Paper presented at the 7th International Conference on Management in AgriFood Chains and Networks, Ede, The Netherlands, 31 May – 2 June, 2006

Systemic model for collective action analysis

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Abstract

Cooperative behavior, information sharing among business agents and collective decisions and actions are important topics in supply chain discussion. This paper proposes a systemic model for analyzing horizontal and vertical collective actions within marketing channels. The model was designed aiming the identification of the conditions for small farmers' inclusion in marketing channels. Understanding the roots of success and failure of collective actions is an important source of learning, whose lessons can underpin the development of public policies aimed at helping business agents build sustainable relationships that allow for shared gains. To meet our proposed objective, several variables are identified based on the theory reviewed exhaustively and presented briefly in this paper. An empirical study was conducted, with ten multicase studies. Successful cases of collective action involving groups of fresh produce growers and their collaborative business partners were selected and a pair analysis was performed. We could state that there are incentives to join in collaborative action in both sides (suppliers and clients) and the existence of uncertainty about the transactions contributes to investments in vertical cooperation. The use of cooperative systems based on shared gains is expected to benefit agents through sustainable long-term relationships.

Keywords: collective action, systemic analysis, marketing channel

1. Introduction and goal

The retail sector is considered as one of the most important reasons for several changes observed in Brazilian agrifood system over the past decade. Consolidation, multinacionalization and competition in this sector have led to adjustments in supply chain organization, as increasing coordination, costs reduction and quality improvement (Farina, 2002). Aiming to offer competitive products for the final consumer, the large retail chains have imposed several demands. Those are related especially to quality, supply regularity, minimum quantities, price and logistics agility. Some authors argue that upstream agents reacted with costs and product adjustments and developing collaborative relationship between retailing and suppliers (Farina and Nunes, 2002). According to Bonfim (2003), deep changes have been observed in large retail chains and suppliers relationship. Those are related to scale economies, specialization of supply centres and product quality demands.

In this context, the retail sector has developed alternative procurement systems that demanded interorganizational relationship review and the development of a new supply structure. This is clearly observed in the fresh fruit and vegetable (FFV) sub sector.

Concerning those products, the relationship between buyers and suppliers became closer as large supermarket chains strategy was to centralize its purchasing process by creating distribution centres in order to buy some products directly from the growers and, eventually, wholesalers.

Several cooperation-based organizational arrangements are observed in different marketing channel levels. It has been found, in the retail sector, forms of collaboration that range from purchasing cooperatives composed by independent stores to some level of collaborative relationship between large supermarket chains and their partner suppliers. Different types of collective actions are observed from the supplier side. These arrangements aim, specially, economy of scale, access to modern production practices and raise of negotiation power. However, there are investments involved in order to attend the main marketing channels demand regarding quality, frequency and managerial capacity. This demand has reflected on small farmers representing challenges and even exclusion from the main marketing channels in Latin America (Reardon and Berdegué, 2002). In order to include small farmers in marketing channels, adoption of collective actions is suggested. According to Farina (2002), collective actions are important not only to purchase inputs or achieve commercialization scale, but to adapt small farmer to the new competition patterns. Thus, the collaboration among agents from the same level in the supply chain and among agents from different levels consists in viable alternatives for small farmer's inclusion and social welfare.

Understanding the causes of success and failure of collective actions is an important source of learning. They can be used for developing public politics aiming to reduce poverty, modify exclusion systems and promote sustainable development. They can also be used for correcting and implementing firms' private strategy aiming cost reduction and efficiency of the collective actions. Thus, it is proposed that collective actions analysis can be adopted to verify the possibility to recommend actions at the production level as well as among them and other agents located downstream, aiming to promote shared gains.

In this scenario, this research proposes a systemic model for analyzing horizontal and vertical collective actions within marketing channels. The model was designed aiming to identify conditions for small farmers' inclusion in marketing channels. The model focus on collective actions as a network under different theoretical approaches: managerial, sociological and economical approaches. The management approach, based on supply chain and marketing channel management, states that intra and interorganizational management and relationships cause a synergic effect leading to a superior performance of the whole system. The sociological approach supports the social aspects involved in the group formation as collective objectives; social capital and equity are determinant aspects of collective action. The economical approach, considering transaction costs economics, suggests that costs reduction is determinant for building the collective action.

