


The influence of public policies on municipal management of solid waste recycling: A systematic review

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ABSTRACT

This systematic study of the literature aims to demonstrate the state of the art regarding the productions of the administrative niche that deals with environmental public policies and solid waste recycling management. From the systematization, it is possible to delineate the collection on the theme that in recent decades has been treated with more recurrence due to the historical context of consumption and unbridled disposal. This theme, which is problematic in this review, allows us to reflect on the need for effective actions to mitigate the environmental impacts of urban solid waste, arising from uncontrolled production and disposal. Public policies, actions that promote sustainability practices, enable the public-private relationship in order to provide national organizations with the opportunity to promote the proper recycling of their waste, generating profitability from consumption and/or assisting with the correct disposal, becoming an active part in the process of mitigating damage to the environment. Formalized through the National Solid Waste Policy (PNRS), published in 2010, the actions that aim at a balanced environment, such as selective collection and recycling, were systematized in this legislative plan where the importance of the adoption by municipalities of sustainable actions regarding discarded solid waste is emphasized. The PNRS, when achieved, provides benefits as a whole, since it is the balanced environment that provides raw material for moving the economy, and it is necessary to reduce the volumes sent to landfills, extinguish irregular deposition, valorization and reinsertion of waste in the production chain, reduce the need to use natural resources and other measures proposed by this Policy; which must be applied from sustainable municipal management.

Keywords: Solid Waste Recycling, Public Policies, Municipal Management, National Solid Waste Policy.

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INTRODUCTION

The ideal of sustainable municipal management should never be disregarded, for this the need to play our role as citizens who are concerned with sustainable development and a balanced environment, which can be achieved by the power we attribute to the State, since, as provided for in the Constitution of the Federative Republic of Brazil (CRFB), in its first article, by which all power emanates from the people, who exercise it through elected representatives or directly, under the terms of the aforementioned Constitution. In order to guarantee the right to an ecologically balanced environment, one of the measures within the environmental governance process is the recycling of solid waste that the government offers, either directly or in private partnerships.

One of the most serious problems today, when thinking about municipal solid waste management, is the unbridled production of products, which are always discarded, but not always recycled. This unbridled consumption and disposal is also seen as a market strategy, but the price of this economic management is paid with the degradation of the environment. This waste strategy is based on the turnover of production from the increase in the pace of demand, where a certain product is consumed faster and faster, thus having to replace it (ROSSINI, NASPOLINI. 2017).

The United Nations (UN), a relevant international organization, was founded in 1945 to mediate world relations across borders, harmonize the action of nations in the face of common objectives, act for common world development and ensure peace. This organization has instituted as a goal of the Sustainable Development Goals (SDGs) of the UN 2030 Agenda¹³, actions that make this attitude of production rotation unfeasible, discouraging unbridled consumption and consequently making countries adopt a robust management of the problem of solid waste recycling.

In short, this mentality of compulsive buying and disposing is unsustainable, as it drives production, increases the generation of post-consumer solid waste and contributes to the increase in greenhouse gas emissions, which cause drastic climate change (ROSSINI, NASPOLINI. 2017).

It is essential, therefore, to understand the important relationship between the legal scope and the public policies to be carried out by each nation, in view of the intervention of the judiciary in the conformation or application of these public policies. Law also plays a role in shaping the institutions that drive, design, and carry out public policies. It is relevant to theorize this relationship in this way, because it is on the Law that the institutional framework on which a policy operates is based, that is, it is the combination and communication, provided for in the rules, between legislative power; government, through political leadership; and Public Administration, constituting the bureaucratic structure. (BUCCI, 2006, p. 37).

Having highlighted the importance of governance regarding municipal solid waste, it is up to the context to study what are the research productions of this management niche about the problem, which is presented in this production.



CONTEXTUALIZATION OF THE WORK

This article arose from a study that is addressing solid waste recycling in the context of public policy and governance.

The increase in the world's population and the speed with which purchasing power has expanded, combined with advertisements that induce overconsumption and easy online purchase, has resulted in an exponential growth in solid waste stocks worldwide. In Brazil, considering the approval of the regulatory framework that instituted the PNRS, more than ten years ago, recycling practices, reverse logistics, and the level of environmental awareness of the population are still reduced. It is also observed at the municipal level that local legislation and collection networks are not yet well established, despite the fact that in theory there are already adequate technical solutions for an ecologically balanced environment.

