PRODUCTIVE AGGLOMERATION AND NETCHAINS: CONTRIBUTIONS TO VALUE CREATION IN AGROINDUSTRIAL SYSTEMS

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Abstract

Considering the recurrent problem of cooperation between agents in the search for economic efficiency and competitiveness, the present study sets out to discuss the connections between the approaches of productive agglomerations, collective actions and netchains for value creation in agroindustrial systems, seeking to demonstrate that this problematic cannot be treated in a unidimensional manner. The discussion focuses on the complementarity of these approaches and presents a brief review of the main points involved. It is then suggested that they should be applied jointly in order to analyze agroindustrial systems, since evidence has shown that they are all part of the central problem. Lastly, it is argued that agroindustrial systems will only be well-coordinated and efficient, establishing long-term comparative advantages, if this coordination takes into account the interdependencies between the actors and the regional dimension, with a view to identifying the main, potential sources of value linked to them.

Keywords

Cooperation; Coordination; Collective Actions; Interdependencies.

AGLOMERAÇÃO PRODUTIVA E *NETCHAIN*: CONTRIBUIÇÕES PARA A CRIAÇÃO DE VALOR NOS SISTEMAS AGROINDUSTRIAIS

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Resumo

Considerando a recorrente problemática da cooperação entre agentes em busca de eficiência econômica e competitividade, o presente estudo objetiva discutir as conexões entre as abordagens de aglomerações produtivas, ações coletivas e netchains sobre a criação de valor nos sistemas agroindustriais, com o intuito de demonstrar que essa problemática não pode ser encarada de forma unidimensional. A discussão está focada na complementaridade dessas abordagens. O texto apresenta uma breve revisão dos principais pontos envolvidos e sugere uma aplicação conjunta para análises de sistemas agroindustriais, por evidenciar que o problema central é compartilhado por elas. Ao fim, defende-se que os sistemas agroindustriais só serão bem coordenados e eficientes, com o estabelecimento de vantagens comparativas duradouras, se essa coordenação levar em consideração as interdependências entre os atores e a dimensão regional, com vistas a identificar as principais e potenciais fontes de valor a elas atreladas.

Palavras-chave

Cooperação; Coordenação; Ações Coletivas; Interdependências.

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Introduction

By the end of the nineteenth century, Alfred Marshall considered that the concentration of production had opened the way for many advances towards the division and specialization of labor, highlighting physical and edaphoclimatic conditions as being responsible for this concentration, as well as the availability and access to the factors of production within a given region. Marshall also emphasized opportunities, the facility for trade and grouping together, and providing feedback to the system, as being relevant factors so as to increase the efficiency, consolidation and growth of productive activities (MARSHALL, 1982).

In this respect, Suzigan *et al.* (2003) argued that the essential characteristic of agglomerations of companies and institutions is the ability to generate external economies, whether incidental or deliberately created, that contribute to their competitiveness. The joint actions created by the agents may increase their competitive capacity, thereby making them more efficient. Hence, Rolim (2005) understood that the problem of location ceases to be a direct relationship between factors, resources and productive activities, and becomes configured as a more general question regarding the relations between the social structures that enable cooperation between local agents.

The last decade of the twentieth century brought about transformations to the institutional environment, which triggered significant changes for companies. This not only occurred in the economic sphere, but also in the technological and informational sphere. In order to face up to such changes, organizational adapta-

tions were necessary in the search for stability and/or competitiveness in globalized competitive markets. Amongst these adaptations are those linked to production and management processes and to the adoption of distinct forms of action supported by different governance structures (SCHMIDT; SAES, 2008).

Within this scenario, companies began to develop governance structures based on association and collaboration amongst the agents; complex governance structures since they involved several individuals. Some authors have called these structures collective actions, mechanisms that seek to serve the different forms of negotiation and that originate largely from the globalized scenario. For Austin (2001), firms are faced with an environment of high interconnection and interdependence, in which it is difficult for isolated agents to obtain success without cooperation.

There is a great quantity of collective actions present in agribusiness, and may be found in a wide range of different productive sectors and different agroindustrial systems. Amongst the several models of collective actions that occur in agribusiness, the most prominent are cooperatives, unions, associations, networks, supply chain, netchains, clusters and local productive arrangements (SCHMIDT; SAES, 2008; ZYLBERSZTAJN, 2010; WENNINGKAMP; PALOSCHI TOMÉ; SCHMIDT, 2014).

The concept of netchain was developed by Lazzarini, Chaddad and Cook (2001), integrating network approaches and supply chain analysis, which is a set of networks composed of horizontal links within the same sector or group (same layer), and vertical ties between agents from different sectors (different layers, chains). The approach demonstrates how agents relate to one another on the same layer as well as to agents from other layers. This analysis considers a tangle of relationships and connections that fosters value creation based on coordinating the various forms of interdependence (SCHMIDT; SAES, 2008).

