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Public policies and the establishment of recyclable material collectors' associations: a case study in the municipality of Chapecó/SC (1999 – 2022)

Políticas públicas e a constituição das associações de catadores de materiais recicláveis: um estudo de caso do município de Chapecó/SC (1999 – 2022)

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ABSTRACT: The purpose of this article was to analyze how local policies and the National Solid Waste Policy (PNRS) have influenced the process of establishing associations of recyclable material collectors in Chapecó/SC, making the municipality an atypical case in the national scene with a high number of associations and associates. The analysis was carried out from the closure of the municipal dump, in the year 1999, until 2022. We also sought to analyze the level of efficiency of these institutions, based on spreadsheets by the Institute of Applied Economic Research (IPEA, 2017), and their limitations as ventures inserted in the solidarity economy. The methodological proposal presented here follows the qualitative method. As a data collection technique, semi-structured interviews were carried out with 12 presidents of the collectors' associations and a few associates who participated in the founding process, totaling 16 interviewees. For data evaluation, content analysis was used. The results indicate that local policies stimulated the foundation of a significant number of associations in the city of Chapecó and the support received by these enterprises, by the municipality, was stimulated by the advances brought by the PNRS. These enterprises are limited as a solidarity-based economy, as despite guaranteeing work and income for these recycling professionals, they maintained the precarious nature that still persists in the activity of garbage collection, which translated into the lack of labor rights, improvement in income, and working conditions.

Keywords: public policy; association of collectors of recyclable materials; Chapecó/SC; solidarity economy.

RESUMO: O objetivo deste artigo foi analisar como as políticas locais e a Política Nacional de Resíduos Sólidos (PNRS) influenciaram no processo de constituição das associações de catadores de materiais recicláveis em Chapecó/SC, tornando o município um caso atípico no cenário nacional com elevado número de associações e associados. A análise foi realizada desde o fechamento do lixão do município, no ano de 1999, até 2022. Procurou-se também analisar o grau de eficiência dessas instituições, com base nas planilhas do Instituto de Pesquisa Econômica Aplicada (IPEA, 2017) e suas limitações enquanto empreendimentos inseridos na economia solidária. A proposta metodológica aqui apresentada segue a orientação qualitativa e, como técnica de coleta de dados, utilizou-se entrevista semiestruturada com 12 presidentes das associações de catadores e alguns associados que participaram do processo de fundação, totalizando 16 entrevistados. Para avaliação dos dados, utilizou-se a análise de conteúdo. Os resultados apontam que as políticas locais estimularam a fundação de um número expressivo de associações na cidade de Chapecó e o apoio recebido por esses empreendimentos, por parte da municipalidade, foi estimulado pelos avanços trazidos pela PNRS. Esses empreendimentos apresentam limites enquanto economia solidária, pois, apesar de garantir trabalho e renda para esses profissionais da reciclagem, mantiveram o caráter precário que ainda persiste na atividade da catação, traduzido pela falta de direitos trabalhistas, melhoria de renda e condições de trabalho.

Palavras-chave: política pública; associação de catadores de materiais recicláveis; Chapecó/SC; economia solidária.

1. Introduction

In Brazil, one of the fundamental players involved in collecting and separating materials destined for the recycling industry is the collectors of recyclable materials. About 90% of all recycled material that reaches the industry comes from them (IPEA, 2017; Sousa *et al*., 2019). Collectors of recyclable materials are precariously inserted in the recycling chain, and recycling industries receive the highest profits (Severi, 2014; Sousa *et al*., 2019).

In this context, in order to consider the issue of integrated solid waste management in the country, in 2010, after two decades of discussions in the National Congress, Federal Law no. 12.305, came into force, instituting the National Solid Waste Policy (*Política Nacional de Resíduos Sólidos* - PNRS). The PNRS reinforced the social aspect of recycling, pointing out collectors of recyclable materials as priority partners of selective waste collection, contributing to fighting social inequalities (Brazil, 2010).

The PNRS is a legal framework for public administrations to draft the Integrated Solid Waste Management Plan (*Plano de Gestão Integrada de Resíduos Sólidos* - PGIRS), close dumps[1] and controlled landfills,[2] with policies to include workers in these spaces and, consequently, encouraging city administrations to create and develop associations and cooperatives of collectors of recyclable materials (Baptista, 2015; Severo & Guimarães, 2020). The PNRS represented a socio-environmental alternative for collectors of recyclable materials (CMR) who worked and lived around these areas, allowing to reincorporate these workers into the workforce (Bastos, 2013; Pitano & Noal, 2020). Despite this,

[1] Dump: inadequate method to dispose of solid waste, characterized by dropping of the material onto the soil, with no environment or public health protective measures (Vilhena, 2018).

[2] Controlled landfill: method of disposal of solid waste that uses some engineering principles but with no soil waterproofing or biogas or percolating system (Vilhena, 2018).

many challenges still need to be overcome for the work of CMRs to be effectively recognized and valued (Bastos, 2013; Pisano *et al.*, 2022).

Social and economic enterprises created and maintained by low-income people are governed more by solidarity than by competition. In this sense, cooperatives and associations of collectors of recyclable materials are part of the solidarity economy (SE). The main difference between the capitalist and solidarity economies is how companies are managed. In a capitalist company, a hetero-management approach is used, i.e., hierarchical management formed by successive levels of authority (Singer, 2013). Whereas a solidarity company is managed democratically, using the self-management approach. In this way, orders and instructions must flow bottom-up, while information and demands flow top-down, and the members' assembly is the greatest authority (Singer, 2013).

Since the 1980s and 1990s, as a result of the economic recession that generated structural unemployment, several types of experiences emerged supported by churches, non-governmental organizations (NGOs), and government agencies (França Filho & Laville, 2004; Singer, 2013; Araújo, 2014). The Technological Incubators of Popular Cooperatives (*Incubadoras Tecnológicas de Cooperativas Populares* - ITCPs) participated in this process[3], providing technical, logistical, and legal support and training in cooperativism and solidarity economy, making these self-managed enterprises possible (Singer, 2013), in this case, cooperatives and associations of collectors of recyclable materials. Thus, this study presents the following issue: How have the local public policies and the National Solid Waste Policy influenced the process of formation of associations of collectors of recyclable materials in the city of Chapeco/SC, making this municipality an atypical case in the national scenario, with a high number of associations and associated CMR, considering cities with 200-300 thousand inhabitants?