2. Literature review

2.1 Networks

The term "networks" has long been used in different fields of knowledge to explain behaviours and tendencies in the modern world. There are three main reasons for the recent interest in the network approach to study the behaviour of firms (Nohria, 1992). The first reason is the emergence of new patterns of competition in recent decades, which has resulted in adaptations of organizational structures. The second reason is the technological advances that have led to the widespread use of information and communication technologies, which have enabled the diffusion of disaggregate and flexible productive arrangements, as well as faster communication among the firms that comprise a network. The third reason relates to

academic studies on the theme, which have led to theoretical improvements, providing a conceptual basis for understanding complex organizations.

According to Baker (1992), the main feature of network organizations is the differentiation between horizontal, vertical and spatial relationships. This type of structure offers comparative advantages such as flexibility and the ability to adapt to unstable environments, which enable it to engage in customized projects. The literature lists various types of organizational networks, including productive arrangements, clusters, associations, cooperatives, informal groups and, more recently, supply chains (Farina and Zylbersztajn, 2003).

Relationships within networks can increase a firm's social capital by providing access to information, technological know-how and financial support (Omta et al., 2001). According to Hakansson and Ford (2002), the network structure offers opportunities and limitations to companies. A company's performance results from the interrelationship between it and the other components of the network and from the investments made by all the agents involved in it. The stronger the relationship among the network's agents the greater the resulting benefits. Conversely, however, these companies are less free to make changes and individual adjustments.

Murdoch (2000) argues that networks should be analyzed based on a set of social, economic, cultural and environmental factors. Considering the network is the structural basis that permits the surge of cooperation among the firms, that is, the surge of the collective action, one can conclude that different factors contribute to the management decisions taken by business partners. In this sense, different theoretical approaches are presented here to help the understanding of networks members' behaviour.

2.2 The managerial approach to collective action

Brito and Roseira (2003) affirm that, from the network perspective, a company's strategy and position are interrelated concepts that influence the behaviour of the actors involved. This theory provides a conceptual structure that enables the actors to understand the network, to limit its scope, to act, and to assume a position in the network according to their strategic objectives. Strategies tend to be developed jointly as a network's companies interact, explore and adapt to new circumstances.

Mechanisms to reduce uncertainties and mitigate the complexity of decision-making may be instituted inside individual organizations. However, greater benefits can be gained when such mechanisms are instituted interorganizationally, i.e., when the agents in a supply chain interact to coordinate the actions in their network.

Explaining the complementarities of network and chain concepts, Omta et al. (2001) state that chains are composed of agents acting inside networks to maintain vertical relationships with the purpose of adding value for the client or end consumer. Such networks encompass all the actors of a sector, or related sectors, who work jointly to generate value for their clients. While network theory is considered an appropriate organizational structure for making cooperation among these agents possible, supply chain management theory suggests that inter and interorganizational arrangements produce a synergic effect which enhances the system's performance. Farina and Zylbersztajn (2003) questioned the use of network theory to analyze agroindustrial systems in terms of industrial configurations and the strategies adopted by their agents. The authors concluded that the concept of supply chains and networks should be kept separate since they involve different strategic choices and forms of coordination. Network theory should be applied in the presence of complex arrangements involving the delegation of rights, while supply chain management theory should be used in the presence of

vertical interdependency. The authors suggest that when characteristics of both systems are involved, the most appropriate term to use is that of a Netchain.

The netchain concept was proposed by Lazzarini et al. (2001) in an attempt to integrate network analysis and supply chain theories. A netchain is defined as a set of layers comprising horizontal ties between firms of a particular group, which are arranged sequentially based on the vertical ties between firms in different layers. Ford (2002) adds that network analysis helps one to understand how relationships within chains or marketing channels are affected by the relationships of the actors with other firms indirectly involved.

In this sense, several interrelated aspects that influence the behaviour of organizations within a network (or netchain) have been identified, namely: cooperation, coordination and interorganizational relationships.

Cooperation

Cooperation can be understood as the process whereby firms develop formal and informal interaction mechanisms aimed at reaping mutual benefits (Hardman et al., 2002). The authors conclude that, as the degree of trust increases, so does the level of cooperation, since problems are solved jointly and communication improves. This allows for the construction of a basis for collective action.

In a relationship of cooperation among the organizations in a network, the partners adapt to each other to achieve optimal results, share information and experience and minimize sources of uncertainty (Zineldin, 1998). This process demonstrates their commitment to the action, heightening their mutual trust and reducing the uncertainty of their transactions.

