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Integrated Logistics in the Supply of Products Originating from Family Farming Organizations

Janaina Deane de Abreu Sá Diniz and
Adelaide dos Santos Figueiredo

*University of Brasília, Catholic University of Brasília
Brazil*

1. Introduction

The family farming sector is of fundamental importance for food safety in Brazil and other countries. This sector mobilizes 14 million people and represents 60% of the agricultural workers. The small farms represent 75% of the rural properties, 25% of national cultivated land and 35% of the national agricultural production (IBGE, 2006)¹. A great diversity of food, especially that which forms the basis of the diet of the Brazilian population originates from small farmers, in particular those who work in the vegetable sector.

The main characteristic of this production is that it happens in small family farms with a predominance of short production cycles, strong seasonality, intensive use of manpower and highly perishable products. Besides their logistics difficulties to access their clients, the small family farmers also have problems to insert their products in the institutional and fair trade market that requires volume, special schedules and higher quality standards. That means that the products present short post-harvest periods, which influence the location of the crops, which must be preferentially close to the consumer market. These elements presented demand researches related to process and practices that can increase the shelf life of these products.

In this context, we verify a tendency of the family farmers to organize themselves in associations or cooperatives. That is why it is necessary to analyze how logistics can be a strategic instrument of competitiveness for these organizations. They really need to be organized to access markets and that is why logistics management can improve their level of organization, helping them to become more efficient and have better management, not only of their production, but also of storage and distribution processes.

The challenge is to distinguish the context of each group of family farmers (vegetables, dairy, handicrafts, tourism and others), even if they do more than one of these activities. There are particularities existing in each one of the logistic chains of family farmers' products and that makes the complexity of these chains a challenging search for solutions.

If the implementation of integrated logistics is complex for large companies, the same logic can be applied to small organizations, even if the contexts are distinct. While large

¹ Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics).

companies have financial, human and technological resources to overcome this challenge, small ones have limited assets.

How then do we adequate a logistic management system for small family farmer organizations? Their peculiarities and limitations have to be known and understood before proposing any solutions. This discussion intends to elaborate a methodological proposal that permits an assessment of the integration of the supply chain of family farmers' products.

For the theoretical framework we used the description and concepts related to the reality of this kind of organization, that usually are presented as associations or cooperatives. Firstly we considered the definitions and relations among logistics and family farming concepts, starting with the peculiarities of the latter, in order to contextualize the logistic chain of family-based agribusiness.

Next, we treated the management of flows, according to its demands of cooperation, coordination and integration, both inside and outside the organizations. Simultaneously, we utilized the results of empirical research carried out with family farmers' collective organizations in Brazil in the evaluation of the main logistic problems.

The practice of integrated logistics begins to show its strategic importance for any kind of organization, including family farming organizations. Integrating the supply chain means to improve and minimize the costs, increasing market competitiveness. One of the advantages of integrating the logistic chain in the marketing of family farming products is that the principles found in the concept of integrated logistics corroborate for collective practices in the organization, where one of the factors of success is related to the construction of a bridge of trust between the various members of the chain.

2. Peculiarities of the family farming organizations

According to the last agricultural Brazilian census (IBGE, 2006), in Brazil there are approximately 5.17 million farms, of which 4.36 million, about 84.3%, belong to family farming. Concerning the 329.9 million hectares of existing agricultural area, only 80.25 million or 24.3% of the total area are operated by family farmers, their average size corresponding to 18.6 hectares.

Abramovay et al. (2003) define as familiar "those units where management, labor and ownership of the means of production (but not necessarily land) belong to the direct producer" (p. 9). Family farming is thus defined not by the extent of the area, but by the management and majority presence of family labor in the establishment.

Family farming represents approximately one quarter of the country's agricultural area, and corresponds to one third of the Brazilian production, being responsible for producing a number of foods that come daily to the Brazilian's table. Considering plant foods, family farms produce about 87% of the national cassava, 46% of the maize, 70% of beans, 34% of paddy rice, 38% of coffee, 16% of soy and 21% of national wheat.

The activity of horticulture in Brazil accounted for 2.1% of agribusiness GDP, moving about 11.4 million of reais (the national currency) in 2005, with a production of 17.4 million tons. It occupies an area of approximately 782,500 hectares, predominantly familiar, with 60% of production concentrated in areas of less than 10 hectares, near the cities, known as green belts. Additionally, 8 to 10 million people depend on this activity (Melo, 2007).

Family farms account for a third of the amount of agricultural production in Brazil. However, most of those family establishments are characterized by low capital investment,

poor qualification of manpower and a high degree of informality (Abramovay et al., 2003). To these characteristics, one can add the facts that the products are most often perishable – which makes their storage and transportation difficult, and there is a low use of technology associated to management difficulties which are partly explained by low investments and the low educational level of farmers.

In supermarkets, the entrance of products is subject to compliance with various requirements, such as having their own transportation, quality, punctuality and competitive price. Much of the vegetables offered in supermarkets come from family farmers, but in order to sell their products in these establishments, they need to be organized in groups such as associations or cooperatives.

Abramovay et al. (2003) mentioned that it is very common for a more structured farmer to gather the production of other producers. To reduce the risk of supply shortages, supermarkets prefer to work with a large number of producers. Still, the need for production volume and the lack of organization limit the participation of farmers having more limited resources. Thus, the production of smaller producers is primarily intended for small local markets and/or to supply centers, and only then to other types of establishments. For Woods (2004), the more alternatives one organization has, the less dependent it will be and the less the chance of being overly affected by the power of another organization. One must seek product diversification and the strengthening of marketing channels for family farmers (Orsi & Melo, 2004).

Since the last decade, however, changes have occurred in order to fill some of the shortcomings experienced by family farmers. Among them are the coordinated actions by some Brazilian public institutions which provide resources for projects aimed at improving the productive and administrative processes of family farming. Corroborating these incentives, Abramovay et al. (2003) consider that the family farming organizations are production units able to incorporate important technological changes, as well as to participate in dynamic markets and to operate in a responsible manner, with the credit that they may receive.

3. Main concepts used in the construction of a model of integrated logistics for family farming organizations

For the construction of the model and its working methodology, some concepts were re-discussed. Besides the concepts related to logistics integration, there were analyzed issues related to market price formation and organization of family production. This review helped to understand how integrated logistics can contribute to the inclusion of the family farmer on the market, based in a collective organization supported by integrated logistics processes.

3.1 Marketing and pricing of family farming products

For family farmers there are two major challenges: placing their products on the market and achieving fair prices that will ensure some profitability for their businesses. In this context it is important to understand how the process of commercialization of family farmer products works.

When we analyze the commercialization process used by family farmers, one can observe that their market inclusion depends on the degree of knowledge and technology that the producers can take control in their production process. In this context, producers can find two basic levels of the marketing channel: a channel called level Zero, used when the producer sells his product directly to final consumers, being the farmer markets one of the

most used in this kind channel. The advantage of this way of commercialization is the approach of the producer to the final consumer, where the price received by the producer is equal to the price paid by the consumer.

On the other hand, small volumes of products are sold in this kind of channel, which is very fragmented. Since there are many sellers and buyers, prices are determined by supply and demand and there is not a great value added to the products offered. Also, the producer is responsible for the entire logistics process. This is a market more similar to perfect competition, where prices vary depending on supply and demand of products and there is a limited market for the operating area of the local fairs. The entry and exit of one seller does not change the product prices, because the volume offered is usually large.

