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STUDY OF THE AGRIFOOD CHAIN OF PRESERVES OF NATURAL TOMATO IN MATANZAS

Análisis de la cadena agroalimentaria de conservas de tomate natural en la provincia de Matanzas

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ABSTRACT. This article's main objective analyzes the agricultural chain of preserves of natural tomato in the county of Matanzas. At present, there are deficiencies in the Cuban food supply chain, so it is necessary to show an immediate solution to increase production and reduce logistics deficiencies linking primary production to markets network, for provide fresh or processed foods to consumers. This paper starts with the presentation of the study procedure and continues with it application in tomato the supply chain in Matanzas city. In general, the food supply chain approach impacts positively on customer satisfaction; as a key economic contribution, improved product availability as an indicator of the supply chain operation, leads to sales rise on the end markets. The satisfaction of the population's food needs and to make easier the consumers' appropriation work to get fresh food in the area, are the social contributions of supply chain analysis.

Key words: supply chain, food supply chain, supply chain study, tomato

RESUMEN. El presente artículo tiene como objetivo principal, analizar la cadena agroalimentaria de conservas de tomate natural en la provincia de Matanzas. En la actualidad existen deficiencias en el abastecimiento de alimentos en las cadenas cubanas, se hace necesario mostrar una solución inmediata para elevar la producción y disminuir las brechas en la logística que une la producción primaria con las redes comercializadoras, para ofrecer los alimentos frescos o procesados a los consumidores. En este trabajo se presenta un estudio del procedimiento y posteriormente como se aplica en la red de conservas de tomate natural en la ciudad de Matanzas. En general, el enfoque en cadenas agroalimentarias impacta de forma positiva en la satisfacción de los clientes. Como aporte económico fundamental, la mejora de la disponibilidad de productos como indicador base del funcionamiento de una cadena de suministro, conlleva a la elevación de las ventas en la red de mercados. Elevar la satisfacción de las necesidades alimentarias de la población y facilitar el trabajo de apropiación que deben realizar los consumidores para adquirir alimentos frescos en el territorio, constituye el aporte social del análisis de las cadenas de suministro.

Palabras clave: cadena agroalimentaria, cadena de suministro, productos alimenticios, tomate

INTRODUCTION

Given the increasing and diverse demands of the society every enterprise should work on achieving the maximum satisfaction of their customer demands (1). This basic objective can not be achieved with individual approaches; it should be considered the growing interdependence among enterprise within supply chains that interact with (2).

Within the range of existing products and services, food is the most consumed by the population, for that reason the study of agrifood chains is of high value for the development of modern societies. The purpose of this study was to analyze the agrifood chain of the tomato puree in Matanzas in the Cuban context, of local or territorial scope.

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The food value chain is a strategic and permanent relevance area. In the overall case the entire chain the main flows of goods, information and financial are analyzed, from the viewpoint of structure, conduct and performance, while local action is reflected in the partial studies on competitiveness, quality, traceability and prospects (2).

The agrifood chain refers to the process that starts from the agricultural production until the product reaches the consumer. Includes agents, stages, factors and costs of production, processing and distribution of agricultural goods; contains direct and indirect activities (3).

Agrifood chains are formed by producers, processors entities and logistics services for obtaining products and services of food industry. In general, an enterprise or institution of the same chain proceeds as coordinator of it, which must be reinforced by a legal framework.

In agrifood chains, logistical problem is embodied in the supply coordination, from inputs to ensure crop as primary production, processing technology, packaging, and even industrial production inputs (seasonings, additives, preservatives, binders, cleaning products and others).

With the goal of analyzing the development of agrifood chains, a study of various methodologies and procedures (2, 4, 5, 6, 7) is made; and international development organizations (8) are included. It is concluded that for Cuba conditions is needed a contextualized procedure and in line with changing needs in actions of the Cuban economic entities (9).

The analysis should include the total of all entities, regardless of the sector they belong, from primary sources of supply to final customers, focused on horizontal relationships. Development projects must conform to the regulations, rules and established laws, but as a result of the study may require any proposed amendment or adequacy of the same.