Despite the different approaches and the discontinuous pathways between them, the central problem is shared by the approaches presented. Thus, the objective of the present study is to discuss the connections between the approaches of productive agglomerations, collective actions and netchains for value creation in agroindustrial systems, demonstrating that it is not possible to treat this problem in a unidimensional manner. The discussion is focused on the complementarity of these approaches around a very recurrent theme within them: cooperation amongst agents in the pursuit of economic efficiency and competitiveness.

Thus, in addition to this introduction, the article is made up of four other sections. In the second section a theoretical review is conducted of productive agglomerations. The third section presents the collective action theory and specifically

the netchain approach. The fourth section discusses the interlinking of approaches within the agroindustrial context and the fifth section concludes the paper with the final considerations.

1. The Productive Agglomerations Approach

The opening up of the markets modified the forms of production and trading, "reducing distances" through lower logistical costs. Because of this, territory ceased to be considered for its technical resources and was viewed as a matrix of organization and social interactions. Competition on a worldwide scale has increasingly demanded that companies produce at reduced costs, improve quality, have product variability, are capable of responding quickly to changes in demand and demonstrate a capacity for innovation (CASSIOLATO; LASTRES, 2001; ROLIM, 2005; DIAS; SILVA NETO, 2004).

There is an ever-increasing trend for economic activities to become organized within more flexible patterns of production, abandoning the classical Taylorist organization and moving towards a system concerned with Toyotism-based task coordination. Overall/total performance will increasingly depend on cooperative interactions between internal systems (research, marketing, production, finance, maintenance, etc.) and external elements (customers, suppliers, research centers, competitors, support industries, etc.) (CARLEIAL, 1997; ROLIM, 2005).

Important elements for this cooperation are related to the generation of external, financial and technological economies, present in structures similar to the agglomerations indicated by Marshall (1982). The attractiveness of a territory or a region is thus linked to its capacity to generate these elements, which in turn are related to complex cultural phenomena, in which the systematic interaction between individuals and public and private organizations will bring about the emergence of organizational and technological innovations, which are at the heart of value creation for companies and the development of regions (CASSIOLATO; SZAPIRO, 2002; ROLIM, 2005).

External economies may be inherent to the system itself because of historical-cultural evolution and endowment, resulting from (i) the existence of a wide availability of specialized labor and with specific capacities due to local demand; (ii) the agglomeration and attraction of specialized suppliers, and (iii) a strong diffusion of knowledge, skills and information regarding local activities. In addition, external economies may come about through deliberate joint actions, in which local agents potentialize their competitive capacity. These deliberate actions may include purchasing raw materials, promoting training courses and professional development, creating alliances for export, contracting specialized services, investing

in research centers for collective use, and credit cooperatives, amongst others. The union of external economies inherent to the system with those created by deliberate joint actions contributes to collective efficiency, which is considered the main determinant of the competitive capacity of local firms (SUZIGAN *et al.,* 2003).

The National Innovation System (NIS), for example, is characterized by a set of different institutions that contribute to the development and diffusion of new technologies, through implementing policies to influence the innovation process. These innovations result from the interaction between firms, clients, research institutions and government, providing an environment conducive to learning new ways of producing and organizing production. This becomes relevant given the importance of innovations in a country's economic development processes (CARLEIAL, 1997; ROLIM, 2005).

Accordingly, the discussion includes the formation of business networks, which seek to increase competition through cooperation. For Britto (1999), there are connections between inter-firm network configurations and an increase in economic competitiveness, relating the internal processes of the network to the generation of sustainable competitive advantages. For Britto, the structuring and evolutionary patterns of firm networks over time is the result of interactions established between three distinct levels: (i) the macrostructure into which the network is inserted; (ii) the specificities of the internal processes of the network structures; and, (iii) the specific behavior of the agents involved in this type of arrangement. The specificities of the internal processes to the firm networks are particularly important since they establish behavior that greatly influences the evolution of these arrangements over time.

There are three distinct impacts associated with the consolidation of networks: i) those directly associated with the productive transformations (an increase of operational efficiency by economies of scale and scope, reduction of costs, etc.), ii) those related to consolidating collective interests in productive and technological decisions, and lastly, iii) the dynamics associated with the structuring of networks (creation, circulation and diffusion of information and broadening the interactive learning mechanisms). Another important aspect concerns the competitiveness of the agents, associating the performance of these arrangements with determined results that strengthen the competitiveness of the members that compose them. These attributes are correlated to the internal properties of networks, which influence their ability to absorb and respond efficiently to competitive market pressures (BRITTO, 1999).

It should be noted that the firm networks are constituted of agents as well as resources and multiple activities that create a functional interdependence between

all the elements. The analysis should embrace all operational activities integrated into the network and a detailed description of the production system to which it belongs, particularly in terms of the technological complexity of the activities carried out and the resulting impacts in terms of organization, operations and flows. Thus, the degree of technical interdependence, the particularities of internal logistics to the network and the technical connections between the different activities carried out by its members are analyzed (BRITTO, 1999).

