KITCHEN OIL RECYCLING NETWORKS USED IN SÃO PAULO MACRO-METROPOLIS

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Abstract

Objective: to analyze if the spatial distribution and the relationship of the main cooking oil waste collecting and processing companies in the Macrometropolis of Sao Paulo (MSP) support the characterization of their agglomeration as clusters or local productive arrangements (LPAs).

Methodology: the research is of a qualitative nature with an exploratory approach based on multiple case studies involving three companies from a current universe of fifteen associated to The Brazilian Association for Awareness, Collection and Recycling of Edible Oil (ECOLEO) that congregates the most important companies active in this segment in MSP. It was based on bibliographical research, documentary survey and interviews followed by triangulation of information.

Originality/Relevance: the analysis of the companies from the perspective of a cluster or a local productive arrangement allowed to verify how they are organized spatially in the MSP, as well as the relationship among them, aiming at suggesting governmental support for the optimization of its activities and the increase of income generation.

Results: the research showed that the elements of the agglomeration´s economy identified were not sufficient to say that the segment could be characterized as either a cluster or a local productive arrangement. It was concluded that the companies studied have little interaction with each other, each forming an isolated network of cooperation with a number of small oil waste suppliers which gravitates around them.

Theoretical Contributions: the contributions of the study highlights the identification of existing cooperation networks in the used cooking oil recycling segment and how its actors are organized and acting in MSP. It is also worth mentioning the expansion of the national literature on this theme that is an emerging one at the global level.

Keywords: Cooking oil residue. Clusters. Agglomerations. Local productive arrangements – LPAs. Cooperation networks.

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REDES DE RECICLAGEM DE ÓLEO DE COZINHA USADO NA MACROMETRÓPOLE DE SÃO PAULO

Resumo

Objetivo: analisar se a disposição espacial e o relacionamento entre as empresas coletoras e beneficiadoras de óleo de cozinha usado na Macrometrópole de São Paulo (MSP) permite caracterizá-las como *clusters* ou arranjos produtivos locais (APLs).

Metodologia: a pesquisa é de natureza qualitativa com abordagem exploratória baseada em estudo de casos múltiplos envolvendo três empresas de um universo atual de quinze associadas à Associação Brasileira para Sensibilização, Coleta e Reciclagem de Óleo Comestível (ECÓLEO), que congrega as mais importantes empresas atuantes nesse segmento na MSP. Baseou-se em pesquisa bibliográfica, levantamento documental e entrevistas seguidas de triangulação das informações.

Originalidade/Relevância: a análise das empresas sob a ótica de *cluster* ou arranjo produtivo, permitiu verificar como elas estão organizadas espacialmente na MSP, bem como o relacionamento entre elas, visando sugerir apoio governamental para a otimização de suas atividades e a ampliação da geração de renda.

Resultados: a pesquisa mostrou que os elementos de economia de aglomeração identificados não se revelaram suficientes para dizer que o segmento se apresenta como *cluster* ou arranjo produtivo local. As empresas estudadas têm poucas interações entre elas formando redes isoladas de cooperação, compostas por pequenos fornecedores de óleo usado que gravitam em seus redores.

Contribuições Teóricas: como contribuições do estudo destaca-se a identificação das redes de cooperação existentes no segmento de reciclagem de óleo de cozinha usado e de como os seus atores se organizam e atuam na MSP. Destaca-se também a ampliação da literatura nacional sobre essa temática que é emergente em nível mundial.

Palavras-chave: Resíduo de óleo de cozinha. Clusters. Aglomerações. Arranjos produtivos locais – APLs. Redes de cooperação.

REDES DE RECICLAJE DE ACEITE DE COCINA USADO EN LA MACROMETRÓPOLIS DE SÃO PAULO

Resumen

Objetivo: es analizar si la disposición espacial y la relación entre las empresas recolectoras y beneficiadoras de aceite de cocina usado en la Macrometrópolis de São Paulo (MSP) permite caracterizarlas como clusters o arreglos productivos locales (APLs).

Metodología: la investigación es cualitativa exploratoria con base en un estudio de casos múltiples considerando tres empresas de un universo actual de quince asociadas a la Asociación Brasileña para Sensibilización, Recolección y Reciclaje de Aceite Comestible (ECÓLEO), que reúne a las más importantes empresas actuantes en este segmento en la Macrometrópolis de São Paulo. Se basó en investigación bibliográfica, levantamiento documental y entrevistas seguidas de triangulación de las informaciones.

La originalidad / Relevancia: el análisis de las empresas bajo la óptica de cluster o arreglo productivo, permitió verificar cómo están organizadas espacialmente en la MSP, así como la relación entre ellas, buscando sugerir apoyo gubernamental para la optimización de sus actividades y la ampliación de la generación de ingresos.

Resultados: La investigación mostró que los elementos de economía de aglomeración identificados no son suficientes para decir que el segmento pueda ser caracterizado como cluster o arreglo productivo local. Se concluyó que las empresas estudiadas tienen pocas interacciones entre sí, formando redes aisladas de cooperación, compuestas por pequeños proveedores de aceite usado que están en sus alrededores.

Contribuciones teóricas: como contribuciones del estudio se destaca la identificación de las redes de cooperación existentes en el segmento de reciclaje de aceite de cocina usado y de cómo sus actores se organizan y actúan en la MSP. Se destaca también la ampliación de la literatura nacional sobre esa temática que es emergente a nivel mundial.

Palabras-clave: Residuo de aceite de cocina. Clusters. Aglomeración. Arreglos productivos locales – APLs. Redes de cooperación.

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Introduction

The use of edible oil, from both vegetable and animal sources, is intimately associated with human history and presently it is an essential ingredient for cooking all over the world. In Brazil, it has widely been used for food preparation for a majority of the population. The used oil becomes a waste that needs to be properly disposed of in the environment for recycling and other after uses (Struffaldi, 2016).

Cooking oil waste combines the oil in its liquid state and other components, such as water, food fats, remnants of all kinds of meat (bovine, pork, fish, chicken), and flour remnants from empanadas and fried food (Struffaldi, 2016).

For many years, in Brazil, this waste has been improperly disposed of into sinks, soil or gutters causing soil and water pollution and, therefore, increased costs in the maintenance of urban equipment due to clogged sewage pipe-lines (Brazilian Association for the Sensitization, Collecting and Recycling of Cooking Oil – ECÓLEO, 2019).

Despite an increase of public awareness, a considerable amount of this waste is still being improperly disposed of into the environment. Estimated statistics show that from the total amount of cooking oil waste generated in the SPM (around 20 million liters per year), only 9% is collected for recycling (ECÓLEO, 2016). Struffaldi (2016), notates out that this collected amount would be smaller if it were not for reverse logistics introduced by the Solid Waste National Policy – SWNP (Law no. 12.305 passed August 2, 2010), and the voluntary actions taken by NGOs such as ECÓLEO and Instituto Triângulo para a Sustentabilidade (Institute Triangle for Sustainability) to name a few.