The time frame refers to the period from 1999 to 2022, which corresponds to the closure of the municipal dump, which took place in 1999, the creation of local policies in 2003 and 2005, the deployment of PNRS in 2010, and the subsequent period up to the data collection in 2022. In addition to analyzing the public policies and the history of how these associations were created, we sought to understand their level of efficiency, based on the study by Damásio (2010) and IPEA (2017), as well as their limitations as SE enterprises. Therefore, based on theorists such as França Filho & Laville (2004) and Singer (2013), we analyzed the limitations and contradictions contained in these solidarity economy enterprises.

2. Literature review

2.1. The PNRS and the recognition of a class of workers: the CMR

The first initiatives to define legal guidelines related to the issue of solid waste emerged in the late 1980s (Nascimento Neto & Moreira, 2010). Discussions to create a National Solid Waste Policy started in the Federal Senate, with Senate Bill (PLS) No. 354, of 1989 (Fagliari, 2017). PLS No. 354 was

[3] ITCPs: university organizations, multidisciplinary, integrated by teachers, undergraduate and graduate students and employees, who serve community groups who wish to work and produce together, based on the SE principle (Singer, 2013).

submitted to the House of Representatives, where Bill No. 203, of 1991, was created, regulating the packaging, collection, processing, transportation, and disposal of medical waste; that was the starting point for Law No. 12.305, of 2010 (Fagliari, 2017; Silva *et al*., 2017).

The central issue that hindered the approval process of PNRS was the lack of consensus between government, civil society, and business sector regarding the post-consumer accountability model to be adopted in the country, i.e., the definition of attributions of manufacturers, importers, distributors, consumers, and public urban cleaning services for the environmental management of waste produced to minimize the environmental impacts from product life cycles (Nascimento Neto & Moreira, 2010).

In this process, the participation of the Waste and Citizenship Forum (*Fórum Lixo e Cidadania*) and the Movement of Collectors of Recyclable Materials (*Movimento dos Catadores*) was of vital importance, influencing decisively PNRS issues related to this class of workers. Some events were key to creating the new policy:

(i) the creation, in 1998, of the Waste and Citizenship Forum, with the campaign "Children in the Trash, Never Again";

(ii) In 1999, the I National Meeting of Paper Waste Collectors (*Encontro Nacional do Catadores de Papel*) was held, and, in 2001, the I National Congress of Collectors of Recyclable Materials (*Congresso Nacional dos Catadores de Materiais Recicláveis*), initial frameworks for the formation of the National Movement of Collectors of Recyclable Materials (*Movimento Nacional dos Catadores de Materiais Recicláveis* - MNCR) and to raise awareness of the importance of selective waste collection that includes collectors of recyclable materials;

(iii) In 2003, the I Latin American Congress of Collectors of Recyclable Materials (*Congresso Latino-Americano de Catadores*) was held to strengthen and organize the class of workers and pressure administrators for public policies (Yagi *et al*., 2012; Fagliari, 2017).

In this context, only in August 2010, after two decades in the National Congress, Federal Law No. 12,305 entered into force, instituting the PNRS, one of the frameworks of environmental management in Brazil. Before that, the lack of a disciplinary regulation on the disposal of solid waste generated legal uncertainty and environmental impacts (Silveira, 2019).

One of the principles of the PNRS is the shared responsibility between government, private sector, and population over the life cycle of manufactured products, encouraging their return to the industries after consumption (Brazil, 2010). According to the new law, it is up to municipal governments to adopt procedures for integrated waste management, based on solutions for waste recycling, composting, and disposal in landfills[4] (Brazil, 2010). Another important point of the PNRS is that it encourages the inclusion of collectors of recyclable materials in this process as a way to solve social inequalities. Its Article 36 states:

> [...] The public urban cleaning and solid waste management services will prioritize the organization and

[4] Landfill: adequate method of disposal of solid waste that follows engineering criteria and in which the soil is impermeable, with percolating and biogas treatment, and waste is confined and covered with inert material (Vilhena, 2018).

> operation of cooperatives or other forms of association of collectors of recyclable materials formed by low-income individuals, as well as their hiring (Brazil, 2010, p. 32).

In this sense, the number of collective CMR organizations throughout the country increased after the law went into force (Severo & Guimarães, 2020). The PNRS is considered a pioneering initiative in Latin America and the Caribbean for promoting the inclusion of CMR in the provision of selective waste collection and reverse logistics services. The Brazilian experience inspired eight countries to adopt the principle of shared responsibility, including CMR in the recycling chain (Pisano *et al*., 2022).

The recognition of collectors of recyclable materials as one of the players in the integrated solid waste management system, as presented in the text of the law, is the result of years of mobilization by this class of workers, which led to an urgent public debate regarding the issues of waste, citizenship, labor, and income generation and, finally, environmental protection (MNCR, 2015; Wirth & Oliveira, 2016). Another important milestone in this process was the recognition of the profession in the Brazilian Code of Occupations, in 2002. However, it is how the policy is deployed that will determine whether, in fact, these subjects will take on an effective role in the process (Wirth & Oliveira, 2016).

Research presents the low quality of selective waste collection provided by city governments (Mazzarino & Silva, 2013; Bastos & Araújor, 2015). Despite this, environmental awareness is present in the discourses of collectors of recyclable materials, who recognize themselves as environmental agents and, through their work, contribute to improving the environment (Sousa *et al.*, 2019; Silva *et al*., 2020; Rode *et al.*, 2021).

Another issue experienced by collectors of recyclable materials is having to deal with the negative perception of the community and the difficulty of working on the streets, as well as the hygienist approach of the municipalities, which put their only survival strategy at risk by forbidding the work of CMR throughout the streets of the city (Rodrigues & Ichikawa, 2015; Sousa *et al*., 2019).