Two other structural elements of firm networks are specifically associated with the characteristics of their internal transaction flows. The transactions carried out within the networks are relatively systematic, involving specific assets generated from the agglomeration of organizational and technological competencies of agents. Therefore, it is important to detail the internal transactions, to identify the degree to which these transactions are centralized and the degree of specificity of the assets involved in the internal transactions. The intangible flows of information and knowledge circulating within these arrangements are especially important for decision-making and for establishing joint strategies (BRITTO, 1999).

The internal properties of the firm networks are considered to be associated with i) technical-productive cooperation (an increase in operational efficiency and gains in productive flexibility); ii) inter-firm coordination (strengthening the effectiveness of coordination and inter-firm flexibility through adjustments to the manner in which members of the network relate); and iii) technological cooperation and strengthening innovative potential (the capacity to identify and process information and to integrate and strengthen innovative capabilities). These internal properties act in order to facilitate the generation of certain types of competitive gains for the entire productive system (BRITTO, 1999).

Finally, the network analysis must also consider the need to assess the evolution of the previously mentioned properties during a certain time interval, since they are inserted into a dynamic environment that demands a nonnegligible degree of adaptability. Furthermore, there is a trade-off between the properties, which may be reinforced or lessened according to the competitive pressures and characteristics of the markets. An increase in the competitiveness of firm networks may be associated with the consistency between the evolution of their conduct and the evolution of the competition and consumption patterns of the markets into which they are inserted (BRITTO, 1999).

From the above, productive agglomerations may be viewed as the result of an historical evolution of the attraction of productive structures in a region given their incidental physical characteristics, but may also be created, fostered and potentialized by deliberately coordinated actions amongst the distinct actors.

These actions may increase the efficiency of an entire productive system, by generating value for all those involved and by improving regional conditions, which in turn will become more attractive and therefore contribute to the renewal of this cycle. Because the incidental processes may prove to be very slow and significantly unequal in regional terms, coordinating joint actions amongst the stakeholders may be the primary tool for sustainable value creation. Focusing on this problem, the following section addresses the collective action theory.

2. The Collective Action Theory

Ménard and Klein (2004) agreed with previous authors in advocating the emergence of networked organizations amongst the trends in the United States, stressing that these were also being observed in Europe. Thus, the importance of the topic is highlighted, since in different areas and economic segments, amongst them agribusiness, and in several countries, partnerships have been formed between individuals and companies through strategic alliances, networks, cooperation, productive arrangements, and associations, amongst other collective actions frequently documented in scientific studies (WENNINGKAMP, PALOSCHI TOMÉ; SCHMIDT, 2014).

For Sandler (2004), collective actions may be defined as the union of the efforts of two or more agents, who may be individuals, companies, institutions or countries, in order to obtain a determined result. Thus, collective action establishes strategic interactions, in which the choices of an agent and their consequences depend on the actions of the agent as well as those of the other members. In this regard, Nassar (2001, p. 27) also argued that "[...] the alignment of interests in collective action is not in the equivalence of the self-interest of the person, but in the fact that individuals have needs in common and that they may only be obtained through joint actions"[1].

However, collective action does not occur in a totally natural manner; certain problems are involved. First, it is necessary to consider that there is common sense regarding group behavior, where it is assumed, especially in neo-classical discussions, that groups of individuals with common interests usually attempt to promote these common interests, i.e., they are in solidarity with the promoted interests. This idea arises from the premise that, in fact, members of a group act through personal /individual interest, and this ultimately results in making each individual act for their own interest, generating a collective benefit. In addition, it follows that if the members of a particular group have a shared interest or goal,

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1. This and other non-English citations hereafter have been translated by the authors.

and if everyone is aware that they would be in a better situation if that goal were achieved, it is logical to consider that the members of that group will, if they are rational and focus on their own interests, act to achieve this goal (OLSON, 1999).

Olson (1999) disagreed with this common sense and asserted that in fact, considering a large group, rational, self-centered individuals will not act voluntarily to promote their common or group interests. These individuals will not act to promote the group goals unless there is some coercive way of forcing them to do so, or unless some further incentive or benefit is offered, beyond the common objective of the group. Thus, unless the number of group members is small or there are mechanisms of coercion or incentive, the agents that make up the groups will not promote the collective interest.

Small groups have more complex characteristics, and there may be some voluntary action towards the common goal of the group. However, in most cases, this action will be interrupted before the optimal results for the group as a whole have been reached (OLSON, 1999).

Another question concerns individual rationality against collective rationality. On this point, Olson (1999) indicated that collective benefits are insufficient to generate voluntary individual contribution. He stated that individuals, even with common goals and being rational and self-centered, will not act collectively if they consider that the effort expended individually will outweigh the benefit that may be gained through group action. This may bring about the problem of non-participation, in which individuals cease to act collectively because they do not believe in the greater efficiency of the group to attain a certain objective.