The channel of level One is when the producer sells his products to a retailer who sells to final consumers. In this channel the sale is no longer done directly from producer to consumer. There is the role of the middleman, meaning that the producer receives a different price paid by final consumers. In this channel, the producer has added to his logistics costs: the transaction costs related to contract negotiation to define the quantity to be delivered, quality standards of the products and forms of payment. The entrance to this channel requires aggregation of some technology in order to ensure the negotiated amount, frequency of delivery, adequacy of packaging and transportation. The price paid to the producers is set by the buyer, featuring a market closer to the oligopolistic market, where there are many sellers spread with a small production volume and few buyers. In this case, we can observe that there are other variations in the structure of this channel level, but the participation of the middleman prevails, sometimes as a wholesaler who can provide multiple retailers, sometimes as a distributor who can provide for the retail market and also to local wholesalers. This marketing configuration is usually associated to the family farming products in Brazil, although some changes have been occurring.

Wilkinson (2003) reflects on the changes occurring in this segment in Brazil, from an academic and political investment that transforms production on small family farms, including them in the modernization of the agri-food system and targeting both external markets and their reinforcement in the domestic market. During this same period, there are changes in the regulatory framework and institutional economics, as well as in the agri-food system, creating a new competitive environment, which threatens the inclusion of family farming, mainly because of its small volume of production.

One of the most promising sectors of family farming is the production of vegetables, which also accompanies the scenario which has changed due to the modernization and transnationalization of the retail market, in the form of super and hypermarkets. At every major supermarket created, replacing hundreds of traditional grocery stores, the requirement of scale is strongly needed in this sector. It is observed that the new minimum levels of scale units indicate the necessity of forms of association as a pre-condition for entry, as well as unprecedented levels of quality required. A number of factors – the opening and regulation of markets, the regional integration of Mercosur², joining the WTO and, more recently, the adoption of good practices and traceability systems as a condition of access to export markets – are already shaking traditional chains (mainly meat and milk), imposing new minimum levels of quality.

² Southern Common Market – economic and political agreement among Argentina, Brazil, Paraguay and Uruguay to promote free trade and fluid movement of goods, people and currency.

Now, however, there is especially the imposition of private qualities, defined by the supermarkets themselves and covering new objectives in this sector, such as homogeneity, appearance of the products and packing conditions. Also, the supermarkets impose a new dynamic to market coordination employing logistic systems that demand a capacity to supply and pay for a minimum cart of products in a planned and continued way on the behalf of the producer. What seemed, therefore, as a great opportunity for family farmers, which are excluded from the main chains of commodities, now seems to be a challenge where the advantages of traditional factors are not very important, considering the new knowledge and organizational and managerial capabilities required by large retailers.

Corroborating this reflection, Melo (2001) examined the horticultural sector in the 1990's and found that in this sector a major restructuring in the marketing process is happening, from a central agent represented by the large supermarket chains. These changes have left negative impacts on the productive sector, which is not yet prepared to meet the demands of those markets. The author observes that the factors for restructuring the sector are related to the expansion strategies of large corporations.

The increasing complexity of business transactions has led the major supermarket chains to coordinate the whole process and take the leadership in the market, influencing the entire production chain. And this leadership has led to a greater bargaining power with suppliers, with impact on the formation of prices received by producers, characterized as an oligopolistic structure, with the asymmetries of market power. This structure of power ends up pushing down the prices paid. The result of this structure was the loss of capital in the Brazilian productive sector in the last ten years, as the bargain power of producers became increasingly reduced. They had to accept the conditions imposed by retailers, such as prices and payment terms. The author also considers it essential to think about a new form of organization and functioning of the market for agricultural products that minimize this asymmetry gained by major retailers depending on their proximity to the consumer market.

The research lead by Belik & Chaim (1999) showed that these changes are occurring especially among the various segments of the production chain of vegetables and fruits, with the emergence of new alliances in this sector in Brazil. The producers are changing the way they produce and sell. They are increasingly paying attention to issues related to quality and product segmentation. To meet the increasing demand of the final consumer, the segments of this sector are changing their way of relating, strengthening the integrated management of the chain.

The current impact observed in this segment is the organization of these suppliers in associations and cooperatives, performing in an integrated manner with the retail segment, in particular the networks of supermarkets and hypermarkets. It must be noted that this partnership and the cooperation of retailers with suppliers tends to be strengthened, forming an alliance. The development of alliances is being considered a more competitive advantage in reducing transaction costs.

This new marketing reality calls into question the traditional structures of existing organizations in family farming agribusiness. According to Ploeg (2000) apud Mior (2005), the tendency of this economy is characterized by a better income support from the development and combination of resources controlled by the farmer, plus greater flexibility and multiple use of resources. This construction requires a process of gradual development, considering the available resources, whose trend is the emergence of multifunctional companies, with local capacity for innovation and gradual change, so that the learning

process happens and the focus is on the collective work and in the networks that are under construction.

Accompanying this tendency is a discussion about the need to establish a new form of collective organizations of family farmers. Araújo (2003) apud Mior (2005) argues that the concept of agribusiness is more of an aggregated view of the economic life of the system of production and distribution of food, with the growing participation of not strictly agricultural activities throughout production, processing, manufacturing, distribution and consumption of food. The author notes that it is the post-harvest activities that add more value to agricultural products and that certainly is the target of economic agents seeking to capture the value added.

Given this reality and considering the growth of competitiveness, there is the need to seek an alternative organization of family farming producers to ensure its profitability and market insertion. Several studies have sought to understand the production chain, signaling new trends for survival of the family farmers.

From an agrarian point of view, linking the rural agricultural development, the trends point to the adoption of a more systemic view, which, according to Moyano (1997), includes strategies to stimulate all resources – agricultural and non-agricultural – existing in rural communities. This new structure, taking into consideration the pressures of competitive markets that are more open and demanding, seems related to technological development and the integration of the rural areas. Thus, it is important to create an agricultural complex which, besides the production of food, can also add to its distribution.

The retailers are going through strategic organizational and technological changes, including the establishment of direct relations between retail food chains and agribusiness, thereby reducing the importance of the intermediation and wholesale sectors in retail supplies, promoting a new model of negotiation.

For Souza (2000) this new form of trading will evolve to the so-called “strategic partnerships”, because even though the supermarket chains are concentrated, they cannot remain competitive without making arrangements with the productive sector. Among the forms of agreements, there are: financial, human, technological and logistics partnerships. Thus, the restructuring of production and marketing for family farming must include the tendency to make arrangements to overcome barriers to competition intensified by the globalization process.

Facing the new tendency of the structure of agriculture and its relationship with the market, it becomes necessary for family farmers to organize themselves in cooperative networks with the goal of operating in a regime of intense partnership in a given region. In this way they will be able to get products to market competitively and with higher aggregated value. In this scenario, the practice of integrated logistics can help in shaping the organization to act in this complex and globalized market.

3.2 Revisiting integrated logistics concepts for the proposed model

In this section we discuss the main concepts related to logistics, trying to place them within the family farming context. These concepts have been increasingly used as essential elements for facilitating more efficient organization managements. Another tendency that has been observed is related to the growing number of family farmers organizing themselves into associations and cooperatives, as mentioned previously.

Logistics is defined by the Council of Logistics Management as the management of flows of raw materials, materials in process and manufactured products, as well as information

related to them, from the point of origin to the point of consumption. Due to its integrative character, logistics can be applied to different stages of a production chain.