It is up to the Public Administration, directly or indirectly through concessions, to govern solid waste recycling services.

There is complexity in the governance of Brazilian cities, it needs to be qualified and, above all, to understand the constituted interests, which are capable of interfering in all stages of the cycle of "public policies". (FONSECA, 2016)

Based on the principle of impersonality, one of those that govern public administration, it is ensured that public administration must serve all citizens, without any type of privilege or discrimination, a challenge that is applied in the context of recycling, since economic niches must be ensured to all, not prioritizing large urban centers and leaving small cities at the mercy of open air dumps or other unhealthy mechanisms for a balanced environment.

In this way, the supposed "unanimity" of "public policies", since it would aim at the aforementioned "common good", conceals, in the so-called "cycle of public policies", its conflictive character regarding the interests in dispute and the vetoes, by different means, coming from social groups that feel, real or imagined, harmed. Such conflicts can take on connotations of a clash of social classes, even though conceptualizing classes and their clashes implies a new analytical effort. (FONSECA, 2016).

In view of this finding, there was an evident need to carry out a systematic review of the literature to investigate the scientific production related to the management of solid waste recycling, at the national level, directed to the electronic collection of the National Association of Graduate Studies and Research in Administration (ANPAD), which has a repository of varied scientific articles.

METHOD

The present work consists of a study by means of a systematic review, with a total or partial qualitative approach, on environmental public policies. This form of research uses the investigation



where a specific question is first formulated to guide the search of the 14 publications, and in this study the research question: "What is the influence of public policies on the municipal management of solid waste?". It seeks to generate knowledge in order to later practical application to solve specific problems that involve interests and truths of a given locality (GERHARDT AND SILVEIRA, 2009).

The period of the search for publications that triggered this study took place in the second week of July 2023, including the articles resulting from the search with publications from all years, as long as the content was not incompatible with the exclusion criteria.

The researcher, through the literature review, will reach who has already written about the theme, what has already been published, what aspects have been addressed and also questions to be asked about the present object of research. From this it will achieve better justification, foundation and definition of the research theme (FONTENELLES, 2009).

The present systematic review was carried out based on a search in an electronic database, using keywords related to the research.

The search was restricted to the website of the National Association of Graduate Studies and Research in Administration (ANPAD), in the field of the SPELL electronic library. The choice of this event was due to its national scope, also enabling the participation of researchers from different teaching and research institutions.

The field selected for the search for the chosen keywords was "abstract". In addition, it was sought to consider the publications that were duly identified as authors, thus respecting their rights.