Trust is considered an indispensable factor for cooperation in interorganizational relationships, and a basic condition for the partners' commitment to such relationships. Rademaekers (2000) suggests that trust can be understood as the set of expectations of company managers regarding their business partners' behaviour. Based on Zucker's work (1986), Rademaekers identified three bases for relationships of trust. The first basis evolves from the experience established among firms along time. Thus, the partners' reputation indicates their probable behaviour. The second basis is the social factors influencing these relationships, such as affinity, ethnical aspects, religion and social relations. Lastly, trust is based on institutionalization, i.e., on society rules. Regulatory and contractual systems are examples of institutional rules that affect relationships.

Coordination

Grandori and Soda (1995) identify several important variables to understand coordination within networks. The first of these variables is the degree of differentiation of the units to be coordinated, including their objectives and organizational profiles. The second variable is the degree of interdependency among the firms in the network. The greater this interdependency, the stronger the firms' integration tends to be. Interdependency is related to transaction costs such as asset specificity, uncertainty and transaction frequency. The number of units to be coordinated is a variable that limits hierarchies but not networks; however, it requires the formalization of a coordinating nucleus (Van De Ven et al., 1979).

According to Grandori and Soda (1995), several mechanisms of coordination serve as the basic structure underpinning cooperation among firms, i.e., collective actions in supply chains. Negotiation, decision and communication mechanisms are crucial, for the actors involved in a collective action must engage in negotiations, maintain information flows and make joint decisions aimed at cooperation. Integration among the network's components and the connections among them must also be taken into account. For the definition of each member's role and responsibilities in the network integration is considered an essential factor for its coordination and for cooperation among its members.

Another point to highlight is the mechanisms of incentives and selection. The former consist of contractual, and profit and input-sharing mechanisms, and property rights. These rights are particularly important when a collective action involves the firms' strategic sectors, as in technological development consortia. Such cases are open to opportunistic behaviour, which must be prevented formally. Mechanisms of selection involve the selection of partners for a collective action and should be employed based on criteria such as the asset specificity and the reputation of the agents. Also to be noted is the fact that social factors, such as ethnicity and social classes, also consists of access specificity to a collective action.

Interorganizational relationships

Omta et al. (2001) point out that, owing to the increasingly competitive environment in which competition is not only price-related but also involves product and service characteristics, the ability to build and maintain a network of interorganizational relationships is seen as a key factor to achieve sustainable competitive advantages. Brito (2001) states that networks tend to be stable due to the connections constituted and consolidated among their members. The cost involved in the constitution of new relationships favours the establishment of stable connections.

According to Ford (2002), network and supply chain management theory focus on explaining the managerial actions taken by actors inside the network. Kim (1999) states that economic motives, such as the transaction costs economics, and strategic motives guide collective actions within supply chains. The author suggests that, from a strategic standpoint, uncertainties must be managed through joint responses among interdependent organizations. Management of the relationship among organizations, however, is a major challenge.

According to Nevin (1995), the formation and maintenance of interorganizational relationships is based on the principle of reciprocity. Reciprocity, in turn, emphasizes cooperation and coordination among organizations instead of domination, power and control, which are considered sources of conflict in the relationship.

Rademakers (2000) believes that a firm must be in a continual process of renovation and expansion of its relationships with suppliers, clients and even competitors. From a management viewpoint, these relationships promote the joining of essential competencies and skills, while from the economic standpoint they favour the joining of assets and resources. This union allows for the construction of comparative advantages within the agrifood supply chain.

Ring and Van De Ven (1994) identify four major factors that influence cooperative interorganizational relationships. The first factor is the uncertainties in these relationships, such as uncertainties about the future and about the partners' behaviour (adverse selection and moral risk). In this case, trust is the fundamental cornerstone that must guide these relationships.

The second factor has to do with efficiency and equity to achieve a cooperative relationship. Equity consists of the equivalence of benefits for the parties involved. The authors assume that the members are motivated to seek equity and efficiency to build and maintain a reputation that will enable them to maintain the relationship under conditions of uncertainty, including specific investments made.

The third factor involves internal conflict-solving. Also based on trust, internal conflict-solving is linked to institutional guarantees. These involve contracts and safeguards. The greater the commitment and the heavier the specific investments, the more the network's members stand to benefit by maintaining the relationship. The authors draw attention to the tendency for informal agreements to be replaced with formal contracts as the relationship consolidates.

