Commercialization circuits of the urban economy of recycling in Rio de Janeiro[1]

Circuitos de comercialização da economia urbana da reciclagem fluminense

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Abstract
With the growth of capitalism, which ends up generating more garbage due to its industrialized products, research on solid waste has also grown, including in the area of geography, which addresses the various aspects of collection and recycling. Therefore, due to the importance of understanding the social subjects involved in this recycling process, this article seeks to do a bibliographic review that unveils the commercialization circuits of the urban economy, in order to understand the various forms of theoretical analysis involved in the phenomenon of picking and recycling. Also, it discusses the contemporary concept of networks and how they are articulated between organizations, surveying the recycling production network of the state of Rio Janeiro. Therefore, it is worth emphasizing the importance of studying this concept of spatial circuit today, since it allows us to identify and know the logic of territories and networks, where the modes of production, circulation, and interactions between the subjects that are inserted are always renewed in the context of recycling and the "Junk Game".

Keywords: Garbage picking, Recycling, Circuits of the urban economy, Marketing circuits.

Resumo
Com o crescimento do capitalismo, que acaba gerando mais lixo em razão de seus produtos industrializados, também cresceram as pesquisas sobre os resíduos sólidos, inclusive da área da geografia, que abordam os variados aspectos da catação e da reciclagem. Portanto, devido à importância de se compreender os sujeitos sociais envolvidos nesse processo de reciclagem, este artigo busca fazer uma revisão bibliográfica que desvela os circuitos de comercialização da economia urbana, com o intuito de conhecer as diversas formas de análises teóricas envoltas no fenômeno da catação e da reciclagem. Também, discute o conceito contemporâneo de rede e como elas se articulam entre as organizações, fazendo um levantamento acerca da rede de produção da reciclagem do Estado do Rio Janeiro. Portanto, cabe ressaltar a importância do estudo desse conceito de circuito espacial na atualidade, já que permite identificar e conhecer a lógica dos territórios e das redes, onde são sempre renovados os modos de produção, circulação, e as interações entre os sujeitos que estão inseridos no contexto da reciclagem e do "Jogo do Lixo" .
Palavras–chave: Catação, Reciclagem, Circuitos da economia urbana, Circuitos de comercialização.

[1] Initial words, Circuits of commercialization of the urban economy of recycling fluminense. This article is part of the research "Recycling production networks in the state of Rio de Janeiro: spatial circuits and the challenges of waste pickers of recyclable materials." completed in the Master's degree in Geography - Master's Program in Geography, college of teacher training of UERJ, in the line of research - Geography and Power Relations.

1. INTRODUCTION

In recent decades, with the rise of capitalism, solid waste has been researched by several areas, including geography, which, through social-geographic bias, seeks to address the aspects of waste picking and recycling concerning the socio-environmental impacts on urban space and the social relations composed in these phenomena that represent the practice of social subjects who have their lives marked vehemently by the exclusionary and exploitative functioning of work in the capitalist system of production.

Thus, one cannot fail to resort to the social subjects involved in this recycling process, since the production of excess solid waste, a consequence of the overproduction of capitalism, requires that someone performs its management and that someone is almost always represented by the work of a population that is exploited and neglected by society, which suffers from low incomes and is poorly qualified to perform other functions in the production networks.

Therefore, this article seeks to make a bibliographic review on the commercialization circuits of the urban economy, in order to know the various possible forms of theoretical interpretation of the phenomenon of garbage picking and recycling. The primary orientation is that these subjects live their daily lives under the bases of unequal geographic networks, which mainly serve capitalist logic, with their social differences based on classes.

The discussion of this article is divided into two parts. The first one, "garbage picking from the theory of the circuits of the urban economy", seeks to understand the positions occupied by peripheral social subjects within the logic of capitalist production. Arroyo (2008) mentions in his studies about the comprehension of the city and man in its entirety, with all its specificities; and Santos (2008), who talks about the differences between production and consumption and on how social selectivity delimits consumption, since the ability to consume is not the same qualitatively and quantitatively for all social classes.

In addition, this chapter deals with the concept of productive spatial circuits and the emergence of two economic circuits of peripheral countries' cities, which are responsible for the economic process and organization of space, and are departing from a need to adapt to a new social reality. Thus, the superior circuit results directly from technological modernization, making up the activities created as a function of the monopolistic reproduction of capital from corporations and working for the accumulation of wealth. On the other hand, the lower circuit is an indirect result of this technological modernization. It emerges from local poverty conditions, being central to the maintenance of the peripheral capitalist system and its unequal morphology, and necessary to the perception of the peripheral urban reality, taking into account the conservation of its function as a distinct provider of jobs for the generation of income and satisfaction of basic life needs.

The second part, “Commercialization Circuit”, surveys the recycling production network of the state of Rio Janeiro, working on the contemporary concept of network and how networks seek to reconstruct forms of articulation between organizations (and even individuals) based on new paradigms such as: horizontality, flexibility, interconnectedness, decentralization, participation, insubordination, among others. Additionally, it analyzes essential data and information about the marketing circuit that operates in Rio de Janeiro.

When one observes the ennading plot between the two circuits of the recycling production network, it is possible to perceive the inequality in power relations and cooperatives and waste pickers represent the lower circuit, with the marginalization of their subjects and large garbage collection companies, with their organized and structured operation, represent the superior circuit, since they treat garbage as a profit-generating business. And, mediating the value and work between these two circuits, there is an intricate network of intermediaries and middlemen.

Accordingly, it is essential to understand that in the recycling network, as much as the power comes from different poles and different subjects, there will always be a movement of forces between them, which ends up ordering them hierarchically and unequally.

2. MATERIALS AND METHODS

The methodological path for the realization of this article on the organization of recycling circuits in the state of Rio de Janeiro, aiming to understand the performance of the actors involved; and, also, the conflicts and barriers existing in the production of recycling, either in the implementation of public policies or within the limits of collective actions. In addition, we intend to analyze the socioeconomic situation of waste pickers based on data collected by PANGEA (2018). The proposed approach encompasses a broad spectrum of processes, actions and social and spatial relations, which require different methodological, qualitative and quantitative procedures.

Understanding that the research should 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, coming from PANGEA databases, to analyze the capital-work relationship and the socioeconomic condition of waste pickers, as qualitative data, derived from document analysis and, mainly, from the experience lived by the researcher in the field of recycling. In this, 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 for 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 they operated? Which networks did the

cooperatives belong to? What would be the most marketable materials? What are the criteria for network support? What are the main challenges? To answer these questions, the networks were searched, and interviews were conducted with the foremost leaders of each network, which cover all existing networks in the state of Rio de Janeiro:

Table 1 - Field research and participating actors

Cooperative	Address	President / Interviewee	Date	Network
Re-cooperating from Itaboraí	Rua José Leandro, s/n, lote 57 quadra 20 -	Maria Helena Rosa de Almeida	04/06/2018	Cata Dream
Association of Waste Pickers of the Gramacho Garden Metropolitan Landfill (ACAMJG)	Rua Almirante Midosi, lote 16, quadra 42 - Jardim Gramacho - Duque de Caxias	Sebastian 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	Recycles River
Recycling for Living Cooperative - RPV	Av. Marechal Câmara, 350 - Rio de Janeiro	Custódio da Silva Chaves	14/06/2018	Network Movement
COOPAMA	Rua Miguel Ângelo, 385 - Maria da Graça	Cibelia Antonia dos Santos and Luiz Antonio do Couto	21/06/2018	Febracom

Source: The author, 2018.

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

At the same time, it was pertinent to promote the collection of secondary data from the recycling sector, as well as IBGE, IPEA, laws, articles, theses, reports, dissertations, in which it is intended to outline an overview of the functioning of recycling in the state: the types of materials collected (i.e., the networks of paper, plastic, aluminium, OGR, cardboard). According to Silva e Mendes, “documentary research represents a resource capable of bringing important research contributions because it can help in understanding the facts. Thus, documents deserve special attention in qualitative studies” (2013, p. 210).[2]

We mapped the organization of all recycling production networks existing in the state of Rio de Janeiro, identifying: cooperatives; private companies; public bodies; and other actors working in these networks. From the interviews, but not only, but we also sought to verify the conflicts, tensions and institutional barriers within the organization and operation of the recycling production network.

[2] Waste Oils and Fats - OGR.

We chose to perform the semi-open interview model, with a pre-established script, because it recognizes the importance of qualitative research as a way of understanding the actors involved and their actions. In this sense, "field research is a means and not a goal in itself. It is the research indispensable to the analysis of the social situation. This is a social situation and not a spatial situation" (KAISER, 2006, p. 97). For the author, the social situation, from the Marxist perspective, is fundamentally the product of history. Alternatively, it is the product of class warfare, as it translates on the ground. Finally, he contributes to us: "the analysis of the situation must take everything into account: in essence, it is what is called today a system analysis. The local situation is, in fact, a subsystem, of metasystem, representing social formation" (KAISER, 2006, p. 97). Besides, the author stresses for the attention that the researcher should have, to what is produced in the daily lives of those who are inserted in the field research:

> For this, the family member, daily life, is essential, the significant. And social analysis must be made from what is at the heart of people's lives, from what conditions their current existence and their future, from what the past has made of them. Hence the importance of cultural and political levels. The researcher must be warned not to be distracted by the anecdotal, the strange, the singular. It is one thing to observe to try to understand, to record the phenomena to interpret them, with the support of the general explanation; another is to go "to research" as who goes to the zoo or safari! (KAISER, 2006, p. 100).