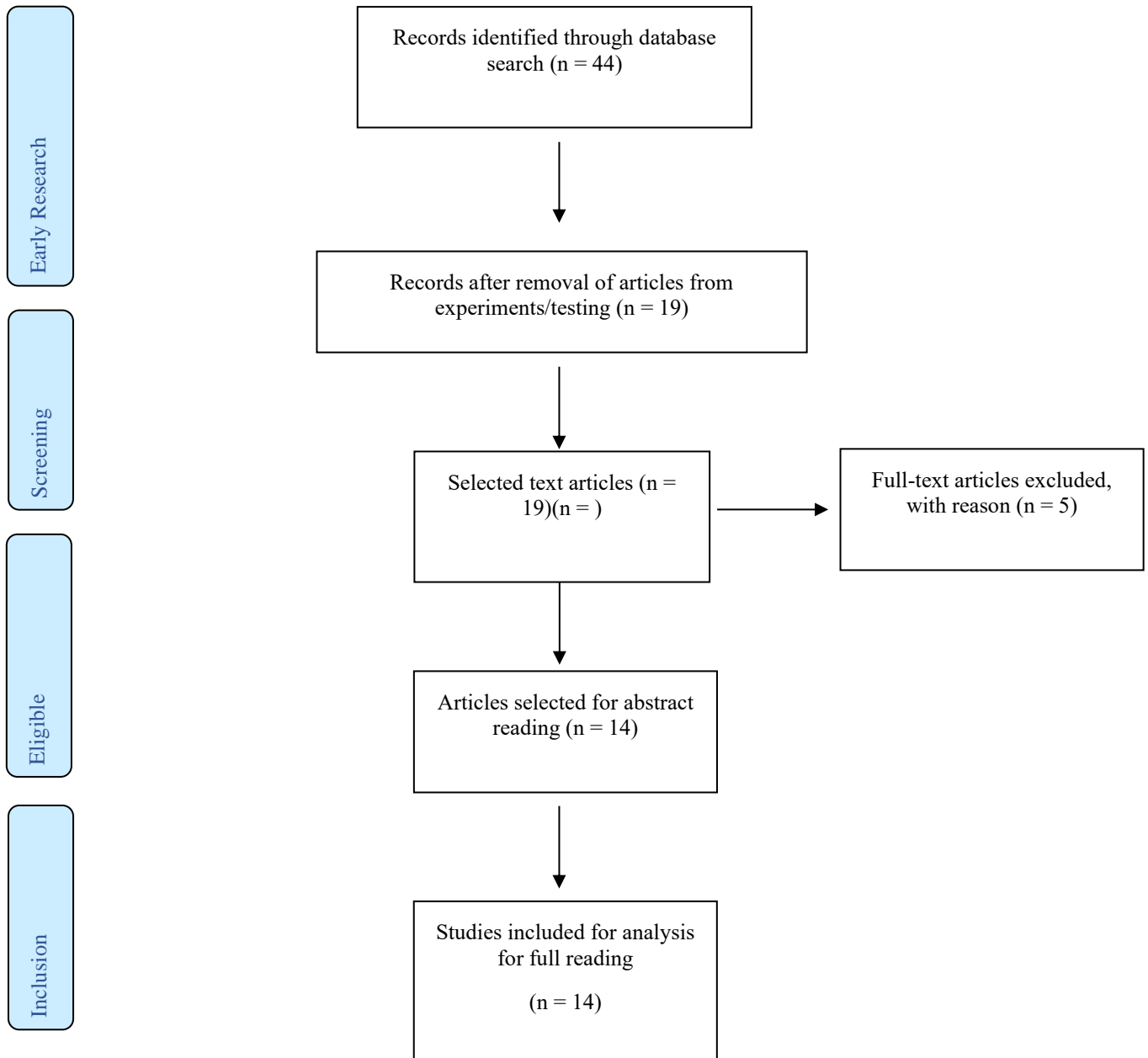
Finally, the abstracts and later full texts were read, the selected publications were filed, as well as a tabulation was prepared for the organization of this selection. Regarding the search design, the keywords "solid waste recycling" were used in the abstract field as mentioned, which resulted in 44 published articles. The methodology and instrument were used as an exclusion criterion, the experiment/testing studies were disregarded, a number of 25 articles excluded in this parameter, considering that this research will not take into account the experimental nature of recyclable solid materials, but rather the aspects involving the environmental public policy that falls on the management of these recyclable solid materials. In addition, articles that were outside the context of the theme were excluded, a number of 5 articles excluded in this criterion, which did not add to the context of the analysis of the influence of public policies on the municipal management of solid waste recycling.

After going through the steps described, 14 articles remained for analysis.

On the following page, through the PRISMA flowchart, the path taken for the selection of the articles systematized in this review is described, the number initially reached, articles removed from the exclusion and inclusion criteria described in the methodology.



Image 01. Prism Flowchart
PRISMA 2009 Flow Diagram



Source: Prepared by the authors.

RESULTS AND DISCUSSIONS

In this topic, the results and discussions of the data collected by the research will be presented. The selected articles, according to the methodology already presented, are arranged in detail in Chart 1 in terms of author(s), title and country, chronologically ordered in descending order. It can also be observed that most of the fourteen selected works originated from research carried out by two or more authors, and in this collection only two works came from individual research.

The various themes that start from the subject of Solid Waste Recycling, as well as the incidence of the theme of public management from public policies in these works, show the excessive influence of municipal management to achieve a balanced environment in common.