The fourth and last factor is the importance of the role of each partner in the relationship. The authors suggest that the partners' individual behaviour may vary in an interorganizational relationship. This factor is particularly important in analyzing the alignment of individual and group objectives of a collective action, an issue the authors discuss in detail. In the absence of mechanisms of incentive and control, opportunism (free-riding) and even conflicts involving power disputes and the equitable distribution of benefits may emerge, interfering in the performance of the collective action.

2.3 Sociological and economic approaches

The above theoretical review indicates that sociological and economic approaches are complementary and thus difficult to discuss separately. They are therefore presented together in order to reach relevant conclusions underpinning reflections on collective action.

Sociology uses different approaches to explain the cooperative behaviour of individuals in collective actions. Grandori and Soda (1995) identified three factors that interfere in the shape and formation of networks, namely: institutional, social and cultural aspects. The easy and effective formation of cooperative structures is contingent upon the larger social institutions in which they are embedded. The second aspect is the pre-existence of a social relationship before any exchange relationship is established within the network. Thus, elementary forms of social coordination, such as information and communication, are the basis for the emergence of more elaborate coordination mechanisms. Cultural aspects involve the organizational culture of the firms in the network.

Among various social factors that contribute to form and sustain collaborative behaviours are the beliefs, attitudes, group homogeneity (including gender issues), values and objectives of the individuals involved.

Futemma et al. (2002) suggest that a certain degree of organizational competence is needed for collective action to take place. Collaboration inside groups consists of a learning and information exchange process in a social network, where individuals learn to develop their sense of commitment and responsibility (Coleman, 1987 *apud* Futemma et al., 2002). The development of trust and reciprocity helps improve the social structure, favouring strong ties among individuals. Social heterogeneity is also a relevant issue that begs discussion.

Olson (2001) claims that motivating individuals or firms to contribute to collective actions requires the existence of incentive mechanisms. Those mechanisms can be monetary or social. Among the coordination tasks of collective action, conflict resolution mechanisms and information sharing are cited (Ostrom, 1990).

Problems may arise in collective action when members are free to choose whether or not to contribute toward the achievement of common objectives. In such situations, individuals may choose not to cooperate toward the collective action, since they can benefit from the action without bearing the burden of attaining the objectives. Such individuals are called free-riders. According to Brito (2001), the free-rider's role is the opposite of cooperation, for cooperation means that each individual contributes to the common welfare.

The conflict between collective and individual interests is the key element to understand the emergence of arrangements of collective organization, as well as their impact on the shape of the network (Brito, 2001). A balance between individual and collective objectives is essential in the development and implementation of collective projects.

Olson (2001) analyses individual versus collective rationality to explain the logic of collective actions. The author considers that, in most cases, the collective benefits are insufficient to motivate individual contributions. Therefore, the incentive mechanisms required may be economic or social. These incentives motivate individual contributions to the

collective action. The author also claims that group size is a determining factor for the performance of collective actions.

Nassar and Zylberstajn (2004) add another important factor that interferes in the performance of collective actions, namely the heterogeneity of interests inside the groups. Based on an analysis of private interest associations, the authors concluded that heterogenic groups require incentives in order to act collectively. Transaction costs are considered the main problem relating to low performance in this type of group. Thus, the development of appropriate organizational arrangements is necessary to promote the collective good.

According to Omta et al. (2002), Transaction Cost Economics (TCE) and agency theory offer a rationale that allows for "make" or "buy" decisions. Such decisions determine whether activities along the chain will be integrated or carried out with other firms. However, Menard (2002) mentions the considerable diversity of agreements between autonomous entities that have business relationships. Such agreements are considered intermediate arrangements established for the purpose of reducing transaction costs. Menard (2000) presents New Institutional Economics (NIE) as a theoretical approach to understand economic relationships that occur as an alternative form of organizing transactions. NIE considers the State and institutions as important factors in market functions, regulating the role of economic agents by developing governance structures that affect the efficiency of transactions (Menard, 2000).

Dyer (1997) argues that the exchange of information between partners reduces opportunism and, hence, transactions costs. This author proposes a model of cooperation and value maximization among firms. His model suggests that the commitment of companies to act cooperatively strengthens as they give signs of their future behavior, increase their exchange of information and adopt mechanisms of control (safeguards) to guide their transactions Thus, credibility leads to lower transaction costs and increases the probability that such companies will make specific transaction investments.