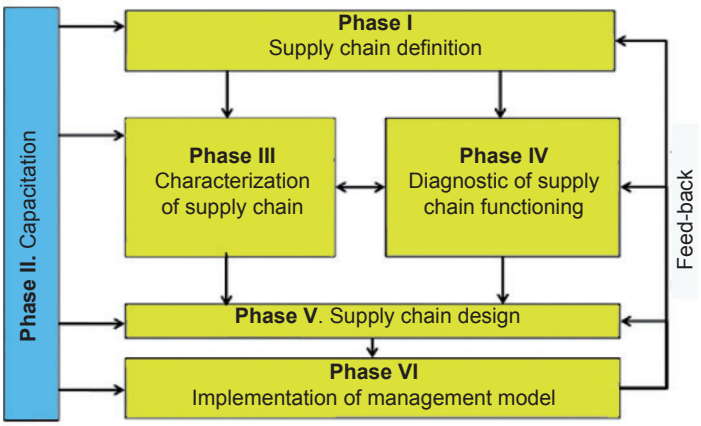
MATERIALS AND METHODS

Analysis of agrifood chains

The analysis procedure of agrifood supply chains (10), which is shown in Figure 1 was used.

In the case study of the natural tomato preserve chain, network analysis was performed through the partial implementation of the procedure, which is part of the first four phases that are explained below:

1- The definition focuses on the impact and study importance of a particular supply chain, depending on needs of customers from a particular territory or a specific entity that perceives the need to integrate into a network to be competitive in the market.
2- The decision-maker training human resources in the supply chain is made under the trend learning by doing, in relation to needs of each player in the network.
3- In characterizing each actor belonging to the supply chain is described, the scheme is performed and the structure of the network is defined; interviews and direct observation techniques are used to gather information.



Source: Taken from López Joy, T. (10)

Figure 1. Procedure for analyzing agrifood supply chains

4- Diagnosis, in this particular case, is made through the collaborative planning philosophy in supply chains. The tool used is the collaborative planning checklist in supply chains (11). The instrument has 91 items and measures the level of collaborative planning and network actors in general, depending on the level index Collaborative Planning. Collaborative planning levels are determined by the following scale: greater than zero and less than or equal to one, "low level"; greater than one and less than or equal to two, "standard level"; greater than two and less than or equal to three, "high level". The value of the level Chain Planning Collaborative is the lowest level of Collaborative Planning value in the network, being the weakest performer of it. Besides, an analysis of the network capacity, it is performed by the Second Generalization Capacity Calculation (12), depending on capabilities of each actor stagnations and possible decisions to be established.

The method application has a continuous and feedback character, because of research results are modified due to changes in the environment and the each player status in the network. The study was conducted from 2009 to 2013.

Description of case study

For the development of the case studies the structure proposed by the BestLog project of the European Commission for the reference case study (13) is followed. The proposed structure is:

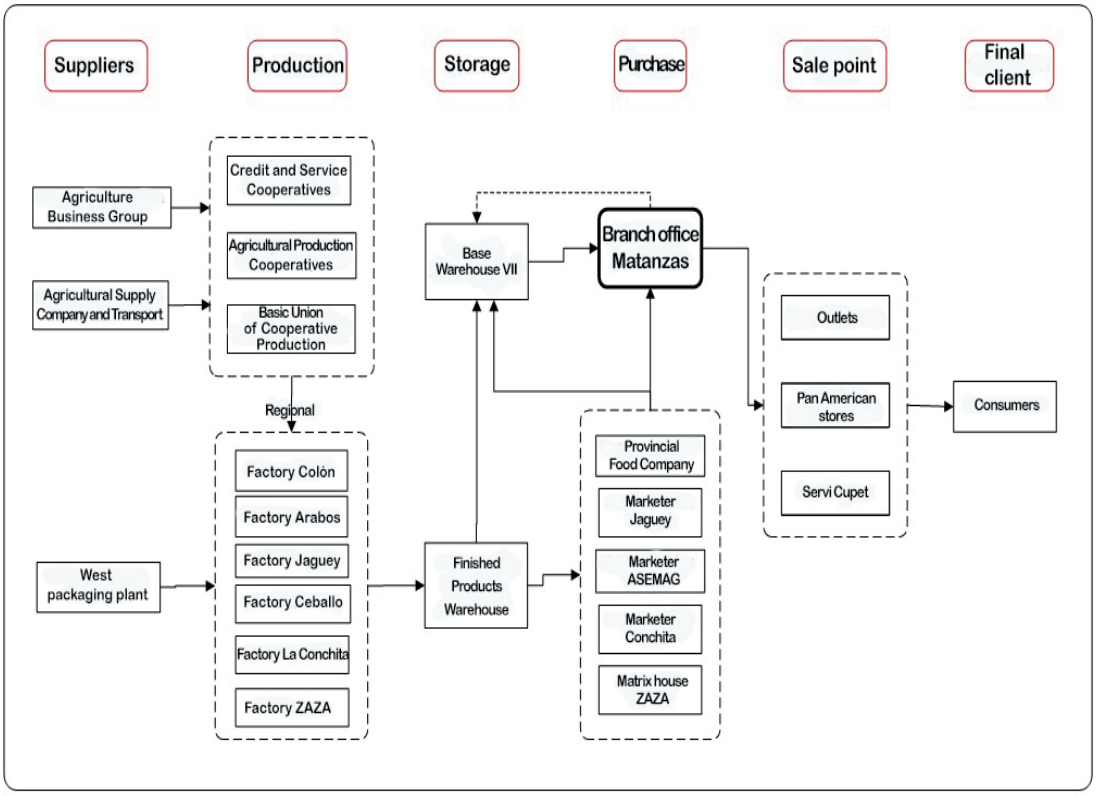
A. Description of the problem
B. Solution
C. Challenges
- ►Learned lessons
- ►Success Factors

D. Benefits
- ►Economic
- ►Environmental
- ►Social

RESULTS AND DISCUSSION

Agrifood chains of natural tomato reserves in Matanzas province

The agrifood network of processed tomato in the territory (Figure 2) consists on eight fundamental links: suppliers of inputs for agriculture and industry; farmers grouped in cooperatives; food processors in different territories; storage of the focal enterprise and previous performer, the importing of tangible matter what is not capable of ensuring national industry; the focal enterprise in this particular case is the commercial chain; the point of sale (POS) formed by the own network of retail shops and end customers.



Source: own elaboration

Figure 2. Basic links in the supply chain of tomato puree

The selection of the product under study that defines supply chain of research is carried out through the procedure (14), for the following reasons are selected the tangible:

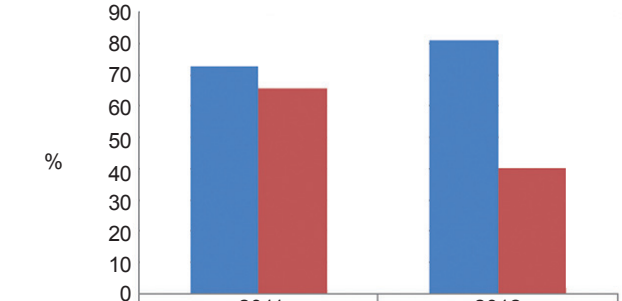
- Most purchased products are foods and represent 27 % of consumer purchases, according to a survey to customers[A] of sale points in Matanzas territory.
- From sales reports of the commercial chain, the most frequently sold products by the chain in the food line (sorted by sales level) are selected. Where natural tomato puree represents 15 % of sales in the food department.
- Moreover, the Business Group Food Industry has a set of targeted products to national level, by means of a circular requiring the collecting currency commercial chains its presence in store.
- Produced products in canning industries in Cuba.
- Foodstuffs Import due to national production does not guarantee compliance with the demand.
- Products of these groups are also prepared by the self-employed sector.

The above reasons based on the study of natural tomato preserves, both in terms of customer needs and the retail chain Business Group Food Industry and for the analysis of self-employed sector in the future (14). Moreover, it is a product that allows monitoring the supply chain from agriculture, food industry, suppliers of other inputs (fertilizer, containers) to shops and therefore, the consumer behavior. The tangible comes in various differentiated formats by the percentage of tomato concentration, which is: at 1/2 kg, 3, 2 kg, 25 L and tanks of 275 L.