One goal addressed in Law No. 12.305 was the closure of dumps and the treatment of solid waste. The deadlines established by the PNRS are as follows:

(i) By August 2012, States and Municipalities must submit their Solid Waste Management Plans;

(ii) by August 2014, all dumps must be closed and only landfills can receive waste, which did not occur.

In this sense, in July 2020, the Senate approved a framework for Basic Sanitation, Law No. 14.026, which determined that irregular landfills must be closed by 2024. According to the new framework, the deadline for all capitals and metropolitan regions to close dumps was August 2021; municipalities with over 100 thousand inhabitants had until August 2022 and, finally, by 2024, municipalities with less than 100 thousand inhabitants must close all activities of dumps and controlled landfills (Barreto, 2020).

Although this segment of SE related to recycling has been fighting for their cause for four decades, their level of work organization and structuring is at a very expressive level of instability (IPEA, 2017; Sousa *et al*., 2019; Pisano *et al*., 2022). The

precariousness of work is linked to the issue of autonomy, since these organizations bring together, in large part, low-income people who do not have the financial resources to invest in the enterprise (Araújo, 2014).

Research points to the difficulty of these workers in understanding the concept of collective work because membership culture is not incorporated into the group members. The members refer to the association as if the institution had an "owner", and there is confusion between the concept of board and owners, contrary to the principles of self-management (Rode *et al*., 2021). Despite this, it is undeniable that these initiatives, although fragile, have an emancipatory potential for these workers, such as their socioeconomic inclusion, increased self-esteem, and improved quality of life (Silva, 2015).

Abramovay *et al*. (2013) bring to the debate the precariousness linked to the income and living conditions of the professionals who dedicate themselves to this part of the recycling chain. For the author, one of the solutions to this issue would be the fulfillment of the obligation, determined in PNRS, of the private sector to be responsible for reverse logistics, which would be expressed in a payment to collectors of recyclable materials for the environmental service provided, since there is no economic viability only from the sale of recyclable material (MNCR, 2015; ANCAT, 2020).

It is observed, in the case of cooperatives and associations of collectors of recyclable materials, that these enterprises have a very restricted character in relation to the material resources mobilized for their constitution. Since these spaces operate in precarious conditions, with a low level of internal structuring and external articulation, the great challenge of the SE, in these groups, is to overcome "[...] the plan of a simple reproduction to achieve that of an expanded reproduction of life in society [...]" (França Filho & Laville, 2004, p. 180), that is, to improve the living and working conditions of these recycling professionals, such as through increased income and labor rights.

3. Materials and methods

3.1. Area of study

The municipality of Chapecó is located in the State of Santa Catarina, in the southern region of Brazil. Created as a municipality on August 25, 1917, it had its economic and population growth intensified in the 1950s as a direct result of the agro-industry. With an estimated population of 227,587 thousand inhabitants (IBGE, 2020), of this total, 91.6% are in the urban area.

Regarding waste management in the municipality of Chapecó, was was disposed of in a dump, which was located in the neighborhood of Parque das Palmeiras. This irregular dump was deactivated in the late 1990s, undergoing a process of closing and remediation of the site. Subsequently, in 2000, the landfill in the rural perimeter, at Sede Trentin, was opened. Due to the end of its useful life, its activities were interrupted in 2009. Currently, the solid waste of Chapecó is disposed of in the landfill of the Tucano company, located in the municipality of Saudades/SC (Leite, 2009).

After the city dump was closed, on July 7, 2003, Municipal Law No. 4.582 went into force, Regulating the Circulation of Animal Traction Vehicles, prohibiting the circulation of animal

traction carts and human traction carts[5] on the city's central streets during commercial hours. This law was amended and replaced by Law No. 4.898, of November 6, 2005, which maintains the prohibition and imposes several restrictions for these types of equipment to circulate (Chapecó, 2005). Law No. 4.898 has now restricted the access of collectors of recyclable material thrown on the streets by the population and local commerce.

The PGIRS of the municipality of Chapecó was established by Municipal Law No. 6.758, on September 2, 2015, to meet the requirements of the National Solid Waste Policy (Chapecó, 2015). According to this document, the city had a total of 526 collectors of recyclable materials, of which approximately 109 belonged to six associations of collectors registered under the Department of Urban Services and Infrastructure. One of these associations had six nuclei/spaces, with a management process different from the others. These institutions screened 100% of the material collected by the company responsible for selective waste collection, TOS – Obras e Serviços (Chapecó, 2015).

With the change in the city administration of Chapecó in 2021, the Chapecó Clean City – Sustainable City Program (*Programa Chapecó Cidade Limpa – Cidade Sustentável*) went into force on March 25 of the same year, instituted by Municipal Law No. 6.758. Article 1, § 1º, provides for the non-generation, reduction, reuse, recycling, and processing of solid residues and the environmentally appropriate disposal of waste. Article 3 defines "the inclusion of collectors of recyclable materials" as one of its goals (Chapecó, 2021).

Table 1 shows data collected from the Brazilian Institute of Geography and Statistics (IBGE, 2020) and the Recycling Yearbook (ANCAT, 2020). Of the 60 cities with populations between 200 and 300 thousand inhabitants, 53 had between zero and four associations; in this context, the following municipalities stood out (Table 1).

TABLE 1 – Cities between 200 and 300 thousand inhabitants, # of associations, and # of members.

State	City	# of inhabitants	Associations	Members
RS	Nova Hamburgo	247,032	5	89
RJ	Volta Redonda	273,988	6	74
SC	São José	250,181	6	120
PR	Colombo	246,540	7	10
RS	Passo Fundo	204,722	7	70
RS	São Leopoldo	238,648	11	100
SC	Chapecó	224,013	14	*121/109

LEGEND: * This figure varies due to the changing nature of these professionals (Dias, 2010).

SOURCE: prepared by the authors based on IBGE (2020) and ANCAT (2020).