Mutual dependency among agents is considered one of the main motives for firms to engage in collective actions (Brito and Roseira, 2003; Kim, 1999; Oliver, 1990). The greater the interdependence of the firms involved in the distribution of a product, the higher the frequency of transactions and the greater the probability of transaction cost reductions, since agents tend to achieve balanced relationships. For firms inclined to build stable relationships with their partners, transaction cost economics offers a strong motivation for commitment among the partners engaged in a collective action.

3. Methodology

This methodology was created aiming to analyze the collective actions in order to identify conditions to include small farmers in marketing channels. The method proposes the identification of conditions for marketing channels' agents to establish and maintain relationships of shared gains. The model proposes the analysis of organizational structures based on cooperation. A description of the methodological stages is presented below.

- Identification of variables

To meet our proposed objective, several variables are identified based on the theory reviewed exhaustively and presented briefly in this paper. These variables are divided into organizational, institutional, technological, social, managerial and economic groups, and classified by different categories, i.e., variables affecting horizontal collaboration (Table 1), those affecting vertical collaboration (Table 2), and those influencing and supporting interorganizational collaboration (Table 3).

Horizontal and vertical variables answer questions such as: Why have the agents joined a collective action? What are the variables underpinning horizontal and vertical collective actions? What are the barriers, the gains, the sources of success, of failure?

The interorganizational variables are the ones that affect the interorganizational relationship, hence, the entire collective action. These variables identify the structures required to support the collective action, such as technology and regulatory systems.

Table 1 – Variables affecting horizontal collaboration

HORIZONTAL VARIABLES		
Social variables:	**Managerial variables:**	**Economic variables:**
– social capital (trust, long-term orientation) – ethnicity – religion – group size – group homogeneity (including gender) – equity – free-riding – leadership – collective vs. individual interests – associative culture	– flexibility – planning – information (information exchange) – marketing – human resources – quality – costs – commitment – trust – functional areas involved – joint projects – logistics	– sunk costs – dependence (consumption volatility, investments) – asset specificity – uncertainty (environmental, competition among firms) – reputation – frequency – size economies – opportunism – profitability

Table 2 – Variables affecting vertical collaboration

VERTICAL VARIABLES		
Social variables:	**Managerial variables:**	**Economic variables:**
– social capital (trust, long-term orientation) – ethnic aspects – religion – group size – group homogeneity (including gender) – equity – free-riding – leadership – collective vs. individual interests – associative culture	– flexibility – planning – information (information exchange) – marketing – human resources – quality – costs – commitment – trust – functional areas involved – joint projects – logistics – cooperation	– sunk costs – dependence (consumption volatility, investments) – asset specificity – uncertainty (environmental, competition among firms) – reputation – frequency – size economies – opportunism – profitability

Table 3 – Variables affecting interorganizational collaboration

VARIABLES THAT AFFECT THE COLLECTIVE ACTION		
Organizational variables:	**Technological variables:**	**Institutional variables:**
– type of organization – organizational structure – formalization level – partnership	– technological level – technological investments level	– regulatory systems – special programs – government support

– Empirical study

The case study method is proposed here as a way to conduct the analysis, since this method allows for in-depth exploration of a case within its context. Multicase studies were conducted in this research work due to the complexity of the object of analysis. Successful

cases of collective action were selected. The criteria for selection were collective actions involving groups of fresh produce small growers and their collaborative business partners. The selection was based on secondary data and indications from researchers and extension agents. The analysis of successful cases was justified since the identification of collective action success conditions was desired. After the identification of the cases, a pair analysis was performed. This type of analysis is recommended because it provides a more accurate view of collective efforts.

Guidelines for different types of interviews were drawn up based on the identified variables. Interviews were then conducted with small farmers, the organizations to which they belong, and their collaborative business partners and support institutions, when present. A total of 10 cases were selected, two cases in each of Brazil's geographical regions. The sample was composed by seven cooperatives, two associations and one informal group. All of them were involved in fresh fruit and/or vegetable growing and collective commercialization. The cases were selected intentionally, according to the criteria of relevance determined by the research design and a second review of the data. A total of 33 interviews were performed from October, 2004 to April, 2005.

– Data analysis

The interviews revealed the main variables affecting the establishment and maintenance of each group's collective action. After identification of the variables, a systemic analysis is proposed to study the existing correlations. Based on this analysis, influence diagrams can be drawn to illustrate the interdependency of variables.

– Condition identification

After the empirical analysis, a generic systemic diagram was developed containing all the analyzed cases. The causal loop diagram consists of a systemic structure that provides a view of the interrelation among the principal variables considered relevant for the establishment and maintenance of horizontal and vertical cooperation. Thus, based on an analysis of this diagram, one can presuppose leverage points and identify the factors that allowed for the collective action and access to markets.