We understand the relevance of fieldwork, which must be done directly, as Borges points out, in which "... the researcher must integrate into the group, analyzing it from the inside out, through daily experiences and coexistences" (p. 186). According to the author, participant observation is the technique that some authors call a method: "For those who venture into the field search for the understanding of the various human manifestations in space, especially when directly related to culture, participant observation has been able to provide good tools to identify and establish relationships with theoretical studies" (BORGES, 2009, p. 185).

Thinking about it, we launch ourselves in the search for understanding the daily processes of recycling in Rio de Janeiro, "through the memories of people and the reconstitution they make of the history they have learned, the great determinant traits of the current situation clearly appear" (KAISER, 2006, p. 99). From the narratives of the actors and subjects of the recycling production network, we seek to learn from them.

3. GARBAGE PICKING FROM THE THEORY OF THE CIRCUITS OF URBAN ECONOMY

Santos (2008) proposes, in the 1970s, a spatial analysis from the circuits of the urban economy (lower/upper), to problematize the peripheral capitalism countries' cities. The notion of inferior and superior circuits, therefore, is based on the logic of capitalist production, in the global

periphery, where social subjects occupy certain positions, tied to their practices and actions, in the process of reproduction and circulation of capital. However, this analytical look of the two circuits needs to go beyond the economic approach strictly. For Arroyo (2008), it is essential to see the city always with totality, not depending on its size and location, besides understanding the different phases of the general production process – production, distribution, commercialization and consumption: "It is necessary to understand it as the place of the production of social life and as the place of life itself, comprising man in all dimensions of his existence, in addition to work and consumption" (ARROYO, 2008, p. 2).

According to Santos (2008), production tends to focus on certain parts of the territory, while consumption responds to space dispersion forces. In the case of the production of recycled material, however, it is noted that the first stage of production begins in a dispersed way, from the work of a collection of waste pickers. Social selectivity acts as a delimiting of consumption since the ability to consume is not the same qualitatively and quantitatively for all social classes, nor all places.

Although modernizations are commanded by the strength of corporations, in the current period, there is a diffusion of information and consumption, which is a fundamental factor of transformation of the economy, society and space. The economic apparatus, then, needs to adapt both to the imperatives of a robust multi-scale modernization and the spatially constituted social realities, thus emerging two economic circuits of peripheral countries' cities, responsible not only for the economic process but also for the process of space organization:

> The upper circuit originated directly from technological modernization and its most representative elements today are monopolies. The essence of their relations takes place outside the city and the region that shelters them and has as scenery the country or the outside. The lower circuit, formed of small activities and interested mainly to poor populations, is, on the contrary, well-rooted and maintains privileged relations with their region (SANTOS, 2008, p. 22).

That is, the upper circuit is the direct result of technological modernization and consists of activities created as a function of the monopolistic reproduction of capital from corporations; while the lower circuit is an indirect reflection of technological modernization, emerging, above all, from local poverty conditions, being linked to the reproduction of life itself. "[...] The fundamental difference between the activities of the lower circuit and those of the upper circuit is based on differences in technology and organization" (SANTOS, 2008, p. 43). However, in the lower circuit, the use of new technologies cannot be totally disregarded, since it makes use of the mobile phone, computer, printer and internet frequently to perform its activities, as is done the continuous use of

these new technologies in cooperatives of recyclable materials, for example. Although not on the same scale of incorporation of the technology of the upper circuit, much more modernized.

Cataia and Silva point out that "[...] the increasing interdependence of the places made possible by the technical systems, required to incorporate new elements into the analyses of the urban economy..." (CATAIA; SILVA, 2013, p. 55). With contemporary changes, other factors began to be considered, such as the expansion of credit as a fundamental element for the expansion of consumption and the use of new technologies in the lower circuit, previously accessible only to the superior circuit. Also the scales and scope of the lower circuit have changed places and, more limited to the city, increasingly involve regional, national and international connections.

Each circuit constitutes, in itself, a system, or rather, a subsystem of the urban system, maintaining with the city space a particular type of relations. It is necessary, however, to take into account "[...] the lower circuit as an indispensable element for the apprehension of the urban reality and to attribute to this circuit a higher productivity and sustained growth, while preserving its role as a privileged supplier of jobs" (SANTOS, 2008, p. 23). The author also points out that individuals directly connected to the lower circuit are not a productive force that produces exclusively for this circuit, since they can sometimes sell their work also in the upper circuit or even transfer added value and perpetuate the concentrated accumulation of capital, through other intermediaries.

It is essential to consider the lower circuit as a necessary element for the perception of the peripheral urban reality, taking into account the conservation of its function as a distinct provider of jobs. In addition to the differences mentioned above regarding employment, in the lower circuit is hardly permanent and its remuneration is often at or below the vital minimum, with formal labor agreements between employer and employee, making the lower circuit one of the main providers of occupation for the poor population of the city and for immigrants without professional qualification.

While in the upper circuit prices are generally fixed and profit margins are calculated in the long term, with the concern of capital accumulation, in the lower circuit haggling and haggling is a rule and the short term prevails, thus, the accumulation of capital almost non-existent or simply there is no such concern. "It is, first of all, to survive and ensure the daily life of the family..." (SANTOS, 2008, p. 46).

> If the inferior circuit should not remain what it is, it is because its role, long before being a provider of occupations and provider of the means of survival, is to be perpetuator of poverty, serving as collector of popular savings, then channeled to the upper circuit by intermediaries of all kinds. (SANTOS, 2008, p. 368).

That is, while the upper circuit works for the accumulation of wealth, the inferior works for subsistence. While globalization demands an increasing number of professions and specializations to meet market needs, also an increasing number of marginalized professions, without any

specialization, emerge to serve the population hardest hit by unequal market sharing, as Silveira (2015) shows us:

> While in concentrated and modern points of the metropolis are deepening sophisticated professions, determining the rapid obsolescence of knowledge and a vicious circle of creation of new specific knowledge, the metropolitan stainexpands, multiplying simple professions and crafts. Necessary for the production of life, these activities are repeated,, sometimes in the face of the economies of agglomeration of poverty, sometimes thanks to the opportunities born in the areas of rarefaction of trades and services of the peripheries (SILVEIRA, 2015, p. 250).

For the author, migrations in diverse quantities and qualities that accelerate the pace of urbanization also allow the demographic and economic growth of the lower circuit, since they add new agents, by production and consumption, to the set of activities of low or no degree of capital, technology and organization. In other words, the more people come in, the more the market grows. In this scenario, consumerism plays a central role in the economy, because "[...] on the one hand, consumerism as a dominant ideology reinforces indebtedness and poverty, and on the other hand, the will to consume is the reason for the production and survival of a large part of the metropolitan population" (SILVEIRA, 2015, p. 252).

While the activities of the upper circuit are based on advertising and have important fixed costs that generally increase the size of the firm without the concern of reusing consumer goods, the activities of the lower circuit are propagated, thanks to contacts with the clientele, and direct costs are of no importance, based on intensive work and the reuse of consumer goods : "In the upper circuit, the reuse of durable goods is almost nil, while in the lower circuit one of the bases of the activity is precisely the reuse of these goods" (SANTOS, 2008, p. 47). An example of this is that, while the upper circuit benefits directly or indirectly from government aid, the lower circuit needs to remain alone and often its workers are marginalized by society, as is the case with waste pickers.

The operation of the upper circuit is directly linked to the need for intensive production, linked to purchasing power and stimulated by consumption, which is imposed by the advertising media that "manufacture" new tastes and new demands to attract the clientele and thus control the entire economy. The lower circuit, "[...] this tends to be controlled, subordinate, dependent" (SANTOS, 2008, p. 47), since it results from demand and relies on consumption, rather than creating it.

On the one hand, the production and commercialization plan leads to the creation of gigantic production and marketing units, on the other "the new needs imposed by technological modernization on people without income lead to solutions that are their own and this at the collective level" (SANTOS, 2008, p. 77).

In other words, the conditions of evolution of the economy, combined with the weight of a growing population with low living, end in manufacturing activities, often artisanal and, in small trade, of multiple services of all kinds, in which family and autonomous companies are numerous, capital is very small, technology obsolete and organization deficient. The lower circuit is then "[...] a permanent mechanism for the integration of the poor into the built environment, to work and to the market" (SILVEIRA, 2015, p. 255).

For Arroyo (2008), the lower circuit is expressive in Brazilian metropolises, due to the magnitude of urban poverty and the agglomeration of people: "It occupies neighborhoods, streets, alleys, road and subway terminals, squares and holds, backyard funds, vans, motorcycles [...]" (p. 3). That is, it is present in urbanized spaces and is interconnected with the upper circuit, adopting multiple forms of existence. The population increase in urban areas of peripheral countries occurred due to the strong field-city migration and, therefore, large cities are located in peripheral areas, with deep territorial inequalities, as Cataia e Silva (2013) teaches us. Ribeiro (2018) helps us understand the chaotic logic of Brazilian urbanization when he says:

> Modernizations accompanied by the expansion of low-paid jobs and increased poverty, a process by which the city's urban economy in its entirety adapts from the proliferation of activities with the most different levels of capital, organization and consumption that the monopolistic economy is not able to meet. Thus, Brazilian urbanization is chaotic, especially because it is corporate and in spots and spots of the territory (RIBEIRO, 2018, p. 93).