Image 02. Systematization of the information of the selected works

No.	Author/Details	Title	Summary
1	Almeida; Silveira; Engel (2020).	Collection and recycling of urban solid waste: contribution to the Debate Environmental Sustainability.	The importance of working on environmental awareness in the selective collection of solid waste is emphasized, along with socio-environmental issues from an early age, through an educational attitude, as well as the understanding that we are all co-responsible for what society produces and discards. The educational-environmental issue is also a strategy to face the problems related to the recycling of urban solid waste. Although there have been laws approved since 2010, only the current legislation is still insufficient. There is a lack of interest in the correct disposal of urban waste, which reveals indifference to those who work in recycling (waste pickers). It is important to work with the quality of life in order to promote local and regional development.
2	Almeida; Gomes (2017).	Discourse and Power in the Formulation of Environmental Public Policies: The Case of the National Policy on Solid Waste.	The definitions of power by Foucault, Elias and Bourdieu represent the theoretical starting point of this work, insofar as they consider power as something that depends on established relations, and that is symbolic. Thus, it is assumed that power can be exercised by language and, in this case, critical discourse analysis can be a useful method to capture the power strategies of actors in decision-making processes. The case of the formulation of the National Policy on Solid Waste, Law No. 12,305, which was marked by disputes of interest that made the legislative process last almost 20 years, was analyzed. The main objective of the analysis was to identify how the actors who participated in the public hearings exercised power seeking to influence the elaboration of the policy, especially with regard to two points considered innovative: shared responsibility and the inclusion of waste pickers in waste management. For data analysis, the general modes of operation of ideology and construction strategies were used identified by Thompson (2000). The strategies more used were dissimulation and legitimation. The first sought to hide relations of domination and the second aimed to legitimize an idea, whether of shared responsibility, or in defense of the incineration of waste as opposed to recycling with the inclusion of waste pickers. The results presented reveal that the discursive strategies of the exercise of power by the actors are an important explanatory aspect of the decision-making process in public policies, although little explored.
3	Siqueira; Costa; Vieira (2017).	Networks of power in Ventures Solidarity From Recycling.	In enterprises belonging to the solidarity economy scenario, decision-making power is usually distributed and shared among the cooperative members, being, therefore, decentralized, democratic, diffuse and horizontal, in a panorama in which the votes have the same value, regardless of

			<p>the actor. Organizations of this nature are characterized by the joint and integrated possession of the means production and democratic management (or self-management), in addition to of the equitable distribution of revenue from what is obtained as surplus for members, as defended by França-Filho (2012). In this context, this work aims to analyze the network of power relations in solidarity enterprises in six cooperatives for the collection and recycling of solid waste. The study was considered exploratory, with a qualitative-quantitative approach, conducted by the multiple case study strategy (YIN, 2006) in five cooperatives of collection and separation of recyclable materials from the greater ABC region of São Paulo and one from the city of Cotia (SP). For the construction and analysis of the networks, the Ucinet 6.0 software was used. In order to obtain data that could be analyzed qualitatively, interviews were conducted with cooperative members and managers, in order to gather evidence that could corroborate the analysis of the networks. The theoretical basis of the study was the typology of power proposed by Mintzberg (1983), presented in six configurations; autocracy, instrument, missionary, meritocracy, autonomous system and political arena. In presenting such a proposal, the same author argues that the organization is not limited to a certain configuration, but that there is the possibility of combinations and transition of stages, according to their maturity, and such dynamics generate their own organizational development. Thus, the existing coalitions between these configurations, addressed by Paz (1997; 2001; 2004) and Gosendo (2009), were also considered in the conceptual field, resulting in four systems: the system of authority, the ideological system of specialists, and the political system. The results point to a power generally centralized in the main manager (president), revealed in a centralized way in four of the six cooperatives, and only two were adherent to a participatory management model, however, of these two, only one stood out for its economic results, differentiating itself from the others by the managerial skills of its president. In addition, the study also demonstrates that the power and collaboration among the cooperative members are linked to the results of the economic and financial sustainability of the cooperative, when based on the more professionalized management model. This investigation sought to help fill a gap in empirical studies of power in solidarity enterprises, which have in collegiate decisions, the main principle of solidarity economy, self-management.</p>
4	Mendonça et al (2017).	Reverse logistics in Brazil: One Study on The Environmental Mechanism, Corporate Social Responsibility and the relevant legislation.	<p>This article addresses two topics of study of Environmental Law: reverse logistics and environmental liability. The first of them, brought to the legal system by the federal law on the National Solid Waste Policy (PNRS), is addressed in order to correlate its applicability in Brazil and abroad, as well as its main aspects. Its historical evolution in Brazil and in the world will be demonstrated, the first legislations that provided</p>