4. Systemic model for analyzing horizontal and vertical collective actions within marketing channels

The variables that contribute to the formation of horizontal and vertical collective actions among business partners in supply chains are interrelated. The empirical analysis revealed the existence of a pattern of correlation among the variables, enabling us to build a generic model comprising the principal variables that contributed to the establishment and maintenance of the cooperative relationship among the agents. It should be noted that, to simplify the model and make it easy to understand, punctual specificities of each case were disregarded.

The proposed model consists of a causal loop diagram, i.e., a graphic representation that allows one to explore the dynamic interrelations among the variables and to test hypotheses about the problem. Causal loop diagrams comprise reinforcement loops and balance loops, relations of cause and effect among the variables, and time lags between causes and effects (represented by parallel bars).

The loops can be defined as a sequence of mutual outcomes of cause and effect. The links connecting each variable to the others indicate how they are interrelated, and the sign "+" or "-" indicates how one variable affects another. The reinforcement loops have the characteristic of magnifying the effects of one variable upon another in a given direction; in

other words, a change in one variable will cause a more intense change in the related variable. These loops may be virtuous or vicious cycles, depending on the change, and are represented by the letter “R”. The balance loops are the ones that stabilize the system, annulling the effect of one variable upon another and seeking to bring the system into equilibrium. These loops are represented by the letter “B”.

The number of “+” relations in a loop defines its characteristic of reinforcement or balance. Even numbers of positive relations characterize a reinforcement loop, while uneven numbers of positive relations characterize a balance loop. Important to note is the fact that it is the combination of reinforcement and balance loops that indicates the structure’s systemic character.

Figure 1 depicts the systemic model proposed here. The central point of this model is the access to a more profitable channel, the main goal of this research. The variables and their interdependencies that make up the system were identified from the model.