When cooking oil waste is correctly disposed of for collection and properly treated to be free of impurities from the frying process, it can be recycled and returned to the productive chains of biodiesel, paint industries, lubricants, building construction, soap, detergents and several others. However, for many years, cooking oil waste was not perceived as a resource with potential use in many industrial sectors and was frequently used by soap manufacturers at the domestic level.

Not until starting in the year 2000, did industries gain interest for used oil, which began to intensify after the passing of Law no. 12.305 (SWNP) in 2010 (Brasil, 2010). Due to reverse logistics introduced by this law as an imperative instrument of waste management, the market for recycled cooking oil boosted contributing to better consolidating the prominent position of some regional recyclers of used cooking oil in the SPM.

The Brazilian Association for Awareness, Collection and Recycling of Edible Oil (ECÓLEO) was created in 2009, bringing together a number of collectors and recyclers of cooking oil waste. and this sector started to become well known by the population. Presently ECÓLEO has 14 associated companies, 10 of them located in the Macro-metropolis of São Paulo (ECÓLEO, 2019). This number fluctuates from year to year since there are continuously companies coming in and out of this association. Gravitating around these companies are a number of small collecting companies, NGOs, cooperatives of collectors, supermarkets, bars and restaurants, as well as individual collectors.

Except for collectors and recyclers, in recent years, at least four huge producers of edible oil, in partnership with SABESP (a state government company), Carrefour (network of hypermarkets) and Trevo (NGO), entered in the market of cooking oil waste.

Considering both the ECÓLEO's network of collectors and recyclers and the recent involvement of the biggest producers of edible oil in reverse logistics of used cooking oil, recently researchers have become interested in studying this sector (Oliveira & Ruiz, 2014; Thode Filho, Santos, Almeida & Silva, 2013).

The conglomeration economy, that includes the theories of clusters or local productivity arrangements (LPAs), was selected as the main theoretical pillar for this study due to its relationship with geographical proximity, governance, and the inter-relationship among the actors (Fochezatto & Valentini, 2010). Secondarily, the theory of networking organizations was also taken into consideration.

Lastres and Cassiolato (2003), define conglomeration as a form of joint work between companies which interacts at the local level with economic, political, and social agents. This takes advantage of geographic proximity to obtain, as a group, strategic advantages in acquiring inputs (e.g. raw materials, equipment, labor) and complement one another in the productive processes. Included in this concept are various formats of groupings of companies, which are as

follows: local productive arrangements (LPAs), clusters, industrial districts, and poles, local productive systems (LPS), local productive and innovative systems and arrangements (LPISAs), and companies´ networks. This latter type of conglomeration does not always meet the condition of geographical proximity, as the involved companies tend to organize themselves autonomously via formal or informal links.

Two types of conglomeration economies, clusters and LPAs, were selected as references to analyze this sector due to the competitive advantages that provided by both to the companies engaged in these two types of arrangements.

The supposition of this study was that this sector could meet the eligibility criteria for at least one of these two categories: clusters and LPAs. However, before analyzing the eligibility for clusters and LPAs, it was necessary to better understand the geographical distribution of cooking oil waste collectors in SPM.

Clusters are geographic concentrations of interconnected companies from a particular field interacting with suppliers of inputs (e.g. components, machinery, services) and specialized infrastructure providers. These companies also maintain relationships with technology industries, government organizations, universities, agencies, and providers of training, communication and education, to improve their competition (Porter, 1998).

Porter (1998) also explains that clusters facilitate dialogue between the public and private sectors to execute business. In this process, government can play an important role by promoting economic growth via the combination of appropriate technologies to local conditions. As a result, clusters can create economies of scale and provide competitive advantages to the all companies involved. Some basic requirements that need to be met by companies taking part in a cluster are: a) located near to each other in the same geographic area; b) share activities, operations and knowledge; and c) interact with Science, Technology and Innovation (S,T&I) institutions (Adapted from Porter, 1998).

In addition, Suzigan, Furtado, Garcia & Sampaio (2001), highlighted nine requirements these companies are required to meet to be eligible as clusters: a) high specialization; b) uniformity of the technological level; c) be involved in viable and relevant businesses; d) occupy the same position in the group as the other companies with no privilege; e) cooperate with all other companies and with existing institutions at the local level; f) use by-products and recycling materials generated locally; g) be under a supra-corporate governance; h) be open to the introduction of new technologies; and i) pursue a result oriented strategy for this type of arrangement.

According to Lastres & Cassiolato (2003), local productive arrangements (LPAs) are territorial conglomerations of economic, political and social agents focusing on specific economic activities, even if their interconnections are weak. Among these agents are: suppliers of inputs and equipment, trade, public and private organizations, and associations.

Basic principles for these LPAs are: a) be composed of small or medium companies of a specific industrial sector; b) be located in the same geographic area; c) all these companies need to cooperate among themselves; d) existence of a governance mechanism to keep these companies focused on the strategy of the group; and e) existence of partnerships with S,T&I institutions to improve knowledge and boost innovation (Adapted from Santos & Guarnieri, 2000).

Similarities between the requirements for LPAs and clusters are remarkable and they exist because LPAs are a Brazilian adaptation of the clusters definition for application to a number of companies of several economic sectors at the country level.

The present interest to understand if the sector of cooking oil waste can fit into the categories of either a cluster or an LPA is related to the knowledge that sectors with such characteristics can be eligible for government funds – both federal and state - for project development.

Theoretical Framework

The theoretical basis for the study was the conglomeration economy emphasizing the theory of clusters or LPAs and the theories of business and corporate networks.

Economies of Conglomeration

Lastres & Cassiolato (2003), conceptualize conglomeration as a joint working format between companies whose characteristics are participation, in the same geographic context, of propulsive agents - economic, political and

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social. Along with taking advantage of this geographic proximity with the intention of obtaining mutual advantage, as it is easier to obtain inputs, raw materials, equipment, labor and complement the productive processes. According to these authors, conglomerations include various types and / or formats of companies such as clusters, LPAs, industrial districts and poles, local productive systems, local productive and innovative arrangements and systems (LPIAS), and business networks, although these last, they do not always meet the condition of geographical proximity, forming themselves through formal or informal links of autonomous companies.

According to Fochezatto & Valentini (2010), the economy is a reference for theories related to regional development, which are constantly evolving. According to these authors, the microeconomic approach of localization to industries, for example, moved to a meso-economic approach, including conglomeration economies related to geographic proximity, governance, and interrelationships.

The advantages of conglomeration economies for regional growth have been explored in regional development literature highlighting the positive effects for firms and workers. For companies, these advantages can result from the relationship of those operating in related activities through the creation and formulation of innovations and dissemination of knowledge. Additional advantages of reducing costs of transportation of inputs, raw materials and instruments come from attracting subsidiary activities to the conglomeration as it expands locally and regionally (Galinari et al., 2007).