			<p>for it, in addition to an analysis of its triple aspect, encompassing the civil, criminal and administrative areas. The importance of the theme in the Brazilian doctrine will also be demonstrated, in addition to the understanding of the Superior Courts. Some information is missing from the conclusions. (It can be seen, therefore, that Brazil is still based on post-consumption recycling and informal post-consumption collection) (...)</p>
5	Espíndola; Netto; Souza (2017).	Social management in the context of environmental management: analysis of the creation and operationalization of the 3r Arq-Ufsc Project.	<p>The socio-environmental crisis faced by contemporary society points to the permanent need to think of alternatives for the development of life in society. Social management has been presented as an alternative in the area of public administration, where the participation of citizens in the production of the common good is a prerogative of the processes of deliberative participation, and which can lead to emancipation. This research, carried out through a qualitative case study, aimed to analyze the process of creation and operationalization of the 3R project (Reduction, Reuse and Recycling) of ARQ-UFSC (Department of Architecture and Urbanism of the Federal University of Santa Catarina) in the light of the assumptions conceptual frameworks that underlie social management in the context of environmental management. The aforementioned research was based on the implementation of a differentiated culture for solid waste management within the scope of the Department of Architecture and Urbanism of the Technological Center of the Federal University of Santa Catarina. The data analysis indicated that the idea of interdisciplinarity that involved the creation of the project, combined with participatory practice, operationalized aspects of the theoretical approach to social management.</p>
6	Silva; Knoll; Neto (2016).	The co-production of Public Service at Recycling Solid waste: study in the city of Florianópolis.	<p>The concentration of income and decrease in access to decent work have led to the need for a new model for public services. The process of urbanization and industrialization of Brazilian society has led many people to the outskirts of cities, in addition to the growth in the production of urban solid waste, which can be recycled. Co-production is an alternative to, from recycling, obtain results for the community, from the point of view of income distribution and access to work. Thus, the present work aims to analyze the co-production of public service in the recycling of solid waste, through a study in the Municipality of Florianópolis. The relationships between the municipal company that collects solid waste, an association of waste pickers and a private company that acquires part of this material were analyzed. It was possible to identify the characteristics of co-production, the predominant model of symbolic co-production and its management mode.</p>
7	Morais; Frey; Ravassa (2016).	Study of the optimal distribution of recycling material collection units in São Bernardo do Campo –	<p>Recycling has proven to be an excellent opportunity for new enterprises, translating into employment and income for various social levels. In view of this, the present study aims to map the</p>

		a map for the social investor.	potential points of supply of solid waste and find out what would be the best geographical location in São Bernardo do Campo for the implementation of collection units of these recycled materials. The potential supply points obtained in this study began to compose a network distribution model, represented by a graph, where the "nodes" of the graph represent the geographic location of each of the points and the "edges" of the graphs the distances between each of them and a strategic point, whose Cartesian coordinates constituted the variables of the model. To solve the model, the algorithm known as Generalized Reduced Gradient (GRG) was used. The results and methodology used in this research are presented and can support the decision-making of social investors.
8	Floriani; Furlanetto; Sehnem (2016).	Sustainable disposal of waste tires	This work Presents as an objective to address the process of collection and recycling of waste tires in Brazil, along with the verification of the actions developed by tire manufacturers after the creation of the National Solid Waste Policy. The verification of the evolution of the percentage of recycled tires and the role of collection points for the growth of this economic segment. The theoretical foundation was built portraying concepts and characteristics of sustainability, along with the current legislation on the subject and interrelating with the reverse logistics of waste tires in Brazil over the years. The methodology was developed from a case study of the company Reciclanip, addressing the company's actions for the growth of tire recycling and also the realization of an analysis of the importance of collection points for compliance with current legislation. The results show that there has been an increase in the percentage of recycled tires in Brazil since the establishment of the National Solid Waste Policy (PNRS). The collection process takes place from 824 points and recycling comprises the stages of co-processing, lamination, creation of rubber artifacts and rubber asphalt. In 2013, Brazil reached 95% of the proper disposal of waste tires, with the goal of collecting 479,429.60 tons of tires and verifying a destination of 459,030.18 tons. Therefore, it is possible to conclude that there is an awareness and improvement in the indicators, which may be associated with Law No. 12,305/10, which institutes PNRS.
9	Freita et al (2016).	Recycling Waste From Construction and Demolition (CDW): a case study at the Petrolina Waste Processing Plant - PE.	The development of civil construction in Brazil has significantly increased the amount of Construction and Demolition Waste (CDW). From Conama Resolution No. 307/2002 and the National Solid Waste Policy, the municipal government became responsible for establishing actions for the management of CDW or "debris" from construction sites and civil construction companies for the correct final disposal of that waste, aiming to reduce the environmental, social and financial impacts caused by its irregular disposal. In view of this scenario, the city of Petrolina/PE, in partnership with CTRP, implemented, in 2008, a Debris Processing Plant (UBE). In order to identify the strengths and