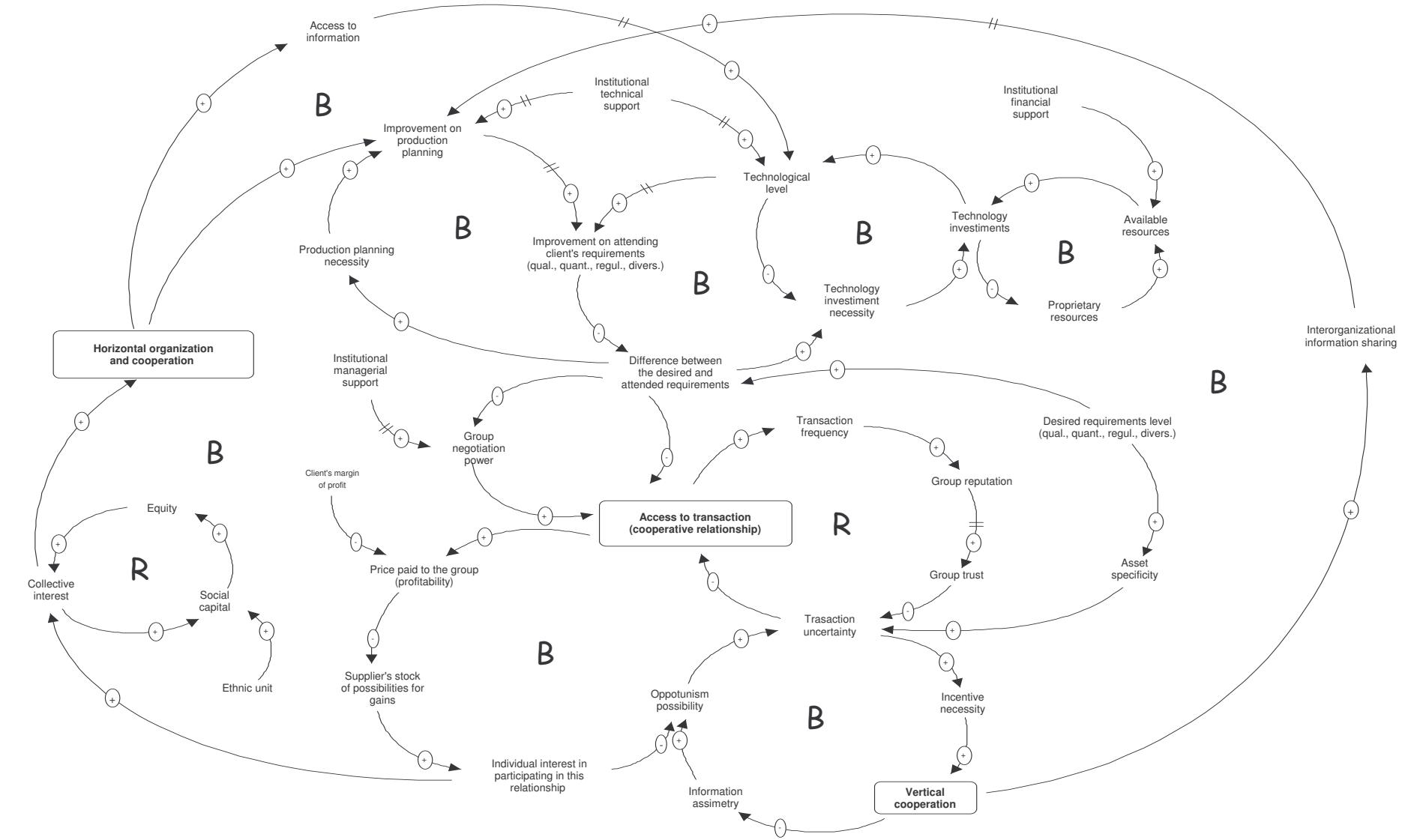

Figure 1 – Systemic model

An analysis of the proposed systemic model reveals that the level of requirements desired by the client is a crucial point for access to the most profitable channel (transaction). The level of requirements is related chiefly with asset specificity such as the required quality, required quantity, product diversity and supply regularity. The difference between the level of requirements of the client and the level offered by the supplier is what influences access to the most profitable transaction. In other words, the greater the difference between the level of consumer requirements and the producers' capacity to meet those specifications the greater the latter's difficulty to access the channels.

The greater the consumer's expectation, the higher is the level of required asset specificity. This specificity implies transaction specific investments by both parties. It also implies higher costs related to the interruption of the relationship. The costs relating to the interruption of the transaction, together with the possibility of opportunism on the part of the agents, confers a degree of uncertainty on the transaction. In this sense, the existence of this uncertainty negatively affects access to the transaction. In other words, mistrust of the agents' behaviour acts as an obstacle to the development of the relationship – access to profitable channel.

The risks involved in the uncertainty of the transaction can be mitigated or voided through the establishment of mechanisms of incentives, such as payment of premium prices, sharing of information, joint planning of activities, etc. An analysis of the systemic diagram suggests that the need for incentive mechanisms is the factor triggering vertical collaboration, for it increases both parties' commitment to the continuity of the transaction. As vertical cooperation develops, there is a tendency for information asymmetry to diminish. The incentive mechanisms used to render the vertical cooperation operational reduce the possibilities of opportunistic behaviour, decreasing the uncertainties of the transaction and allowing access to the most profitable channel.

Once access to the channel has been achieved, the recurrence (frequency) of the transactions contributes to the construction of the agents' reputation. Over time, this reputation contributes to increase trust and thus diminish uncertainties. Our empirical study revealed that, although it is not a direct relation, trust is a recurrent factor to justify access to cooperative relationship.

The greater the difference between the client's requirements and the suppliers' capacity to meet them, the greater the need for investments in technology and production planning. Investments in technology are a management decision that depends on the availability of financial resources, whether propriety or from outside sources (institutional financial support).

There is a time delay between investments made and evidence of their results. In the proposed systemic model, there is a time delay between technological change and improvement in meeting client requirements.

Improvements in production planning are influenced by vertical cooperation as information such as demand forecasts and production scheduling is shared, sustaining decision-making processes. In the presence of institutional technical support, advances in the technological level and in production planning are evident.

Production planning and the technological level adopted are also influenced by horizontal organization and cooperation. The variable of horizontal organization and cooperation consists of the closest relationship among agents of the same level. Based on this empirical research, this cooperation was found to favour benefits that are difficult to gain isolatedly. Production planning, for instance, involves various management decisions regarding the product and the productive system, which are difficult for small producers to make isolatedly.

Considering the technological level, it was found that heavy investments are only possible because the costs of such investments are diluted among a group of producers. The

difficulties of access to credit and the aversion to risks, among other factors, are reasons for which small producers individually present a low investment capacity.