Authors Ceglie & Dini (1999), reinforce that these conglomerations allow the emergence of external economic factors, such as the emergency need of suppliers of raw material and components or the growth of specific tacit knowledge of each sector.

Within conglomeration economies, it is necessary to create, share and apply this knowledge and existing expertise in each of these organizations. The competitive environment in which these industries operate, acts as an introduction of specialization or quality improvement, i.e. their core competencies need to be the main focus of attention so that it represents an aggregation of value to their products and their image to the customers. This is one of the reasons why industries seek to form networks of relationships, including strategic alliances of varying nuances, thus complementing their skills and abilities (Prahalad & Hamel, 1999).

According to Lundvall (1988), companies seek competitiveness through cooperation and mutual work with other companies or other actors and companies, enabling the creation of innovation more frequently, rather than waiting for results from isolated actions.

Clusters or Local Productive Arrangements - LPAs

Porter (1998), a respected author, who studied and researched clusters in several countries within America and Europe, states that the idea of these clusters spread throughout the world and presents its classic definition:

> Clusters are geographic concentrations of companies and institutions interconnected in a particular field. They encompass a group of connected industries and other entities important to the competition. They include, for input suppliers, such as: components, machinery, services, and specialized infrastructure providers, as well as cultivating relationships with technology industries, government agencies, universities, agencies, and training providers, education (Porter 1998, 78).

Additionally, the type of conglomeration, along with the characteristics of clusters, favors efficient mean for dialogue between the public and the private sectors so that business and government can collaborate for the same purposes and create conditions to promote growth. In addition, it allows companies to act as if they operate on a larger scale or that have associated with others without losing its flexibility. They typically originate in the combination of technologies appropriate to local conditions, which create extraordinary economies of scale and provide competitive advantages to companies that are part of the conglomeration.

Concerning industrial clusters, Albu (1997), presents them as any form of industrial organization in a spatial concentration of numerous companies belonging to the same or similar category, while making it clear, however, that mere spatial concentration does not characterize a cluster, as these tend to specialize

in certain processes or stages of production and distribution channels. The Federation of Industries of the State of São Paulo - [FIESP], (2014), emphasize that only the existence of conglomeration of productive units, by itself, is not enough to characterize a cluster or LPA.

In Brazil, the term cluster is confused with that of LPA. Bedê (2002), points out that companies that make up LPAs present a common economic dynamic depending on the type of activity performed. According to Santos & Guarnieri (2000), these productive arrangements can be of a single sector or may include a grouping of suppliers of industrial inputs, machines, materials and services, or have similar technologies or use common inputs.

Bedê (2002), adds that the term LPA is also suitable for groupings of companies that: a) use a specific technology, such as a particular type of software, b) use the same inputs as the petrochemical industry, or c) that depend on the same climatic conditions for production as it happens for some types of fruits.

According to Santos & Guarnieri (2000), the basic principle of these arrangements is the cooperation between the group of companies of a given sector or industrial segment, usually of small and medium size, located in the same geographic area. Lastres & Cassiolato (2003), conceptualize LPAs as territorial conglomerations of economic, political and social agents focusing on a specific set of economic activities that have links, even if they are tenuous. Linkages between these agents are more consistent and emphasize innovation and learning in an environment of sustained competitiveness, and these authors refer to these as arrangements of local productive and innovative systems (LPIS), where innovation and learning are emphasized in competitiveness.

According to these authors, it is possible to summarize the concept of LPAs and clusters as conglomerations that follow the following parameters: a) geographical proximity, b) existence of some type of cooperation (complementary of activities) between the companies operating in the activities of the segment in question, c) existence of governance mechanisms to act in the coordination of the strategies of the segment and d) existence of partnerships with entities and institutes offering CT&I to boost innovation of the sector as a whole.

Tristan (2000), emphasizes that the importance of LPAs and clusters is to enable attitudes that provide conditions for companies to face competition and market globalization demands from the various sectors of the economy.

Cooperation and business networks

Czajkowski & Cunha (2010), define cooperation networks as a set of actors grouped into a single structure, working together to achieve a common goal. For Thompson (2003), the objective of cooperative networks is to group attributes that facilitate a better adaptation to the competitive environment in a dynamic structure, from standardized but decentralized actions that allow for scale gains by the union, which result in companies losing their flexibility because they are lean.

Business networks can be considered as conglomerations of companies whose degree of loyalty allows them to identify as capable of competing with the whole, as well as other aspects such as complementarity and similarity of activities (Boaventura & Siqueira, 2007). In this respect, business networks seem to be close to the concept of Lastres & Cassiolato (2003), which reviews company networks, since it is assumed that similarity of activities will lead to the formation of formal or informal links between them.

The meeting of companies in a group that form a business network has implications in the area of strategy, whose performance is expanded, and also incorporates the way these entities compete with companies outside the network and with other networks.

While companies are free to choose their partners, they must observe certain conditions to maximize their earnings and ensure competitiveness. For example, the focus should be placed on a small number of companies with which it is known in advance that the chances of gain will be greater. With this, there will be an increase in transactions and, therefore, an indication of certain loyalty (Boaventura & Siqueira, 2007).

Lastres & Cassiolato (2003), affirm that the competitiveness of companies and organizations depends on the breadth of the networks they are inserted in, as well as on their use, since this network format favors collective learning and cooperation, it contributes to innovative processes, increases the chances of growth and

survival, and can generate lasting competitive advantages.

Some networks are run by nonprofits, congregate recycling companies, waste pickers and several other organizations that interact with each other. A successful case is the Brazilian Network for the Recycling of Edible Oil (ECÓLEO), which brings together several public, private and third sector entities that interact in a collaborative way, participating in social-environmental fairs, lectures in public schools and universities, negotiations with government agencies, distribution of information material, and interviews with the media.

Currently, ECÓLEO has 15 associated companies that collect and benefit from used oil in more than 60 municipalities in the state of São Paulo, and operate in the states of Rio de Janeiro, Santa Catarina, Minas Gerais and Bahia (ECÓLEO, 2019). Among the entities that make up the ECÓLEO network are: waste pickers including oil collectors, recyclers, cooperatives, NGOs, Civil Society Organizations of Public Interest (CSOPIs), SECOVI, the State of São Paulo Commercial Association (ACESP), the State Secretariat of Environment of São Paulo (SMA), São Paulo State Basic Sanitation Company (SABESP), Legislative Assembly, Chamber of Deputies, among others (ECÓLEO, 2019).

Method

The research performed can be characterized as an exploratory nature with a qualitative approach. The exploratory nature can be justified in relation to the objective of the research, which aims to analyze if the spatial arrangement and the relationship between main collectors and benefactors of cooking oil in the São Paulo Macro- metropolis.