The solution to this problem lies in the insertion of incentives, which may either be negative or positive, of an economic, social or psychological nature. The positive incentives are those offered apart from and besides the gain that will be obtained by achieving the common goal. The negative incentives, however, are mechanisms of coercion, punishment or exclusion of individuals who do not collaborate in collective action (OLSON, 1999).

In general, social incentives only work in smaller groups, or in groups small enough so that each member may have personal contact with everyone else. There are two reasons for this difference in attitudes between large and small groups. First, in the large groups each member is so small in relation to the total that their isolated actions have little or no effect on the whole. There is also the possibility that one member does not know all the other members, so that the large group is not a group in which everyone is known. Therefore, it cannot be assumed that social incentives will lead members to obtain a collective benefit (OLSON, 1999).

In second place, the presence of free riders is another problem in the formation of groups, in which agents who do not cooperate to achieve the common

objective nonetheless benefit from the collective benefits, i.e., they profit from the efforts of others. In the case of free riders, Olson (1999, p. 57) highlighted a problem in that "the larger the group, the less the likelihood that the contribution of any one will be perceptible."[2]

This signifies that the presence of free riders is detected more easily in small groups, because the smaller the group, the easier it is to control and monitor the actions of each member. In large groups, individuals tend to tolerate profiteers more easily, since it is difficult to verify who is not coming forth with the expected contribution.

It may be concluded therefore, that the size of the group is also a variable that influences the effectiveness of collective action. In this respect, Olson (1999) argued that groups with fewer members are more efficient than those with more members, which is mainly due to three reasons: i) the costs of organizing a small group are lower; ii) in smaller groups, the non-contribution of a member is more easily detected; iii) in smaller groups perceiving that the benefit has been achieved collectively is greater for each individual member.

Even if members of a large group totally abandon their personal interests, they would not rationally contribute to any collective or common benefit, since their personal contribution would not be perceptible or influential (motive "ii" in the previous paragraph). For example, if one farmer placed the interests of other farmers above his own, his output would not necessarily decrease in the attempt to reduce the market supply and raise the prices of the product on the market, since he would know that this would not have a noticeable effect for anyone (OLSON, 1999).

Moreover, for Olson (1999), the gains of collective action, in which each individual obtains a pre-established portion of the group's return efforts, would be a collective benefit for the group members. Thus, when the number of group members increases, the incentive of each one to work for the success of the action decreases and this ultimately inhibits individual participation and effort.

It should be emphasized, however, that Olson's (1999) analysis of the size of the group does not consider the heterogeneity of the groups as being an influential variable in the efficiency of collective action. On this, Nassar and Zylbersztajn (2004), when studying private-interest associations in Brazilian agribusiness, added the heterogeneity of interests to the concepts of large groups and small groups, thereby characterizing the groups as either homogeneous (those with common

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2. N.B. – For direct citations, the English version was used of OLSON, M. *The Logic of Collective Action - Public Goods and the Theory of Groups.* Cambridge, Massachusetts: Harvard University Press, 2002, p. 45.

ideas and objectives and more easily aligned) and heterogeneous (those with more distinct and dispersed ideas and goals). According to the authors, heterogeneous groups have higher transaction costs than the homogeneous, which represents a problem for the efficiency of collective action, thus justifying the consideration of this variable in the analysis of groups.

Another significant contribution to collective action theory was provided by Ostrom (2003), who sought to understand the motives of individuals cooperating in a social dilemma, whether they could be free riders and take advantage of the efforts of the other individuals in the group. For this, Ostrom (2003) addressed two well-known models in the economic literature, especially in Game Theory: The Tragedy of the Commons and The Prisoners' Dilemma.

The first model was presented by Garret Hardin in 1968, and is basically related to the fact that when people use a resource in common, they give rise to a kind of degradation, since this resource is scarce. Hence, what is available to all is valued by no one, i.e., through the lack of control over the use that the other has of the resource in question, there is a tendency to squander, for fear of not being able to enjoy the good at another time. In other words, this degradation is the result of the impossibility of an individual to control how others enjoy that resource, which also occurs with others. A daily example would be the lack of individual water and/or gas meters to measure consumption in residential condominiums, which, because individual control is impossible, tends to encourage excessive consumption and waste, since the bill will be divided equally amongst all the residents of the condominium (WENNINGKAMP, PALOSCHI TOMÉ; SCHMIDT, 2014).

The Prisoners' Dilemma is defined as a noncooperative game in which there is no communication between players. In this model, all individuals make their own decisions seeking a result that is satisfactory to each individual, implying that the result obtained collectively is suboptimal. Olson (1999) criticized this model because it does not represent an absolute truth, since in the real-world agents are able to communicate. However, Nassar (2001, p. 39) argued that "the prisoner's dilemma is perhaps the most widely used game model to prove collective failures", since, from the viewpoint of collective action, such games tend to have sub-collective terms, although individually, the actors are seeking and may achieve positive results. For Ostrom (2003), both the Tragedy of the Commons and the Prisoners' Dilemma are models that explain the various problems that agents face in attempting to achieve benefits through collective action.

