

PRODUCTION NETWORKS AND ACTORS OF THE RECYCLING NETWORK OF THE URBAN ECONOMY OF RIO DE JANEIRO



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ABSTRACT

This article seeks to understand how the recycling production network, which enables the flow of recyclable materials between cooperatives and the recycling industry, takes place. While, articulated in a network, it is interesting to understand how the relationships of the main actors are built - companies, the State, social groups, cooperatives and waste pickers - and how formal and informal, material and immaterial, sometimes cooperative, sometimes conflictive modes of exchange are built. The spatial cut of the research comprises the actors of the Metropolitan Region of the state of Rio de Janeiro and for the analyses made in the article, the concept of productive spatial circuit was adopted as a theoretical perspective. In this sense, Corrêa (1997) elucidates us with what would be a geographical network, Henderson et. al. (2011) contributes to the analysis of the capitalist production system with the concept of production network, while dialoguing with Santos (2011), Milanez & Santos (2013) and Dicken (2015). It presents, from direct observation and the documents analyzed³, the actors that make up the recycling of the state of Rio de Janeiro and how they are articulated in social and productive networks composed of different actors. In view of this, it is thus assumed that the phenomenon of waste picking represents the practice of social subjects, whose trajectories are marked, specifically, by the exclusionary and exploitative functioning of labor in the capitalist system of production and that recycling networks are part of a system composed of various social actors, playing important roles. However, at the same time, recyclable material collectors make up the weakest link in the recycling production network, or the 'garbage game'.

Keywords: Production network. Urban economy. Recycling.

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³ Theses, dissertations, books and scientific articles were analyzed, which could contribute significantly to the reflection presented here.

INTRODUCTION

Although modernizations are commanded by the force of corporations, there is currently a diffusion of information and consumption, which turns out to be a fundamental factor in the transformation of the economy, society and space. The economic apparatus, then, needs to adapt both to the imperatives of a powerful, multi-scale modernization and to spatially constituted social realities, thus emerging new ways of thinking about society and labor relations.

Thus, the concept of spatial productive circuit assertively reaches the role of circulation in the current historical period, as it leads us to identify a logic of territories and networks, in which different ways of producing and circulating are recreated, whose agents interact, dispute the territory and confront the most diverse interests.

This article presents a bibliographic review that seeks to dialogue with the specific literature of geographical science, unveiling the possible forms of theoretical interpretation of the phenomenon of scavenging.

Therefore, the discussion of this article is divided into three parts. The first "gathering from the perspective of the production network" dialogues about how new ways of operating have emerged and how geoeconomics, based on the phenomenon of globalization, is always in a process of transformation.

It will also be about how it is thought that a production chain is basically linear and represents the sequence of operations necessary to produce and distribute a product or service, but the economic processes in the production circuit are circular, long and indirect and non-linear. It also reveals an approach by Henderson et. al. (2011) on how the concept of network can help in the analysis of the production chain related to the capitalist system of production and how individual production circuits are increasingly involved in production networks of interpersonal and intercompany relationships. Furthermore, it defines global production networks (RPGs) with their conceptual categories and essential dimensions.

The second part "the recycling production networks" seeks to understand how the recycling production network has several actors who, articulated in a network, build circuits of formal and informal, material and immaterial exchanges, sometimes cooperative, sometimes conflictive. There is no homogeneity of space or networks.

It will also be shown that networks are constituted from the social relations instituted by the actors who compose them and who establish them materially, which relate through multi-scalar webs and in a certain time (whether ephemeral or long-term) and space. It

seeks to reveal that, from a geographical perspective, space is a social construct, produced by multiplicities of social relations, in a constant becoming. Without social relations, space is not constituted, in the same way, relations are not established without the existence of space.

The third part "the actors that make up the 'garbage game' in Rio de Janeiro", presents, based on direct observation⁴ and the documents analyzed, the actors that make up the recycling of the state of Rio de Janeiro and how they are articulated in social and productive networks, composed of different actors, which can be highlighted, in a schematic way, according to the main functions in: (i) waste pickers; (ii) purchasers; (iii) middlemen; and (iv) entrepreneurs. It states, from the perspective of Costa and Chaves (2012), that the expansion of the recycling industry is directly linked to the environmental crisis of capitalism and, although waste pickers are on the margins of the relationships that institute the network, they are fundamental for its maintenance. Without the practices of these subjects, there is no possibility of supplying the material to the other actors.

In addition, it seeks to understand the organization and interrelations of the Recycling Production Network of the State of Rio de Janeiro (RRERJ), since, specifically, in Rio de Janeiro, with regard to the public selective collection of recyclable solid waste (paper, plastic, aluminum and metal), called inert waste, this is carried out weekly and its disposal destination, it is usually done with some of Comlurb's partner cooperatives. Recyclables, when they arrive at cooperatives without adequate sorting and with a high level of waste and organics, make separation difficult and, many times, cause them to lose financial market value.

Sanitary landfills, public-private partnerships, are also the target of complaints from cooperatives, since the material is always taken to landfills, according to the amount paid per ton and this explains why Rio de Janeiro recycles only 1.9%⁵ of its garbage.

The region of Barra, Recreio dos Bandeirantes and surrounding areas, for example, are places where green waste produces another market logic. These are privileged places that have extensive wooded areas in their high-end condominiums and generate a large amount of green waste. The problem arises in the non-collection of green waste neither by

⁴ I participated in the Waste Pickers and Waste Pickers in Solidarity Network Project, in which we interviewed 3084 waste pickers. The data of this research can be updated through the CATAsig software, developed by the author. Registered with the INPI, under number BR512013000238-9

⁵ O Globo Newspaper - 13/04/2017. Available at: <<https://oglobo.globo.com/sociedade/sustentabilidade/no-rio-apeenas-19-do-lixo-reciclado-21202718>>. Accessed on: 31 out. 2018.

the condominiums nor by the State, which does not offer this type of selective collection, thus opening a market niche focused on the collection of this material. As for condominiums, they prefer not to carry out the proper collection, avoiding the payment of private collection, according to Cruz, (2019).

In view of this, it is thus assumed that the phenomenon of scavenging represents the practice of social subjects, whose trajectories are marked, specifically, by the exclusionary and exploitative functioning of labor in the capitalist system of production. Such subjects constitute their daily lives along unequal geographical networks, which meet, above all, the logic of capital's reproduction, carving out social differences based on classes. These processes of a geography of inequality and exploitation of labor interconnect and interact in an interdependent way at multiple geographical scales.