Furthermore, Santos (2008) highlights that it is in the metropolises where the greatest possibilities for the poor are constituted to create ways to generate income in a permanent struggle to meet the essential needs, since the largest concentrations of materialities and population are in the metropolises, which allows the expansion of modernization and the lower circuit itself because, according to the author , poverty is historically and spatially constructed. For Cataia e Silva (2013), poverty is currently characterized as structural-globalized poverty, that is, a "scientific production of poverty", which is "[...] created, programmed and scientifically administered [...]" (2013, p. 61) intentionally and artificially.

We have a very original universe there that adapts according to the circumstances, in which indebtedness replaces savings and generates forms of archaic underemployment: "There is, of course, the truck, but its use can be limited, by the state of the roads, by the price of its use, by the small amount of goods to be transported. Animal transport or on the back of man is very frequent" (SANTOS, 2008, p. 198). As we can observe, with the logistics carried out by the waste picker of recyclable materials in the streets, which carries out its activity for the purpose of creating new products: "The newspaper used becomes packaging, the piece of wood turns into a chair, the cans, in water reservoirs or in flower pots etc." (SANTOS, 2008, p. 199).

When we think about the dialectical relationship between the two circuits in the recycling production network, we realize that there is a question of power inequality there. The question arises as to the organization of cooperatives and industries. Recyclable waste pickers and cooperatives thus represent the lower production circuit. On the other hand, large companies of extraordinary garbage collection and transformation, with organized and mechanized collection, represent the superior production circuit, because they see garbage as a business of reproduction of capital. As much as there is, thus, a power struggle between the cooperative members, does not make him an emerging from the upper circuit.

Dagnino e Dagnino (2010) highlight that, in the recycling production network, there are two types of circuits involved: the recycling industries, which see the possibility of profit from the exchange value in recyclable waste; and the waste pickers, whose meaning lies in the need for survival of these individuals, who seek, in the labor practice of the garbage picking, a possibility of generating income and satisfying the basic needs of life.

Regarding the organization and roles of the agents that make up the recycling production network or the intersection between the different circuits, Silva states that:

> The recycling production chain comprises several agents, including: recycling industries or plants, scumbags or warehouse owners and recyclable waste pickers. There are also the variable actors that surround these agents, especially the latter, which comprise public agencies, NGOs, OSCIPs, churches, consulting institutions such as SEBRAE, universities and the citizens of individuals. In the production chain, each segment plays a role in production and economics, while variable actors fulfill the role, in different rhythms and intentions, of solidarity cooperation (SILVA, 2017, p. 204).

Silva (2017) makes his arguments in the same sense as Dagnino and Dagnino (2010), considering that both support their discussions in Milton Santos, in the theory of the circuits of urban economy. In this sense, the recycling production network, inserting the collection system, would be permeated from one circuit to another, connecting one circuit to another, or even the interrelationship between the formal and informal sectors of the network, obviously in order to maximize the profits, via exploitation, of the informality of waste pickers. The links and "communicating vessels" between the two circuits are made by banks and financial institutions and middlemen.

In order to add the definition of the recycling production network, Gonçalves (2006) states that:

> The work of waste pickers in the dumps [...] is part of a complex network for the collection and commercialization of recyclable waste. An established circuit, structured from informalized economic relations and which are very dispersed in the territory and which are of little visibility in the urban economy, and the actions of its main agents are easily noticed, just as the waste pickers and the deposits that accumulate the recyclable waste installed in the cities (GONÇALVES, 2006, p. 78) are observed.

From Milton Santos, the upper circuit would then be characterized by the direct logic of capital, directed to the satisfaction of a certain wealthy and privileged social layer; while the lower circuit would be formed by individuals who, in other words, are considered marginal in the capitalist system of production, requiring strategies to overcome the social and legal barriers of exclusion imposed by the controlling actors of the first circuit. The lower circuit, as Cataia e Silva (2013) adds, are the forms used by the poor population, which is the majority and tends to grow, to generate income from simple organization activities, with labor intensive and little or no capital.

The vital needs of the actors that form the lower circuit, however, come from the living condition in the context of marginalization and exclusion, in view of the formal work sector. Thus, such needs are paradoxical, because they are imposed on workers, since of their ashamed freedom, that is, a choice (or non-choice) made in view of the conditions provided by a classist and racist society, linked to power related to the reproduction of capital.

Rio de Janeiro, more specifically in the region of Barra, Recreio dos Bandeirantes and adjacencies, are places where green waste produces another market logic. Privileged locations have extensive wooded areas in their high standard condominiums, generating a large amount of green waste. The problem arises in the non-collection of green waste either by condominiums or by the government, which does not offer this type of selective collection, thus opening a niche market focused on the collection of this material. As for condominiums, they prefer not to perform the due collection, avoiding the payment of private collection.[3]

The tailings, in this way, will usually be disposed of irregularly, in the lagoon area of Jacarepaguá, committing an environmental crime. This is due to the absence of the state to offer this type of selective collection or provide landfill or overflow area in these regions, thus encouraging private companies to provide a disqualified service with unconventional commercial agreements.

In Rio de Janeiro, with regard to the selective public collection of recyclable solid waste (paper, plastic, aluminum and metal), called inert waste, are carried out weekly and their disposal destination, usually, with some cooperative partners of Comlurb. Recyclables, when they arrive in cooperatives without proper screening and with a high level of tailings and organics, make separation difficult and often make them lose market value. On the other hand, 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% of its garbage.[45]

[3] They are the residues from the pruning of plants and trees, with branches, trunks, grasses, leaves, tree bark, etc. That is, all kinds of organic material of plant origin.

[4] Municipal Urban Cleaning Company. It is a mixed economy company of the City of Rio de Janeiro, linked to the Department of Conservation and Public Services. It is the largest public cleanup organization in Latin America.

In peripheral countries, in a contradictory way, the lower circuits of the economy complement the superiors. The indirect sectors or lower circuits exist at the same time for the benefit of the reproduction of the capital of the upper circuit, transferring capital, merchandise and indirect workforce; but also as a way of subsistence of unemployed workers and, therefore, as a mechanism of social control of the masses. According to Montenegro (2012), "[...] intersections and invasions between circuits, making them increasingly complex in the face of the most different combinations of capital, technology and organization content [...]" (p. 159). The lower circuit, therefore, is central to the maintenance of the peripheral capitalist system and its unequal morphology.

For example, as for investments in cooperatives, they are carried out by private companies as follows: with projects, equipment, trucks, professional qualification. That is, a financial framework for cooperatives to continue selling their materials to them, for the following fact: it is more profitable to invest in cooperatives and receive the material at low cost. Thus, labor expenses and rights, taxes - which are not paid by cooperatives - are avoided, the reserve of huge areas, qualified professionals and a whole environmental certification, so that the same raw material can be acquired.

Castilho e Frederico (2010) propose the joint treatment of Milton Santos' theory of economic circuits, aggregating the theory of productive spatial circuits, being worked in a complementary way, since the upper and lower circuits are part of the productive spatial circuits of different size and technical and organizational characteristics. The productive space circuit emphasizes, at once: "[...] the centrality of circulation (circuit) in the chaining of the various stages of production; the condition of space (spatial) as an active variable in social reproduction; and the focus centered on the branch, that is, on the dominant productive activity (productive)" (CASTILHO; FREDERICO, 2010, p. 463).

In this sense, production would not be limited to production, but would be directly linked to the circulation of the goods, which is now highlighted, from the moment of its production to consumption.

Similarly, the idea of productive spatial circuits attributes equal importance to space, from the concept of Santos (2008), when it tells us that space is understood as a social instance, that is, a set of factors and functions conditions and transforms social reproduction. The term "productive", on the other hand, comes from the variety agents, especially firms. The focus on the product differentiates the notion of productive spatial circuit from the idea of the two circuits of economy SANTOS (2008).

[5] Jornal o Globo - 13/04/2017. Available from: <https://oglobo.globo.com/sociedade/sustentabilidade/no-rio-apenas-19-do-lixo-reciclado-21202718>. Accessed: 31 Oct. 2018.

The production spatial circuits involve the different stages of the production process, dialectically chaining the place and the world. The direct relationship between the spatial circuits of production and the movement are found in the studies of Arroyo (2008), when he teaches us that "this articulation is expressed by the movement of countless flows of products, ideas, orders, information, money, surplus. Finally, by circulation" (ARROYO, 2008, p. 30). In other words, the spatial circuits of production are composed of companies of different sizes and that reach in a structured way several spaces of the territory, in the same way that it encompasses a multiplicity of places and actors, with the increase of the exchange of materials, which provides the increase of the territorial division of labor.

> [...] we can say that the spatial circuits of production presuppose the circulation of matter (material flows) in the chain of the geographically separated instances of production, distribution, exchange and consumption of a given product, in a permanent movement: the circuits of cooperation in space, in turn, deal with communication, embodied in the transfer of capital, orders, information (inmaterial flows), ensuring the levels of organization necessary to articulate geographically dispersed places and agents, that is, unifying, through centralized commands, the various stages, spatially segmented, of production (CASTILHO; FREDERICK, 2010, p. 464-465).