[5] Human traction carts: vehicle developed to move by human traction; it has a compartment with adequate dimensions to accommodate recyclable materials collected from public streets (Bruno, 2006).

3.2. Data collection and analysis

The methodological proposal presented herein follows the qualitative approach and semi-structured interviews were used for data collection. Of the 14 existing associations in the city, two did not agree to participate in the research. Thus, semi-structured interviews were carried out with the presidents of the 12 associations of collectors and with some members who participated in the process of creating these solidarity enterprises, totaling 16 respondents. To maintain the confidentiality of the interviewees, they identified by the acronym "collector of recyclable materials" (CMRF or CMRM – female or male) and a number. The criteria for assessing the total number of CMR in the solidarity enterprises was the number of members over 18 years old and who had six months or more of activity in the association, because the turnover in these groups is considerable (Dias, 2010).

To assess the qualitative data, we used content analysis to analyze the speech of the interviewees, seeking to achieve an in-depth interpretation (Gomes, 2013). Table 2 shows the names of the institutions that were part of this study, their year of foundation, the number of members with more than six months in the institution, and the profile of the interviewees.

To assess the level of efficiency of the associations, the data of item "Characteristics" of Table 3 were adapted to the reality of the CMR associations of Chapecó/SC, based on the work by Damasio (2010) and IPEA (2017), which assessed a series of socioeconomic variables in 83 recycling solidarity enterprises in all major Brazilian regions[6], with the exception of the North region, between 2006 and 2009. According to this study, the production units were different in levels of efficiency, as shown in Table 3.

The level of efficiency of the associations, their constitution process, and their limitations were assessed as SE enterprises. In this sense, semi-structured interviews were conducted with the presidents about what prompted the foundation of the association, its infrastructure (owned or rented warehouse), whether it had any equipment (press, forklift, scale, transportation), capacity for scaling and administration, volume produced, and partnerships. The collected data were separated into tables and analyzed. In line with Resolution 466/2012 of the National Health Council, which regulates ethical issues in research involving human beings, this study was registered in the Brazil Platform and in the Research Ethics Committee (CEP) of the *Universidade Comunitária da Região de Chapecó* (Unochapecó), and approved by opinion No 121967/2021.

[6] It is important to highlight that this research is not a census regarding the collective enterprises of collectors, it is a non-probabilistic sample from the national territory (IPEA, 2017) and, in this sense, some characteristics about their level of efficiency and productivity may differ from the present study. It is necessary to take into account the large turnover of workers that start and quit the activity (Dias, 2010), which can cause differences in the ton/CMR/month productivity.

TABLE 2 – Name of associations, year of foundation, number of members for over six months, and profile of respondents.

Association/ Name	Year of foundation	Total of members	Profile of respondents	
			ID	Age
BORMANN – Associação de Catadores de Materiais Recicláveis Bormann Limpo	01/09/2016	8	CMRM 01	30
PARQUE DAS PALMEIRAS – Associação de Catadores Parque das Palmeiras	12/03/2017	9	CMRF 12	54
ESPLANADA – Associação de Catadores Esplanada	17/05/2017	14	CMRM 18	56
			CMRM 32	60
ASMAC – Associação de Catadores de Materiais Recicláveis de Chapecó	05/05/2015	7	CMRF23	37
LIDER – Associação dos Catadores de Materiais Recicláveis Lider	20/03/2019	6	CMRM 39	32
VILA BETINHO – Associação de Catadores de Materiais Recicláveis	10/02/2017	24	CMRF 45	33
			CMRM 64	38
ASMAVI – Associação de Catadores de Materiais Recicláveis Nova Vida	07/09/2011	5	CMRF 69	57
			CMRF 70	48
ARMARLUZ – Associação de Catadores de Materiais Recicláveis Raio de Luz	05/10/2009	6	CMRM 79	72
ACRAN – Associação de Catadores de Materiais Recicláveis Amigos da Natureza	20/02/2015	14	CMRM 80	49
ESPERANÇA – Associação de Catadores de Materiais Recicláveis Esperança	05/02/2019	10	CMRM 94	63
			CMRM 98	41
ARSOL – Associação de Catadores de Materiais Recicláveis Solidário de Chapecó	14/06/2014	8	CMRM 104	41
ROTA NA RECICLAGEM – Associação de Catadores de Materiais Recicláveis na Rota da Reciclagem	17/05/2016	9	CMRM 114	23
*ECOVIDA – Associação de Reciclagem Ambiental	----	----	----	----
** ACMAR – Associação dos Catadores de Chapecó	----	----	----	----
Total of members		120		

LEGEND: * The president of ECOVIDA decided not to participate in the survey. **The president of *Associação dos Catadores de Chapecó* (ACMARC), after the beginning of the survey, decided not to participate.

SOURCE: prepared by the authors.

TABLE 3 – Level of efficiency of the association.

Table to assess the level of efficiency of the association		
Institution name:	**Person in charge:**	**Date:**
Level of efficiency	***Characteristics**	**Average productivity**
Level 1: High efficiency	( ) association; ( ) press; ( ) scale; ( ) PPE; ( ) transport – carts or truck; ( ) own warehouse; ( ) capacity to scale the activity (new collectors); ( ) necessary knowledge to manage the activity that can disseminate and verticalize the production.	Over 1.8t/CMR/month.
Level 2: Average efficiency	( ) association; ( ) scale; ( ) transport (cart); ( ) rented warehouse; ( ) some knowledge about the enterprise.	Between 1.0 and 1.8t/CMR/month.
Level 3: Low efficiency	( ) association; ( ) no equipment; ( ) need financial support to develop the activity; ( ) need training.	Between 0.500t and 1.10t/CMR/month.
Level 4: Very low efficiency	( ) not organized in an association or cooperative; ( ) no equipment; ( ) no workspace; ( ) no knowledge of the activity.	Below 0.55t/CMR/month.

* NOTE: The "Characteristics" column in this table has been adapted.

SOURCE: adapted from the work by Damasio (2010) and IPEA (2017).