MATERIAL AND METHODS

The methodological path for the realization of this article encompasses a universe of meanings, actions and human relations, not perceptible only by equations and statistics. "Scientific methodology is much more than a few rules on how to do research. It helps to reflect and provides a 'new' look at the world: scientific, curious, inquisitive and creative" (GOLDENBERG, 2004, p. 11). Here, the method is understood not only as a tool to be used for the observation of social phenomena, but also as a conception of reality that will mediate the process of apprehension of knowledge, in order to achieve a new look at the scenario chosen for the research.

Minayo (2001, p. 21) states that "qualitative research has a level of reality that cannot be quantified, measured in all its complexity". As for RAMIRES; PEOPLE:

The identity of qualitative research is the recognition of the existence of a dynamic relationship between the real world and the subject, of a living interdependence between subject and object and of an interpretative posture, constituting itself as a field of activity that has internal conflicts and tensions (2013, p.25).

Therefore, the method used will be qualitative, as I understand that it will allow a denser and more significant approximation of the reality that I propose to research, in this case the Metropolitan Region of the State of Rio de Janeiro - the criteria adopted are detailed in chart 1. In qualitative research mode, "... The researcher's concern is not with the numerical representativeness of the researched group, but with the deepening of the understanding of a social group, an organization, an institution, a trajectory, etc." (GOLDENBERG, 2004, p. 12). Quantity, then, is replaced by intensity, in a deep

immersion, in which observation is prolonged and careful, interviews are in-depth and analysis from different sources is crossed.

However, this does not mean admitting that there is an opposition between quantitative and qualitative data: "... one can, at most, prioritize one or the other, for any reason, but never insinuate that one would be done at the expense of the other, or against the other" (DEMO, 1998, p. 92). On the contrary, they complement each other, because the elements of social reality interact dynamically and each method constitutes the object of study in a particular way.

Starting from the principle that the act of understanding is linked to the existential universe of the human, qualitative approaches are not concerned with establishing laws to produce generalizations. The data of the qualitative research aim at a deep understanding of certain social phenomena supported by the assumption of the greater relevance of the subjective aspect of social action. Thus, they are opposed to the statistical inability to account for complex phenomena and the singularity of phenomena that cannot be identified through standardized questionnaires (GOLDENBERG, 2004, p.49).

The two modes of research, here, are not in opposition or competition. As Demo (1998) contributed to us, they complement each other. Quantitative and qualitative research are integrated, as they allow the researcher to cross-reference the data obtained with in-depth discussions, which allows for greater clarity and reliability in the results obtained.

As a methodological procedure, data collection will be carried out from documentary analysis of official sources on the recycling network, such as theses, dissertations, articles, magazines, reports, laws, ordinances and decrees. For Silva and Mendes, (2013, p. 210) "Documentary research represents a resource capable of bringing important contributions to research, because it can help in understanding the facts. Thus, the documents deserve special attention in qualitative studies."

With this in mind, the report developed by the State Secretariat for the Environment – CRS/ Fundação Getúlio Vargas – FGV and PANGAEA – Center for Socio-Environmental Studies will also be used, following the SEA/PANGAEA PARTNERSHIP AGREEMENT No. 01/2012, as the first partial execution report for the identification and registration of 3,084 (three thousand and eighty-four) waste pickers and waste pickers and the realization of the socioeconomic diagnosis of solidarity economic enterprises of the production chain of waste pickers present in the selected municipalities.

The purpose of this report is to present the collection of information from waste pickers in 41 (forty-one) municipalities in the State of Rio de Janeiro. We understand the importance of the data collected, because "Bibliographic or archival research can, therefore, precede the first steps in the field" (KAISER, 2006, p. 99). For the development of the report, I was able to participate both as an employee in its execution and in the creation of the system aimed at compiling the information collected in the research, generating maps and *XLS, KMZ, KML, MySql, Shapefile* files. We also had the collaboration of 40 (forty) enumerators, who were in charge of visiting the collectors of recyclable materials, carrying out the appropriate face-to-face interviews with a closed structure. In this unprecedented work, lasting 6 (six) months, *Global Positioning System*⁶ - GPS devices were used as a methodological resource, in order to obtain precision as to the location of each of the collectors.

According to Santos (1995), if inequality is a socioeconomic phenomenon, exclusion is mainly a cultural and social phenomenon of civilization. And so, culture is strengthened and legitimized by a historical discourse that is supposedly true and that aims not only to dictate what needs to be followed, but also to reject everything that does not fit. It refers to a historical process by which a culture, through a discourse of truth, generates the interdict and rejects it. "It establishes a limit beyond which there is only transgression, a place that throws to another place, heterotopia, all the social groups that are affected by the social interdict, be they madness, crime, delinquency or sexual orientation" (SANTOS, 1995, p. 2). And he emphasizes:

(...) It must be recognized that not all difference is inferior. And so equality policy does not have to be reduced to a single identity norm. On the contrary, whenever we are faced with non-inferiorizing differences, the policy of equality that ignores or mischaracterizes them, contradictorily becomes a policy of inequality (...) Hence the new categorical imperative that, in my opinion, must preside over a postmodern and multicultural articulation of equality and identity politics: we have the right to be equal whenever difference makes us inferior; we have the right to be different whenever equality mischaracterizes us (SANTOS, 1995, p. 41).

It is understood that the other does not know what needs to be known, thus establishing an authoritarian treatment without dialogue that needs to be protected, guided and directed, denying the difference or, if recognized, used only to create hierarchy and

⁶ GPS stands for "Global Positioning System" in Portuguese, and consists of a satellite location technology, in which a satellite navigation system sends, from a mobile device, information about the position of something at any time and in any weather condition.

discrimination. Here, therefore, this dialogue will be built horizontally, of equal value, since "the weight of anti-differentialist standardization is so great in capitalist modernity that the affirmation of difference almost always results in recognition of inequality" (1995, p. 45). Thus, we would continue to deny or certify either equality or difference, because they would be in opposition, since, in order to be equal, they would be subordinated to an identity norm, thus denying difference. And to be different, it would be making difference full, denying equality.

By understanding that the research must contemplate the economic, political, historical and social links that build social relations, considering the complexity of the spatial reality established in this work, we used both quantitative data, from the PANGEA databases, to analyze the capital-labor relationship and the socioeconomic condition of the collectors, as well as qualitative data, from the analysis of documents and, mainly, from the experience lived by the researcher in the field of recycling. In this one, I sought to understand the spatial organization of recycling production networks and the advances and obstacles that characterize the public policies of the sector in the state of Rio de Janeiro, from the point of view of waste pickers.