This allows them to be characterized as clusters or LPAs, with views to evaluate the future potential growing of this segment through public policies. Exploratory research is developed to provide an overview of a particular subject. This type of research is carried out when the chosen theme is sparsely explored and it becomes difficult to formulate precise and operable hypotheses. The primary objective of exploration is, as a rule, to develop concepts more clearly, to formulate a research problem better delineated (Cooper & Schindler, 2011; Martins & Theóphilo, 2009).

Conversely, studies with a qualitative approach have the purpose of knowing "how and why things happen," that is, to make possible the understanding of the different meanings attributed by people and their experiences, while using appropriate research techniques to register the understandings, motivations and interpretations (Cooper & Schindler, 2011). For Collins & Hussey (2005), a qualitative study is characterized by more subjective questions, that is, it is necessary for the researcher to examine and reflect the perceptions in order to obtain an understanding of social and human activities.

For conducting the research, the case study was adopted as a research strategy. Yin (2014), defines that this is the most appropriate method for the "how" and "why" questions. According to this author, it is a research strategy with applicability in situations where the researcher has little control over the events, when he is faced with the need to understand complex social phenomena, or when the availability of systematized information on the subject is reduced, as is the case of the present study.

According to Yin (2014), the analysis unit of a case study can be an industry, any entity of society, the economy of a country, the flow of capital between nations, or even an individual, each with its circumstances and peculiarities. For the development of this study, the companies that operate in the segment of collection and processing of used cooking oil and are associated with ECÓLEO, a non-governmental entity, for economic purposes, were delimited as a unit of analysis. In this context, a multiple case study was carried out.

Cooper & Schindler (2011) and Yin (2014), agree that one advantage of multiple case studies, when compared to simple case studies, is that the understanding of the problem increases as unified points are obtained so the generalization of the results, even for the subjects that do not comprise the sample, but which are part of the research universe.

According to these authors, the choice of multiple cases (i.e. in this study, the companies to be considered) should abide by the following conditions: a) considerable similarity among the elements of the population; b) choosing the three largest representatives of the selected sector or segment; and c) great similarity in the activities of the elements in both operation and commercialization. In this case, the area of the research in question is the set of formal and

informal collectors that integrate the segment of recycling of cooking oil used in the Macro-metropolis of São Paulo that is of the order of hundreds. We chose to define as members of the sample only the companies with recognized performance in this market segment. Thus, three companies were selected to conduct the research: Dajac, located in the city of São Paulo (SP), Hipala, in the city of Guarulhos (SP) and Lirium, located in the city of Mauá (SP). Giglio, from São Bernardo do Campo (SP), did not integrate the sample due to the confidentiality of its data.

Martins & Theóphilo (2009), mention that the necessary flexibility of the case study has peculiar advantages and offers quality to the research product. Yin (2014), points out that the collection of data for this type of strategy should be based on several sources of evidence. The main ones are: observation, participant observation, interviews, focus group, content analysis, questionnaire and social and attitudes scales, documentary research, records in archives, ethnographic research and speech analysis. These authors also emphasize the need for triangulation between sources. In this study, we used sources of evidence: bibliographic research, documentary analysis, interviews and participant observation. The documentary survey, involving secondary data for the research, was carried out through consultations with the reports of ECÓLEO and the publications of ABIOVE (Brazilian Association of Vegetable

Oils Industries), in order to obtain information and market data for used cooking oil. Furthermore, specialized sites were reviewed for obtaining information on legislation and terms of commitments involving government bodies, environmental agency and companies producing edible oil and used cooking oil recyclers. In addition, reports from FIESP and SEBRAE were also consulted.

Participant observation was conducted through several visits made within the companies, in which it was possible to actively participate in the data collection. Participant observation is part of an observation approach in which the observer participates actively in data collection activities, requiring the researcher's ability to adapt to the situation. It is a method that allows us to access common situations and events, which may be difficult to capture through interviews or through self-assessment tools. (Atkinson & Hammersley, 2005; Pawlowski, Andersen, Troelsen, & Schipperijn, 2016).

The study was conducted taking into account two steps, as shown in Figure 1. In step 1, a pilot study was conducted at Dajac Enterprise to guide the conduct of the research, based on a survey of its main operations and collection logistics. In Step 2, a Multiple Case Study was conducted with a view to establishing the type of conglomeration of the companies in this segment of the economy.

Figure 1 - Development stages of the case study
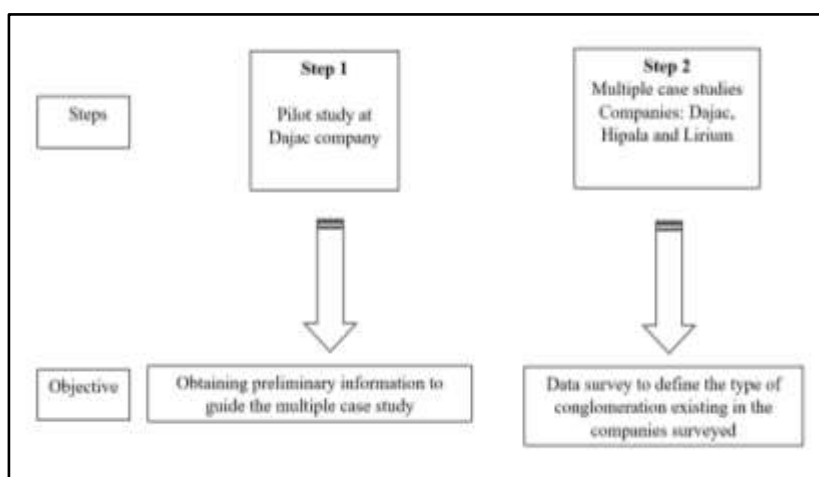
Source: the authors.

For the collection of the primary data, two models of roadmaps for conducting the structured interviews were developed, which were sent to the

companies. The first interview script was used in stage 1, in the pilot study, in order to obtain the core information regarding Dajac, taking into

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consideration its operations and production volumes. The second script was applied to the three companies under study, as described in step 2, which also contains questions with the perspective of exploring possible operations of these companies, which could characterize conglomerations as clusters and LPAs, in accordance with the assumptions of Porter 1998), Lastres & Cassiolato (2003), and Federation of Industries of the State of São Paulo - [FIESP] (2014).

For the conduction of the pilot study, the interview script was composed of two blocks of questions: (a) general company data, aiming to know its activities, operations and production volumes and b) characteristics of the collection logistics to have a preliminary idea of Dajac's type of organization.

For the study of multiple cases, the script was structured in two blocks of questions: a) general data of the company, similar to what was done in the pilot study (activities developed, operations and production volumes) and b) Is it possible to identify possible forms of business activity that could

characterize specific types of conglomerations, such as LPAs and clusters, in accordance with the concepts discussed by Porter (1998), Lastres & Cassiolato (2003), and FIESP (2014).