Production chain is defined as a set of interactive components, including productive systems, suppliers of inputs and services, processing industries, marketing and distribution agents, as well as final consumers (Castro et al., 1998). The same authors define an agribusiness productive system as a set of interactive components that aims to produce food, fiber, energy and other animal or vegetable raw materials. The productive system is a subsystem of the production chain and refers to activities undertaken within the farms. The family farming agricultural activity is part of production systems, causing that part of the flows originated in these establishments to be coordinated by more structured agents.

Bastos & Araújo (2004) suggest the application of logistics in the development processes of small groups and initiatives as a way to provide better forecasting and planning conditions, enabling operational improvements and techniques, aiming at an integrated management of their economic activities. The authors also consider that it is possible to increase participation of local organizations in global processes through the adaptation of techniques and management tools already used in large organizations. The difference is that, instead of focusing only on economic goals, social goals should also be pursued.

Marchesnay & Foucarde (1996) emphasized the management inability of small agri-food organizations, since their activities are mainly centered on productive capacity, with little focus on management of other processes, such as storage, marketing and distribution. The same scenario can be observed in agriculture cooperatives, which lack a management culture. This deficiency distances these organizations from the market, since they are usually focused on production processes (Waack & Machado Filho, 1999).

Besides the internal management problems, producer organizations have other weaknesses: difficulties in making complex decisions, lack of criteria for allocating investments and restrictions on funding. Several authors consider the logistic problems of distribution and marketing in the cooperatives to be significant, where the scale of production is inadequate, and technology, in most cases, obsolete.

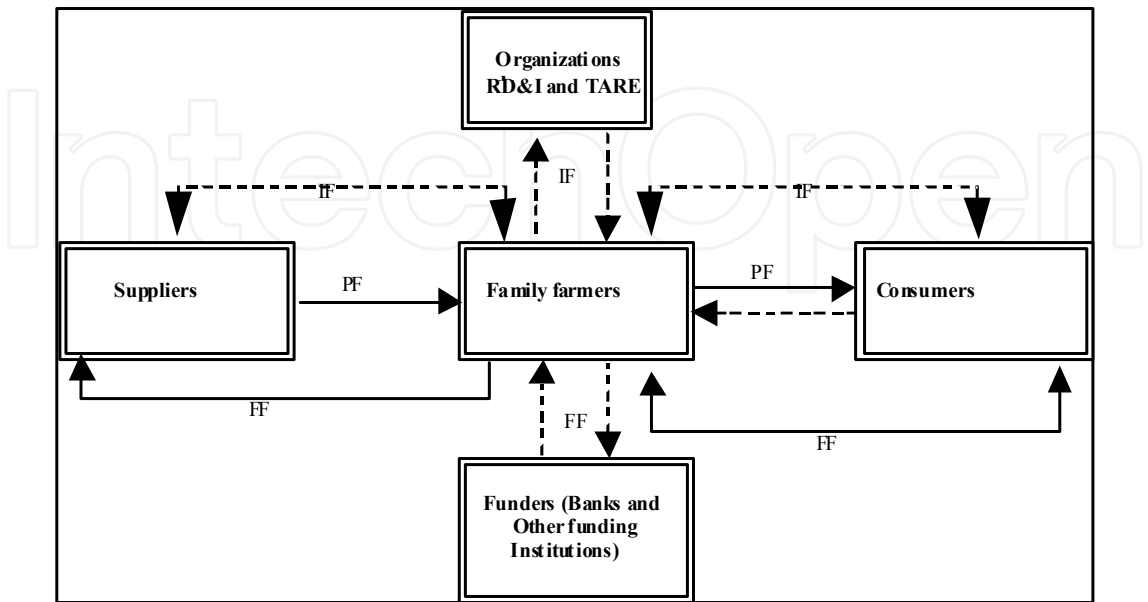
Moreover, the implementation of models of efficient management is not based on hiring the best professionals in the market or the best tools, but to adapt their management models to the characteristics intrinsically associated to the background and reality of family farming organizations. In this sense, it is essential to know the main flows concerning the process of placing the production on the market.

3.2.1 Main flows in the family farming agribusiness

Contextualizing the logistic flows within the family farming agribusiness, we found that many of them are deficient or absent. Figure 1 presents the main flows related to family farming logistic activities. In addition to the flows intrinsic to the logistic processes, there are also presented – in horizontal arrows – those flows coordinated with other institutions that are indirectly related to the supply chains and where the familiar establishments are inserted (vertical arrows). Even indirectly, these other flows influence the logistic performance of family farmers, since they represent other possibilities of supplying information and financial resources.

Among the flows inherent to the logistic processes, we considered the physical, financial and information flows of the logistic processes. The physical flows consist of i) flows of raw materials and packaging required to agricultural activities; ii) flows of sending products to the consumer market. In field research carried out with the vegetable producers in the

Brazilian Federal District it was observed that the return of returnable packaging was not systematized, which can cause delays in the delivery of products to the clients, since the vehicles have to wait for the release of the packages to then visit the next client.



Legend:
PF – Physical Flow
FF – Financial Flow
IF – Information Flow
RD & I – Research, Development and Innovation
TARE – Technical Assistance and Rural Extension
—> Consolidated flows
---> Deficient or absent flows

Fig. 1. Main flows in family farming-based agribusiness.

The financial flows consist of: i) the flows of material purchasing; ii) services paid by producers and iii) those exchanged with the consumer market. In this second case, the flows follow the two directions, as some producers pay for the rental of spaces in their client outlets. This situation is very common for organic products. Among the services paid for by producers, those concerning transportation, storage and equipment maintenance stand out. Finally, the information flows cover all information that occurs between each component of the chain, from collection to final consumers. These flows are still deficient in most chains involving family farmers. This deficiency is not related only to customers, but also refers to the lack of collecting and managing information about suppliers. It is verified that larger customers utilize a more structured and better management of information, but there is still a lack of integration concerning producer information, in a way that may ensure efficiency to processes such as reducing waste of time and products.

Related to the flows indirectly connected to the family farmers supply chains, we have, mainly, financial and information flows. Financial flows occur between lenders – banks and other funding institutions – and the producers. These flows concern not only funding agencies, but also enterprises of research, development and innovation (RD&I) plus technical assistance and rural extension. The information flows must occur in both

directions. i.e., between the institutions and the producers – at the time of training workshops and technology transfer – and between producers and organizations, when the priority demands must be clearly presented. In most of the cases, producers do not know how or to whom they should report their demands, once these demands should be addressed to meet collective needs. In this direction, it is important for producers to organize themselves into groups, because with this new condition they can be able to increase their access to the market. However, this is only possible if they make an assessment of logistic performance.

3.2.2 Assessment of logistic performance in family farming agribusiness

For Pessoa & Leite (1998), the performance of a production chain “can be measured by its ability to generate economic and social benefits to its participants” (p.291). Bialorskoski Neto (1999) adds that the efficiency of the agribusiness system is achieved not only through relations of price and productivity of the various factors traditionally considered by neoclassical economics, but also by reducing transaction costs along the chain and the implementation of an efficient coordination and governance.

The management of an organization uses performance indicators and other tools. These indicators should be included in management systems that integrate the various processes: financial, commercial, quality control, environmental, operational, environment, among others. Among the management systems, the systems of information and communication (SIC) are primordial to intra and inter-organizational cooperation because they encourage interaction. The quality management systems are also important, as they consider the organization as a set of processes that occur between multiple customers and suppliers.