Likewise, the authors help us to elucidate the challenges faced by the fragmentation of studies of the geographical space, even though it is directly related to economics, politics, law and culture. Such studies, even if they take place independently in academia, are part of an inseparable whole that complements and distinguishes itself. Thus, the concepts of production chain and productive spatial circuit belong to studies of specific disciplines, although they share assumptions and analytical procedures in common. The difference in fundamental method alters the entire methodology and analytical procedures, being the first theory of liberal economic inspiration, while the second is inspired by the Marxist political economy (thus, in the productive process as a circular process).

> The concept of production chain "aims or facilitates the visualization, in an integral way, of the various stages and agents involved in the production, distribution, marketing (wholesale and retail), support services (technical assistance, credit, etc.) and consumption of a given commodity, in order to: 1) allow a systemic, rather than fragmented, view of the various steps through which a product passes, before reaching the final consumer; 2) identify 'bottlenecks' that compromise the interaction of the various segments, ensuring or promoting competitiveness (CASTILHO; FREDERICO, 2010, p. 466).

The idea of a production chain has been used by the Applied Social Sciences, especially in Economics, Administration and Production Engineering and has several conceptual formulations, especially when they are integrated with value chain ideas, supply chain management and logistics. Furthermore, the concept of the production chain is directly linked to:

> [...] growing demand for organization of business activities, in view of the current productive paradigm, with the objective of increasing the competitiveness of products and

> services, through the restructuring of production processes and the rationalization of flows (CASTILHO; FREDERICO, 2010, p. 467).
> The similarities, however, are numerous, since both act in understanding the various stages of the production process, from production to final consumption. Its objectives, however, are different: The idea of a production chain arises in the context of business administration and the search for greater economic rationality, aiming at gains in the competitiveness of agents and sectors, assuming that this objective brings benefits to society as a whole, namely local. Moreover, it is part of a system of concepts and ideas that includes the technical and social division of labor, local development (local arrangements and production systems and/or *clusters), systemic competitiveness* (of the product and the company), functional integration,, among others (CASTILHO; FREDERICO, 2010, p. 468).

While in the production chain the external environment is considered as a factor that can affect the production process, the productive spatial circuit shifts the company's focus to geographic space. Thus, the concept of productive spatial circuit assertively achieves the role of circulation in the current historical period, because it leads us to identify a logic of territories and a logic of networks, in which different ways of producing and circulating are recreated, whose agents interact, dispute the territory and confront the most diverse interests.

4. MARKETING CIRCUITS

Georeferencing of the recycling network in the state of Rio de Janeiro allows us to understand the degree of concentration and deconcentration existing in the network. It is a strategic element to assess the challenges and potentials, in a technical way and appropriate to the local context. The construction of logistics arrangements in the recycling production network depends, among other factors, on the regional distribution of cooperatives, intermediates and recycling industries in the state of Rio de Janeiro.

The issue of solid waste and the whole theme that involves the subject has aroused interest in the daily practices of the recycling production network, its management in urban space. Thus, it is legitimate the relevance that the spheres of Geography are in charge of in the onslaught to understand the phenomena about this scenario. The space gains distinction here as the primary category of research, because it is seen and understood as a social factor (SANTOS, 1997). Thus, understanding space is impossible to understand it from the perspective of its relationship with society and time. With this, the analysis of the geographic space provides a critical view of the transformations and dynamics of society and the relations with urban solid waste.

According to Santos (2008), space should be understood as an inseparable system of object systems and action systems, with emphasis on the inseparability of the two systems. In this case, the objects cannot be understood separately from the stock systems, since the objects are the result of the work, which requires a social elaboration. The understanding of space and space organizations

produced by capital in geographicality/society is essential for understanding the phenomenon of spatiality in the recycling production network in the research area.

It is essential to consider the lower circuit as a necessary element for the perception of the Brazilian urban reality and to provide practical measures to give this circuit a more eminent productivity and sustained growth, taking into account the conservation of its function as a job provider. It is in this perspective that one must ensure an organization of the bond of the two circuits in the cities, in search of new ways of addressing the realities of the present, which points to cities as living machines.

According to the survey on the recycling production network of the state of Rio De Janeiro, a total of 136 cooperatives were identified, of which 79 present interference in the production network and another 57, due to size, no longer directly influence the morphology of the network.

The existence of the cooperative network of waste pickers of recyclable materials as an instrument of economic and political articulation is something contemporary. The Cata Bahia Network of Waste Pickers, from 2004, is the oldest, having been organized together with cooperatives present in ten municipalities of Bahia. Five cooperative networks were located in the recycling production network in the state of Rio de Janeiro: Rede Movimento (31 cooperatives), Febracom Network (22 cooperatives), Mesc Network (13 cooperatives), Rede Cata Sonho (8 cooperatives) and Rede Recicla Rio (5 cooperatives), as shown in the following graph.

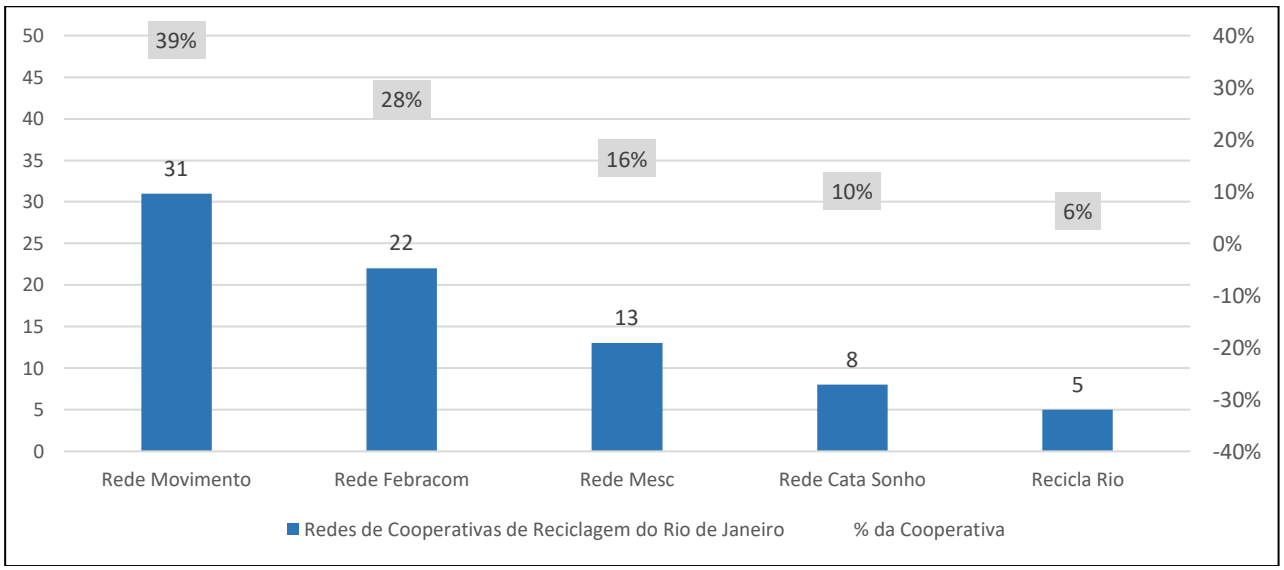

Figure 1: Networks of cooperatives present in RRERJ - (2018)
Legend: Questionnaires applied by the author.
Source: The author, 2018.

The contemporary concept of network emerges in the context of productive restructuring, generated by globalization, which disarticulates the classic Fordist model, based on serial

production in the same spatial locus, promoting a new model, based on a flexible productive structure, in which production factors are globalized according to the best available investment costs. Associated with a process of productive restructuring, it is also observed the exhaustion of organizational models, based on pyramidal structures, inflexible and where communication circulated selectively in the various existing hierarchies. Thus, the network, as a model of organization, has developed in recent decades as "A practical alternative of organization, enabling processes capable of responding to the demands of flexibility, connectivity and decentralization of contemporary spheres of action and social articulation" (CASTELLS, 1999, p. 498).

Thus, networks seek to reconstruct forms of articulation between organizations (and even individuals) based on a new paradigm, namely: horizontality, flexibility, interconnectedness, decentralization, participation, insubordination, among others.

Thus, one can conceptualize networks as:

a) "[...] a form of democratic organization, consisting of autonomous elements, interconnected in a horizontal way and that cooperate with each other." (MARTINHO, 2003 apud TIRADO SOTO, 2011, p. 21).
b) "[...] organizational systems capable of bringing together individuals and institutions, in a democratic and participatory way, around common objectives and/or themes" (CABRAL; DEPAULA, 2007, p. 5).
c) "Network is a set of interconnected nodes. Knot is the point at which a curve is cut" (CASTELLS, 1999, p. 498).
d) "An articulation between several units that, through certain connections, exchange elements with each other, strengthening each other, and which can multiply into new units, which, in turn, strengthen the whole set, to the extent that they are strengthened by it, allowing it to expand into new units [...]" (MANCE, 2009, p. 24) .

These, however, are specific interpretations and meanings of the network, because others understand it as carriers of modernizations, verticalities, orders and distant senses, generating disorder for most of those who live in the places.