In order to identify in companies, the occurrence, or lack of, of the typical characteristics of clusters and LPAs, questions with answers of "Yes," "No," and "I do not know," were used. This criterion is exclusive, i.e. "Yes" means that the company meets a certain characteristic specified in the literature and "No" means that the company does not meet that characteristic. An answer of "I do not know," could mean a misunderstanding of the question by the interviewee.

From October 2014 to November 2015, technical visits and interviews were conducted in the three companies surveyed to carry out the participant observation, as summarized in Table 1. The interviewees' choice met the following conditions recommended by Cooper & Schindler (2011): a) hold the required information; b) be aware of the importance and accuracy of the information to be passed on to the interviewer; and c) willingness to cooperate.

Table1 - Collection of primary data for research

Research steps	Company	Perfil do entrevistado	Type of data collect	Date
Step 1	Dajac	Chief Executive Officer, Chemical Engineer, 60 years old, 12 years of experience in the field	Personal interview	2014, 10/17
		Operation supervisor, technician, 40 years old, 10 years of experience in the area	Technical visit	2014, 10/17
Step 2	Dajac	Chief Executive Officer (same as above)	Personal interview	2015, 11/04
	Hipala	Managing Partner, engineer, 55 years old, 10 years of experience in the field	Personal interview	2015, 10/23

		Operations manager, technician, 55 years old, 10 years of experience in the area	Technical visit	2015, 10/23
	Lirium	General manager; 61 years old, 18 years of experience in the field	Technical visit	2014, 12/08

Source: the authors

In the Dajac company, the interviews lasted approximately 1.5 hours each and, in the company Hipala, the interview had a duration of 50 minutes. In both companies the interviews were face-to-face and recorded with the consent of their directors. The interview at Lirium was conducted via telephone, lasting 35 minutes and without recording.

Finally, for the data treatment, the synthesis tables and figures were elaborated, in order to triangulate several sources of evidence. According to Eisenhardt (1989), triangulation derived from the various methods of data collection provides consistent proof. In this study, triangulation was performed based on bibliographical, documentary, direct observation through technical visits and content analysis of structured interviews.

The analysis of the results was performed through inter-cases analysis. In this context, the following aspects were addressed: a) general characteristics of the companies surveyed and b) evaluation of the companies regarding the configuration of LPAs and / or clusters, through the following criteria: geographical proximity between companies; sharing of complementary activities; perceived forms of cooperation in conglomeration; existence of a governance system for the whole conglomeration; partnerships with institutions offering science and technology, and training common to conglomeration companies (Porter 1998, Lastres & Cassiolato 2003 and FIESP 2014).

Analysis and Discussion of Results

The Macro-metropolis of São Paulo, where the studied companies are located, encompasses the metropolitan areas of São Paulo, Baixada Santista, Campinas, Sorocaba and the Paraíba Valley and North Coast, as well as the Urban Conglomerations of Jundiaí and Piracicaba. This macro-region is formed by 174 municipalities that concentrate 33.5 million inhabitants in an area of approximately 50,000 km². It is considered the most developed in the country with Gross Domestic Product (GDP) of R $896.4 billion, which corresponds to about 30% of the national GDP and 85% of the GDP of the State of São Paulo (Empresa Paulista de Planejamento Metropolitano S/A - Paulista Company of Metropolitan Planning [EMPLASA], 2012).

Results of the Literature Review on Used Kitchen Oil

The results of the literature review, particularly of the available documents, since the bibliography on used cooking oil is still scarce, allowed to identify two large groups of organizations that collect used cooking oil in the Macro-metropolis of São Paulo.

The first group is made up of collection and processing companies that since 2009 have worked individually in this region and are represented by ECÓLEO. The second group is comprised of edible oil companies, represented by the Brazilian Association of Vegetable Oil Industries (ABIOVE) and the Union of Vegetable Oils and Vegetable Industry (SINDÓLEO), which, following PNRS, have implemented the collection of used cooking oil in the State of São Paulo since mid-2012 (ABIOVE, 2013).

The companies represented by ECÓLEO that comprise the first group are 15 in total, 11 of which are located in the state of São Paulo, 1 in Rio de Janeiro, 1 in Bahia, 1 in Minas Gerais and

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1 in Santa Catarina (ECÓLEO, 2019). Four of them, located in the Macro-metropolis of São Paulo, are among the majority representative of the collection and processing segment: Dajac, Hipala, Lirium and Giglio (Struffaldi, 2016).

Some of the companies represented by ABIOVE and SINDÓLEO, which make up the second group, signed terms of commitment in the Food sector with the government of the State of São Paulo, in order to comply with PNRS requirements, and to begin implementation of used cooking oil, assuming its post-consumer responsibilities. Among these companies, the following stand out: Adm Brasil Ltda., Bunge Alimentos S / A, Imcopa Import, Export and Oil Industry Ltda., Louis Dreyffus Commodities Brasil Ltda., Siol Alimentos Ltda., Triângulo Alimentos, and Cargill Agrícola S / A (ABIOVE, 2013, 2015). Table 2 shows estimated volumes of used cooking oil collected by the companies linked to ECÓLEO (base year 2015) and by the companies represented by ABIOVE / SINDÓLEO (base year 2013), whose added values result in 20.3 million liters.

**Table 2: Estimates of volumes of used cooking oil collected in
Macro-**metropolis **of São Paulo by the companies represented by
ECÓLEO, ABIOVE / Cargill e Trevo (Base year: 2018)**

Organization	Liters/month	Liters/year (millions)
ECÓLEO	3,000,000	36,0
ABIOVE / Cargill	100,000	1.2
Trevo	275,00	3,3
Total	3,375,000	40.5

Source: Ecóleo (2019); Cargill (2019); Trevo (2019).

These estimates should cautiously be used in view of the fragility of the statistics provided by collecting and recycling companies. This fragility is due to the low reliability of the data provided by the primary representative companies operating in the segment and also due to the lack of official data on the collection volumes of the large number of small collectors scattered throughout the Macro-metropolis.

In the Macro-metropolis in São Paulo, with an estimated population of 33,7 million (EMPLASA, 2019), 255 million soybean oil was consumed per year, using a consumption index of 7.57 liters per inhabitant per year (Brazilian Institute of Geography and Statistics - [IBGE], 2016). Considering that the estimated annual collection volume for the years considered was 40.5 million liters (Table 2), it is estimated that the annual collection is approximately 15,9% of the total used cooking oil. It is noted, however, that in order to simplify the calculations, volume losses in their life cycle were not considered.

Interview Results

The results of the study were based on interviews conducted with the three companies - Dajac, Hipala and Lirium, which were conducted in two stages: phase 1 - pilot study and phase 2 - multiple case study.