3.2.3 Cooperation and coordination in the flows of family farming agribusiness for integration with the retail market

The term cooperation refers to joint or collaborative work. In a production chain, its members may have conflicting or cooperative attitudes. Many factors are related to this behavior, but certainly the degree of each of these attitudes depends on the degree of coordination presented by the chain. Castro et al. (1998) state that “ideally, the links of a chain should be cooperative, while competition should occur between components of the same nature” (p.16).

The coordination of agri-food production chains has been guaranteed by large retailers, who are increasingly forced to meet the demands of consumers. Thus, large retailers try to transfer the market pressures to upstream levels of production chains (Montigaud, 1992). Normally, it is the retail market that will establish the strategies and procedures needed for better supply chain integration, reducing the risks of disruption and discontent of consumers.

Chain coordination is an important element for its efficiency and success. Coordinated chains can supply the consumer market with quality products in a competitive and sustainable way. Chains that are not coordinated and do not deal with conflicts between their components can weaken and lose competitiveness and sustainability (Castro et al., 1998). Paché & Sauvage (2000) highlighted the importance of interaction between the different actors participating in the same productive project and provide some examples of reciprocal influence that contribute to reducing transportation costs, as well as maintenance and storage costs, if shared by the actors of a supply chain :

- Interaction between food industries and their suppliers (farmers) in order to establish the procedures for replenishments compatible with the intensification of flows;
- Interaction between distribution companies and industries to create compact packaging and reduce areas of storage; and
- Interaction among producers, distributors and carriers to standardize weights and volumes of the transported containers.

As already mentioned, to ensure the integration of family farming production in the retail market, an important requirement is that producers must be organized in a cooperative way, not only among themselves, but also among their class entities, clients and suppliers. Below we present two types of cooperation that need to be adopted in the family farming agribusiness.

- Intra-organizational cooperation: this must exist primarily in activities that involve family members and the producers organization; and
- Inter-organizational cooperation: cooperation and coordination of operations between the organization and key consumers, such as supermarkets, industry, transportation companies.

The theoretical framework usually adopted to study inter-organizational cooperation is the Economy of Transaction Costs, even though in recent years several authors have demonstrated the limits of this theory in analyzing this type of relationship (Barthelemy et al., 2001; Koenig, 1999). Figure 2, proposed by Dornier & Fender (2001), presents the three possible types of logistic cooperation occurring between manufacturers and their customers: operational cooperation, trade cooperation and marketing cooperation.

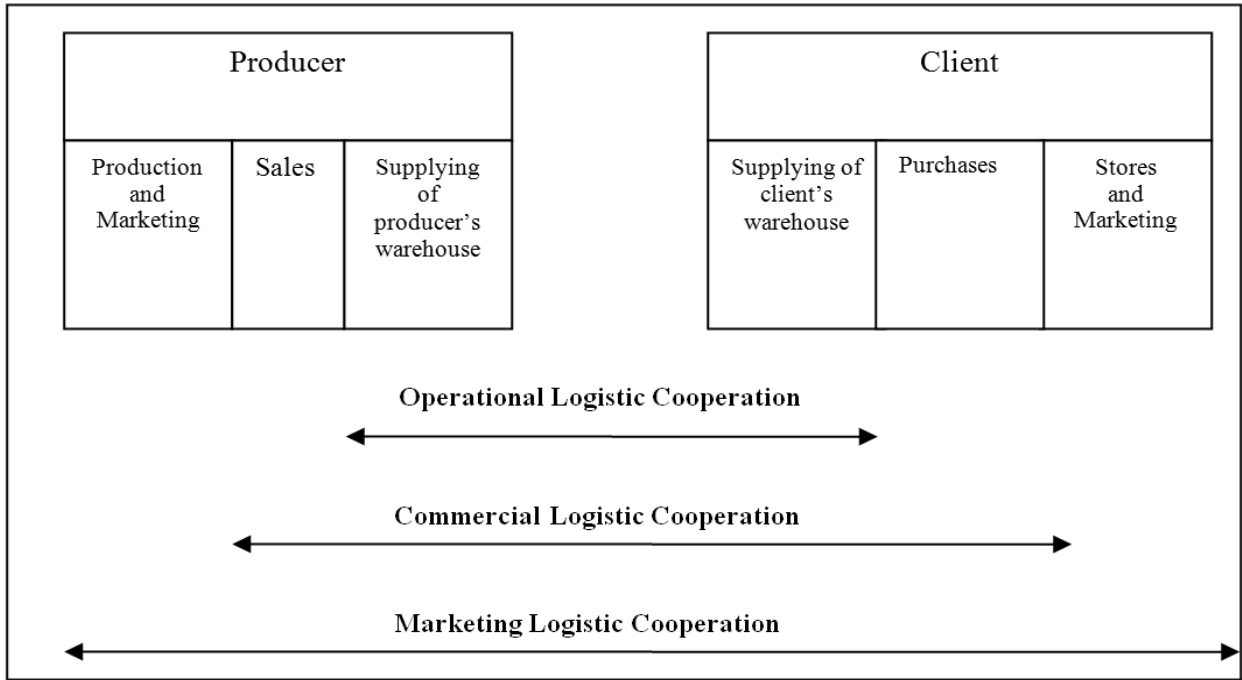


Fig. 2. Inter-organizational kind of cooperation in logistics. Source: Dornier & Fender (2001, p. 388).

In the figure, each kind of logistic cooperation implies in different organizational structures, which will be responsible for different working approaches among partners. “Questioning

habits and historical relationship modes between producers and distributors are greatly raised. It should gradually be built a new space for exchange and make the theme logistics rather than a commercial operating space limited to one enterprise but a common working place which seeks not only to maximize the supply to the final customer" (Dornier & Fender, 2001, p. 390).

Concerning the agricultural cooperatives, logistic cooperation between them and their partners should not be limited to the operation level, especially because nowadays we have a scenario of strong competition among companies of all sizes. It is also a way to expand relation between actors, promoting better outcomes for two or more partners.

The next section will discuss how the concept of integrated logistics can help the construction of a model concerning the integration of family farming production with the retail market.

3.2.4 The role of integrated logistics in family farming agribusiness

The practice of integrated logistics begins to show its strategic importance for any kind of organization. Integrating the supply chain means to improve and minimize the costs, increasing market competitiveness. Some authors, like Christopher (1992), Chopra & Meindl (2003) and Romano (2003) defend the necessity of creating bridges of confidence among stakeholders, in order to share resources and information, as well as acting in networks, where the solution must be built together, with the participation of those involved in the problem, in a win-win solution.

The concept of integrated logistics applied to family farming agribusiness seeks to develop facilities for the negotiation of these organizations with the market. According to Lambert & Cooper (2000), to integrate the logistics of a chain means integrating business processes, which involve every supply needed for production till the final customer, sharing products, services and information.

One of the advantages of integrating the logistic chain in the marketing of family farming products is that the principles found in the concept of integrated logistics corroborate for collective practices in the organization, where one of the factors of success is related to the construction of a bridge of trust between the various members of the chain. In this sense, it can be inferred that the practice of integrated logistics can also help the accumulation of social capital. For Ostrom (2004), social capital is a variable in the generation of human capital and an aspect of social structure that facilitates certain forms of action and cooperation.