It is important to note that the networking process has resulted in increased impact capacity of civil society actions. It went from a method of action whose results remained limited to a certain socio-territorial context, to a method of action based on a dialectical exchange and interconnectivity approach with the "other", with diversity. The result was the ability to produce its own impact, globalizing the involvement of the social fabric and the territorial base.

According to Santos (2006), conceptual definitions multiply, but we can understand the network as a vertical system, conducted by and for actors involved in the work, which happens between different points in the territory. Thus, we can conclude that the nature of networks exists beyond materiality: "But the network is also social and political, by the people, messages, values that frequent it. Without this, and despite the materiality with which we impose our senses, the network is, in fact, a mere abstraction" (SANTOS, 2006, p. 263). The network is also built in the political plots organized by different actors and points of the territory, in constant articulation with other actors, in order to achieve a specific objective and understands that there is no homogeneity of space, but also there is no homogeneity of networks:

> And where networks exist, they're not uniform. In the same subspace, there is an overlap of networks, which includes main networks and tributary or tributary networks, constellations of points and line tracings. Taking into account their social use, inequalities in use are recorded and the role of agents in the control and regulation of their functioning is different (SANTOS, 2006, p. 268).

Furthermore, Spósito (2008) adds, it is necessary to take into account that there is a cohabitation between the traditional urban network, of the hierarchical type, and new spatial arrangements, fruit of the dynamics of appropriation of the use of the territory. There are also changes in the urban network because of changes in industry, industrialization of the field, the emergence of other borders and the networked business organization, with improvements in financial speculation processes and innovations in the retail structure of merchandise distribution.

Among the networks present in Rio de Janeiro and their respective cooperatives, we have:

- **Rede Movimento:** originated in the municipality of Duque de Caxias/RJ, after the closure of the Jardim Gramacho dump in 2011, which directly impacted the amount of materials deposited on site and thus forcing waste pickers to organize themselves into five Solidarity Economic Enterprises – EES, which are broader than cooperatives. Thus, waste pickers were able to add more value to their products, since the sale began to be made from a collective and not individually, in a more organized way, with a larger scale of production and being able to achieve the greatest bargaining power. [6]

  The satisfactory results obtained by the EES and its participants - ACAMJG, Coopercamjg, Coopercaxias, Coopergramacho and Cooperjardim, with ACAMJG being responsible for coordinating the network's actions, encouraged the government representatives of the National Movement of Waste Pickers of Recyclable Materials of the state of Rio de Janeiro -

[6] Ventures Solidarity Economic swerities comprise different types of 'Companies', voluntary associations, in order to provide its associates with economic benefits. These companies emerge as reactions to shortcomings that the dominant system refuses to address.

MNCR/RJ. Most of them members of the EES of Gramacho began a process of network organization by waste pickers in the state of Rio de Janeiro. The objective was to increase the production and marketing power of the products, in addition to facilitating public and private partnerships, in accordance with the Pnrs National Solid Waste Policy. Thus, 28 bases were incorporated in the MNCR/RJ, which gave rise to the Network of the National Movement of Waste Pickers of Recyclable Materials of the state of Rio de Janeiro, composed of 31 EES from 19 different municipalities. Currently, make up the network: ACAMAN, ACAMJG, AGASAR, Jabiranga Association, Beautiful Friendship Association, Hope Association, Reviver Association, CoopCarmo, Coopcat, Cooper Caxias, Cooper Gericinó, Cooper Rei, Cooper Rei, Cooper Rangel, Cooper Rangel, Cooperativa D Esperança, Cooperativa Morro do Céu, Cooper Canit, Cooper Clean, Cooper Forte, Cooper Gramacho, Cooper Jardim, Costa do Sol, Folha Verde, Recicla Resende, Recicla VR, Recycle Campos, Recooper, Recooperita, Reciclando para Viver, Coop Jurujuba, which remain in full operation.

- **Febracom Network:** The FEBRACOM-RJ Network (Federation of Cooperatives of Recyclable Materials, Recovery, Environmental Conservation, Treatment, Handling and Final Disposal of Solid Waste of the state of Rio de Janeiro) emerged in 2005 and its social status highlights its objectives, being them: the integration, guidance and coordination of the activities of federated singular cooperative societies, representing them in operations and enterprises that transcend their capacity or convenience of operation, cooperating in the organization and implementation of projects and promoting the exchange of services and information.

  Understanding that the self-management cooperative can increase the social inclusion of workers, the FEBRACOM Network - RJ emerged as a tool for strengthening the cooperatives of the Recycling Network and in order to regularize other existing cooperatives. With a network of 6 cooperatives, FEBRACOM - RJ has today a great representation of production in the state, present in the municipalities of Rio de Janeiro, Seropédica, Mesquita, Duque de Caxias, Nova Iguaçu and Japeri, with partnerships with the state Government, city hall and public and private companies, with a contingent of 470 waste pickers.

- **Mesc Network**: Emerged in 2015, as a consequence of the exclusion of waste pickers from recyclable materials that, like most cooperatives in Brazil, are excluded from projects related to the sectoral packaging agreements, with the purpose of organizing waste pickers

dissatisfied with the absence of comprehensive public policies. Currently has 13 cooperatives: ACAMJG, Coopercaxias, Coopertraser, ReciclaMais, Coopermaisverde, Cooper Ecologica, CooperCat, Coomub, Cooperideal, Coopama, Coopercam, Assoc. Belo Amizade, Cooper Mambu and is present in the following municipalities: Duque de Caxias, Seropédica, Itaguaí, Mesquita, Barra Mansa and Rio de Janeiro, being the main cooperative the Association of Waste Pickers Of The Metropolitan Landfill Do Jardim Gramacho - ACAMJG.[7]

- **Cata Dream Network:** It was a project of the NGO Rede Cata Sonho, extinguished in 2014, with Petrobras, which had the participation of eight cooperatives: Recuperating from Itaboraí, Recooperar de São Gonçalo, Coop RPV Recycling for Living, Cooper ACAMJG, Coop Bongaba, Coop Gericinó and Coop Quitungo and is present in Itaboraí, São Gonçalo, Rio de Janeiro, Duque de Caxias, Niterói and Magé, the main one being Recooperar de São Gonçalo.

- **Recycling Rio:** Rede Recicla Rio was founded in May 2009 and is located in the city of Rio de Janeiro, with five cooperatives of waste pickers of recyclable materials, including Coopcal, Coopquitungo, Cooper Rio Oeste, Cootrabom and Coop são Vicente de Paulo, being present in Campo Grande and Rio de Janeiro. It has a shed of 600 m2, in the railway station of Cascadura, provided by SUPERVIA, having been renovated in 2012 and inaugurated in 2013. It has partnered with other companies such as ITAIPAVA, TETRAPAK and seven railway maintenance companies supplying SUPERVIA (DB2, Fively, MDFER, VICOUFER, HES, Alberoni e Arruda and; IRON) and NESTLÉ. The partner companies make periodic visits to the cooperatives that are part of the network and, in April 2014, work began to renovate coopcal's 1000 m^2 shed.

Of these partnerships, five projects were approved in 2010, from FUNASA 001/2010 notice with UFRJ/SOLTEC/RIPeR, yielding equipment and trucks to the four cooperatives and the Rede Recicla Rio, which, since 2011, has been developing Software Recicla Dados in partnership with the NGO ECOIDEAS, in order to improve the operation of all cooperatives in the network. Also in order to optimize and organize production, braskem, a partner since 2013, financed the purchase of computers and printers/scanners for all cooperatives and for the training room of the

[7] Only large cooperatives were able to benefit from the sector's packaging agreement. Small cooperatives are excluded, for not meeting as minimum requirements, which generated a huge dissatisfaction of most of the recycling network of Rio de Janeiro, because the largest number of cooperatives could not benefit from the sector agreement of packaging.

central shed. With the licensing of the warehouse in 2014, the Recicla Rio network began its activities with two service contracts, the first being the Maracanã stadium - currently in force - and second with SUPERVIA, which included the collection at 16 stations of the Saracuruna Extension, finalized in 2014.[8]

Currently the Rede Recicla Rio has the Advisory Board, formed by the partner institutions: SUPERVIA, NESTLÉ, ITAIPAVA, BRASKEM, TETRAPAK, UFRJ/SOLTEC/RIPeR, SEBRAE and also has the support of bunge, with the financing of small reforms in the sheds. In 2015, NESTLÉ financed the works of COOPCAL, COOPE RIO OESTE and Cascadura Central.

Other partnerships emerged, such as the contract signed in 2015 with the Banco do Brasil Foundation for the Provision of Cooperation Services of Waste Pickers of Recyclable Materials under the Cataforte III Project - Sustainable Business in Solidarity Networks resulting from the Public Call Process No. 2014/03 and lasts to date.