In phase 1 the pilot study was conducted at Dajac to learn about its activities, how it is organized and the external actors with whom it interacts to get a preliminary idea of what could be expected in the surveys with the two other central companies, Hipala and Lirium, which are part of the segment of cooking oil used in the Macro-metropolis of São Paulo.

Dajac is a medium-sized company with 11 employees distributed in the administrative, accounting, financial and operational areas and its monthly operation volume is 430 m3, or 430,000 liters. It owns a fleet of 4 own vehicles and 4 contracted third parties, half of the used oil is collected by their own fleet and half by the third party that deliver to Dajac (Struffaldi, 2016).

Dajac maintains a network of loyal collectors in several municipalities of the Macro-metropolis of São Paulo: Osasco, Cajamar, Cotia, Santo André, São Bernardo do Campo, Atibaia, Caraguatatuba, Mogi das Cruzes, Campinas, Santos, Jacareí, Sorocaba, São José dos Campos, Sumaré, Americana, Tatuí, Ilha Bela, Itapetininga, Ubatuba and Cruzeiro. Among these loyalty partners are commercial establishments in the area of food,

hospitals, shopping malls and industrial kitchens that are large generators of used cooking oil. There is also a myriad of bars, restaurants and companies`` that constitute a smaller network of collectors with collection capacity ranging from 5,600 to 11,200 liters / month. This loyalty, according to Calhau (2014), is important to maintain an open channel of communication with the collectors which provides transparency in the quality of the commercialized waste and a practice of fair prices.

The Dajac activity flow chart, presented in Figure 2, includes the following operations: a) collection in the generating sources (own and outsourced fleet); b) processing (receiving, filtering, decanting, separation of water, animal and vegetable fats, clean oil and final tailings, c) laboratory evaluations; d) packaging and storage; e) recycling and generation of by-products; and f) distribution. Among the by-products of used cooking oil that Dajac sells are the recycled oils used in the production of: a) biodiesel; b) mold

release agents used in the construction of concrete beams; c) plasticizer additives and binders used in the production of cement blocks, d) plasticizers based on organic polymers to increase fluidity of the concrete, e) rust inhibitors for sheet metal, parts, molds, tools; and f) lubricating fluids for cold and hot forming operations such as drawing, stamping and cutting of ferrous and non-ferrous materials. Wastewater from operational activities is treated and directed to a SABESP emissary and the final reject is sent to feed manufacturers for pigs and to the fertilizer industries (Calhau, 2014).

In phase 2, the multiple case study, general information about the three companies surveyed, their geographical locations and the distances between them were followed.; subsequently followed by an evaluation of each one, seeking to identify characteristics that are observed in clusters of LPAs and / or clusters.

Table 3 presents the general characteristics of the three companies: Dajac, Hipala and Lirium.

Table 3: Profile of the companies

|	DAJAC	HIPALA	LIRIUM
Number of employees	11	60 (15 in oil)	31
Production (Liters/month)	430.000	420.000	275.000
Truck fleet	50% own fleet 50% third party	2% own fleet 98% third party	100% own fleet
Strategy	Great generators + Micro-nets of collection (2 to 5 tons) Driving distance - 250 km from São Paulo	Great generators + Micro-nets of collection Driving distance - 250 km from São Paulo	Great generators Driving distance - 250 km from São Paulo
Proccess	Filtration and decantation	Filtration and decantation	Filtration and decantation
Mean destination of clean oil	Biodiesel, Release agents, Lubricating Fluids	Supplies for food	Biodiesel

Fonte: Struffaldi (2016)

Table 3 shows common characteristics of the three companies, such as average size, number of employees ranging from 11 to 31, and production volumes varying from 275,000 to 430,000 liters / month. Regarding logistics, the strategy of each of the companies is to operate in the São Paulo Macro-metropolis, within a 250 km radius, as the

nodal point of a collection network composed of micro-nets of small collectors that collect used cooking oil from a large number of commercial establishments and residences. 50% of Dajac's collection is made with its own fleet and 50% with outsourced fleet (Calhau, 2014); the Hipala makes 98% of the collection with outsourced

fleet and only 2% with own fleet (Alves, 2015). Lirium collects 100% with its own fleet (Denuzzo Junior, 2015). The operational flow involving the generation of used oil, collection and beneficiation operations are similar and can be summarized together as shown in Figure 2.

Figure 4: Synthetic operational flowchart for the companies surveyed
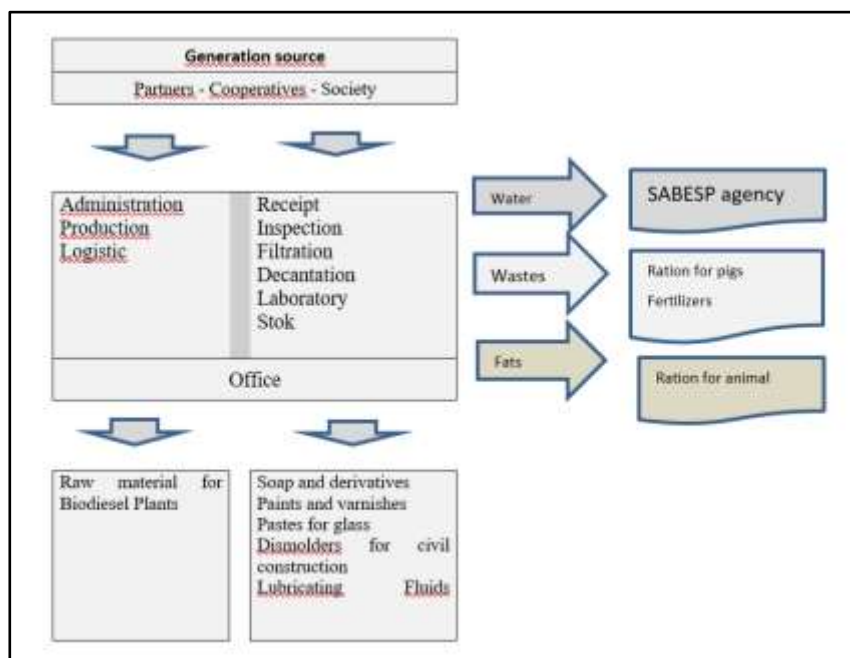
Source: the authors

As for the destination of the beneficiary oil, the three companies supply biodiesel plants, and Dajac also produces mold release agents used as support for concrete beams in the construction industry (Calhau, 2014), and Hipala uses it as a flavoring ingredient in the industry (Alves, 2015). In relation to the evaluation of each of the three companies to identify characteristics observed in clusters of LPAs and / or clusters, the information obtained in the interviews with LPAs and clusters requirements was analyzed, explicitly: a) geographic location and distance as a factor of integration and synergy; b) existence of common or complementary activities; c)

adoption of a governance system to lead, negotiate local decision-making processes, and organize to achieve common goals; d) practice of a common system of training and education; e) existence of partnerships with universities and technology institutes aimed at the practice of innovation for knowledge generation; and f) community rootedness demonstrated by the relationship with public and private entities (Porter, 1998; Lastres & Cassiolato, 2003).