In a research carried out on understanding the concept of integrated logistics, Gibson et al. (2005) noticed that this practice has components related to mixing strategies and the implementation of activities that transcend individual and company roles. Moreover, it has an important component related to the collaboration between supply chain members, supported by a significant contribution in the areas of marketing, finance and sales.

Seeking alternatives of management related to integrated logistics applied to a family farming organization that works with perishable products implies understanding the interaction of different processes and activities related to the business sector to reduce time and resources involved in the chain as a whole, and not only in a single process. This strategy is crucial, once it involves highly perishable products, where the main challenge is to make them available to the final consumer in the shortest time and with adequate quality. Authors such as Chow et al. (2005) argue that the greater the synergy among the supply chain actors, the greater the facility to find strategic solutions. In summary, it means that the

experience exchanged among the various actors is one of the factors required for the construction of knowledge in the logistic chain, which will facilitate the implementation of strategies and logistic solutions.

It is worth noting the importance of information flows in adding value to products. Thus, it can be assumed that a chain is actually integrated when there is really a good flow of information, preferentially in real time among its participants. The asymmetry of information in the chain eventually can result in barriers that generate impacts on its profitability, as noted in the commercial structure still practiced in the market.

Stank et al. (2005) emphasize that the value of a chain is built from its internal activities, in synergy with external systems with the objective of adding value to the customer and by the incorporation of supply activities, marketing channels and purchasers. The authors argue that Porter's logic can facilitate the construction of a management model that encourages the understanding of the relationship between the strategic and operational levels of integrated logistics. In a chain of perishable products, which is the case of the majority of products originating from family farms, the understanding of what is strategic or operational has a tenuous border, since a good strategy can be reducing the permanence of the product in the chain. For that it is necessary to ease the coordination of all processes, which are exclusively operational. In this context, strategic and operational planning act simultaneously to achieve the expected results.

The concepts discussed may imply that the logistic model of a chain depends on the conditions of competition that each product faces in the market, being related to their lifecycle. Since this is a chain of mainly perishable products, operational measures of performance also become strategic to maintain marketing competitiveness. These measures are linked to the performance of activities associated with speed, consistency and flexibility. The speed is measured by the time spent between the arrival of a request and the availability of the product on the shelf. When it is the case of a product whose shelf life is measured in days or even hours that time must be as short as possible.

The great challenge is to associate the shortest time with the lowest cost. Considering the speed, it is essential to have consistency, i.e., to provide products on time in a constant way. And finally, flexibility is related to competence in dealing with unexpected requests, such as a sudden increase in demand, changes in destinations, failure of supply or removal of improper products. So, it is this flexibility that facilitates the process of correction of faults and recovering from errors that may occur during the movement of goods in the chain.

Logistic quality requires a constant evaluation. It is necessary to maintain a good flow of information feeding the chain, in terms of demand as well as concerning the performance of operational logistic processes related to transportation, packaging, loading and unloading, handling of products, return of packaging, delivery schedule, and waiting time in queues for loading and unloading. These parameters directly influence the time that products are being moved in the chain.

In the particular case of a family farming chain, where usually the logistic processes are focused on time, its structure requires greater attention to the basic processes considered, requiring an appropriate planning to avoid impacts in the costs. As this is a chain where the products are usually delivered daily and are very perishable, it is ideal to plan the processes of collection and distribution to reduce the frequency of handling and loading and unloading at intermediate periods. Wherever possible, products should be delivered directly to the shelves, being available immediately to the final consumer. To plan the chain in an integrated manner, it is essential to have a precise monitoring of the demand at each

point of sale, and that the information is able to be transferred to the producers' organization so that it can operate all the chain processes, ensuring consistency in supplying and in quality standards.

The structuring of networks in rural areas can be facilitated by the use of integrated logistics, which ends up supporting the organization of processes, information exchange and consistency of the bonds of trust built up from the transactions. The systemic monitoring of the chain leads to adjustments not only of processes, but also in the attitudes of the participants, strengthening the bond of trust between the chain members.

One of the most discussed points in the integration of logistic processes, which promotes representative gains for the whole chain, is to create a win-win relationship between the members, where everyone is committed to the quality and performance of their processes and concerned about the manner in which these results will be inserted in the next step of the chain.

Without this commitment and systemic view, it would be very difficult to achieve real gains from logistic operations. In fact, the gains are not concentrated in a single link of the chain, but they are distributed equally among all participants.

3.2.5 Understanding the supply chain of vegetables and fruits as an integrated supply chain

In the previous items we discussed the principal concepts and processes that favor the understanding of the logistic chain of family farming organizations, as well as its advantages in the actual market. We emphasize, furthermore, that time is a determinant for the quality of the products and in the costs of vegetables and fruit chains.

Now in this item, we want to broaden the understanding of the concept of integrated logistics to a more comprehensive one, whose main point is the integration of logistic processes.

This understanding is of fundamental importance to ensure the profitability of all members of a chain of perishable products, especially for the producers.

It is important to emphasize that the integration of logistics helps all chain members, but in the case of vegetables and fruits chains, this integration not only guarantees major profitability to producers, but also increases its bargaining power in the market.

Stock & Lambert (2001) argue that the management of the supply chain does not substitute or is not similar to the concept of logistics. While the Council of Logistics Management defines logistics as the management of material flows and its related information, from its origin to its consumption, supply chain management (SCM), for the same authors, involves the key business processes, which start at the final customer and continues until the providers of production supplies, integrating products, services and information that add value to both the client and other chain members (producers, suppliers, customers, shareholders, etc.).

It is important to observe that the understanding of this concept can be very helpful in the modeling of the integrated chain of vegetables and fruits with the market, because such integration, as has been discussed previously, impacts on time, affecting the costs and quality of products.

To integrate the supply chain of vegetables and fruits of a family farming organization it is necessary to observe some important aspects:

- Regarding the collection chain of products in the field through the warehouse of the producers organization, for the selection and classification of products, we can affirm

that it is possible to establish a similar flow between producers and its properties to the distribution center; and

- regarding the distribution chain, it is not possible to establish a unique integration flow among the diverse distribution points in the market. Although the logistic processes are the same, the type of relationship with each one of these points is different and it is from the recognition of these differences that it is possible to model the chain integration.

In order to operate from a supply chain management view, Stock & Lambert (2001) argue that it is necessary to manage eight key business points: 1) from the management of customer's relationship; 2) customer service; 3) demand; 4) request compliance; 5) production flow; 6) product procurement; 7) design and marketing of the product and 8) return of products.

Analyzing these eight key points in the supply chain management in the context of family farming organizations, in particular for the vegetables and fruits sector, we verify that organizations and groups of producers that work for supermarkets or hypermarkets need to manage these key points due to buyer requirements.

However, due to lack of technology and often lack of knowledge, it is not possible to integrate the logistic processes, making it difficult to dimension the demand and the product quality, resulting in heavy losses which usually fall on producers' organizations.

Stock & Lambert (2001) argue that the structure of a distribution channel has to attend the final consumer in his needs in terms of product quality and cost. To achieve this, the authors argue that it is fundamental to structure a distribution channel in line with consumer needs. It is also important to have an integration of the different distribution channels that can exist in a specific supply chain.

Faced with this reality and market requirements, it becomes necessary to seek alternatives that permit exploration and adapt logistics and supply chain models to find solutions that mitigate the current problems faced by those organizations and consolidate an organization model.