According to Sandler (2004), the relationship between the Prisoners' Dilemma and collective actions is often poorly understood in the literature. For Sandler, it is incorrect to state that both have the same meaning or that all collective action failures are of the same type as the Prisoners' Dilemma. In short, what occurs is

that the Prisoners' Dilemma gives rise to the failures of collective actions. Therefore, there is in fact a relation between the two concepts, but in the sense that an "individual rational action leads to an undesirable outcome for the group. Selfish activities do not benefit the group" (SANDLER, 2004, p. 25). In other words, the individual and self-interested action of each agent does not bring about a benefit for the whole group.

As previously mentioned, there is a vast number of collective actions in agribusiness, demonstrated in several productive segments and different agroindustrial systems. The collective structures, with emphasis on their frequent occurrence in agribusiness are cooperatives, unions, associations, networks, supply chains, netchains, clusters and local productive arrangements (SCHMIDT; SAES, 2008; ZYLBERSZTAJN, 2010; WENNINGKAMP; PALOSCHI TOMÉ; SCHMIDT, 2014). Particular attention will be paid to the netchain approach, since this paper considers that it is one of the most complex and comprehensive forms of collective governance. Thus, it is discussed in the following subsection.

2.1. Netchain Analysis

The concept of netchain was developed by Lazzarini, Chaddad and Cook (2001), integrating network and supply chain approaches. Networks are continuous relational contracts (bilateral governance, "mini-corporations", with a continuous trading channel that considers all transaction-related factors), which span two or more agents (multi-firms). They are defined as complex governance structures, designed to coordinate transactions between actors, involving both horizontal and vertical coordination for value creation and capture. For Zylbersztajn and Farina (2006), aspects related to trust and informal rules are potentially relevant in this case. According to Schmidt and Saes (2008), these structures are also innovative for achieving competitiveness and survival in the face of a competitive environment. Figure 1 represents a generic example of a network indicated by Fulton (1998) apud Zylbersztajn (2000, p. 15).

The supply chain approach comes from the development of two theories: industrial organization and new institutional economics, in which the agroindustrial system, or any other productive system as a whole, is studied from a systemic viewpoint and not just a specific transaction (ZYLBERSZTAJN; FARINA, 1999). This approach focuses on vertically organized sequential relationships and is concerned with optimizing internal transactions as well as amongst the agents that make up the chain, such as logistics, information flow and quality control. According to Lazzarini, Chaddad and Cook (2001) there are three main sources of value in supply chain management: the optimization of production; the optimization of operations and the reduction of transaction costs.
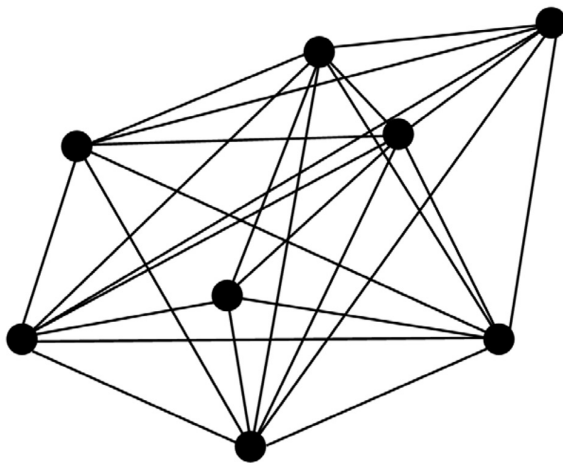
Figure 1. Generic representation of a network
Source: Fulton (1998) apud Zylbersztajn (2000, p. 15).

With the concept of netchain, this line of thought emphasizes that a complex inter-organizational environment may simultaneously combine three types of interdependence: (i) pooled; (ii) sequential; and, (iii) reciprocal. Thus, netchains may be viewed as a nexus of interdependence (Lazzarini, Chaddad and Cook, 2001). The generic illustrative representation of a netchain is presented in Figure 2, according to Lazzarini, Chaddad and Cook (2001, p. 8). The authors and Saes (2008) discuss these three different types of interdependence amongst agents, proposed by Thompson (1967) and outlined in Figure 3.
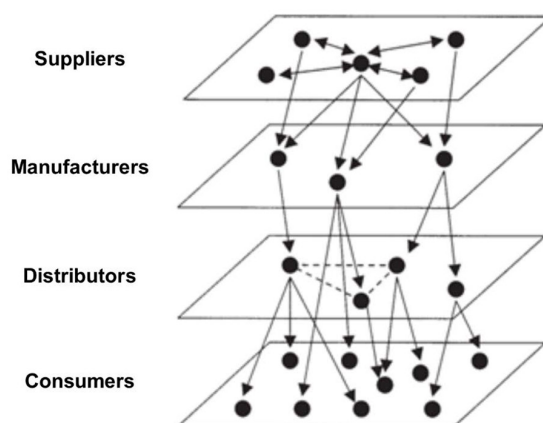

Figure 2. Generic representation of a Netchain
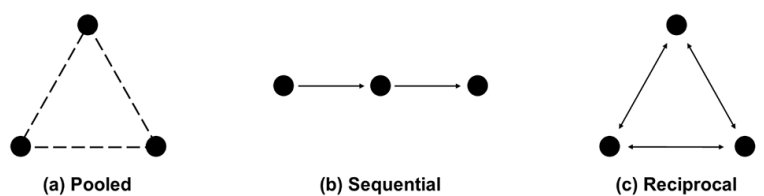Source: Lazzarini, Chaddad and Cook (2001, p. 8).