4. Results and discussion

4.1. The process of constitution of associations in the city of Chapecó/SC and public policies

As presented, the PNRS provided for the closure of dumps by 2014, and this deadline was extended to 2024. It also provided for the socio-productive inclusion of CMR who worked and lived in these spaces. In this context, the dump in Chapecó was closed in the late 1990s (Leite, 2009), and the CMR, supported by the city government, founded the *Cooperativa de Reciclagem Vida Nova* on May 21, 1999 (Brazil, 2023). This cooperative was located in Rua Anselmo Santa Catarina, No. 177-E, Bom Pastor, which is now the headquarters of the *Associação dos Recicladores Raio de Luz* (ARMALUZ). In the words of the president of the association:

> [...] *It was in 1998 that the Cooperativa Vida Nova was created, with the people who lived in the dump. They worked with recyclable materials in the dump and then had to leave. Then, when José was elected mayor, he created a project for Cooperativa Vida Nova, which took place in this warehouse. And they worked, worked until the cooperative broke* (CMRM. 79, 2022, Chapecó/SC).

In the studies presented by Bastos (2013) and Pitano & Noal (2020), in addition to working in the dumps, many inhabited the surroundings of these spaces. This reality was also part of the daily lives of some CRM families in Chapecó. Later, these people were moved to a plot built by the city government in

the neighborhood of São Pedro. In the interview of this collector, it is possible to perceive the situation of this population who lived in the dump:

> *The houses were inside the dump, from the gate down, at the fence, everything belonged to the dump. We used to build in the dump; the houses were made of wood, canvas, and fiberglass roof tiles, we had no water or power... actually we used lamps, and candles. There people had batteries, so they could have light bulbs. We washed our clothes in the 'sanga'*[7] *and got drinking water from a well* (CMRF. 70, 2022, Chapecó/SC).

Despite the support from the city government, some collectors continued to live near this old dump and, since not all of them were absorbed by Cooperativa de Reciclagem Vida Nova, they started to collect recyclable materials from the city streets using animal traction and human traction carts. This cooperative went bankrupt due to maladministration and its members were dispersed. This is clear in the reports of the workers who participated in this process:

> *I think for about 10 years my parents worked on harvesting mate at Bormann. I think it was in the 1990s that my parents came to Chapecó, so we went to live in the dump. Then, in 99, they closed the dump. Then, they brought us to the São Pedro neighborhood. Then, they opened the cooperative; the cooperative closed and we started collecting recyclable materials from the street. Then they put us here* [in the houses]*, there were no inner walls, there was no bedroom, so we started building.* [...] *They forbade it, we couldn't bring cats, couldn't bring dogs, anything, anything*[...] (CMRF. 70, 2022, Chapecó/SC).

Although the closure of the dump was prior to the implementation of the PNRS, the city government wanted to relocate these workers to the *Cooperativa de Reciclagem Vida Nova*. This action by the city government was the result of social movements in favor of the CMR, and the legalization of the activity carried out by the CMR was the result of years of mobilization of this class of workers (MNCR, 2015; Wirth & Oliveira, 2016). Still according to the report by CMRF. 70, the removal of this group who lived in the dump, despite the difficulties encountered, represented an alternative to improvements in living and working conditions.

After the closure of the dump and bankruptcy of *Cooperativa de Reciclagem Vida Nova*, some of these CMRs started collecting recyclable materials from city streets. As a way to keep these CMRs out of the central streets of the city, the city government created Ordinary Law No. 4.582, which was amended, and Law No. 4.898 (Chapecó, 2005) came into force. This law hindered the activity of collectors of recyclable materials, who could no longer circulate around the city's central streets looking for recyclable materials. This is clear in the story told by one collector: *We starved as a result of the ban, we sold land to buy* food (CMRF. 23, 2022, Chapecó/SC).

Again, we can see that the recognition of CMR is the result of years of mobilization of this class of workers (MNCR, 2015; Wirth & Oliveira, 2016). This historic moment of CRM fighting and mobilization in the national scenario was also observed in the city of Chapecó. There was a movement of city CRM aimed at the city government, demanding the right to continue working in this activity. In this

[7] Sanga: a small spring found on the lot; a small flooded stream with little water (Michaelis, 2022).

sense, an agreement was made between the city government and these workers for the donation of selective waste collection. The collectors of recyclable materials were to organize themselves into associations and cooperatives to subsequently sign the partnership agreement. In the report by this collector, it is possible to notice the situation experienced by these groups: [...] *they forbade us all of the sudden* [...] *and we protested at the city hall, and he invited us to a meeting, and told us to organize ourselves and get the association documents, and wherever the was an association, there was selective waste collection* (CMRF. 69, 2022, Chapecó/SC).

Rodrigues & Ichikawa (2015) and Sousa *et al.* (2019) point out that the hygienist view of city governments threatens the survival strategy of these workers since their circulation around the city streets is prohibited. This fact was key to promoting the creation of associations in this period. Thus, the *Associação dos Trabalhadores no Serviço de Reciclagem e Similares de Chapecó e Região Oeste de Santa Catarina* (Astrarosc) was founded on June 30, 2009 (Brazil, 2023). This association was constituted with six nuclei, distributed throughout several regions of the city. According to the PGIRS of Chapecó, in 2015, the city had six associations of collectors of recyclable materials duly registered under the Department of Urban Services and Infrastructure, and one of these associations had six nuclei/spaces, with a management process different from the others (Chapecó, 2015).

Astrarosc, according to reports, accrued debts that caused its deactivation. This led to these nuclei transforming into "*new associations*". This fact was confirmed by the report of one of the collectors: *The association had an owner, 'L'. Then, the group took over the new association, it was to seek resources because the old association had debts* (CMRM. 98, 2022, Chapecó/SC).