			<p>weaknesses of the CDW recycling process and propose improvements for its management, a case study was carried out, with monitoring of the process, documentary research and semi-structured interviews with those responsible for the UBE. The main weaknesses are the lack of segregation at the source, the inefficiency of waste collection and transportation, the presence of contaminants, the environmental impacts of the recycling operation and the low resistance of the blocks produced. As a potential, the processing capacity of the UBE stands out, which can process up to 2600 tons of CDW per month. Among the proposals for improvements, it is suggested the development of programs for segregation at source and for the collection of CDW, in addition to a partnership with the University to improve the quality of the product.</p>
10	Filho et al (2014)	Comparison between the masses of urban solid waste collected in the city of São Paulo through selective and household collection.	<p>The problem of urban solid waste requires effective actions to mitigate its environmental impacts. To this end, actions that promote sustainability practices in its management must be applied, involving the participation of the public and private sectors and the population, as already highlighted in the National Solid Waste Policy (PNRS), published in 2010. Actions such as selective collection and recycling, when properly integrated, provide significant benefits, such as reducing the volumes sent to landfills, reducing areas of irregular disposal, valuing and reinserting waste into the production chain, reducing the need to use natural resources, etc. However, despite the importance of adopting these actions, some municipalities do not have effective policies regarding selective collection and recycling, even after the publication of the PNRS. This paper presents the monthly monitoring carried out in 2013 of the masses of urban solid waste sent to sorting stations located in the city of São Paulo, seeking to compare the amounts from conventional household collection and those from selective collection. The results obtained indicate a great disparity in the masses obtained, with the mass coming from selective collection corresponding to only 1.9% of the collected, that is, a negligible value in relation to the total amount. It should be noted that selective collection is of great importance for the implementation of effective recycling actions, providing economic, social and environmental gains.</p>
11	Gonçalves; Tanaka; Amedomar (2013)	The final disposal of waste Urban Solids: Alternatives for the City of São Paulo Through Success Stories.	<p>This article studies the public cleaning service of household solid waste in the city of São Paulo, Brazil, based on the year 2010. It highlights problems associated with the current waste management model in São Paulo and proposes solutions to the most critical issues, having as a reference the appropriate treatment given by other globalized cities. The literature review seeks to elucidate the most relevant concepts to the study of this theme. Information is collected regarding the management of household solid waste and reverse logistics initiatives by the private sector, listing the obstacles observed in this municipality. National</p>

			<p>and international cases of success regarding the disposal of waste were studied, aiming to find sources of potential improvements. It is concluded that the proper disposal of waste, through recycling, composting or energy generation, requires the engagement of the population with waste separation and disposal habits, the involvement of the municipal administration, providing the necessary resources for the evolution of these alternatives and, finally, it cannot dispense with reverse logistics actions by the producing companies, respecting the federal legislation. By seeking to broaden the discussion on solid waste, the article seeks to insert this issue, in a more significant way, in the strategy and investment decisions of the public and private authorities.</p>
12	Vicente; Brendalis; Alves (2009).	Social entrepreneurship: waste recycling as a source of socioeconomic inclusion and environmental preservation.	<p>This article analyzes and describes a Third Sector organization, emphasizing the entrepreneurial spirit and strategies of the agents responsible for the creation and development of the Association in Defense of the Environment and Citizenship Caminho Verde, located in the municipality of Campo Limpo Paulista, State of São Paulo. The Association has been building, for more than a decade, a history of struggles in defense of the environment and citizenship. The article addresses a case study regarding the recycling process of used frying oil, from its collection to its final transformation into biodiesel. The analysis suggests that waste recycling managed through social entrepreneurship promotes the maximization of social returns instead of profit, and can be considered an efficient process of reducing the volume of solid waste and preserving the environment.</p>
13	Dias (2006).	Reflections, dilemmas and responsibilities related to the end of life of packaging.	<p>The need to consider the fate of packaging, after its original use, has been growing in recent decades. Seen sometimes as a receptacle of products avidly consumed, sometimes as great villains of environmental problems, packaging poses important challenges to the understanding of its conception and revaluation at the end of its life. This article, therefore, intends to promote a dialogue between the fields of design, sustainability and the life cycle of packaging. Seeking to advance in the understanding of the possibilities, challenges and dilemmas of managing the end of life of packaging, it places special emphasis on plastic packaging due to the growing volume of solid waste from households. The literature review points to concepts and practices still under construction. Thus, this article presents a systematization and structuring of the main concepts, not only summarizing the existing literature, but also bringing some examples of the valorization of plastic packaging; Legislation from the international and Brazilian context is also discussed. However, it is possible to anticipate that the theme presupposes an increase in the level of information of the population, elimination of waste from conception, development of technologies, shared responsibilities, recycling, but above all a change in the behavioral pattern of today's society.</p>
14	Zortea (2001).	Analysis of costs for the	Currently, both companies and public