Figure 3. Types of interdependence
Source: Lazzarini, Chaddad e Cook (2001, p. 11).

Pooled interdependence (Figure 3a) exists in a condition where each agent in a group has a well-defined discrete and autonomous contribution for a given task. Each member contributes discreetly to the group and similarly receives the support of the group, so that each party must perform its functions in the best manner so that the entire organization is efficient. The relationships between the agents are dispersed and indirect, the social ties between them are weak and there is a great diversity of knowledge (greater heterogeneity). As the relationship between individuals is dispersed, it tends to be mediated by some technology or form of organization with increasing returns of adoption (the more agents, the greater the efficiency). The type of problem it represents is of low complexity. Prices are sufficient to provide the required incentives. Producer cooperatives are one type of solution for dealing with this type of interdependence. Standardization, through certification, may be an outlet for solving asymmetric information problems (LAZZARINI; CHADDAD; COOK, 2001; SAES, 2008; SCHMIDT, 2010).

Sequential interdependence (Figure 3b) occurs when the strategy of the agents is directly related to the specific investment made by a downstream company (ahead, in the chain) and it is this that determines the conditions of organizing the production, planning and coordination of the chain. In this case, one activity precedes another, sequentially, relating to the management of a chain, and involves direct relations between agents ordered in series. The type of problem it represents is of medium complexity. It involves inventory management, logistics, optimization of production processes, and efficient governance mechanisms in an attempt to reduce transaction costs and set ownership rights to appropriate revenues throughout the chain. Hierarchy-based authority is necessary to prevent strategic information from being lost (LAZZARINI; CHADDAD; COOK, 2001; SAES, 2008; SCHMIDT, 2010).

In reciprocal interdependence (Figure 3c) each agent is mutually dependent on the decisions and actions of others, the knowledge of one agent depends heavily on the knowledge of others. Recurrent, deep, intertwined relationships exist

between individuals with strong social ties. It is a complex process to be solved, since the decision-making rights are distributed amongst the members, thereby requiring the need for negotiation mechanisms between the parties and mutual adjustment (MENARD, 2004; ZYLBERSZTAJN, 2005). Rather than centralized planning, the coordination and adaptation framework requires learning through feedback. Because of its complexity, the resources created by this mechanism enable better value appropriation by its members. Since multiple agents are involved, the rules of exclusion need to be clear and consensual and free riders may be a problem (LAZZARINI; CHADDAD; COOK, 2001; SAES, 2008; SCHMIDT, 2010). In addition to the interdependencies, although remaining associated with them, Granovetter (1973) indicated that agents are embedded (connected, immersed) by ties that form a network of relationships between them that cannot be left aside. For Granovetter, there are fundamentally two types of ties within social networks: strong ties and weak ties.

Strong ties exist for a long period of time, characterized by a relationship of effort, trust and reciprocity, and are usually formed by friends, relatives, neighbors, amongst other agents of the same social group, and are geographically concentrated. Common sense may believe that this situation is perhaps best for a network of firms, however, such strong ties tend to add little value to firms that are seeking new information and resources, since the agents have the same information and resources already existing in the network, given the homogeneity they present. Thus, in these cases, there is less possibility of innovation (GRANOVETTER, 1973).

Weak ties, in turn, are present in specific transactions between agents, and issues such as trust and reciprocity are of little importance in such networks. However, this does not signify that these relations are of no importance, on the contrary, Schmidt (2010) argued that they are important precisely because they establish ties between agents of the most diverse social groups, creating a network, rather than forming isolated islands as in the case of strong ties. For Granovetter (1973), weak ties are more important in sustaining a social network than strong ties. Weak ties have a greater chance of creating and distributing new information and aggregating value to the relationship, since they are able to connect each individual in the network to other agents, thereby sharing several sources of information (SCHMIDT, 2010).

Granovetter (1985, p. 487) also argued that "actors do not behave or make decisions as atoms outside a social context", since human behavior is characterized by a strong embeddedness with a system of ties or social relations, and is directly influenced by it. Thus, every action and/or economic behavior is embedded in social relations. On this point, Uzzi (1997) reported that trust is the main governance

structure in embedded transactions, followed by calculated risk, monitoring/control systems and arrangements for conflict resolution. Moreover, for Uzzi, information shared within this embedded system is much more elaborate and selected than the dispersed data available in the market.