Another point addressed by the collectors that influenced the opening of associations in Chapecó was that the public authorities forbade these professionals from collecting materials and recycling them in their homes. This is evidenced in the statement of the president of the association: [...] *at the time I, my father, wife, and mother worked at home. The city government banned recycling at home and called us to open the association* (CMRM. 39, 2022, Chapecó/SC). Once again, we can note the hygienist approach by the city government, which hindered the survival strategy of these workers (Rodrigues & Ichikawa, 2015; Sousa *et al.*, 2019).

In this context, the *Incubadora Tecnológica de Cooperativas Populares* (ITCP), maintained by Unochapeco was a supporter of these solidarity projects by organizing the documentation and projects to acquire presses, scales and treadmills. The city also supported these associations of collectors of recyclable materials with land donations, the construction of warehouses, and equipment acquisition/loan. Some associations were supported through projects developed by Treta Pak, in partnership with the *Associação Brasileira de Bebidas* (ABRABE), to purchase equipment and improve warehouses. Other institutions also had the support of MNCR and ANCAT to build warehouses and purchase equipment. Table 4 shows the name of the association of collectors of recyclable materials, whether they belonged to the Astrarosc nucleus, supporters in the constitution process, and motivation for the foundation.

TABLE 4 – Association name, year of foundation, number of members, Astrarosc nucleus, supporters, and motivation.

Association name	Astrarosc Association nucleus	Supporters				Motivation
		ITCP –Unochapecó	City government - Chapecó	Tetra Pak and Abrabe	ANCAT and MNCR	
Bormann Limpo	--------	Documents	Rent, water, and power	--------	--------	Lack of service in Bormann and the activity of harvesting mate was difficult. Invitation by the city government
Parque das Palmeira	Astrarosc nucleus	Documents	Donation of land, eucalyptus posts and roof tiles, press, scale, payment of water and power utilities	--------	--------	Closure of the dump and Law n.º4.898
Esplanada	Astrarosc nucleus	Documentation, press, calculation of the warehouse	Donation of land, scale, construction of the warehouse, payment of water and power utilities	--------	--------	Law n.º 4.898
ASMAC	--------	Documents	Press, rent, payment of water and power utilities	Scale and treadmill	--------	Law n.º 4.898
Lider	--------	Documents	Payment of rent, water, and power utilities	Fan, scale, and notebook	--------	Prohibition of working at home
Vila Betinho	Astrarosc nucleus	Documentation and PPE	Donation of land, construction of the warehouse, press, payment of water and power utilities		Forklift and scale	Law n.º 4.898
ASMAVI	--------	Documentation, press, and scale	Payment of water and light utilities – Agreement between the association of CMR, Verde Vida, and the city government for the land use section	Construction of the warehouse cover	Warehouse floor and new scale	Law n.º 4.898

ARMALUZ	--------	Documentation, acquisition of press, scale, and treadmill	Payment of water and light utilities – Agreement between the association of CMR, Verde Vida, and the city government for the land use section			Law n.º 4.898
ACRAN	Astrarosc nucleus	Didn't know how to answer	Land donation		Construction of the warehouse	Didn't know how to answer
Esperança	Astrarosc nucleus	Documents	Donation of the land and construction of the warehouse			Closure due to debts and the need for organization to get support
ARSOL	Astrarosc nucleus	Documents	Donation of land in the rural area of the city		Construction of the warehouse, treadmill, vertical press, 2 trucks, and scale	Lack of union and improvement of activities
*Recycling Route	--------		--------	--------	--------	Difficulty in disposing of waste

LEGEND: *This institution differs from the others due to a lack of supporters.

SOURCE: prepared by the authors, based on interviews with their managers.

Based on Table 4, what motivated the creation of associations of collectors of recyclable materials in the city of Chapecó was Law No. 4.898, which prohibited the movement of animal traction and human traction carts around the city's central streets. The historical context in Brazil, with the approval of PNRS, in August 2010, naming CMRs as the priority partners for selective waste collection, reinforces the partnerships obtained by these solidarity enterprises during the period of its constitution. But, as was reported, this partnership with the city government only existed effectively after the class of workers claimed their right to continue working in the recycling activity.

Furthermore, the ITCP of Unochapecó is featured as a great partner in the drafting of the documentation of these institutions, since it was present providing legal support for 10 of the 12 associations surveyed. Projects developed by the institution for the purchase of presses, scales, and treadmills were found in four institutions. The city government of

Chapecó also appears as a great supporter, donating land to five associations, equipment to two associations, building warehouses for two associations, and paying for maintenance expenses: rent for three associations and water/power for five associations. Only one association had no support from government authorities, the ITCP of Unochapecó, as well as MNCR or other supporters. The motivation for the constitution differs from the other institutions studied, which suggests an individual process, or of a group with different objectives from the others.

Since the 1990s, several experiences emerged supported by churches, NGOs, government agencies, and ITCPs (França Filho & Laville, 2004; Singer, 2013; Araújo, 2014). This political and social landscape is confirmed in the process experienced in Chapecó, with ITCP/Unochapecó as great supporters. The support received by these institutions, from the city government, was effective after 2010, showing the effects the PNRS had on the process of structuring these enterprises because the new law placed the CMR as priority partners in the integrated solid waste management system.

After the implementation of the PNRS, there was an increase in the number of collective organizations of CRM throughout the country (Severo & Guimarães, 2020). However, this still does not explain the atypical case found in Chapecó. The large number of associations in this municipality was possibily due to the prohibition of animal traction and human traction carts around the central streets of the city, as established by Law No. 4898. Another important point that must be taken into account was Astrarosc, with its six nuclei, which, after its bankruptcy, fragmented the system, contributing to this atypical scenario.

4.2. Solidarity enterprises and their level of efficiency

Since there are many associations with different constitution and structuring processes, their level of efficiency, presented in Table 5, varies according to the support received, the political, technical, and administrative capacity of their leaders, and the degree of involvement of their members.

Table 5 shows that four CMR associations are considered low efficiency, six of average efficiency, and only one of high efficiency, based on the study by Damasio (2010) and IPEA (2017). The monthly yields provided by the managers of the associations, marked with asterisks in Table 5, may be overestimated, due to the lack of control of productivity and turnover in the group. Only the *Associação de Catadores de Materiais Recicláveis Rota na Reciclagem* is not featured because it was not possible to classify it due to the volume produced (160t/month), type of management, and equipment owned by the institution.