		<p>recycling of paper fibers from Tetra Pak packages in Porto Alegre.</p>	<p>administrations are looking for a sustainable way of coexistence. Within this coexistence in cities, the management of solid waste, including Tetra Pak packages, is beginning to receive some attention regarding its reuse and recyclability. Based on the idea of innovative processes and the search for solutions through research, the Tetra Pak Company discovered recyclability processes for its Long Life packages, offering them a technological feasibility of recycling. Through instruments such as life cycle analysis, it is possible to verify the costs incorporated in the manufacturing and recycling process of Tetra Pak packages, for a subsequent economic analysis. The article studies some items that influence an analysis of the economic feasibility of recycling Tetra Pak packages. In the course of the work, the values of home and selective collection in Porto Alegre are demonstrated, their costs and variables that influence the low value of these collections in the city. The costs of obtaining and recycling the paper fibres from Tetra Pak packages are also verified, comparing this with the normal paper recycling process. From there, some conclusions and ideas are reached for the fate of this recycling process.</p>
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From the specification of the academic productions, selected for systematic review of the literature, the following keywords are found in each listed work, following the order of the table presented above:

Image 03. Structuring of the keywords of the selected works.

Text n°	Keywords
1	Solid waste. Environmental planning. Regional development. Environmental public policies. Environmental education.
2	Power. Speech. Public policies. Solid waste.
3	Social Network. Power. Cooperatives. Solidarity Economy.
4	Reverse Logistics; Responsibility; Jurisprudence;
5	Public administration; Environmental management; Social management; University.
6	Public Service Co-production; Management Modes; Solid Waste Recycling.
7	Non-linear programming; solid waste management; recycling.
8	Sustainability. Reverse logistics. Sustainable disposal.
9	Processing of rubble; Construction; Environmental impact.
10	Urban Solid Waste, Sustainability, Recycling.
11	Waste Solid. Urban cleaning. Recycling. Reverse logistics. Garbage. Sustainability. Environment.
12	Social entrepreneurship, Waste recycling, Used frying oil.
13	Packaging Design, Packaging Life Cycle, Plastic Packaging.
14	Tetra Pak packages. Selective collection. Costs. Economic viability.

Source: Prepared by the authors

From the keywords listed, it is possible to glimpse the multidisciplinary that exists in the context of solid waste recycling, and the problem can be applied in the most diverse areas of research and not exclusively the mentioned context, combining various objects of study.

Image 04. Diagram of word cloud grouped according to the 20 keywords used by the authors