In general, embedding is seen as a strategic resource for companies. The performance and efficiency of firms are impacted by embedded relationships. Such a mechanism allows companies to identify complementary and trustworthy partners, reducing the risks of joint actions. These risks of cooperation are linked to the possibility of opportunistic actions by some agents of collective action (GULATI; NOHRIA; ZAHEER, 2000).

In short, the concept of netchain may be understood as defined by Schmidt (2010, p. 34) as a "set of social and economic relationships (vertical, horizontal and lateral) between collective actors, that appear with the aim of value creation for those involved".

As may be observed, netchains consider the existence of transactions between interdependent actors and are immersed in a complex social environment; when they are related, they become agents with complementary and collective actions, which allow and aim at value creation for the whole. There are also several types of interdependence between these agents, making it essential to understand the different degrees of interdependence and the characteristics of existing collective actions, for the efficient coordination of actions regarding the creation, maintenance and distribution of value amongst individuals (SCHMIDT, 2010). The problem of coordination is discussed in the following section with a multiple approach of the concepts thus far presented.

3. Discussions

In order to discuss the connections between the approaches of productive agglomerations, collective actions and netchains for value creation in agroindustrial systems, and to demonstrate that this problem cannot be treated in a unidimensional manner, this section presents a brief discussion focused on the complementarity of the aforementioned approaches. The focus reflects on the cooperation between agents in the pursuit of economic efficiency and competitiveness for value creation.

The starting point is the definition by Davis and Goldberg (1957), who regard agribusiness as an interconnected system that converts raw materials into final products, from the manufacture of inputs and implements, through agricultural production to industrialization and distribution to the final consumer. It is thus considered as the existence of a complex system of relations that should be studied based on a broad view of the interactions between the agents.

The notion of an agroindustrial system is directly linked to the concept of agribusiness. Thus, the object of analysis is broad, considering not only agricultural production, but an entire system involving input suppliers, rural producers, agroindustries, storage, logistics and other support, distribution and consumer services. These dependence relations between actors involve the links of an agroindustrial system with different types of transactions between the agents. Furthermore, this concept also takes into account the relationships and interdependence between the various sectors that form the systems, as well as the environments into which they are inserted.

As agroindustrial systems are formed by a chain of agents, there is a clear sequential interdependence between these agents so that the raw materials are converted into final products and reach consumers. Moreover, it is not sufficient that this chain of physical transformations functions, it is also necessary that the needs of the markets are met, providing what is valued by consumers. Clearly, just one company is unable to meet all these needs, since the process of converting raw materials into consumer goods, creating and maintaining the attributes demanded, depends on all of the actors in the system.

Agribusiness has developed and adapted to a more complex, competitive and globalized environment, where coordination is essential for efficient agro-industrial systems. The efficient, extensive coordination of value chains is a determining factor for delivering the quantity and quality of products and services demanded by consumers (CALEMAN, 2015). An agroindustrial system that lacks coordination or has coordination failures is characterized by high transaction costs and experiences difficulty in responding to environmental changes (CALEMAN; ZYLBERSZTAJN, 2012).

This need for coordination is a direct reflection of the internal interdependence of agroindustrial systems. For example, for organic food to reach the consumer, it is necessary for rural producers to ensure that their property is appropriate for this type of production, and that they only use inputs and techniques permitted for the cultivation of organic products, etc. In addition, the agroindustry for processing or converting this product must also meet the requirements for the non-contamination of food and for maintaining the organic characteristics. Lastly, distribution needs to provide the proper conditions for the product in order to preserve the properties that qualify it as organic. Therefore, for the agroindustrial systems to be competitive and able to develop comparative advantages, it is necessary for agents to have common objectives and to establish joint actions in order to serve the market.

For Caleman (2015), the efficiency of an agroindustrial system may be summarized in its capacity to create, sustain and distribute value amongst the agents that

compose it. For this to occur and for the agroindustrial system to develop these three capacities, coordination amongst the actors is of great importance. Value creation is related to innovation, whether in processes or products, which thereby establishes a differential. Sustainable value is associated with maintaining long-term comparative advantages, which signifies upholding a differential against competitors. Distribution is also linked to the appropriation of created value, which may often be conflicting, since some agents will own larger portions of this value.

Returning to what was presented on the productive agglomerations, it should be emphasized that in agribusiness the concentration of agents around a certain activity is recurrent. In general, the processing agro-industries are located near the sources of their main raw material and in regions that offer a satisfactory infrastructure for the flow of production to their main target markets. Because of this, industries and services that support this main activity may be created, developed and strengthened, thereby fomenting the growth of the most diverse sectors. The specificity of an agribusiness resides in the fact that the physical conditions may, in certain cases, determine the type of activity developed, since the edaphoclimatic conditions may partially or totally render the agricultural production nonviable.