Table 4 shows the locations of the three companies studied and the approximate straight distances of each of them to the center of the city of São Paulo.

Table 4: Geographic locations of Dajac, Hipala and Lirium

Company	Year of Foundation	Municipality	District	Straight line distance to São Paulo
Dajac	2007	São Paulo	Freguesia do Ó	9.13 km
Hipala	1997	Guarulhos	Jardim Aracília	30.42 km
Lirium	2001	Mauá	Sertãozinho	25.40 km

Source: the authors.

From Table 4 it can be seen that Dajac, due to its location in the Bairro do Freguesia do Ó, is located at a distance of 10 km from the center of São Paulo. Lirium and Hipala are located at greater distances, between 25 and 31 km, respectively. Figure 3 shows the relative straight distance, straight, between the three companies, located at the vertices of an equilateral triangle is 34 km.

Figure 3: Distances em linha reta entre Dajac, Hipala and Lirium

Source: adapted from Google Earth (2019).

Local Products, Clusters, and Business Networking Triangulation Results

In Table 5, we discuss the main requirements pointed out in the literature for the characterization of LPAs and clusters and the results obtained in the interviews.

Table 5: Results obtained regarding the requirements of clusters or productive locals arrangements

Main requirements	Description of the requirements	Research results
Geographic proximity of companies	The geographical proximity between companies and other agents of development - economic, political and social - is important because it is easier for them to obtain inputs, raw materials, equipment, labor and complementary in productive processes (Lastres & Cassiolato, 2003; Fochezatto & Valentini, 2010). The relationships between economic agents, including firms, are directed towards a "central place in space" where the aggregate production of the business is implemented through the neighborhood effect (Silva, 2004). A spatial concentration of companies belonging to the same category alone does not characterize a cluster because they can specialize in certain processes or stages of production (Albu, 1997).	The three companies are located 35 km far from one another; each one has a regional market for collecting cooking oil waste in the surrounding municipalities and districts; there is an implicit agreement among them, so one does not invade the market of another. In this regard, geographic proximity, important to the definition of clusters or LPAs, is not observed in these companies.
Sharing of complementary activities	For companies, this sharing of activities can result from the relationship of those operating in related activities through the creation and formulation of innovations,	The three companies are totally independent from one another and do not share any type of activity.

	dissemination of knowledge, reduction of the cost of transporting inputs, raw materials, instruments and machines (Galinari et al., 2007; Santos & Guarnieri, 2000). The complementary of activities may also result from the use of by-products and recycling of some companies by others (Suzigan et al., 2001).	
Perceived forms of cooperation in the conglomeration	Cooperation between a group of micro and small enterprises, located in the same area, is the basic principle of local productive arrangements (Santos & Guarnieri, 2000). The interrelationship between them is key in this respect (Fochezatto & Valentini, 2010). The formation of networks of relationships between companies provides the creation, sharing and application of knowledge and the expertise of each one (Prahalad & Hamel, 1990). The collaboration between companies is seen by Suzigan et al. (2001), as a success factor for the local productive arrangement. Confidence, level of social commitment and social environment are subjective and non-measurable variables, but they define parameters of interaction between the actors that are related in a cluster (Altenburg & Meyer-Stamer, 1999). Working in a collective way is pointed out by Porter (1998), as one of the four fundamental points of clusters. Cooperation is one of the factors that contributes to consolidate relations between companies (MIDC, 2004).	Each company operates independently and there is no cooperation among them in order to benefit all, therefore, not meeting the requirement of perceived cooperation.
Existence of a governance system for the conglomeration set	Governance over the different modes of coordination related to production, distribution of goods and services, and the process of knowledge generation and dissemination is important in clusters (Porter, 1998), and in local productive arrangements (Lastres & Cassiolato, 2003). The existence of supra-corporate governance is highlighted by Suzigan, et al. (2001), as an important element for the success of a local productive arrangement. They highlight the need for balance with the absence of privileged positions among companies. MIDC (2004), points out that governance helps	There is no governance system for the companies; each company preserves its own individuality and is responsible for its objectives and goals regarding the collection and processing of cooking oil waste and market strategies.

	to consolidate relationships between companies. The condition of equity, participation and consensus, for the benefit of the group of companies depends on the extent of the networks in which they are inserted, as well as their use of them. This network format favors collective learning and cooperation, contributes to innovative processes, increases the chances of growth and survival and can generate lasting competitive advantages (Lastres & Cassiolato, 2003).	
Partnerships with S&T institutions	Suzigan, et al. (2001), highlight the importance of cooperation between companies and S & T institutions for the success of local productive arrangements. According to Porter (1998), clusters originate in the combination of technologies appropriate to local conditions, which create economies of scale and provide competitive advantages to the integrated companies. He emphasizes that these companies must cultivate relationships with universities and development agencies, among many other actors. These relationships, according to MIDC (2004), emerge the technological development and innovation that promote endogenous technological capacity of companies.	None of the three companies have any kind of partnership with universities and/or research institutions, aiming at increasing knowledge and to enhance activities of processing cooking oil waste via innovation.
Common training and professional qualification for all companies	The culture of generation, sharing and socialization of knowledge, implicit or not, must be disseminated by the different actors of a cluster (Porter, 1998), or by a local productive arrangement (Lastres & Cassiolato, 2003). Companies must relate to training agents and providers of training, communication, and education (Porter, 1998). Innovation and interactive learning enable the introduction of new products, processes and methods, fundamental to guarantee sustainable competitiveness (Porter, 1998; Lastres & Cassiolato, 2003). In this paper, we present the results of a study on the relationship between clusters (Porter, 1998), and local productive arrangements (Lastres & Cassiolato, 2003). Companies should invest in training and capacity building to build differentiated	There is no common workforce for training or professional qualification for the three companies; each one provides specific training for its employees to meet its needs and demands.

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	human capital in local productive arrangements (MIDC, 2004).	
Support to the public sector	The support of the public sector in investments for productive specialization processes and the training and qualification of differentiated human resources is relevant in the case of local productive arrangements (MIDC, 2004). Public sector support through direct measures is pointed out by Suzigan et al. (2001), as a factor that dynamizes local productive arrangements. Public investments and financing can help the process of productive specialization (MIDC, 2004).	No support from the public power was provided to this economic segment in the São Paulo Macro-metropolis.

Source: the authors

Table 5 displays data related to the requirements of LPAs and clusters, from the literature, and information for each of these requirements obtained for the three companies interviewed.

It can be observed that even the requirement of geographical proximity was not observed among the companies studied. It should be noted that due to the high population concentration in the region where they are installed, the average distance between them (34 km), is an inhibiting factor between them due to frequent problems of congestion.