Problem description

In the years 2011 and 2012 studies of the tomato puree availability in sale outlets, 24 hours markets and stores are made in the territory. The analysis of presence in store generic product yields 72, 8 % in 2011 and 81, 04 % in 2012 as shown in Figure 3. In conjunction with the study of product variety, which decreased from 65, 7 % in 2011 to 40, 2 % in 2012.

In this period there is a decrease of tomato puree variety in the store due to declining imports at the country level and the non-fulfillment of the production plans of the national industry in line with the demand of the population; while it is increasing the presence of the product for sale.



	2011	2012
Availability	72,8	81,04
Variety	65,7	40,2

Source: taken from Bueno Acosta (2013) (15)

Figure 3. Results of the availability analysis of tomato puree in 2011 and 2012

Despite high levels of availability, customers expressed dissatisfaction with the appropriate variety and assortment. Low-price products, small formats and specific sauces, are not always available for sale.

Therefore, the low availability and the product variety for sale is an effect that presented the supply chain of natural tomato preserves in Matanzas, from this study, so the main problem was determined by evaluating the collaborative planning in the supply chain.

The evaluation of the agrifood chain of canned natural tomato in Matanzas, post the checklist implementation to network actors, the Level of Collaborative Planning Network 1,35 "standard level" is obtained (higher one and less than or equal to two), from the weakest performer; that is the agriculture[B] (16). Although agriculture is the actor lowest level collaborative planning, industry 2 and 3 belonging to Matanzas territory, have a low level value of collaborative planning with the storage 2, where products of typical industries are located of Matanzas province. Figure 4 shows results of collaborative planning level shown in the study object.

There are different causes that influence the collaborative planning development in the supply chain of natural tomato conserves of Matanzas, among which are the low level of customer service, lack of demand for network links , poor integration among plans and the capacity of the productive ways, ignorance of their manufacturers and end customers by the links of the network, low crop

[A] They are consumers buying at the sale point of a commercial chain in Matanzas territory. The simple is 400 customers and they selected by means of probability sampling stratified by proportional affixation.

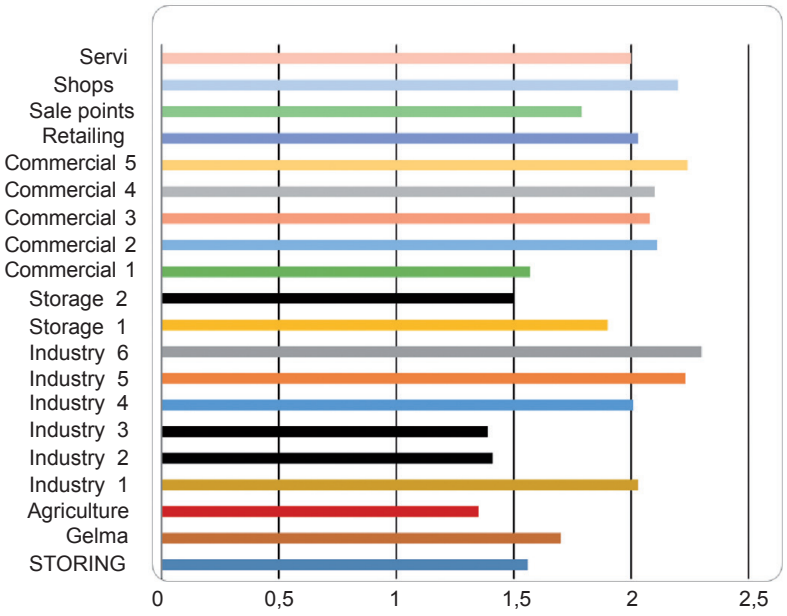
[B] Beginning at productive ways, which are: Cooperative of credits and services and the Basic Unit of Cooperatives Production.

yields to meet customer needs, inefficient supply to stabilize national production, technological decapitalization in the network performers, the low range of packaging in industry and agriculture, hiring does not work as a regulation mechanism, lack of training of decision-makers network, the distortion between prices and costs in the supply chain and high inventories in the network (11).

Owing to the collaborative planning level is medium, it needs strengthening relationships with suppliers, the development of information technologies and communications, the estimating of customer demand together, stable inputs to producers, packaging lines canning industries, and knowledge management to increase value to the products and operations in the food chain under consideration.