Both the quantitative data collected and the theoretical reflections brought to this research new questions, such as: what were the networks and how did they operate? To which networks did the cooperatives belong? What are the criteria for joining the network? What are the main challenges? What are the power relations and main tensioning flows/intensities of the network? To answer these questions, the networks were searched and interviews were conducted with the main leaders of each network, which cover all the existing networks in the state of Rio de Janeiro:

Frame 1 - Field research and the participating actors

Cooperative	Address	President / Interviewee	Date	Network
Recooperate in Itaboraí	Rua Jose Leandro, s/n, lote 57 quadra 20 -	Maria Helena Rosa de Almeida	04/06/2018	Dream Catcher
Association of Waste Pickers of the Metropolitan Landfill of Jardim Gramacho (ACAMJG)	Rua Almirante Midosi, lote 16, quadra 42 - Jardim Gramacho - Duque de Caxias	Sebastião Carlos dos Santos	08/06/2018	Mesc
São Vicente de Paulo Cooperative	Avenida Pastor Martin Luther king Júnior, 3099 - Engenho da Rainha	Luiz Carlos Santiago and Carminha	12/06/2018	Recicla Rio
Recycling to Live Cooperative – RPV	Av. Marechal Câmara, 350 - Rio de Janeiro	Custódio da Silva Chaves	14/06/2018	Movement Network

COOPAMA	Rua Miguel Ângelo, 385 - Maria da Graça	Cibelia Antonia dos Santos and Luiz Antonio do Couto	21/06/2018	Febracom
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Source: The authors, 2025.

The methodological instruments used were the field notebook, with semi-open questions and audio recorder. In addition, as a partner of the recycling network and, therefore, with greater access to the networks, the observation of the researched field was also present in the research, with the aim of seeking a possible dialogue between theory and practice.

SCAVENGING FROM THE PERSPECTIVE OF THE PRODUCTION NETWORK

Globalization has emerged and, with it, new ways of operating emerge, in a new geoeconomy, with economies in networks, having a new way of flowing that is always in a process of transformation. According to Cataia & Silva (2013):

[...] globalization is not synonymous with homogenization, on the contrary, territorial inequalities are deepening in this new period. For technical systems lead to differentiation and inequalities of places, which are now not due to the diversity of nature, but to human choices.

For Dicken (2015), globalization, which "[...] it is the new economic, political and cultural order" (DICKEN, 2015, p. 25), brought new ways of operating, with the revolution in the exchange of information and the origin of what we use in everyday life, which comes from a geography that is increasingly complex in its production, distribution and consumption, whose scale has become, if not totally global, at least much more extensive. As a result, we are witnessing the complexity of a new geoeconomics: economies as networks, which "are always flowing, always in a process of transformation" (DICKEN, 2015, p. 31). And he adds:

Here is the secret: to glimpse economic processes (production, distribution, consumption) in terms of connections of activities, linked through flows of material and non-material phenomena (such as services) to circuits and networks. These circuits and networks constitute related structures and processes in which the power relations between the main 'actors' – companies, states, individuals, social groups – are unequal (DICKEN, 2015, p. 30).

We can conclude, then, that networks do not exist in isolation, since they are generally incorporated into the broader macrostructures of the global economy and rooted in the predominant geographic structures of the place. In this scenario of power disputes, among the variables that determine how power circulates, it is in the first place, "[...] control

over the main assets (such as capital, technology, knowledge, professional qualifications, natural resources, consumer markets)" (DICKEN, 2015, p. 32). Because the possibility of controlling access to assets is a great bargaining power. Secondly, there is the spatial and territorial range where the assets are located and the flexibility of each actor, which relate unequally, whether geographically, organizationally or personally.

Dicken (2015) draws our attention to the common practice of conceiving the production of any product or service as a production chain, that is, "[...] a linked sequence of transactions of functions, in which each stage adds value to the process of producing products or services" (DICKEN, 2015, p. 34).

Still for the author, a production chain is basically linear and represents the sequence of operations necessary to produce and distribute a product or service. However, the economic processes in the production circuit are circular, long, and indirect and non-linear. According to the author, they are bidirectional, as they involve flows of materials, semi-finished goods, and final products in one direction; information flows (customer demands – tastes, preferences, etc.) and money (payments for products and services) in the other direction. Each element of the production circuit depends on technological inputs, service inputs, logistical (movement) systems, financial systems, and coordination and control systems.

Thus, each of the elements in a production circuit depends on several other types of inputs, both those directly related to production and those related to circulation. In addition, individual production circuits are, in turn, involved in more comprehensive production networks of interpersonal and intra-company relationships: "[...] these networks are extremely complex structures, with complicated connections - horizontal, vertical, diagonal - forming multidimensional trusses, of various layers of economic activity" (DICKEN, 2015, p. 36).

Milanez and Santos (2013), defending the applicability of the concept of network, to the detriment of the notion of chain, state that it is an analytical response to the verticality that is presented in the chain parallel to the multiscalarity presented by networks.

In order to conceive a theory of production networks, Henderson et. al. (2011), argue that the concept of network has been an alternative approach to analyze the production chain, related to the capitalist system of production. They affirm that the notion with the nickname chain makes the mistake of analyzing the relations of production under a verticalized and linear panorama, limiting the possibilities of analyzing the complex,

represented by the relations that are established through connections that occur in the most diverse ways and are better signified as networks.

The authors also consider that networks are constituted by the interrelation of different actors, establishing themselves in means of a heteronomous (unequal) power, just as recycling production networks are established in Brazil. As Henderson (2011) points out:

Such an approach is the actor-network theory (ART), which emphasizes the relational character of both objects and agency in heterogeneous networks ('relational materiality'), indicating that entities in networks are formed by, and can only be understood through, their relations and connectivity with other entities (HENDERSON et. al., 2011, p. 150).

The network approach pointed out by the authors establishes a direct confluence with the concept of relational base power proposed by Foucault (1995). Such understanding is presented as a mechanism through which we can analyze the Brazilian recycling network.

Santos (2011) argues that the analytical perspectives of networks preserve a certain autonomy for all the actors that make up the phenomenon, taking into account the dialogue between global and local in their specificities. Within this, the author states that power relations, in a way, shape the exchanges between actors that make up the network. Thus, understanding the relationship between space and power, Dicken (2015) highlights the three main dimensions of production networks: (i) control - how they are coordinated and regulated; (ii) spatiality – how they are geographically configured; and (iii) territorial incorporation – to what extent they are associated with certain political, institutional and social scenarios (DICKEN, 2015).

Santos (2011) provided theoretical apprehension and an analytical tool of great value for the analysis of the patterns and forms of concrete interactions between firms, State and society, in which he uses the article by Henderson et al. (2002), *Global production networks and the analysis of economic development*. This article is what can be called the founding manifesto of the approach to global production networks (RPGs), establishing their conceptual categories (value, power, and rootedness) and essential dimensions (firms, sectors, networks, and institutions), understanding that capillarity leaks between one network and another.