4. Methodological proposal for farmers organization based on integrated logistics

For the construction of the proposed model for family farming organizations, we took as reference the organization of producers of fruits and vegetables, considering that this sector corresponds to 2.1% of the Brazilian GDP and employs 8 to 10 million people.

The market for fruits and vegetables had its marketing affected, particularly by the fact that the products depend on limited periods to be harvested, i.e., most of them are products that can not be stored for long periods. This means that when it is harvest time, the product should be available on the market, regardless of its demand. Most of them are seasonal products, which mean that there are periods where the offering of the products is large and the market prices are low, but also periods of scarcity, where the supply of products is reduced and the prices tend to increase. Therefore, managing all processes of collection and distribution could be a great advantage of these marketing organizations.

Assuming that it is necessary to organize and manage chains of vegetables and fruits, not in isolation, but in integration with the market, seeking to decrease the permanence of products in the chain, we chose to adapt the seven steps proposed by Stock & Lambert (2001) for the design of a supply chain from the integration of logistic processes. These steps can be constructed from:

Setting the objectives of the supply chain - the producers' organization and the other members of the chain should set goals for their processes of production, collection and distribution, based on the supply chain concept, whose main objective is to ensure quality for consumers and reduce the time of permanence of the product in the chain.

Formulation of a strategy for the supply chain - from the establishment of goals for all participants in the chain, the following items must be defined: strategies needed to ensure product quality, reduction of logistic costs and time of permanence of the product in the chain, of purchase prices more competitive and better meet the demand;

Determination of alternative structures of the supply chain - being a pulverized chain, it is difficult to establish a unique marketing channel for products. For this reason, it is important to establish other channels and thus seek a better use of available resources;

Evaluation of the alternative structure of the supply chain - it is important to analyze the structures which ensure better quality, lower costs, continuity of supply, as well as communication;

Selection of the structure of the supply chain: the one that presents the best result, i.e. that acts with the structure that can best answer the questions related to the product quality, costs, continuity of supply and communication links;

Determination of alternatives to individual members of each supply chain - as previously discussed, generally, in a family farming organization, the logistics of collection may be standardized, i.e., the organization's relationship with each manufacturer follows a pattern established according to the quota of delivery of goods or of their involvement. However, in the distribution chain that relationship can be changed in each of the points of distribution and depends on the relationship between market and organization. In this context it is extremely important to recognize the constraints and define alternatives to minimize these restrictions;

Analysis and selection of the members of each supply chain - this is an important step, considering that the result of the supply chain depends on the commitment of each member in the various processes of the chain. To recognize partnerships and create a good relationship with them is also essential for supply chain integration. This recognition helps to strengthen the bonds of trust among participants, a basic parameter for the chain integration;

Measurement and performance analysis of the supply chain - it is important to establish indicators to allow benchmarking of the various chain processes. To measure, analyze and share these indicators with the various members of the chain is a key strategy for integration and minimization of costs and better utilization of resources;

Analysis of alternatives when the proposed objectives are not being met - this is a feedback step in the system, i.e., to assess whether the proposed objectives are being met and, if necessary, redefine them. As an example, it does not help if a supermarket decides that the goal is to have fresh products and good quality on the shelf, if it leaves the vehicle of the producers' organization waiting in line for a long time.

Importantly, each of the steps in building an integrated supply chain involves the structuring of communication channels without noises, i.e., by creating a network of social relationships in order to create and enhance a relationship of trust between the members of the chain. This is a model that is constructed daily from the transactions between the organization and the various markets.

So, combined with the steps mentioned, it is also necessary to obtain information on market demand. This information is known by the retailer, but must be shared with the producers. From this information, it is possible to start the structuring of the entire flow of the chain, beginning with the collection processes of the product on the property of each producer, as well as selection and product standardization, packing, loading and transportation.

All these processes require an integrated coordination to ensure that the activities can be undertaken in the shortest time, ensuring quality and longer product availability to the client. Table 1 summarizes the description of the basic functions that need to be integrated into the practice of integrated logistics of fruits and vegetables.

In this context, the proposed structure of methodology for the integration of family farming organizations of vegetables with the retail market needs mechanisms that can overcome barriers in organizational and technological integration between familiar production and retail market institutions in an era of globalization.

The model allows the family farming organization to overcome its competitive situation of fragility, because of problems caused by its own management – internal conditions of the familiar unit itself – as a result of changes in market structures and systemic conditions – political and economic infrastructure.

Processes	Information	Responsible for the information
Offer planning	Supply capacity in each producer of the organization	Organization's purchasing manager, purchasing manager of the retailer and logistics coordinator
Demand planning	Demand capacity of each market that must be supplied	Sales manager of the organization, sales manager of the retailer and logistics coordinator
Negotiation	Terms of transaction: price, period for payment, frequency of delivery, packaging supplies, time of delivery	Sales manager of the organization and logistics coordinator
Transportation planning	Optimization of the load, selection of the type of vehicle and routes planning	Operations manager of the producers organization
Distribution	Information that can help to optimize the distribution network (time and volume of delivery at each point	Operations manager of the producers organization
Orders	Quantity of products to be delivered	Purchasing, sales and operations manager of the producers organization
Packing	Availability of packing for orders treatment	Purchasing and sales manager of the producers organization
Load / unload	Appropriate time to perform the loading and unloading of the products	Operations manager of the producers organization and from the retailer
Packing return	Availability of packaging return at the time of unloading	Purchasing and sales manager of the producer organization, purchasing and sales manager of the retailer
Coordination	At any moment of the chain and each of its components, identifying bottlenecks and conflicts	Logistics coordinator

Table 1. Processes and basic information in the integrated logistics

5. Methodological proposal for the design and test of the model

The theoretical model emphasized the necessity of creating and sustaining a bond of trust between stakeholders, and negotiations in an all-sides win style between the chain participants in order to share resources and information. The model was also based on the platform concept. This concept considers that the solution must be constructed collectively by all relevant actors involved in the problem.

The methodology developed for this study was exploratory and associated to action research, i.e., at the same time that the phenomenon of interest is observed, some interventions are made in the process, so it can be more fully examined and understood. The action research was carried out during 12 months, but sometimes such studies can take longer, with the first results emerging only after a process of technology appropriation.

More specifically, the methodological choice considers that the design and testing of a model for the integration of producer and market emerges, necessarily, from a process of cooperative learning, where groups of logistic chains of distribution have the opportunity to share experiences, information and knowledge. In an environment provided with adequate infrastructure, it is expected that the group can build gradually, through observation, reflection and joint action, a management model that allows the full implementation of combined and interconnected actions, seeking a more effectively and efficient production chain of vegetables, considering the concepts of integrated logistics.

5.1 Designing of the model

The delineation of the model concentrated on increasing the profitability of the producers from the sale of their products, focusing on the integration of the producer with the retail market, in order to improve its marketing, maintaining an integrated supply chain of vegetables with the buyer (the retail market). For the structuring of the preliminary model, some assumptions were constructed as guiding principles:

- Involvement of all links of the chain, from producers to buyers. It is not possible to involve only one party.
- The collective construction holds as a premise that the participants should find a common goal and develop all the work towards that goal;
- The guiding concept should be the idea of chain integration, i.e., all members involved must be committed to the processes from production to product delivery to consumers;
- It is essential to create a bond of trust and commitment among all participants of the group;
- It is vital for the development of this culture of integration that one seeks a unique coordination with the objectives of facilitating the negotiation process and solutions for the conflicts and bottlenecks identified in the chain.