None of the other requirements have similarly been met, since from their implantations to the present day, the traditional companies of the used cooking oil segment act individually in "market spaces". These spaces are regional and, in general, apparently, they are respected even if there is no explicit agreement between business owners. Each company has its collecting micro-nets and the benefaction of the residue in a similar way using simple technologies and widely dominated as separation of the coarse residues by filtration, decantation and storage. In the face of this situation, no interaction with S & T providers was identified.

There is no cooperation between companies and there has also been no commercialization of specific types of "tailings" between one company and another that denote complementary activities. Governance far removed from the reality in which these companies operate.

Training employees of these companies is practical in nature, of the hands-on type,

specifically aimed at maximizing production. No talk and / or event, articulated by these companies, aimed at discussing problems related to the workforce was mentioned by the interviewees.

In summary, Dajac, Hipala and Lirium act autonomously and individually in terms of their goals and objectives. There are no formal links between them, although their owners know each other and maintain a cordial relationship. Since they operate in the same economic segment, maintain sporadic contacts and do not invade each other's oil market, it can be said that all three are part of a network that is close to the concept of Lastres & Cassiolato (2003). In this larger network, each company has its own network of collectors, consisting of commercial establishments in the area of food, hospitals, shopping malls, industrial kitchens, residential condominiums, nongovernmental organizations (NGOs), cooperative of collectors, environmental entities, associations, bars, restaurants and volunteers.

Since the three companies are free to choose their partners in the context of their networks, they need to restrict the number of partners so that they can keep them loyal, aiming to increase the collections in the areas within their scope of action, maximize their gains and ensure competitiveness. In this context, the networks formed around each of the three companies have characteristics of business networks described by Boaventura & Siqueira (2007).

The fact that there is no joint action of these three companies aiming at a common objective

and adaptation to a competitive environment does not allow for the characterization of the network that brings them together as a cooperation in the way pointed out by Czajkowski & Cunha (2010), and Thompson (2003).

In relation to the edible oil companies that more recently entered the market for used cooking oil, created by the reverse logistics of waste introduced by the National Solid Waste Policy, it can be said that a business network (Boaventura & Siqueira, 2007), was established through signatures of terms of commitments headed by the Brazilian Association of Industries of Vegetable Oils (ABIOVE) and the Union of the Industry of Vegetable Oils and Derivatives (SINDÓLEO), which represent them. This network includes companies Adm Brasil Ltda., Bunge, Imcopa Import, Export and Oil Industry and Louis Dreyffus Commodities Brasil SA, Cargill Agrícola S / A, Carrefour, the NGO Trevo and the Basic Sanitation Company of São Paulo (SABESP).

The initial assumption that there would be conditions to organize the three companies studied and the other collectors associated with them in the Macro-metropolis of São Paulo, in a local productive arrangement or cluster, does not support itself. In this way, the preliminary idea of possible allocation of public resources to strengthen the companies in the segment, given the still very incipient level of organization of this economic segment, is not supported.

Final Considerations

This work sought to answer the following research question: how are companies involved in the used cooking oil segment distributed spatially in the Macro-metropolis of São Paulo and how are they organized regarding the collection and processing activities of this waste? The three companies are spatially situated at the vertices of a nearly equilateral triangle with the following approximate distances: 35 km between Dajac and Hipala, 33 km between Dajac and Lirium, and 34 km between Lirium and Hipala. The results showed that the three companies surveyed presented themselves as autonomous networks that congregate several used cooking oil collectors, including companies, NGOs, OSCIPs, cooperative of collectors, commercial establishments, environmental entities, associations and volunteers.

At the beginning of the research, the large number of participants (formal and informal) in the collection of edible oil residue in the MMP region, together with the absence of other researches, could be seen that the companies operating in this segment could be organized in the form of clusters or LPAs. However, it was found that the type of conglomeration of the three companies surveyed does not meet the requirements of clusters or LPAs in the literature, which are: visible forms of cooperation, sharing of activities, existence of governance for the whole conglomeration of companies, joint training among companies in the group, regularity in the exchange of information and agreements with technology offering institutions aimed at the sustainability of the group (Porter 1998, Lastres and Cassiolato 2003, and FIESP 2014). It was observed in this research the existence of collecting conglomerations distributed regionally in the Macro-metropolis around the three companies studied, but, as observed by Albu (1997), and FIESP (2014), this alone is not enough to define a cluster or LPA.

The three companies studied present themselves as nodal points of autonomous networks with independent administrative and operational management that congregate other smaller companies, commercial food establishments, several entities, among them NGOs and OSCIPs, autonomous collectors and networks of cooperatives, resembling the networks of companies described by Lastres & Cassiolato (2003). This is an important contribution to the practice, since it may mark future decisions of the public power regarding a possible program to support the dynamization of the segment of collection and processing of used cooking oil.

Due to the lack of initial knowledge of the operation of the main companies involved in the collection, processing and marketing of used cooking oil and the business networks that have developed from and around them in the Macro-metropolis of São Paulo, the pilot research with the company Dajac made possible the preliminary understanding of the stage of development of this company and its main competitors (Hipala and Lirium), as well as their spatial distributions and the influence of their markets. This preliminary knowledge was of fundamental importance in order to design the second part of the research, especially the instrument of data and information gathering,

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focusing on the arrangement and the relationship networks of these companies. This type of approach is recommended in situations where the initial knowledge of an economic segment is limited and / or fragmented.

The existence of few studies in the national and international references, related to the economies of conglomerations involving companies and collectors of used cooking oil, presents a gap that shows the importance of the accomplishment of this study. Filling this gap represents an opportunity for the development of technical and academic studies to support the recycling activity. It is important to know the main collectors, beneficiaries and end users, their geographic locations, the business networks in which they are inserted and / or connected, their spatial distributions, as well as their interactions and eventual sharing of activities in this macro-region that circumscribes the study object of the present research.

As a limitation of this study, there is the difficulty of accessing the various information of the companies surveyed. During the data collection, the companies refused to provide some information, under the allegation of confidentiality. The lack of a database with information of the companies and associations belonging to the segment of used cooking oil can also be seen as a limiting factor of the research, since it precludes an aggregated view of the segment as a whole.

Finally, larger research involving the large edible oil companies that assumed their post-consumer responsibilities, through the signing of terms of commitment in the food sector with the government of the State of São Paulo, is a suggestion for future work that can be made from the present study. In this context, it may be relevant to know the main collectors that integrate into the networks of these large companies, as well as their geographic locations and possible interactions in the Macro-metropolis of São Paulo, allowing an adequate targeting of public policies, especially those linked to environmental incentive funds. This strategy would be interesting, since the activities of collecting the edible oil residue, considered as having a high environmental impact, presents high environmental relevance due to the high volumes involved and significant benefits resulting from income generation and social inclusion due to the great capillarity of this economic segment in the society [Secretariat of the Environment of the State of São Paulo - SMA. (2011)].

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