The GPR model advances in the understanding of these interactive contexts, by providing a multicentric approach, that is, capable of dealing with the variety of economic, political and social agents, and, on the other hand, by affirming the

analytical importance of the spatiality of its agency (multiscalarity) (SANTOS, 2011, p. 129).

In this sense, GPRs provide a fruitful understanding of the global dimension, enabling discussion about development, work and the environment. In addition, the concept of RPG favors a more complex discussion between the various types of influential agents in complex economic, political, and social processes and their specific resources, value, power, and rootedness.

The paradigm of RPGs proposes a broad definition of value, comprising the set of the various forms of economic rent, with the firm being recognized as "... the axis on which technological, relational, organizational, brand and commercial policy resources or revenues overlap the core of its value generation: the work process" (SANTOS, 2011, p. 133).

However, in multicentric processes (concrete economic, political and social – multiple agents) they must be attentive to the ways in which these agents relate to value, as they produce effects on the economy. Thus, in the paradigm of RPGs, the examination of value is completed by the analysis of the plans for the creation, expansion and capture of value, considering its material generation through the work process, and expressed, for example, in the technological, organizational, commercial, etc. standards of operation of firms and sectors. The value can also be expanded and captured.

First, with regard specifically to the creation of value, the model highlights the theme of the conversion of labor power into real labor, via the labor process, with emphasis on its conditions of production and reproduction. In this sense, the structures of employment and professional qualification, working conditions and production technologies, among other key themes, are of great importance, which bring to light the importance of political and, especially, social agents in the conditions of value creation enjoyed by the firm (SANTOS, 2011, p. 133).

Allied to the concerns about the modes of work, it is also important to create the various forms of income, with regard to the conditions of access and control over economic resources of different types and how market structures and competition regimes value these resources. The increase or expansion of value depends on the institutional contexts on the action and relations between economic and non-economic agents, in which the capture of value involves issues of government policy.

Value capture also incorporates issues related to the ownership of the firm that involve dichotomies related to nationality (foreign vs. national) and administrative

regime (private vs. public) and corporate governance on a national scale.
(SANTOS, 2011, p. 134)

Power, on the other hand, also considers control and coordination decisive: "The sources and forms of power in the network are decisive both for the increase and for the capture of value" (SANTOS, 2011, p. 135). This category refers specifically to a set of non-economic agents, particularly related to formal political-institutional spheres, in which economic, political, and social agents can influence and be influenced in interactive contexts, thus establishing themselves with three forms of power: corporate, institutional, and collective.

Corporate power is defined as the ability to effectively influence the corporate decisions of one or more economic agents over another(s). Institutional power is exercised, differently, by various non-economic agents, including state organizations and agencies, interstate agencies, the Bretton Woods institutions, United Nations (UN) agencies, and credit rating agencies.

Your action can influence economic stocks. Collective power, on the other hand, is exercised directly or indirectly by social agents, in order to influence economic and non-economic agents – political and institutional.

"[...] Economic actions, organizations, and institutions are, by definition, specific forms of social relations and are therefore rooted in social configurations." (SANTOS, 2011, p. 136). In other words, rootedness is considered as the ability of social relations to influence the agents that compose it and economic activity, with three ways of happening: territorial, which refers to the different forms of spatial anchoring; of network, concerning inter-firm network relations, economic activity and its agents, and social rooting, which refers to the history and sociocultural origins of agents – economic and non-economic, from the perspective adopted here. That is:

Network rooting refers to the importance of relationships between individual or collective agents in the network – regardless of temporal (with their own history) and spatial (specific territorial anchoring) relationships (SANTOS, 2011, p. 137).

Thus, global production networks have the possibility of overcoming the unitary matrices and explanation of economic phenomena, represented sometimes by the firm, sometimes by the State.

Having located the discussion about networks beyond what has already been presented at the beginning of this review, initially based on Raffestin (1993) and the

relationship of this concept with the concept of Territory, I resume from Gonçalves (2006) his discussion about the other actors that make up the recycling network.

The author, based on the concept of network, presents confluence in his discussion about the waste pickers who correspond to the main link in the recycling industry. When it moves towards a problematization of the other actors that also make up this network, it highlights the direct relationship of the capitalist system of production as a factor that produces specificities between the fixed and flows present in this sector.

Following the understanding that, according to Gonçalves (2006), the recycling production network is composed of middlemen (also known by waste pickers as 'scrap dealers') and businessmen, the author states that middlemen fulfill the role of direct negotiation with the industry, which directly contributes to the marginalization of waste pickers, even if they are framed as fundamental pillars for the maintenance of the 'garbage game'.

This fact also occurs because, based on the notion that recyclable material collectors are established in this work practice by the need for survival and, thus, their work is signified by the scarcity of monetary capital. This is related to the disparity between the actors that make up this power relationship, based on economic possession, as well as on the immediate need for money on the part of the collectors of recyclable material, obtained by selling their labor power and the materials collected to the middlemen.

This need is met and, if negotiated with the entrepreneurs of the industry, it is done differently in relation to the payment of this material – and also the sorting of it -, in addition to what has been previously demonstrated about the 'non-rationality' of the subject who, through mechanisms and strategies, absents the worker linked to the collection of material from the knowledge about the importance of his work, as well as regarding the logic of commercial operation of this material, thus excluding the possibility of direct negotiation. In other words, Gonçalves highlights:

Thus, in order to participate profitably in this trade network, the scrap dealer must have, in addition to knowledge about the functioning of the recyclable waste market in its various scales, with a basic infrastructure that presupposes the existence of a place for storage, machines and people who will do the separation and pressing and vehicle(s) for transporting the goods from the dumps to the warehouses (GONÇALVES, 2006, p. 80).

The author also advances the notion that the maintenance of the direct exploitation of the scrap dealers towards the waste pickers, maintained through the logic of an affirmed

and accepted discourse, is placed as a pseudo-discourse of improvement in the relationship between scrap dealer and waste picker, disguising the inequality of power imprinted in this relationship from an understanding that the scrap dealer collaborates with the income of the waste picker, because he establishes himself as a buyer (client) of the collector.

Thus, in the same way as the other authors, Gonçalves also understands the recycling of urban solid waste in his labor relations, according to a network that corresponds directly to the logic of the capitalist system of production, since it is based on uneven development and, of course, on the unequal relationship between the actors that compose it, a direct way in which profit is produced intrinsically to the exploitation of the worker, which constitutes the fundamental basis of the chain of recycling, as well, is established as the main exploited in this chain.