Once access to the most profitable channel as well as to vertical cooperation has been established, it was found that the transaction's profitability, i.e., the price paid to the group, was the variable responsible for the system feedback. However, prices do not display an upward trend as the transaction is repeated. There is a limit to price increases, which is the client's margin of profit. The lower this margin of profit the higher tend to be the prices paid to suppliers. We found that the client's margin of profit oscillates according to variations in supply and demand of products in the market.

The profitability of transactions inversely influences the group's stock of possibilities for gains. In other words, the higher the profitability the lower the supplier's stock of possibilities for gains tends to be, for, as mentioned earlier, there is a limit for the behaviour of prices. However, the possibilities for gains positively influence the individual interest of producers in continuing to participate in the group, i.e., in continuing the transaction. The greater their commitment to the group, the slighter the chances for producers to behave opportunistically.

Individual interest in participating in this relationship contributes to strengthen the collective interest, because the producers have common objectives to be achieved. Note that collective interest is an important aspect for the construction of social capital, for it keeps individual and groups interests aligned. Our empirical research revealed that the ethnic unit is an external factor that provides a higher initial level of cohesion and alignment of interests (social capital) than when this type of factor is absent.

The greater a group's social capital is, the greater the equity of benefits tends to be among the group's individuals and, hence, the lower the tendency for free-riding. Thus, we conclude that the "collective interests" variable directly affects horizontal organization and cooperation.

Lastly, we found that institutional support is a relevant external factor for the establishment of horizontal and vertical cooperation and for cooperative relationship access. Institutional support occurs in different ways: a) technical support that influences production planning and the technological level adopted; b) management support that occurs in the form of training and intermediation in the relationship among the agents and that affects the group's negotiation capacity, among other factors; and c) financial support, which is represented by credit agencies. Institutional financial support affects the resources available for investments in technology, for example.

5. Conclusions

The cooperative relationships of clients with their suppliers involve mechanisms established to stimulate vertical cooperation. These incentives can be initiatives on the part of the supplier (group) or the client. The providing of technical assistance, the sharing of information such as sales forecasts, the payment of premium prices for products, and joint participation in production planning, among other factors, can be cited as mechanisms of incentives on the part of clients. Participation in product promotions for the end consumer and information sharing as expectations of gains, in turn, are mechanisms of incentives for cooperation on the part of suppliers.

The aforementioned mechanisms of incentives were found to incur costs. In view of this fact, why do agents invest in vertical cooperation? According to our empirical study, one major reason is the existence of uncertainty about the transactions. This uncertainty is related chiefly to asset specificity required by the clients and with the possibility of opportunism on the part of their suppliers.

Our research indicated principally the occurrence of physical and temporal specificity. The physical specificity of products is related mainly with the quantity required, with the diversity of products, and with the requirement of quality standards. The temporal specificity of products has to do with the need for continuity (regularity) in the product supply flow.

Opportunism, in turn, is associated with the interruption of the supply flow due to the suppliers' decision to use other marketing channels. If the transaction lacks continuity, the client bears a cost relating to the nonfulfillment of his clients' demands and a search for new suppliers. For the supplier, supply discontinuity also represents transaction costs, translated into risk of losses, since other business partner must be found and he must adapt his production to the requirements of other partner.

Although opportunism increases the uncertainty of the transaction on the one hand, on the other, the trust established among agents tends to reduce these uncertainties. Trust is the result of a reputation built over time. This variable facilitates the establishment of more cooperative relationships. Therefore, agents establish these relationships because they consider that the cost of establishing and maintaining vertical cooperation is lower than the cost of uncertainty of the transaction. It is thus clear that the variables that condition cooperation among business partners in supply chains are of an economic and social nature. However, these variables influence and are affected by management decisions. Understanding the interrelation among the variables is an important source of leaning. One can identify probable impacts of a decision. The system reveals the complexity of the collective action and offers tools for improving its management. The managerial implications are specially related to planning for both farmers and business partners. Both can be benefited from uncertainty reduction in decision making process. This will result in long-term sustainable relationships.

Under a systemic point of view, as they are interrelated, changes in the variables or in agents behaviour lead to adjustments in the system. Thus, as the variables are dynamic, external interferences or agents decisions may affect the whole collective action. This is an important opportunity for public and private politics action.

Finally, the model proposed seems to be able to identify critical points for collective actions establishment and maintenance. This information can be used in order to propose alternatives of innovator commercialization and distribution systems, especially for small farmers, who face difficulties of access to profitable marketing channels.

Acknowledgements

Research supported by Conselho Nacional Científico e Tecnológico (CNPq) and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), Brazil.

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