It is important to highlight that recycling production networks, established from cooperatives in RRERJ, are related to geographical locations next to the road system, proximity to material collection and distribution areas, which facilitates the flow of commercialization, significant concentration of cooperatives in peripheral environments adjacent to the Gramacho dump. The Duque de Caxias region is a region where the largest dump in Latin America was concentrated, that is, an area of enormous concentration of materials. The municipality became known as a recycling hub where much of the recycling force in Rio de Janeiro is located. The facilities of the cooperatives were already installed in these spaces, which were maintained after the closure of the Gramacho dump, with its marketing and logistics network already established. And this concentration of historical commercialization is permeated to this day, considering that the state Institute of the Environment itself - INEA allocates all its solid waste inert via manifest solid waste in Duque de Caxias and although the gramacho dump has been closed, there are still private companies that still dispose in Duque de Caxias in an unconventional way.[9]

[8] The Riper follows the guidelines of SOLTEC/UFRJ, which is a network of people and organizations interested in the production of knowledge aimed at sustainable development, with a view directed to the rational use of natural insums and the proper disposal of waste. To achieve this goal, the Riper proposes to act in an interdisciplinary, interinstitutional way, respecting diversity and differences of opinion, having as main parameters the values of solidarity and the interest of society. Among its lines of action, support is supported by the organization of a network of waste pickers' cooperatives, seeking to strengthen selective collection, as recommended by the National Solid Waste Policy. The Riper adopts as a guideline, together with the cooperatives, the networking, aiming to gain scales, with a view to increasing income and also the structuring of the different recycling chains. At the same time, it seeks to develop, together with the cooperatives, the values and principles of the solidarity economy. Available from: <http://nides.ufrj.br/Index.php/projects-Soltec/Riper>. Accessed August 23, 2019.

[9] The Waste Transport Manifest (MTR) is a mandatory document that records information on the transport of waste from the generating source to its final destination. Through this record it is possible to monitor the generation, transportation and proper disposal of solid waste in the state of Rio de Janeiro. Available from: <http://www.inea.rj.gov.br/Portal/Agendas/LicenciamentoAmbiental/Licenciamento-saiba-mais/Residuos/index.htm>. Access: 20 Jun. 2019.

The following cartogram corresponds to the spatialization of the five identified networks, in order to identify how they are organized spatially, establishing themselves as important nodes (materials) for the maintenance of rrerj. It should be noted that the largest concentration of cooperatives of waste pickers of recyclable material is located in the Metropolitan Region of Rio de Janeiro, especially in the headquarters municipality, because it is where the largest concentration of recyclable materials available for collection is located.

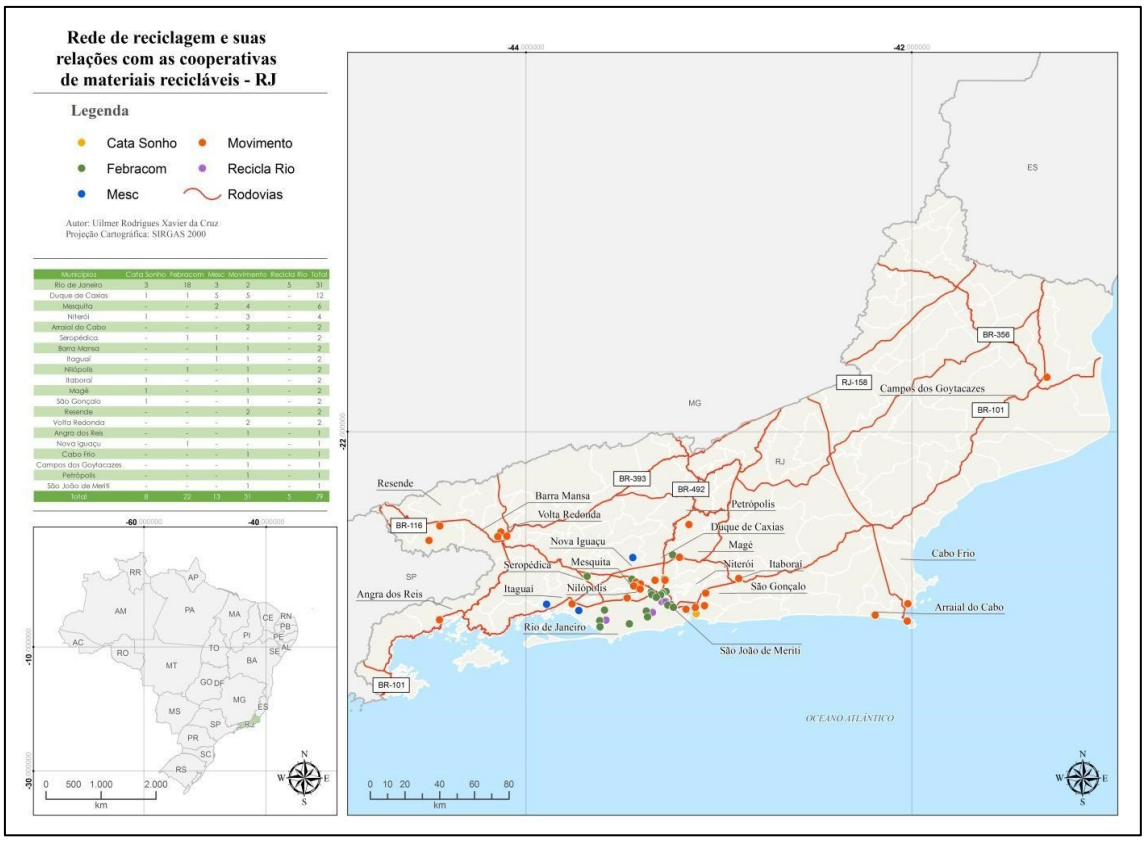

Figure 1: Distribution of the five main cooperative networks of the Recycling Network of the state of Rio de Janeiro - (2019) **Legend**: Prepared from a survey carried out through the CATAsig computer program. **Source**: The Author, 2018**.**

Only Rede Movimento operates outside the metropolitan region, without any competition with other networks. Due to a state public policy, Project Waste Pickers and Waste Pickers in Solidarity Network of the Government of the state of Rio de Janeiro, there was public appeal for the organization of existing cooperatives, in the following locations: Nilópolis, Duque de Caxias, Resende, Angra dos Reis, Mesquita, Barra Mansa, Rio de Janeiro, Itaguaí, Magé, São João de Meriti, Petrópolis, Niterói, Arraial do Cabo, Cabo Frio, Volta Redonda and Campos dos Goytacazes, however, without articulation and bond of belonging.

Table 1: Relationship of Cooperative Networks and Waste Pickers

Networks	Pickers	%
Mesc Network	825	40%

Network Movement	674	32%
Febracom	470	23%
Recycles River	87	4%
Cata Dream Network	30	1%
Total	2.086	100%

Legend: Elaborated from data collected in field research.
Source: The author, 2018.

From the point of view of existing networks in the state of Rio de Janeiro, the interviewees reported the existence of 4 organized networks, that is:

- Network Movement: This network is articulated by the National Movement of Waste Pickers of Recyclable Materials MNCR. Therefore, it is an organization that has links with other state networks of the MNCR, which in itself means an advantage in terms of the ability to raise funds for investments, in view of being an affiliate of a national operation. According to the interviewees, this would have 674 waste pickers, about 32% of the total waste pickers associated with cooperatives or associations.

- Movimento Eu Sou Catador RJ Network - MESC: The cooperatives of this network are also part of an organization that has national coverage, the MESC, so they also have comparative advantages related to having greater ease of receiving investments in their bases. The MESC is a dissent of the MNCR and was formed fundamentally from a disagreement in the implementation of the Sector Agreement on Packaging, signed by the MNCR. According to the interviewees, there would be 825 waste pickers, corresponding to 40% of the total members.

- Febracom: The cooperatives associated with this network are part of the MNCR or the MESC, therefore, as well as the aforementioned ones, they can obtain some investments of national resources raised by these organizations. According to the interviewees, Febracom has 470 waste pickers, which corresponds to 23% of the total number of members.

Finally, the Recicla Rio and Cata Sonhos networks are state networks without ties to national organizations and would have 87 and 30 waste pickers, respectively, corresponding to 4% and 1% of the total members.

There is a weighting about the information provided by the interviewees, which is the high probability of double counting, that is, overlap of associates between networks. In fact, it is common for a basic association or cooperative to join more than one network, aiming to benefit

from any investments with more than one funder, which leads to associates who are in the register of more than one network.

The following figure demonstrates, thus, the spatial distribution of recycling sites in the state of Rio de Janeiro, relating cooperatives, industry and intermediaries. I draw attention to the observation of the great concentration of collection performed by waste pickers of recyclable materials, in the places where cooperatives are established – although not every collection point is a cooperative, corroborating the previously stated that the collection areas exist in the vicinity of material distribution points.