As the discussion addressed throughout this review demonstrates, the theme that corresponds to this reflection should be considered as emerging in the Field of Brazilian Geography, especially when it comes to labor relations and the need for clarification and elucidation about these relations that, like the relations that correspond to the capitalist logic, are established in an unbalanced way, praising certain subjects to the detriment of others.

The authors who correspond geographically or in consonance with the geographical discussion with the theme presented, evidence and seem to prove that the recycling network, which refers to spatially and territorially constituting the Brazilian social reality, corresponds to an important component in the capitalist logic, in the paradoxical relationship between the economic development of a certain class and the non-development of another. As Santos (2006) translates, the maintenance of the upper circuit of the economy depends on the exploration of the lower circuit and, therefore, strategies are produced to maintain this logic – such as the one presented in this reflection, signified in the unequal relationship between the nodes that make up the network that is addressed here.

Obviously, this review does not demonstrate that this specific field of scientific analysis is saturated, however, as demonstrated through the survey pointed out in the first paragraphs, it represents a starting point through which it is possible to understand the logics that involve the social and work relations that make up the Brazilian reality, evidencing, through the scientific discourse, the need to look at certain subjects and the

way in which the social reality that plagues the country, signified by the capitalist system, it needs to change its logic for a relationship closer to the balance of the actors that make up the recycling network.

THE ACTORS WHO MAKE UP THE "GARBAGE GAME" IN RIO DE JANEIRO

According to direct observation and the documents analyzed, the actors that make up the recycling of the state of Rio de Janeiro are articulated in social and productive networks. However, there is a variation in the recycling network, depending on the product, as Rosado teaches us about the garbage game: "The human world becomes the space of relationships built according to the positions (positions in the game) and the evaluation that social actors make of them" (ROSADO, 2009, p. 208). Thus, this author helps us to understand the social space as a field of forces, in which social actors are defined by their relative positions.

According to Costa and Chaves (2012), the expansion of the recycling industry is directly linked to the environmental crisis of capitalism. In turn, the institution of production networks is composed of different actors, and can be detached, in a schematic way, according to the main functions in: (i) waste pickers; (ii) purchasers; (iii) middlemen; and (iv) entrepreneurs.

Costa and Chaves (2012) argue that, although waste pickers are largely on the margins of the relationships that institute the network, they establish themselves as fundamental to its maintenance. Without the practices of these subjects, there is no possibility of supplying the material to the other actors.

However, according to a study carried out by PANGEA, the technological advances that have occurred in the last twelve years put in check the work of recyclable material collectors, making them replaceable or minimizing the need for their presence. According to the latest studies, only in the last decade have cooperatives been able to have a pet and glass separation machine by color, a conveyor belt and a press machine in accordance with work safety standards. In addition, according to Cruz (2020), the first business control software - CATAsig, developed by the author, has also been used in recent years.

Costa and Chaves (2012) also state that the recycling industry can be seen as a pyramid, according to the relationships established, as highlighted in the following excerpt:

The constant transformations resulting from the structural crisis of capital have placed the recycling industry as a segment of great expression, whose territorialization brings together the other agents (collectors, buyers, middlemen and

entrepreneurs) that make up and sustain this circuit, with the waste picker workers being the basis of the process, that is, the structure of the production chain of the recycling industry understood as pyramidal, constituting the base millions of collectors, in the intermediate range the middlemen and at the top the still small number of industries that have the reuse of materials as raw material. (COSTA and CHAVES, 2012, p. 03).

To go beyond the interpretation of the recycling production chain, we turn to Rosado (2009), to understand that there is a network with unequal practices and actions, according to the social position they occupy. By looking exclusively at the composition of the production chain, Costa and Chaves (2012) identify four actors: "street" waste pickers and cooperative waste pickers, buyers, middlemen and entrepreneurs. However, from the perspective of the network, we can see at least ten actors. The concept of network, in addition to being directly linked to the different relations present in the social exchanges that involve a geographical network, is specifically associated with the contemporary capitalist system, which Castells (1999) defines as a society directly organized from information networks⁷.

In this way, the analysis from the production networks allows us to explain in a broader way the processes of the spatial economy of recycling. In addition to including the actors in the production chain, the network also includes the actors that contribute to the formation, organization, operation, mediation and regulation of each of the circuits within the network. Thus, we understand that the institution of a (geographical) network derives from the social, material and immaterial relations of the subjects and actors that compose it.

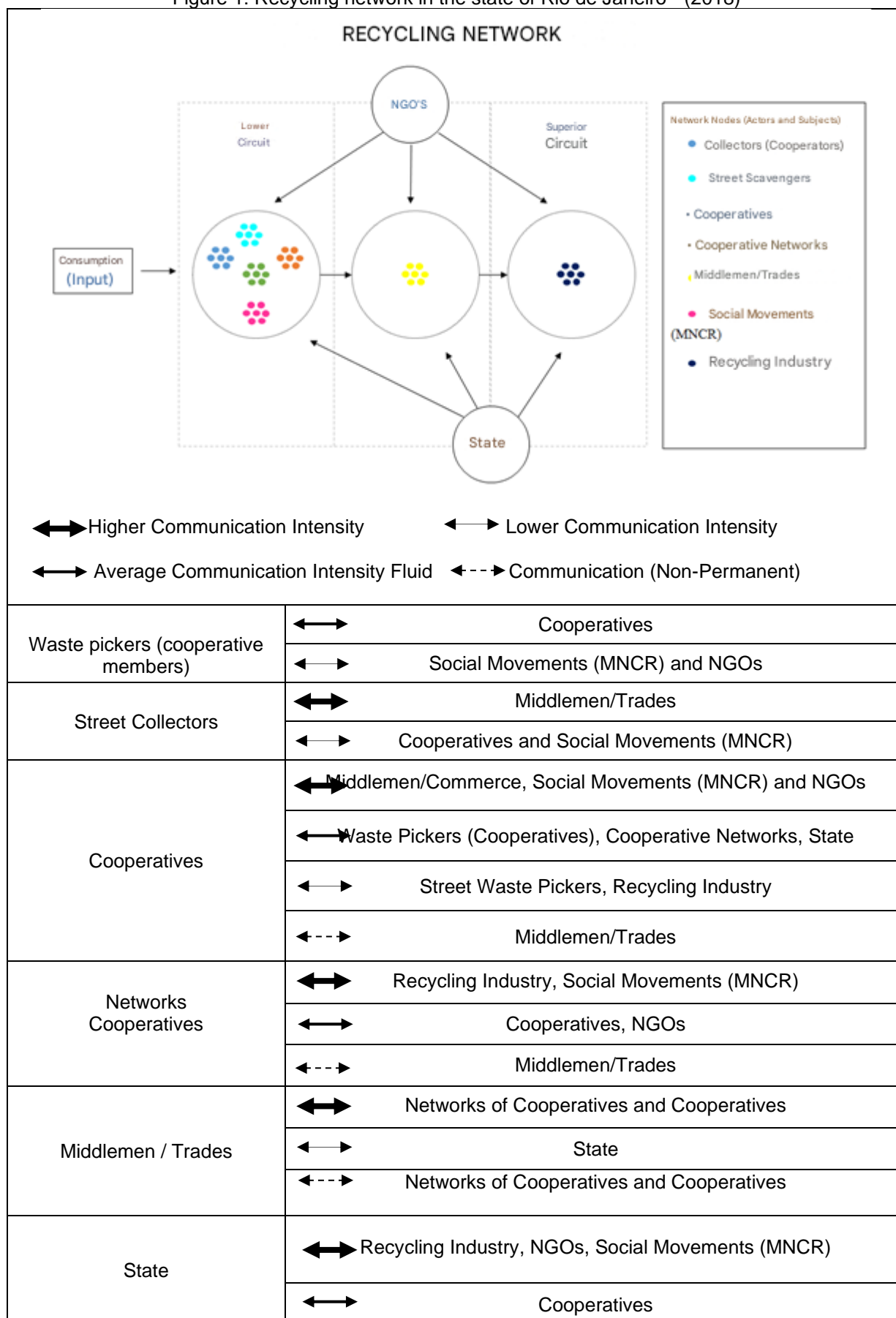
An important point regarding social relations and exchanges in the recycling production network concerns the inequality of power. According to Foucault (1995), power refers to a certain number of practices and actions that correspond to each other, beyond what is popularly understood about someone's power over another or over something, that is, in a unilateral way.