Among the associations surveyed, *Associação de Catadores Parque da Palmeiras*, considered of low efficiency, is the most in need. This association does not have a warehouse, only an area provided by the city government, with no paving and with an improvised cover to protect the press, scale, materials worked by the group, and a toilet connected to a rudimentary cesspit[8].

[8] Rudimentary cesspit: characterized by wells or holes excavated in the soil, with no or partial impermeabilization, into which raw sewage is disposed of. Its related environmental impacts are soil and groundwater contamination (Figueiredo *et al*., 2019).

TABLE 5 – Level of efficiency, characteristics, name of the CMR Association, and its monthly production.

Level of efficiency	Characteristics	Name of the associations	Volume in tons produced/ month
High efficiency	Formally constituted groups, with press, scales, carts, and their own warehouse, and capacity to scale, with high knowledge of the enterprise; PPE; production above 1.8t/collector/ month.	Arsol	150t to 160t/month: 11.5 t/CMR/month
Average efficiency	Legally constituted groups, but with a lack of resources to acquire equipment and/or warehouse, with some knowledge about the enterprise, requiring training; production between 1.0 and 1.8tk/collector/month.	Bormann Limpo	10t/month –1.25t/CMR/month
		ASMAC	*60t/month – 8.5t/CMR/month
		Lider	*30t/month – 5.0t/CMR/month
		Vila Betinho	45t/month – 1.8t/CMR/month
		ASMAVI	20t/month – 1.8t/CMR/month
		ARMALUZ	11t/month – 1.8t/CMR/month
Low efficiency	Formally organized groups, with little equipment, some owned by members, need technical and financial support; production between 0.50 and 1.0t/ collector/month.	Parque das Palmeiras	** 150t/month – 13.6kg/CMR/ month
		Esplanada	*30t/month – 2.1t/CMR/month
		ACRAN	---
		Esperança	*40t/month – 4.0t/CMR/month
Very low efficiency	Unorganized groups, with no equipment and working in extreme precariousness, need financial support for the complete assembly of the infrastructure; and production of 550/kg/ collector/month.		

NOTE: Associação Arsol has a high production because it buys recyclable material from small middle agents, associations, and collection from donor companies. It was not possible to classify Associação Rota na Reciclagem due to the volume produced, type of management, and equipment owned by the institution.

LEGEND: *Monthly productivity was informed by the president of the CMR association. These may be overestimated figures due to a lack of control of production and turnover in the group. ** This production does not match the reality informed by the president of the association.

SOURCE: prepared by the authors based on Damásio (2010) and IPEA (2017).

Although CRMs have been fighting for their cause for four decades, the level of work organization and structuring of these SE is at a very expressive level of instability (IPEA, 2017; Sousa *et al*., 2019). Most of these organizations are made up of low-income people who do not have the financial resources to invest in the enterprise (Araújo, 2014). This is the reality of the associations in the city of Chapecó, with 10 associations with a degree of efficiency between average and low, with deficiencies that prevent their autonomy as SE enterprises.

Whereas Associação de Catadores de Materiais Recicláveis Solidário de Chapecó (ARSOL), with a high level of efficiency, has its own wa-

rehouse, treadmill, vertical press, horizontal press (borrowed from a commercial partner), a forklift (borrowed from an associate), scale, and two trucks with a capacity of five to six tons. They control the input and output of the materials, have the capacity to scale, develop technology for the use of PP[9] , and aggregate value to the materials by grinding (PVC and PP[10]), allowing them to improve the resale value. It has a high monthly productivity because it buys material from smaller enterprises, and associations, and collects recyclable material from donor companies in the city.

To meet the objectives of the PNRS, the city government provides selective waste collection for all associations, which arrives in compactor trucks and box trucks. According to the waste pickers' report, the material that arrives in the compactor trucks is of very poor quality and can reach a waste index of 80% of the material. On the other hand, the material that arrives in box trucks has a waste index of around 30%. This is clear in the words of these collectors of recyclable materials: *I have already given up the compressed one, it's a lot of garbage. It gives about 30% of good material, lots of garbage. The box truck used to yield 90% good materials; now, it's 70% good and 30% garbage* (CMRM.32, 2022, Chapecó/SC). *We received materials from box trucks. Compactor trucks don't enter here, they're 70% garbage and 30% recycling. Box trucks are more regulated, 70% is recycling and 30% is garbage* (CMRM. 98, 2022, Chapecó/SC).

As Mazzarino & Silva (2013) and Bastos & Araujo (2015) point out, the low quality of the selective waste collection made available by the city government makes the work of these CMRs difficult. In some associations, collectors turn over these materials with a hoe, mining the "recyclables". To exemplify, we have the testimony of this collector: [...] *we are removing waste from the streets to make the environment healthier, if each one did their part...* (CMRM. 64, 2022, Chapecó/SC). We can see in the testimony of this CMR the recognition of the environmental importance of this activity, also present in the studies by Sousa *et al.* (2019), Silva *et al*. (2020) e Rode *et al.* (2021), in which CRM identify themselves as environmental agents.

Despite this, the lack of awareness among the population on how to properly separate waste from recyclable materials is perceived by this group of workers (Mazzarino & Silva, 2013; Bastos & Araújor, 2015). Despite the low quality of the selective waste collection, the maintenance of donations is due to the city government's concern of being in compliance with the PNRS, which places CMR in cooperatives or associations as major partners in this process.

Regarding the internal structure of service and administration, considering these as SE enterprises, in five associations of collectors of recyclable materials studied, the spaces were divided into "*boxes*" (the name given by the collectors for the internal divisions in the warehouses), in which groups of people or families worked. In these institutions, the production was sold individually, that is, each box had its buyer and sold the material according to its storage capacity or need for income. In one of the institutions, although there were no "boxes", the production was also sold separately. Whereas

[9] Material found in car bumpers. According to the vice-president, the material is crushed, placed in a water tank and, subsequently, salt is added. The material that floats becomes decontaminated and suitable for use by the recycling industry (CMRM. 104, 2022, Chapecó/SC).