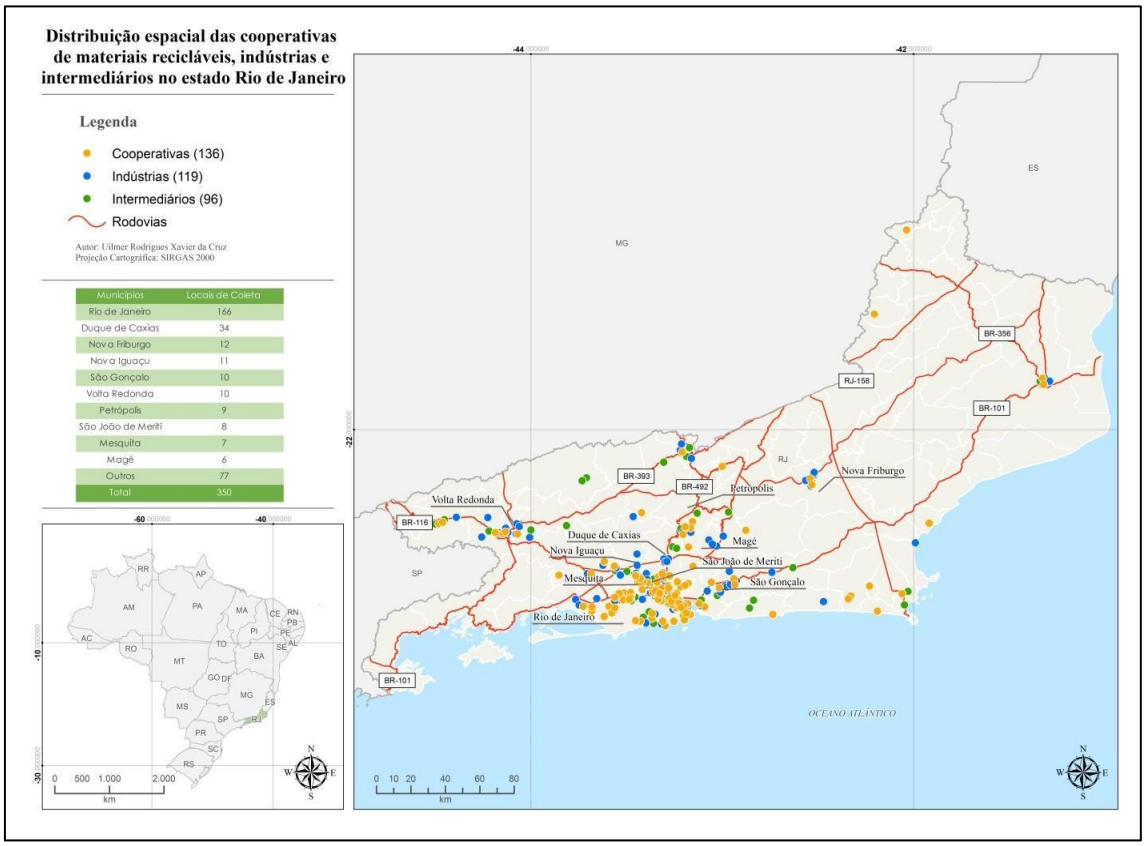

Figure 3: Spatial distribution of cooperatives, industries and intermediates of recyclable material in the state of Rio de Janeiro - (2019). **Legend**: Prepared from a survey carried out through the CATAsig computer program. **Source**: The author, 2018.

Another point worth mentioning is the location of industries and intermediates, geographically strategic, especially with regard to highways. This is due to the ease of material flow, thus reducing transportation costs. The green dots, corresponding to the intermediaries, are in localities, especially, where cooperatives do not have direct access to the industry, either because of the distance to the industry or by the low volume of material moved by the cooperatives.

This point is of important emphasis, since it corroborates the reflection presented by Costa and Chaves (2012), who affirm about the roles of the actors who set up recycling production

networks that, in this case, have their practices focused on the intermediary between the sale and purchase of recyclable material, between waste pickers and industry.

It is important to resume Gonçalves (2006), in the discussion about the actors that make up the recycling production network and its different economic circuits. According to the author, recycling is also composed of middlemen (also known by waste pickers as "scavengers") and entrepreneurs. The author states that the middlemen fulfill the role of direct negotiation with the industry, which directly contributes to the marginalization of waste pickers.

Some middlemen are fed by individual recyclable material pickers and this occurs for two correlated reasons: first, waste pickers are established in this work practice due to the need for survival; according to the social condition of waste pickers is characterized by the absence of capital to mediate the buying and selling relationships.

These characteristics express the disparity of power among the actors of the production network of the garbage picking, based, in this case, on the unequal possession of economic resources; as well as, in the condition of waste pickers as offerors of their workforce, through the autonomous collection of recyclable materials for the middlemen. When waste pickers negotiate directly with entrepreneurs in the processing industry, other forms of payment for the material and also of sorting are established.

Also, with regard to the industries of recyclable materials, there is an expected metropolitan concentration in the city of Rio de Janeiro, the municipality of RMRJ, since the concentration of recyclable materials is in urban areas. As far as intermediaries are regarded, they follow the same concentration, but with a greater territorial dispersion in other parts of the state. That is why the cooperatives of rede Movimento that are located in more inland cities have a greater dependence on these intermediaries to sell the material to industries.

However, depending on the scale, logistics circuits, road system, cost of collection, packaging and transportation, it is possible to propose regionalized subsystems that are configured in logistics warehouses of recyclable stock, intermediate or final, operated by regional networks of cooperatives, cooperatives of 2nd degree, aiming to reach the recycling industry directly, thus surpassing the intermediaries and, even, replacing the role of these , with more economic efficiency and logistics.[10]

[10] Cooperative sit-ins are cooperatives formed by individuals, such as the CAEC cooperative, Caelf, Cooperbrava and so on. 2nd degree cooperative is cooperative cooperative, i.e. federation CATAbahia - BA, Cataunidos - MG, Cata sampa - SP, Febracom - RJ, Movimento - RJ, finally, are the centers of cooperatives and the federations of cooperatives. There are still, hardly, cooperatives of 3rd degree, which are like confederations, which are cooperatives formed by networks of cooperatives of 2nd degree, that is, are formed by centers of cooperatives and federations. Efficiency cited by OLIVEIRA Filho, 2006, p. 79 does not fit this terminology, because there are first-degree cooperatives that are more efficient than a 2nd degree or 3rd degree cooperative. It is noteworthy that the cooperatives of 1st, 2nd and 3rd degree are a legal system. Efficiency is therefore an economic variable. Once, such variables do not intersect, when efficiency is analyzed.

However, observing cooperatives, intermediaries and industries of the recycling network as monolithic blocks can generate strategic misconceptions. If cooperatives, in general, collect a significant part of recyclable materials, each intermediary does not always purchase all products marketed by marketing networks, and certainly industries acquire and process materials specific to their industrial plants. Thus, it is essential to build logistics strategies to understand how the spatial distribution of the recycling network by type of recyclable is behaved.[11][12]

The organization of actors and their spatial distributions as components of the recycling production network also takes place from the collected and recycled material. It is important to state that, regardless of the four agents involved in the collection of recycling material, all have in their practices the recycling of specific materials, corresponding to their geographical location and availability of this material or the existence of a market for buying and selling.

When we analyze the following graph, about the relationship about which recyclable materials are most present in the commercialization of intermediaries, it is observed that, practically in the same percentages, we observed metal, plastic and paper, respectively with (25%), (24%) and (24%). These data make sense, considering that these residues have more significant values per kilogram marketed (R$/kg) and also because they have a greater scale in the supply operations promoted by the suppliers of these intermediaries, whether these smaller intermediaries, cooperatives or individual waste pickers, in the latter case, as we saw in the previous tables, rarer.

Regarding the battery, it is observed that (11%) intermediaries market this material. This index, on a smaller scale in relation to the aforementioned materials, is justified, considering that it contains toxic elements in its composition and promotes an evident specialization in its management and commercialization for few buyers.

With regard to the long-life material, the index of (9%) commercialization of this is justified by the complexity, because it is composed of cardboard and aluminum, mixed with each other, which reduces the opportunities for reuse. Moreover, it is observed that there is a significant performance of the industry producing this material itself, Tetra Pack, which develops its own strategy of acquisition of the material, through a very capillary reverse logistics process in the

[11] "If there is no political enterprise that, however monolithic it may seem, is the place of defronts between divergent tendencies and interests, it is no less true that the parties are all the more condemned to function according to the logic of the apparatus capable of responding instantly to the strategic demands inscribed in the logic of the political field, let alone culturally devoid and more bound to the values of fidelity , therefore, more given to the unconditional and lasting delegation are its commanding officers; and also the older and richer they are in objective political capital, the more strongly determined they are in their strategies, by the concern to defend their achievements; or even more expressly ordained for the fight." (BOURDIEU, 2001, p. 196-197).

[12] And in this case there are still recyclable materials with high business potential, but not yet properly exploited by cooperatives, such as the electronics network and even OGR - Waste Fat Oil.

territory, acquiring, directly from cooperatives, this product, to be reinserted and recycled in its production process.

The marketing of glass corresponds to only (7%) of the total intermediaries. This is a material that has a significant weight per capita, low value per kilo, generates a certain risk for the management of this and mainly has a lot of volumetry. In this sense, what tends to occur in intermediaries is a process of specialization in which those who handle the glass only manipulate it if it is on a large scale, without which its operation is not worth it, so the low index.[13]

In general terms, this behavior reflects the pyramidal structure of the recycling network, whose base of the pyramid is less specialized and composed of more actors, mainly cooperatives, individual waste pickers and small intermediaries, and progressively there is a greater specialization with medium-sized intermediaries, aparistas and recyclers.