According to the author, the concept comprises a force or a set of forces (practices and/or actions) that are constituted in the most different ways, depending on the way they

⁷ Castells (1999) states that, until the beginning of the 90s of the twentieth century, a restructuring of capitalism was sought around a rediscovery of identity or even an attempt to rescue national identity in some countries, such as Japan. According to the author, although the restructuring of capitalism is also related to a society of informational networks (communication), it is through this new configuration that 'postmodernity' is organized, in much more interconnected relations, facilitated by the means of communication and information and, currently, closely related, for example, to instant communication technologies – such as cell phones, computers, tablets, etc.

relate and tension. Therefore, it is valid to state that the recycling production network is composed of power relations that stratify the actors and subjects according to their roles and, as a result of these relations, the subjects assume political postures of mediator and mediated in the recycling network. The subjects take the form of mediators or mediators at all times, according to the circumstance, whether in the mediation of conflicts or in the search for representativeness with the public power.

Figure 1: Recycling network in the state of Rio de Janeiro - (2018)



	↔ Middlemen/Trades
NGOs	↔ Cooperatives, State and Social Movements (MNCR)
	↔ Cooperative Networks
	↔ Waste pickers (cooperative members)
Social Movements (MNCR)	↔ NGOs, Cooperatives, Cooperative Networks, State and Recycling Industry
	↔ Waste Pickers (Cooperative Members), Street Waste Pickers
Recycling Industry	↔ Networks of Cooperatives, Middlemen/Commerces and Social Movements (MNCR)
	↔ Cooperatives

Source: The authors, 2025.

Figure 1, above, seeks to understand the organization and interrelations of the Recycling Production Network of the State of Rio de Janeiro (RRERJ). To do so, it is necessary to explain the nodes that make up this network – represented by multicolored circles – and the connections between the nodes – represented by arrows of different sizes.

Each of the circles, represented above by different colors, corresponds to specific actors of the Recycling Production Network. It is noted that each of these actors, which correspond to the nodes of the network, is related to each other, with different degrees of intensity. To establish the flows, 10 people from the following networks were interviewed: Cata Sonho, Mesc, Febracom, Rede Movimento, Rede Recicla Rio.

In turn, the intensity of communication between these subjects is represented by the thickness of the strokes (which illustrate the exchange of information), in four different stages, inversely proportional: higher intensity of communication, medium intensity of communication, lower intensity of communication and fluid communication (non-permanent).

According to the central question of this reflection, the subjects on which we have established the focus are the street collectors (non-cooperative workers), who represent the majority of the subjects that make up this network. According to the National Movement of Waste Pickers, 90% of the waste pickers and only 10% are properly cooperated. In addition to being in almost all of the general number of waste pickers, they develop their work in a precarious way, without legal support to protect the worker and are still

conditioned to the exploitation of middlemen, thus establishing a relationship of power of exploitation and a sub-human work relationship.

Thus, because they are in greater number, they represent the fundamental basis for its maintenance, as they are responsible for the largest number of material collected and traded, which is why RRERJ is maintained⁸. Non-cooperative workers constitute three webs of communication with other actors, with different intensities: social movements (National Movement of Recyclable Material Collectors), cooperatives and middlemen/commerce. The first two webs of communication observed are constituted as connections of lesser intensity (social movements and cooperatives), as these are less represented in relation to the State and industries, as they are able to impose

It is worth noting that these connections occur in a way that corresponds to the interests of these actors and that, although they do not constitute connections of medium or greater intensity, they represent relationships that remain based on the interests of these actors. The weakened relationship of non-cooperative workers (street collectors) with cooperatives contributes to the intensification of inequality in their negotiation with middlemen/merchants, in the sale of the collected material. Once collected, the non-cooperative collector finds himself at a commercial disadvantage, since he is unable to negotiate his material with the cooperatives and is forced to negotiate with middlemen who, although they pay for the material immediately, devalue the negotiated product. Silva (2017) argues that cooperatives have the role of bringing to light the needs and issues related to urban solid waste collectors.

This dynamic also interferes directly in the labor relations that involve the upper and lower circuits of this industry, through the development of public policies that take into account the non-precariousness of work and, adding to this discussion, the overexploitation of these workers, based on the purchase and sale value of the scrap.

In this sense, when we look at the more intense relationship present in the RRERJ, with regard to the non-cooperative waste pickers, the intense relationship between these workers and the middlemen/trade is noticeable. The way in which this negotiation is established and, in turn, the maintenance of the network and the recycling industry, is permeated precisely by the absence of representativeness of cooperatives in favor of the

⁸ It is valid to state that each actor that constitutes RRERJ has its own specificities and a sphere of importance. The reason why we will not address these other subjects is based on the justification already presented in the introduction of this reflection, regarding the fact that 80% of the questioned (who are the base of the Network) are street workers – not cooperatives.