5.2 Details of the design of the integrated chain of vegetables

The design of the proposed integrated chain is built of several actions taken by producers and retailers under a unique coordination which acts as group facilitator in the role of negotiator of common interests and mitigates the conflicts that arise in the chain. Thus, the group coordinator, who may be called the logistic coordinator, is responsible for directing negotiations in the group, in all its actions, and should have the following profile, as shown in Table 2.

Technical Skills	Relational Skills
Agricultural sciences	Systemic view
Knowledge concerning the profile of the family farmer	Negotiation
Production and post harvest of vegetables	Leadership
Logistics of distribution	Communication
Supply chain	Knowing how to act on teamwork
Legislation for sorting and packaging of products	Planning

Table 2. Profile of the Logistic Coordinator

In this step, from discussions with groups of producers and retailers, it was found that at least at the beginning of the process, the coordination should be made by a local institutional delegate, outside the group, to provide technical support to facilitate the processes, considering the weakness of the managerial structure of most family organizations. In the case study an employee of the Enterprise of Technical Assistance and Rural Extension was chosen to act as coordinator. This organization maintains good relationships with both producers and retailers.

After identifying and choosing the coordinator, the design of the integrated supply chain begins with the search and identification of common interests among the actors in the chain of vegetables, particularly the producers and retailers. This identification was accomplished through the following actions.

5.2.1 Awareness

This phase aimed to raise awareness among the members of the supply chain concerning the importance of acting in an integrated manner for the marketing of products. It consisted of meetings among producers and retailers, organized by the logistic coordinator. The meetings transmitted the importance and benefits of an integrated operation in the distribution chain of vegetable producers and the importance of managing the logistic processes of the chain.

This was also the moment of introduction of some logistic concepts, essential for a good performance of the chain.

For producers, the approach was aimed to educate and raise awareness about the demands of each of the distribution channels and the importance of being prepared technologically and organizationally to act in each channel. It is understood that the lack of conditions of the producer in meeting the demands of a particular channel can increase the loss of profitability. Therefore, producers must meet the requirements of each channel and assess their conditions to serve individually or collectively.

For retailers, the approach was driven to demonstrate the benefits of an integrated performance, creating a bond of trust between producer and retailer, providing significant gains for both. It is important to make the retailer aware of the importance of logistic management, since we are dealing with perishable products. The time of availability from producer to consumer, as well as handling and packaging are also important factors to ensure the quality of the product to the consumer.

5.2.2 Instruments used to create awareness

These meetings were carried out in order to work with instruments directly related to the weaknesses and needs of each actor involved, as well as to explore comparative advantages.

The instruments used to sensitize were lectures presented by specialists in the area, leaflets about awareness and introduction to logistic concepts, technical visits to become familiar with other successful experiences of cooperation within groups, testimonies from producers and retailers with experience in acting as a group or in cooperatives. In these talks the main focus was on how the integrated chain works and the advantages of working this way. The holding of workshops for rural settlements identified several groups of producers that are interested in using this model as a base.

5.2.3 Formation of the groups

Based on the adhesion of producers in the awareness phase, the group that would perform in the integration experience was formed targeting the commercialization of their products in the retail market. The formation of these groups can be generated in two ways: from the demand of a retailer or from the need for groups of producers who have to improve access in marketing channels and consequently their incomes. In this research the group was formed from the demand of a retailer. After creating the group, the plan of action was started, resulting in the design of the integrated logistic chain and the resources necessary for its implementation. The actions undertaken concerned the establishment of a common goal, the creation of a pilot of the integrated channel of distribution and planning of the production scheduled.

5.2.4 Establishing a common goal

This action was structured in several negotiation meetings. On the average, there were four meetings with the group participants – basically producers and retailers – chaired by the logistic coordinator. In these meetings, everything that was decided was registered. The participants evaluated the advantages of acting in a collective manner, debated about selling prices and the group's commitment to continuously supply quality products.

Another meeting was carried out with the retailer, in order to discuss what his expectations were for the supply, quality of products and the price he would pay for the products and payment conditions. Once these points were settled, two meetings between producers and retailers were organized. At the first meeting the common goal of the stakeholders and the negotiated conditions of supply for an experimental project were established, noting that the information should be shared among participants, especially information concerning demand. Another meeting with producers and retailers aimed to discuss the general aspects of the partnership. These meetings concerned creating a bond of trust between chain participants. Actually it is the principle of strategic alignment of the chain, where participants discuss each stage of the process until the product availability to consumers. Responsibilities were established for each link of the distribution chain.

5.2.5 Prototype of the integrated supply chain

This action was crucial to consolidation and model fitting. A prototype project was planned, with the delivery of a producers group and a retail chain, as monitored by the logistic coordinator and a group of researchers. The design of the distribution chain began, with the first delivery of products to the marketing. The following subjects were decided upon: the goods, quantity, selection processes and the quality of products required, quantity to be supplied by each producer, time delivery and who would be responsible to transport produce in each section of the roadmap.

During the development of this prototype conflicts occurred. They were mainly caused by the lack of an integrated vision of those involved. They are limited to analyzing and worrying about their processes. It was observed that, although the members of the chain have been sensitized to act in an integrated way, they still do not have this practice. At this time, the role of the logistic coordinator is fundamental, since he intervened in the pursuit of an agreement between the parties and the correcting processes.

The logistic coordinator also has the role of identifying the training needs, and their bottlenecks, of the members of the chain. In the prototype the necessity to improve internal processes was identified, in order to facilitate the integration of external processes. From this experience one can see that the need for training of human resources is vital to the functioning of the chain. The themes identified in the research as basic to the classification of producers and retailers are those concerning the handling, packaging, transportation, preservation and classification of foods. In the producer and retailer relationship, the major bottleneck is the lack of information concerning the real demand. A deficiency of this information eventually generates oversupply of some products and lack of other products. Generally, the experience of the prototype project showed that many of the bottlenecks in the chain are due to the lack of information on demand, difficulties in the negotiation of prices, more precise specification for standardization in selecting the most appropriate products and packaging.

5.2.6 Qualification of the chain

Qualifying was done with the participation of producers and retailers. Problem solving was done in groups, taking advantage of the platform concept, in which solutions are proposed by those involved, trying to visualize the chain from the production through the purchase of products by the final consumer. Therefore, the entire chain process, both physical and informational, must be carefully run to ensure the quality and integrity of products for the consumer. The proposal was carried out until this step and the development occurred with the implementation of the planning of scheduled production and the assessment and monitoring of results.

5.2.7 Planning of scheduled production

After assessing the experience of delivery, some needed adjustments were made, offering a basic training for the group, so its members could evolve in the negotiation for planning the production schedule, i.e., decide, among the producers who is going to plant, in which period and which products and quantities, in order to maintain the continuous supply of products. This step only moves forward if the information regarding the demand of the products supplied by retailers and producers with availability to plan their production, based on the demand information is guaranteed.

This step is an important evolution in the model because it helps build the bond of trust and commitment among the participants: the producer commits the group to plant what was established and the group commits itself to provide the amount requested by the retailer. The latter commits to purchasing the required amount within the standard of quality and price agreed. This step should be led by the logistic coordinator, requiring more formality in relationships, including the establishing of more formal contracts. Some key definitions for these activities:

- **Products:** definition of products that will be provided and the producers who will do the planting or deliver it. Not all the producers will plant the products, as this decision will result in the producer's experience in growing and the quantity demanded by the retailer;
- **Quantity:** establish how much of each product must be grown or supplied;
- **Frequency:** whether the product will be grown in an incrementally or seasonal way;

- **Responsibility:** the commitment of the group of producers to supply the retailer and the retailer to buy the product. Requires a more formal contract of supply;
- **Price:** a basic agreement on how the prices will be paid for the products, which may be the same deal made in the prototype or based on prices of the local supply center.