One of factors influencing the product availability increase for sale, it is the ability of each actor and the network in general. Therefore, analysis of the each player ability and the network processes that influence the chain ability, from Capability Model (12), in order to determine limiting points in the network is performed, which are set out in the table.

From results a decision is made based on the level of capacity utilization. In this particular case, it has the ability to maintain the existing capacity through the use of outsourcing and create joint capabilities. Outsourcing focuses on the tomato mixture purchase to the mini industries in the territory, with the goal of using the set of tomato production in the province, sometimes it is not hired with industry.



Source: own elaboration as from data (16)

Figure 4. Evaluation of stakeholders through collaborative planning level in the agrifood chain of natural tomato conserves in Matanzas

Limiting processes and factors affecting the network capacity of natural tomato conserves in Matanzas

Limiting process	Factors
Tomato sowing in Matanzas	- Insufficient availability of land for cultivation. - Poor technological package. - Planning staggered planting. - Poor monitoring of crop predictions as the basis for hiring.
Line of packaging, industry 4, out of the province to 400 kilometers on average and easy access	- Technological decapitalization and deficiencies in the functioning of the capper for cans.

Source: taken from Suárez Pérez, Y. (2013) (17)

In correspondence with the evaluation obtained by the collaborative planning level, no integration among different entities of the network is the fundamental problem. This problem is expressed in several ways: insufficient study and low satisfaction of customer demand (low availability of the product for sale), lack of customer focus, insufficient integration of planning, lack of coordination among processes, flows and cycles do not coordinated and lack of actor capacity in the network by decision makers.

Training human talent, decider in the chain management is made depending on needs of each actor and focuses on issues such as integration and cooperation between planning processes of each actor in the network, benefits and impact of its work in end customer satisfaction and achieving competitiveness in the market.

Challenges

- Promoting the collaborative planning philosophy among actors in the tomato puree chain in Matanzas to achieve network integration.
- Minimizing the low availability effect of products for sale, because it is a major element of development in Cuba (18), and contributing to improvement customer satisfaction.

Solution

The proposals as development projects are.

- Preparing the business plan set between actors in the supply chain, in the aggregate demand and the establishment of common goals for all links included.
- Predicting end customer demand through appropriate statistical methods and that is the basis of planning for all performers.
- Strengthening the information chain system to ensure reliable exchange of basic information for taking decisions collaboratively.
- Performing the comprehensive analysis of actors in agricultural production and food processors to identify main problems that affect the final result.

Learned lessons

Lesson 1: The non-institutionalization of the agrifood chain integration causes the continuous improvement of it, depends solely on interests and will of men.

Lesson 2: If members of the agrifood chain do not recognize benefits to be gained from the integration, it is difficult to work in a collaborative environment.

Lesson 3: The improvement in the different teachings on issues of agrifood chains encourages the rise in the human talent formation, must have specific job skills (19) for the implementation of philosophy.

Benefits

- Economic: availability improvements in the tomato puree impact in the increasing sales of network actors.
- Social and Environmental ♦♦ If integration is improved in the supply chain increases the availability of products and are satisfied to a greater extent needs of the population.

The main challenge for the development of agrifood chains according to authors of this study is the human talent recognition of the need to apply the integration philosophy in networks for improved levels of customer satisfaction. This element is correlated with the study conducted in agrifood chains in the country, where it was identified as the main problem of supply chains in Cuba, the skills development and training of staff that work in logistics processes and decision makers of the network (20).

CONCLUSIONS

- In the territorial agrifood chain of natural tomato preserves, the identified deficiency is the weak integration of entities in the chain management. In general, the described chain has weaknesses that impact the end customer satisfaction; and the value of the good practices of supply chain approach in the food industry is demonstrated. To help solve this weakness, development projects focused on collaborative planning in the network are proposed.
- The study of other agrifood chains in the territory is recommended, with the goal of comparing different levels of collaborative planning and seeks common ground among networks. Develop training mechanism of type learning - making for human talent of actors in the network, and influence training. Continue to study the market and customers, in order to deepen consumers' needs and characteristics of the market in Cuba. Perform a research related with the cost of activities and the food chain processes of natural tomato conserve in Matanzas, and evaluate budgets that define the prices of natural tomato preserve.

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