(financial) valorization of the work of these collectors, being an important factor in the generation of profit based on unpaid work, since the middlemen/trade constitute an important and intense relationship with the industry.

With the discussion about the concept of network and the interface with infographic 1, we expose, in this subsection, the way in which the organization of RRERJ corresponds directly to the maintenance of the recycling industry, based on the unequal relationship (of power) between the actors focused on this research, the collectors of recyclable materials.

The following table corresponds to an introductory model that serves as a starting point for understanding the actors that make up the recycling production network, based on a general overview. It is necessary to state that, although there are important characteristics demonstrated in this table, I consider, at this moment, only a simplification, a synthesis of these actors.

Frame 2: Actors and their economic role in the Recycling Production Network - RJ

ACTORS	DEFINITION OF THE ECONOMIC ROLE
Waste pickers	There are 36,238 people who are part of the recycling network who collect recyclable materials directly from the streets and trash cans and sell them to merchants or directly to recycling industries. There is a high level of informality in this segment. They practice scavenging as a way of acquiring income for the family's subsistence.
Disorganized waste pickers: they act individually, without a formal relationship with a collective organized by waste pickers. Therefore, they do not participate in any initiative to formalize their work activities. They collect directly from consumers or in warehouses and sell to small merchants/intermediaries.	
Semi-organized waste pickers: they work in conjunction with the collective of waste pickers in formation, although not yet legalized, acting informally. They collect directly from consumers or in warehouses and sell to small merchants/intermediaries.	
Organized waste pickers: they are formalized in waste pickers' organizations. They collect directly from consumers or in warehouses and sell to small and medium merchants and recycling industries and, in some cases, they are organized in marketing networks and few add value to production in the field of transformation.	
Merchants/Intermediaries	They are the actors that are part of the network that buys recyclable materials from waste pickers of different sizes, organized or not. They sell to other larger intermediary traders or directly to recycling industries. There is a considerable level of informality in this segment.
Waste picker agents: Informal traders who are not regularly constituted. They do not maintain any type of formalization. Often it is former waste pickers who have come to control the commercialization of recyclables on a local scale. They practice extremely low prices for the purchase of materials and subordinate the group of collectors in the neighborhoods who, having no alternatives for the commercialization of their materials, agree to carry out the daily sale, in order to obtain some resource for their livelihood. With some frequency the practice of "renting" carts to be paid in cash or with food is found. They resell the purchased materials to merchants located at points higher in the marketing circuit (usually <i>deposeiros</i>) or intermediate medium-sized dealers. In	

<p>episodic situations, these agents also partially or totally control drug trafficking in their region of operation.</p>	
<p>Middlemen: small traders, mostly informal, who control the flow of sorted or unsorted materials, collected by isolated collectors or by low-efficiency cooperatives. When they are formally constituted, they may come to call themselves collectors' cooperatives, to facilitate access to public investments. They find the term "middleman" deeply offensive, even though the big scrap dealers also often call them that. In general, they do not have ample storage spaces, which means that recyclable materials remain in their domains for a very short time: the transfer to the industry is almost always made in very short terms, often on a daily basis. Most of the time, they do not process recyclable materials before resale. Namely, the average production of a low-efficiency cooperative is around 20 tons, the medium-efficiency one varies from 50 to 100 tons, and the high-efficiency one above 100 tons.</p>	
<p>Warehouse Owners: medium-sized merchants, better known as <i>deposeiros</i>, usually formalized, with their own CNPJs and with some capacity to store materials. The traditional and old owners of junkyards are included here. Most of the time, they are fond of accounting practice and are proud of the social role they understand they play within the recycling production networks. Most <i>deposeiros</i> are not willing to expand their business, nor do they carry out any transformation of the materials stored there. They study the moment to acquire materials when there is an excess of supply at reduced prices, either from collectors and their collection points, or from other less organized merchants, reselling them, at more attractive prices, in times of scarcity and demand from the recycling industry.</p>	
<p>Medium-Sized Intermediaries: are 96 formally established traders, often specialized in certain types and specific groups of recyclable materials, with direct buying and selling contacts with the recycling or reselling industries and to large scrap dealers. They often keep quotas reserved for the resale of recyclable materials, stored in their facilities. They acquire these materials from isolated waste pickers, waste pickers' cooperatives and less organized merchants. Often, some pre-process the materials in their own facilities – sorting, baling, weighing and packaging – even using hired labor from former waste pickers. Most maintain the goal of becoming a large scrap dealer – seeking to dominate segments of urban and regional logistics.</p>	
<p>Large Scrap Dealers: the term already represents it. They are large-scale, formally established merchants who seek to control the markets of the circuit of commercialization of various types of products. They maintain close relations with the recycling industries, given their characteristics of regular supply and quality assurance of the recyclable material sold by them. In general, they prefer to purchase materials that have already been sorted, cleaned and baled. For this reason, they work, as a priority, with cooperatives with high and medium productive efficiencies; intermediate middlemen and <i>deposeiros</i>. Often, large scrap dealers have fleets of cargo vehicles that allow their direct access to the physical and logistical networks of effective commercial intermediation. Some carry out pre-industrialization stages. It is remarkable the fact, recently verified, that some recycling industries have started the process of <i>verticalization downwards</i> – occupying the commercialization circuits the place previously reserved for the large scrap dealer.</p>	
<p>Recycling Industry</p>	<p>There are 119 formalized companies that carry out the process of transforming solid waste, involving changes in its physical, physical-chemical or biological properties, with a view to transforming them into inputs or new products, which are sold to final consumers or other processing industries. These industries are organized by the following classifications: tire, paper, plastic, metal and glass, however, in this research, we will emphasize plastic, long life, metal, glass and paper and other materials. In each of these production networks, new subdivisions are observed, among which the plastic sector is the most diversified. It needs scale and regularity of material supply, which ends up favoring large intermediaries as its main suppliers.</p>
<p>Plastic processing industries: it is the most diversified of the recycling industries, with possibilities of adding value to PP (polypropylene), PS (polystyrene), HDPE (high-density polyethylene), LDPE (low-density polyethylene), among others. The industrial sizes are of different modalities, including small, medium and large industrial plants that can use the materials mentioned above individually or together.</p>	

<p>Glass Processing Industries: there are no major subdivisions. Due to the difficulty of collection, in view of the low purchase prices, they often act directly as collectors of this material. It has a serious logistical problem, due to the competition of illegal piracy structures (copying or imitating something, reproducing, distributing or selling products and services on the black market), which offer better <i>per capita</i> prices for waste picker and merchant organizations.</p>
<p>Metal Processing Industries: it has a small, medium and large production network and covers several social actors, some with a high participation of collectors and traders (as in the case of aluminum cans) and others that do without these actors, such as those that are recyclable, captured from post-industrial waste. Currently represented by 9 metal processing industries, located in Duque de Caxias and Itaguaí.</p>