[10] PVC – polyvinyl chloride and PP – polypropylene: these are plastics called thermoplastic, widely used because they can be reprocessed several times (Vilhena, 2018).

in 5 associations of collectors, the production was sold as a group and the income shared between the members, taking into account the number of days worked. Only in 1 institution, the members rented the box and sold the production to the president of the association (this institution has no support from the city government, receiving only the selective waste collection).

It is worth mentioning that the associations rented spaces *(*boxes) for the associated waste collectors, but this practice is prohibited by the city government, which is a great supporter of these institutions. In this sense, the government authorities directly interfered in the management of some of these solidarity enterprises, prohibiting the sale and lease of the boxes and, if they were empty, it would be up to the public authorities to indicate a CMR to occupy the space. This is clear in the words of these members:

> *In the past, we would hold a meeting and vote if we agreed or not.* [...] *Now with Fulano things have changed, it's in the articles of incorporation; he is the one who decides who gets the box, so he takes the people and puts them there. So it's not up to us anymore, right?... We're out of these things*[...] *And that's not right. They bring people who we can't even talk to; how could we, if we have never seen the person* [...] (CMRF. 45, 2022, Chapecó/SC).

From the presented, it is possible to see the limitations of these solidarity enterprises, considering the issue of self-management, as defined by Singer (2013). Five of these associations did not work in groups, they were families or people who used the same space to carry out recycling activities, but individually, which reduced the income of each member[11]. One association had an administrative process that was closer to a hetero-management approach; it rented boxes and bought material from its associates and other associations, i.e., this enterprise could not be considered part of the solidarity economy.

Some of them had leaders who considered themselves "owners of the enterprise", being called "boss", which again contradicted the spirit of solidarity economy. This data corroborates the studies by Rode *et al.* (2021), in which collectors of recyclable materials had difficulty understanding the meaning of collective work, referring to the association as if it had an owner.

Because they were associations, their members did not have any labor guarantee, they received only by the volume produced individually in some cases and collectively in others. These elements of the research confirm the studies by Abramovay *et al*. (2013), MNCR (2015), and ANCAT (2020), since there is no economic viability only from the sale of recyclable materials, the solution would be to put the private sector responsible for reverse logistics by paying the CMR for the environmental service provided, thus improving the working conditions and income of these workers.

This was the scenario that translated the limitations of these solidarity enterprises, with their members with no labor rights, income restricted to the volume of material sold, and, finally, precarious working conditions.

5. Final Considerations

We sought to present, based on the data collected about the city of Chapecó, which is considered an atypical case in the national scenario due to the

[11] The group sale allows the increase of the value paid per tonnage, that is, allowing greater gains along the recycling chain (IPEA, 2017).

high number of CRM associations and members, how local policies and PNRS, over the past two decades, influenced the process of constitution of CMR associations. We sought to analyze the level of efficiency of these institutions based on the study of Damásio (2010) and IPEA (2017) and their limitations as SE enterprises.

Thus, it was possible to observe that municipal law No. 4.898 (Chapecó, 2005) stimulated the foundation of these enterprises because it prohibited the circulation of CMR in their animal traction and human traction carts in the central streets of the city. The Astrarosc foundation, in 2009, with its six nuclei and five other associations formed during this period, as presented in the PGIRS (Chapec[o, 2015), fragmented the system after the first went bankrupt. This made the municipality an atypical case in the national context, considering the number of associations and members, compared to its population volume.

The structuring of these enterprises, with the support of the city government and the donation of selective waste collection, was a direct effect of the implementation of the PNRS, which places collectors of recyclable materials in cooperatives and associations as priority partners of "those in charge of public services of cleaning and management of solid waste" (Brazil, 2010, p. 32).

As for the level of efficiency of these solidarity enterprises, it is noticed the lack of structure in the institutions studied. Only one has a high level of efficiency, four are considered low efficiency, and six of average efficiency, based on the study by Damásio (2010) and IPEA (2017). This shows that, despite the support received, these solidarity enterprises have a long way to go to effectively emancipate their associates because they still have many shortcomings and structural problems. It was not possible to classify the level of efficiency of Associação Rota na Reciclagem due to the volume produced, type of management, and equipment that comprise the institution.

In terms of solidarity economy, these enterprises are limited in the topic of self-management, which involves the difficulty of working as a group, leaders who consider themselves "owners of the enterprise", and those who buy from smaller associations aiming at making a profit, which goes against the spirit of solidarity economy. In all of them, the members have no labor rights, remuneration is restricted to the volume produced and working conditions are precarious.

In short, the study presented the preponderant role of local policies, which stimulated the foundation of an expressive number of associations in the city of Chapecó, and the support received from the city government to structure these spaces, stimulated by PNRS. It brought the limitations of these solidarity economy enterprises, which, on the one hand, allowed to guarantee work and income for many recycling professionals; but, on the other hand, maintained the precarious nature that still persists in this activity, translated into a lack of labor rights, improvement of income, and working conditions.

Having achieved its objective, the study presents contributions to other municipalities on how the debate with all the players involved in the solid waste management system is important, avoiding distorted scenarios, and allowing to achieve a more efficient management of the system. Regarding the academic and scientific contributions, we consider the work was able to collaborate on the topic related to the CMR and their associations, bringing to the debate the limitations present in these institutions, as SE enterprises.

Finally, it is worth noting that the solution to such a complex issue requires specific solutions. In some cases, the solution would be the merger of some institutions with a limited number of members, which is not a simple task, because the loss of autonomy of their leaderships may interrupt the process. The continued training of the groups is urgent, and this would enable the transformation of these collectives into cooperatives, bringing, with this, some labor rights. This task involves the government authorities, financial support, and trained technicians willing to transform a reality that is part of the national scenario, marked by the exclusion of many groups from the social welfare of the recycling chain.

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