5.3 Assessment and monitoring of results

This phase should be sustained by the principle of integrated coordination of the chain, i.e., the involved parts must follow, and obtain information on how the product is reaching the final consumer.

The producers must know if the products are providing competitive advantages to the retailer and they must track every step of the chain to the final consumer. It is essential that participants understand that the exchange of information between stakeholders on how the product is reaching the consumer is the key point for the technological development of the chain. It is from this point that we can determine the needs for training producers and buyers and then design an integrated qualification plan for the chain.

It is worth noting that, since this chain has no high technology to conserve and maintain the product, it was perceived that all logistics need to improve processes to ensure that the product arrives in the shortest time possible to the final consumer. This will ensure the quality (product freshness) and decrease the loss rate (increase profits).

In this context, it is necessary to follow certain processes to verify product integration and guarantee the availability of the product in the shortest time possible. Therefore, this evaluation must begin by basic tracking of the chain with the monitoring of chain performance indicators. The way to structure and monitor these indicators should be done from the principles established in the theoretical framework involving mainly the following processes:

- **Harvesting and product selection:** adequate time and standardization in product selection, as agreed upon with the retailer. This standardization in the selection is of fundamental importance, for it avoids this conference during shipment;
- **Handling and packaging:** handling should be restricted to the smallest possible number. The use of packaging that goes straight to the gondola is an alternative that contributes significantly to reduce time;
- **Storage of retailers:** storage conditions of the retailer and product distribution time to retail outlets. It is noteworthy that this time should be minimal and preferentially find ways to distribute products directly from distribution center to outlets;
- **Condition and suitability of the site for product exposition in retail outlets:** these conditions can be of great importance for the maintenance of product quality for consumers;
- **Profits for the agents involved:** mainly verify if producers managed to negotiate their product at more competitive prices than the one they negotiated before.

5.4 Consolidation of the group in the first stage of the model

Once the agreements on the production schedule and the adjustment of processes in order to speed the chain are signed, the group begins systematic marketing operations with support from the logistics coordinator.

This consolidation phase seeks to improve the methodology of price formation (harvest and inter-crop period) and a mechanism to exchange information between agents in the chain. Approximately 12 months is necessary to consolidate the group. During this period, the group will continue to be made aware of the advantages of acting in an integrated way. This will give rise to the need of expanding the training of the group to improve chain management.

Importantly, this initial phase is crucial for a paradigm shift of the actors involved in the production chain and construction of a bond of trust between stakeholders, because the

undertaken actions permits the initiation of a culture of cooperation and trust between players. It also permits both the organizational and the technological evolution of the group. It is observed that in this first design of the chain, although there is an introduction of modern management concepts and logistics, the priority is to explore in depth all the conditions and existing knowledge of those involved. This means that the major emphasis is on organization and on the creation of relationships of cooperation and trust between the players, starting with the sharing of experiences, essential conditions to implement the model.

6. Conclusion

Based on the results of the action research and in the development of the methodological proposal for the prototype of the integrated supply chain, one can observe that the model is not limited, having a dynamic and evolving approach that facilitates the integration of small producers with market structures. It incorporates new technologies and thus guarantees performance changes in the chain – offering higher quality products to final consumers, increasing participation in the market and obtaining profitability.

In summary, the research has shown that there are alternative activities for small farmers that can be more fair and equitable. Noteworthy is the evidence that the availability of small farmers to incorporate new technology is a determining factor in the level of their income, i.e., the higher the qualification, the greater the producer bargaining power in the market.

These results showed that the losses due to the waiting time for delivery in the retail market, uncertainty of selling the production and the transaction costs in the market negotiation represent an almost 30% increase in logistic costs. Considering a peculiarity of this market – perishable products – we started the construction of a methodology to assess the logistic chain taking into account some assumptions. Empirical observation of the family-based agribusiness production chain showed that a clear and agile treatment of the information flow is a determinant for the quality of the product and for the profitability of the chain.

It is essential to seek to establish among the chain members all the relevant information that has to be shared. The improvements observed in information technology in recent years make this process easier. The facility and availability of technology helps to promote the changes from logistics into the concept of supply chain management. This involves key processes from the organization until the consumer, where processes, services and information are integrated. The challenge is to adapt this technology to family-based agribusiness chains.

Considering this chain and its integration with the retail market, one of the main goals to achieve this integration is to obtain demand information. Then it is possible to structure every flow in the chain, starting with the processes of collection in each farm, selection and standardization of products, packing, loading and transportation.

All these processes require an integrated coordination in order to optimize activity times, assuring quality and greater available time of the product for the consumers. It is observed that this set of processes has to be coordinated and integrated by all the involved actors, since any obstacle in the chain results in losses in the quality of products. So, the commitment of the actors to the overall performance of the logistic chain and the degree of commitment of each member determines its level of integration. The greater the degree of member integration, the higher its commitment with the final result: the commitment of assuring good quality products in the marketplace.

The model focused on the farmers' integration with the retail market, in order to improve their position in commercialization, maintaining an integrated vision of the distribution chain. The preliminary model had the following guidelines:

- a. Commitment of all production chain members in the construction of the model;

- b. Collective construction, where all relevant actors seek a common goal;
- c. Focus on chain integration, which means that all members must be committed to all the processes, from production to consumer delivery;
- d. Establishment of a bond of trust and commitment among all the chain members;
- e. Unique logistic coordination of the chain, where all members know and help to solve the bottlenecks that appeared during products flow until the market;
- f. Understanding that each marketing channel needs a different modeling of logistics processes.

To rationalize more effectiveness of the logistic chain, the function of market channels – which are a means of bringing the product to the final consumer – must always be considered. Cooperation among agents also has to be emphasized, in order to identify the best way to optimize resources, taking into account that one of the main functions of market channels is to assure that the consumer will receive quality products, within specified deadlines and with minimal cost.

In this context, it is important to emphasize that each step in the construction of an integrated family farming supply chain includes the structuring of good communication channels - creating a social network that permits the creation and enhancement of a bond of trust among the chain members. This is a model that is daily constructed by transactions between organizations and different markets.

It is important to emphasize that there is still a big challenge to overcome, since implementing the practice of integrated logistics concepts in a chain is still too fragmented to become a model of management and organization. The concept of integrated logistics can be considered a kind of paradigm breaking.

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Over the past few decades the rapid spread of information and knowledge, the increasing expectations of customers and stakeholders, intensified competition, and searching for superior performance and low costs at the same time have made supply chain a critical management area. Since supply chain is the network of organizations that are involved in moving materials, documents and information through on their journey from initial suppliers to final customers, it encompasses a number of key flows: physical flow of materials, flows of information, and tangible and intangible resources which enable supply chain members to operate effectively. This book gives an up-to-date view of supply chain, emphasizing current trends and developments in the area of supply chain management.

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Unit 405, Office Block, Hotel Equatorial Shanghai
No.65, Yan An Road (West), Shanghai, 200040, China
中国上海市延安西路65号上海国际贵都大饭店办公楼405单元
Phone: +86-21-62489820
Fax: +86-21-62489821

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