<p>Paper and Corrugated Cardboard Processing Industries: of the recyclables, it is the one most collected by suppliers, representing about 40% on average of total revenue. The industries are few and medium and large, which end up constituting an oligopsony, which is also valid for the glass and metal industry. Currently represented by 7 paper and corrugated cardboard processing industries.</p>	
<p>Cooperative Networks</p>	<p>It is responsible for giving scale and regularity to the commercialization of recyclable materials, integrating the logistical operation of collection, standardizing the sorting and baling of materials and carrying out the integrated commercialization of the various unique cooperatives that make up the network. There are 136 recyclable material cooperatives. In the region surveyed we have the following: Cata Sonhos, Mesc, Febracom, Rede Movimento, Rede Recicla Rio.</p>
<p>State</p>	<p>It stimulates the recycling production network, through the implementation of policies for the social and economic inclusion of waste pickers and other actors/subjects in the network. It carries out tax policies that encourage the addition of value to recyclable materials. Recognizes the provision of services provided by collectors' cooperatives, through payment for urban environmental services, differentiated tax burden, simplified operating license. It is to implement the legal arrangement already available such as Law 11445/07 and Law 12305/10.</p>
<p>NGOs/Universities</p>	<p>They provide technical assistance to waste pickers' organizations, carry out training in management, vocational and citizenship skills, aiming to build the autonomy of cooperatives and the long-term sustainability of these organizations. They also prepare studies and research, aiming to add new knowledge, which can be applied to the recycling production network. Among the NGOs we have: PANGEA, Guardians of the Sea, Mesc, National Movement of Waste Pickers and Viva Rio. Among the universities we have: UERJ, UFRJ, UNIRIO, UFRRJ and UFF.</p>
<p>Social Movements</p>	<p>The National Movement of Waste Pickers of Recyclable Materials (MNCR) emerged in mid-1999, with the 1st National Meeting of Paper Waste Pickers, being founded in June 2001 at the 1st National Congress of Waste Pickers in Brasília, an event that brought together more than 1,700 waste pickers. At the congress, the 'Letter from Brasilia' was launched, a document that expressed the demands of this segment that survived from the collection of recyclable materials.</p> <p>The origin of the MNCR occurs from a matrix of Catholic and Protestant movements, based in urban areas, represented by institutions such as CARITAS, Lutheran Foundation, OAF – Fraternal Aid Organization, INSEA Institute, Street Pastoral, among others that worked with a</p>

	<p>focus on the homeless population of the large Brazilian metropolises. The function of the movement in the recycling network is fundraising, project management, professional training, meeting the demands of equipment, such as presses, conveyors, scales, trucks, computerization, technical studies, technical staff present in the cooperatives, among others. They are: I am a waste picker movement - Mesc, National Movement of waste pickers - MNCR.</p>
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Source: DAMÁSIO, J. coord. (2009) - "Economic Diagnosis of Recyclable Material Collectors in the Metropolitan Region of Rio de Janeiro", adapted by the authors.

The division of labor in warehouses is also a point of dispute, as this division of labor is not always fair. With this, productivity methods are created in which the apportionment of the amount collected is based on individual productivity. The same dispute occurs in relation to spaces, since some collectors constitute domain in some collection points, making the collected material individual and not collective property.

On the other hand, the apportionment system adopted by some cooperatives, which stipulates a minimum production target to reach a minimum wage, continues with concerns that permeate social security rights, paying the social security guide for waste pickers. There is also a concern to qualify the waste picker, with the offer of courses that reach their daily work, that is, cooperativism, public policies for the waste picker, organization of the production of recyclable materials, safety at work and the Brazilian code of occupations, the market for recyclable materials and network marketing, legal arrangements for waste management and social and economic inclusion of waste pickers, financial and accounting management of cooperatives, budget and financial planning, among others.

That is, on the one hand, the upper circuit works for the accumulation of wealth, while the lower works for the subsistence of agents and firms of the lower itself, and, moreover, providing value and wealth in labor, which is collected and drained through networks of intermediaries and middlemen, culminating in part in the wealth accumulated in their actors and firms, and, above all, from the upper circuit.

The activity of recyclable material collector emerges as an alternative for marginalized individuals, who did not have adequate access to schooling and the growing need for specialization required by the formal labor market. "It is above all a matter of surviving and ensuring the daily life of the family..." (SANTOS, 2008, p. 46). It is, therefore, a matter of ensuring survival, in the same proportion as they struggle to have access to acquired rights, such as education, health, housing, social security and food.

FINAL CONSIDERATIONS

The idea of production chain has been used by the Applied Social Sciences, especially in Economics, Administration and Production Engineering, and has several conceptual formulations. This fragmentation of the studies of geographic space, even though it is directly related to economics, politics, law and culture, is configured as a challenge, since they are part of an inseparable whole that complements and distinguishes each other. Thus, the concepts of production chain and spatial productive circuit belong to studies of specific disciplines, although they share common assumptions and analytical procedures.

In this sense, thinking about production networks presumes understanding the role of all the actors/subjects/agents that compose them, obviously safeguarding the position and power of each one in the social relations that make up the network.

Therefore, the objective of this work was to understand what the recyclable production networks are, their operation and their main aspects, mainly social, since it is a network that moves from the work of several subjects, whether they are collectors, middlemen, among others.

In addition, it was sought to reveal how the work of these subjects is, specifically in Rio de Janeiro, as protagonists of this network of production and this work, although they are pushed by society to a place of invisibility and subalternity, daily exploited as informal workers and without legitimate recognition as formal workers. Although they perform functions of paramount importance to society, they perform their activities outside of what is accepted, as well as usually settling at strategic points around the dumps, where the tailings will generally be disposed of irregularly, which is configured as an environmental crime. This is due to the State's absence in offering this type of selective collection or providing landfill or transshipment area in these regions, thus encouraging private companies to provide an unqualified service and with unconventional commercial arrangements.

Finally, it was found that the recycling networks are part of a system composed of several social actors playing important roles, however, at the same time that the collectors of recyclable material make up the weakest link in the recycling production network or, of the 'garbage game', the non-existence of these workers would correspond to the non-existence of the network as it is, particularly when it refers to the existence of this network under an aspect of the Brazilian peripheral reality, being an alternative for the survival and

guarantee of the basic needs of marginalized individuals, who did not have adequate access to schooling and the growing need for specialization required by the formal labor market.

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