It is therefore reasonable to consider that the analysis of agroindustrial systems should take into account the regional dimension of the coordination problem. This dimension is often suppressed in agro-industrial analysis, whereby the attention of researchers is turned mainly to questions related to the transactional dimension of the problem. What is argued here is that both are relevant, which justifies the congregation approach to productive agglomerations and collective actions. It is thus necessary to understand the relations between the agents from the perspective of a geographically located netchain, with concerns for the transactions and relations between the agents, and those with the place into which they are inserted.

Focusing on the efficiency of the agroindustrial system advocated by Caleman (2015), value creation is tied to innovation. On this point, both productive cluster and netchain analyses are in agreement that interaction between individuals and public and private organizations may generate innovation through specialization and the diffusion of knowledge, learning diversity, a combination and strengthening of innovative capacities, research for collective use, forming and training labor, forming strategic alliances, amongst others, which will increase the capacity to identify and process information and to efficiently absorb and respond to the competitive pressures of the markets. This is linked to technological cooperation for strengthening innovative potential, which implies a reciprocal interdependence, in which agents are related in a much closer manner, with strong social

ties, built from a very present cultural identity. Given the strong ties, these groups may close themselves to the point of not accepting ideas from outside and this may harm the collective action, thereby deserving attention and reflection on the part of its members.

Value sustainability by maintaining long-term comparative advantages is related to the continuity of relationships and innovative commitment, defusing conflicts of interest and advancing in relation to the joint objectives. In the approach of productive agglomerations, this support involves the consolidation of collective interests in the productive and technological decisions that lead to strengthening coordination effectiveness. Activities such as the purchase of raw materials, creating alliances for export, contracting specialized services, credit cooperatives, attracting specialized suppliers and labor tend to increase operational efficiency by economies of scale and scope and cost reduction, which by in turn, support and sustain the value created. This relates to the network externalities of netchain analysis, where benefits increase to the extent that more agents become part of the relationship, with so-called increasing returns to adoption, which implies joint interdependence, in which social bonds are generally weak.

The distribution of the created value is especially important and problematic because it involves the definition of property rights and, consequently, the appropriation of the property by the involved agents. Therefore, from a netchain perspective, there is a need to optimize the processes and operations, with sequential interdependence, in which efficient governance structures need to be defined so as to reduce transaction costs and define appropriate property rights downstream from the agroindustrial system. From the viewpoint of agglomerations, inter-firm flexibility by adjusting the way members of a particular group relate, and more flexible production patterns may contribute to co-operation amongst the actors and to the coordination of activities.

Interdependencies are clearly present amongst the agents of any productive agglomeration or agroindustrial system. In both cases, singular actions tend to be inefficient, just as rigid governance structures such as vertical integration will have high transaction costs. Thus, applying the netchain approach to the analysis and formulation of public and private policies for agribusiness in an economic, sociocultural and regional context becomes relevant, as it is focused on all types of interdependencies amongst the actors. Thus, before concern is given to value sources or specific governance structures for a unique type of interdependence, the starting point for the netchain approach is to recognize all the important interdependencies for cooperation between firms, to identify sources of potential value, and then to structure and establish the most efficient coordination mechanisms (LAZZARINI; CHADDAD; COOK, 2001).

Therefore, based on interdependencies, possible value sources may be identified in a geographically located productive system and governance structures created, which enable this potential to be exploited in a long-term sustainable manner, whereby the systems become efficient in terms of creation, sustainability and value distribution.

Final Considerations

The objective of the present study was to discuss the connections between the approaches of productive agglomerations, collective actions and netchains for value creation in agroindustrial systems. Recognizing that this problem cannot be addressed in a unidimensional manner, the discussion has focused on the complementarity of these approaches surrounding the cooperation between agents in the pursuit of economic efficiency and competitiveness.

Considering these approaches, it was observed that that the efficiency of companies operating in the most diverse sectors, including agribusiness, the efficiency of agro-industrial systems and, ultimately, the efficiency of agribusiness as a whole is not only linked to individual internal administration of the firms (quality, price, costs, performance strategies, etc.) but also, and more strongly, coordination amongst the agents that make up the entire system, including within this context, the economic, socio-cultural and regional aspects. A system that does not recognize relevant interdependencies and regional connections fails to create satisfactory coordination mechanisms and will be unable to create, sustain and distribute value for the actors in a competitive manner. As a result, in the long-term, it will be neither efficient nor competitive, and will remain on the margins of the markets. In systems with well-formulated, well-defined coordination mechanisms that recognize interdependencies, including the regional, and that exploit all potential sources of value, the agents take advantage of learning, shared knowledge, market intelligence, and pass this on to the entire system and set common goals so as to meet the needs of consumers. Thus, they are able to exploit the needs of specific markets, and add value to their products with larger margins, etc.

It is argued, therefore, that agroindustrial systems will only be well coordinated and efficient, establishing lasting comparative advantages, if this coordination takes into account the interdependencies between actors and the regional dimension in order to identify the main, potential sources of value to which they are linked. Hence, the approaches of productive agglomerations and of netchains may be used together when analyzing agroindustrial problems with the aim of contributing to the formulation of inter-firm cooperation and coordination strategies.

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