclable Waste Pickers and the Catapananá network. The Movement seeks to ensure the independence of these workers in relation to political parties, governments, and entrepreneurs. At the same time, fighting for the integrated management of solid waste, with the active participation of organized waste pickers throughout the collection, sorting, and processing of recyclable materials. The movement also believes that it is strategic to develop feasible technologies, which guarantee control of the production chain of the waste pickers.

The waste pickers collect and sort waste to earn their income. They play an important social and environmental role, as they help to minimize environmental impacts by collecting recyclable material around the city, and generate income by sorting and processing it, so that it can be reused by industry instead of being placed in landfills. Therefore, it can be inferred that waste pickers work, but are excluded, because of the type of work they do by the working class they represent. This is compounded by discrimination in terms of gender and race, as most of them are black women and single mothers. In this sense, it could be said that the inclusion of these waste pickers, even when they are members of associations and cooperatives, is somewhat perverse.

The problems of the cooperative are a challenge to the usual distinction between the technical and the social. They are, indeed, both social and technical. The solutions employed to combat the problems should be understood as being conditioned by social and technical problems. In this sense, to avoid social exclusion through partial exclusion through work, it is necessary for the authorities and support institutions, to consider the specific demands of waste pickers. They must invest in research and development to find adequate solutions, for the technological route of popular recycling, and to articulate different policies for education, healthcare, housing, the eradication of child labor, and social work for waste pickers and other requirements that must be heard and observed in the experience of these workers.

## 6. Conclusions

It can be proved that waste pickers when organized into cooperatives can gain some economic and social benefits that improve their quality of life. Moreover, as they become involved in social movements that are concerned with their work, they begin to perceive the important role they play in preserving the environment and discover that they have the right to citizenship. On the other hand, the interviews with the waste pickers showed that they work in a permanent condition of coercion by multiple social subjects, in addition to the veiled competition between the waste pickers themselves. The study also found that the political organization of waste pickers and awareness of this group, together with other relationships that the cooperative has built with the public authorities, enable the development of social technologies, although this is still in its early stages. This study reaffirmed that isolated programs do not totally alter the perverse social exclusion of waste pickers via

inclusion through precarious work. In this sense, there must be guarantees of the universalization and integration of public policies in all spheres of public administration.

The issues raised in this study indicated that the organization of the work of the waste pickers, serves the interests of the capital involved in the chain of purchasing, recycling, and selling all the collected waste. In this context, the theme is understood as being highly relevant to scientific research, managers of public administration, and cooperatives of waste pickers, who are partners in the process of improving social inclusion and gaining citizenship, for these most important environmental actors in large urban centers.

Among the suggestions for future studies, is the need to produce researches that have the cooperative network as a study object. It could also be interesting to understand the gender implications that permeate the activity, since most of the collectors were women and most of them suffered or had already suffered domestic violence. It could be seen that this influences the construction of the identity of the activity, and there are direct relationships between the work and the autonomy of women. Further works on the recycling industry are needed, with emphasis on the cooperatives experience after the National Solid Waste Policy has been sanctioned. Research needs to be done on other less costly and more efficient processes and recycling methods, which consider the collectors activity. It is also necessary to analyze public projects, such as the Cataforte, and the methodologies applied by the institutions in the development of these projects.

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