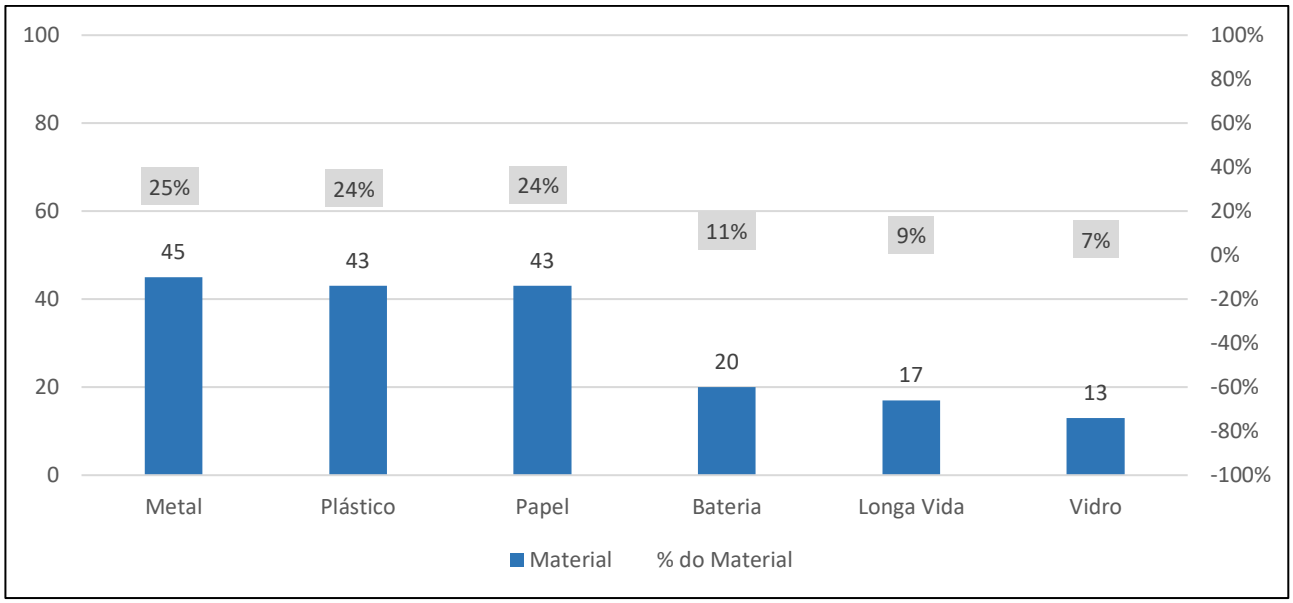

Figure 4: List of recyclable and intermediate materials in the state of Rio de Janeiro - (2019)
Legend: Elaborated from levantamento carried out through the CATAsig computer program..
Source: The author, 2018.

From this, it is important to highlight the materials that correspond to the practice of garbage picking in the state of Rj, in relation to their distribution, according to cooperatives, industries and intermediates. The following Graph expresses the relationship between recyclable materials and the number of cooperatives in the state of Rio de Janeiro working with the respective materials.

[13] It is noteworthy that there is no glass recycling industry in the state of Rio de Janeiro.

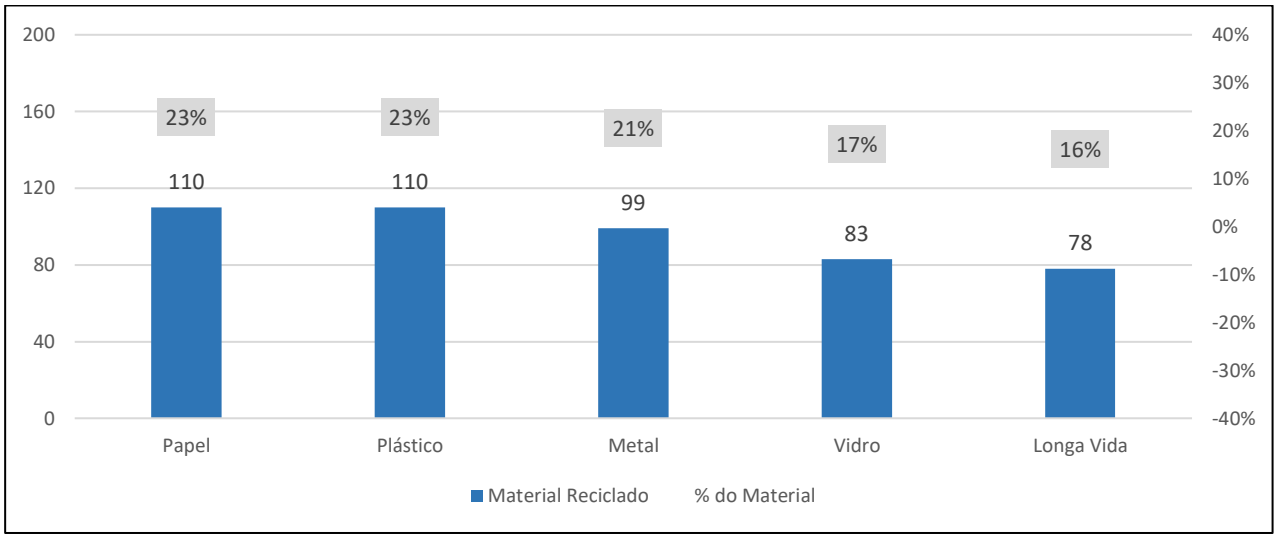

Figure 5: List of the number of cooperatives by type of recyclable material in the state of Rio de Janeiro - (2019
Legend: Prepared from a survey carried out through the CATAsig computer program.
Source: The author, 2018.

When we analyze the relationship about which recyclable materials are most present in the commercialization of cooperatives, it is observed that practically the same percentages of intermediaries are repeated, inversing only the order with paper, plastic, in the same condition and slightly below the metal, respectively with (23%), (23%) and (21%).

The justification of these indexes corroborates the understanding of the initial graph, referring to intermediates, either because they are materials that have a better market efficiency (R$/Kg), or because they are more abundant materials in the gravimetric composition of Brazilian recyclables that, therefore, are easier to be collected by the streets of cities or acquired from individual waste pickers.

Regarding glass, it is observed that 17% of cooperatives sell this material, that is, almost twice the rate of intermediates in the previous table. This higher percentage is justified because glass also integrates the mix of materials more available in the basket of products available in the streets of Brazilian cities. Since the cooperative is an actor practically situated at the base of the recycling pyramid, in which there are no specializations that already occur with the intermediation structures. Naturally, the flow of glass passes to the cooperative that then sells it to a few intermediaries, which underlies the behavior of the above-mentioned graphs, that is: the operation begins with 83 cooperatives marketing the glass, which are acquired by 13 intermediary companies, probably specialized in this field, which sell to the recycling industry or large regional aparists.

It is important to note that the glass recycling chains, as well as that of aluminum, are of high intensive capital, that is, the recycling operation is carried out by few industries, quite the opposite, for example, the case of plastic in which there are numerous industrialization plants of

small and medium size, which feed successive stages of value aggregation, reaching large companies.

The long life residue is marketed by 16% of cooperatives, more than double what is observed by intermediaries. This is clearly the present action of the reverse logistics operation carried out by the major national producer of this package, which is tetra pack.

Tetra Pack carries out an operation to purchase these products throughout the territory, with small but very capillarized warehouses strategically distributed in the Brazilian states. These warehouses favor the acquisition of this material with cooperatives, either because the purchase price practiced by these organizations is lower, or because, with its warehouse operation, Tetra Pack, ends up occupying the position of intermediaries in this productive network.

Tetra Pack's operation, with this intensity in the reverse logistics operation, is a consequence of some facts: a) it is a packaging with virtually unique technology and widely used in the Brazilian packaging sector; b) does not have greater large-scale reuse other than the return to the production process of manufacturing a new Tetra Pack packaging, which, in turn, led to the reason that, since the 2000s, even before the sanctioning of the National Solid Waste Law (Law 12.305/10) in 2010, this company, whose connection to the product was obviously easier, because it was the only national producer, was easily held responsible by the state Public Ministries, in view of the environmental impact and difficulty of reusing it.

5. CONCLUSION

Currently, studies related to sustainability are increasingly emerging, since the capitalist mode of production generates a large amount of garbage and waste from industrialized products. Thus, this issue of solid waste and everything that surrounds them, causes a need to also understand the functioning of the daily practices of the recycling production network and its management in urban space.

Thus, this work sought to carry out a bibliographic review in order to understand the positions occupied by peripheral social subjects within the logic of capitalist production, analyzing the concept of productive spatial circuit and the emergence of two economic circuits of the cities of peripheral countries: the upper circuit, represented by large garbage collection companies; and the lower circuit, represented by cooperatives and waste pickers. Since there is also one of intermediaries and middlemen, they mediate between value and work in these two circuits. Moreover, this work gave a general overview on the recycling network of the state of Rio de Janeiro, also analyzing the concept of network and its main aspects.

In this sense, it is important to consider how the management of solid waste, represented by the collection/recycling, has a fundamental and unquestionable role for the environment, despite reproducing a part of the capitalist production process, which ends up validating the exploratory and marginalized character of the workers who perform this work, contributing to the maintenance of the power relations implicit in this process.

Finally, it is worth saying that this concept of spatial circuit is imperative in the current period, since it allows the identification and knowledge about the logic of territories and networks, where the various ways of producing and circulating are renewed, whose subjects interact in various ways pursuing multiple interests.

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Paper submitted in 22/02/2020
Work in 05/10/2020