Source: Prepared by the authors

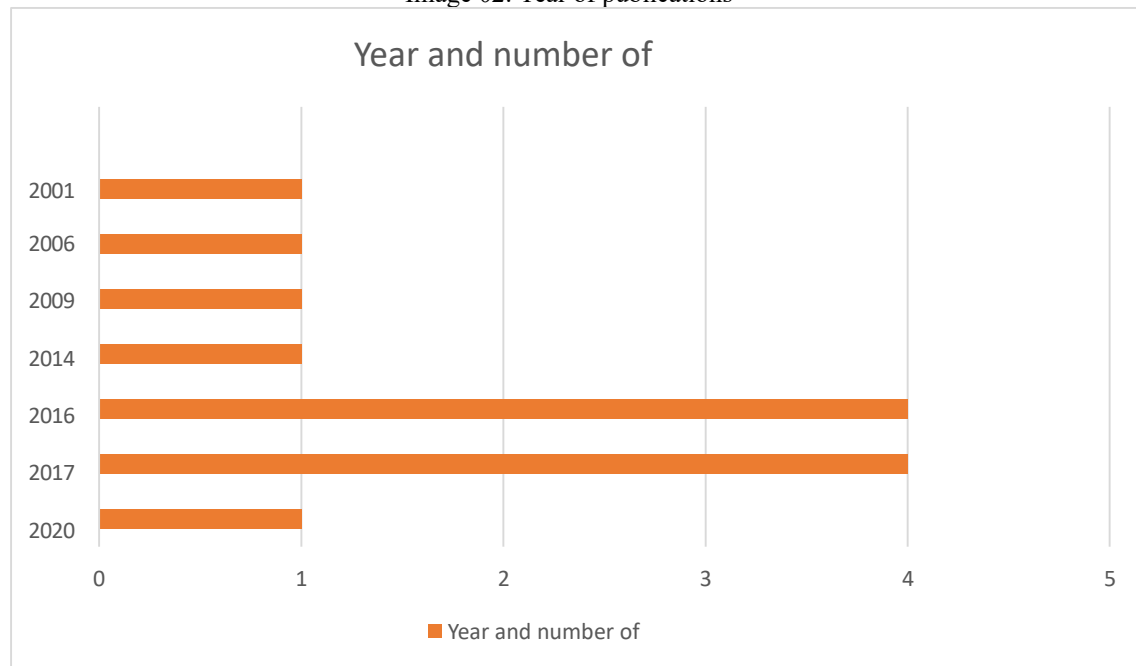
Disregarding the recurrent preposition "de", we have in a cloud diagram the recurrent catch in the keywords of the selected works, the first 20.

Image 05. Top 20 Keywords in Works

Classification	Keyword	Recurrence
1	Of	10
2	Waste	7
3	Solids	6
4	Recycling	5
5	Environmental	4
6	Packaging	4
7	Management	3
8	Logistics	3
9	Reverse	3
10	Social	3
11	Sustainability	3
12	Power	2
13	Policies	2
14	Public	2
15	Administration	1
16	Environmental	1
17	Environment	1
18	Benefit	1
19	Cycle	1
20	Civil	1

Regarding the years of publications, there are:

Image 02. Year of publications



Source: Prepared by the authors

It is noted that the selected publications, in addition to not being found in large quantities prior to 2016, also did not prosper quantitatively until 2023, the date of the research, when no article entered the adopted selection, due to non-existence, the last year being 2020. The years 2001, 2006, 2009 and 2014 receive one publication each, while the years 2016 and 2017 register four publications, and the year 2020 registers only one publication, respectively.

In view of this information, it is evident that the global context of excessive waste production, the growing resumption of the theme of Cooperativism, Public Policies, Solid Waste Recycling, National Solid Waste Policy, began to be addressed with greater emphasis in the periods presented.

In view of this information, it is evident that the global context of excessive waste production, with the resumption of literary production on the theme of Cooperativism, Public Policies, Solid Waste Recycling and National Solid Waste Policy, began to be addressed with greater emphasis in the years 2016 and 2017, in the context of research in the Administration, which was the niche chosen for this systematic review.

It is also relevant to address the historical context that culminated the present decades applied as a filter of the study, 2001 to 2020, with emphasis on the eighteenth and nineteenth centuries with the Industrial Revolution and the beginning of a new period in the relationship between society and balanced environment. The increase in the influence of the activities of the new society on the cycles of nature was remarkable, which translated into a progressive "humanization of natural landscapes and degradation of the environment, source and final destination of all resources and waste." (VENTURA, 2004).

The increase in population, with the rural exodus especially in urban areas, and the technological progress spread from globalization, ~~has resulted~~ in an enormous overload on natural



resources, whether in the field of raw materials, fossil fuels, water and other waste (VENTURA, 2004).

The National Solid Waste Policy was instituted in August 2010, a year in which there was no literary production complying with the requirements added as a filter in this research, which are those described in the Methodology, one of these filters being the search design using the keywords "solid waste recycling". This fact makes it possible to question the low scientific production related to solid waste management, considering that in the period of time covered in the systematic review, it comprises the year that was instituted nationally, a remarkable fact for the sustainable theme, National Solid Waste Policy.

It is concluded, by this systematic review, after careful analysis of the articles found, that the same environment that generated the advances of society, also serves later for the place destined for the discards as a result of this economy, with such short cycles for great profitability, and enormous losses, with extensive degradation of nature. Finally, there is little recurrence in the production of this theme, which denotes the worsening of the environmental situation, making it necessary to increase academic views of the environmental problem.



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