

Original Article

Analysis of the level of integration of the supply chain of a food industry in the west of Santa Catarina

Análise do nível de integração da cadeia de suprimentos de uma indústria de alimentos do oeste de Santa Catarina

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ABSTRACT

Objective: The study aims to analyze the level of integration of the supply chain of a food industry located in the western region of Santa Catarina.

Methodology: this is a case study with a qualitative approach. For data collection, the AGA methodology (Assessment of Degree of Adherence) by Lambert and Cooper (2000), adapted by Simon (2005; 2014) was used.

Findings: the results show that the focal company has an “A” level of adherence, indicating a high power of influence and performance in chain management, both for the incorporation of innovations aimed at sustainable practices and for monitoring more responsible organizational processes, processes and relationships throughout the supply chain. This elevated level of integration may be associated with the elevated level of vertical integration in the chain, coordinated by the focal company.

Research limitations: the results obtained can only be applied to the focal company and cannot be generalized to all companies. In addition, other evaluation metrics and/or endogenous variables not considered in this study may influence the results achieved.

Originality/value: the originality of the study converges with the lack of studies that address the application of methodologies for evaluating the degree of interaction in the supply chain in the food industry segment. Thus, it is expected that the results of the study can be used as an instrument for analysis and reflection on the level of integration of supply chains, as well as to identify potential barriers to the implementation of supply chain management practices.

Keywords: Supply chain management; Supply chain integration; Business processes

RESUMO

Objetivo: o estudo tem por objetivo analisar o nível de integração da cadeia de suprimentos de uma indústria de alimentos localizada na região Oeste de Santa Catarina.

Metodologia: trata-se de um estudo de caso, com abordagem qualitativa. Para a coleta de dados utilizou-se a metodologia AGA (Avaliação de Grau de Aderência) de Lambert e Cooper (2000), adaptada por Simon (2005, 2014).

Descobertas: os resultados demonstram que a empresa focal apresenta Grau de Aderência nível "A", indicando alto poder de influência e atuação na gestão da cadeia, tanto para a incorporação de inovações que visam práticas sustentáveis, quanto monitoração de processos organizacionais mais responsáveis, processos e relacionamentos de toda cadeia de suprimentos. Este alto nível de integração pode estar associado ao elevado nível de verticalização da cadeia, coordenada pela empresa focal.

Limitação da pesquisa: os resultados obtidos só podem ser aplicados para a empresa focal, não podendo ser generalizados a todas as empresas. Além disso, outras métricas de avaliação e ou variáveis endógenas não contempladas nesse estudo podem exercer influência nos resultados alcançados.

Originalidade/valor: a originalidade do estudo converge com a carência de estudos que abordam a aplicação de metodologias de avaliação do grau de interação na cadeia de suprimentos no seguimento industrial alimentício. Dessa forma, espera-se que os resultados do estudo possam ser utilizados como instrumento de análises e reflexos acerca do nível de integração das cadeias de suprimentos, bem como para identificar potenciais barreiras de implementação de práticas de gestão da cadeia de suprimentos.

Palavras-chave: Gestão da cadeia de suprimentos; Integração da cadeia de suprimentos; Processos de negócios

1 INTRODUCTION

In recent decades, the supply chain of the food sector has stood out in the Brazilian and international scenario. Despite the negative impact on all economic sectors derived from the Covid-19 Crisis, national agricultural production continues to expand (CNA, 2020). Agribusiness accounts for approximately 4.99% of the Brazilian Gross Domestic Product (GDP) and agribusiness represents 21.40% of the total national GDP in 2019 (CAN & CEPEA, 2020), thus these indicators demonstrate the significant importance of the food sector for the country and the entire supply chain, even in the face of uncertainty in the world economy in the face of the pandemic.

The State of Santa Catarina has become one of the most competitive Brazilian federative entities in the food sector, especially the West region, which has been recognized as the state's hub for agribusinesses, due to its strong presence in the

domestic and foreign markets, and, consequently, in promoting the entire production chain (Zanella & Leite, 2016; Brasil, 2021; CEPEA, 2022).

There is enormous potential to be explored to meet the latent demands both internally and in the foreign market. To this end, the country has shown superior performance in initiatives focused on serving the consumer market, among which is the degree of articulation between the links in the supply chain and the ability of the productive sector to innovate in response to the demands of diverse market segments (Dutra; Azevedo & Elias, 2008).

In the conception of Siqueira and Alcântara (2020) internal integration plays an essential role for the effectiveness of the principles and practices of Supply Chain Management (SCM), which provides insights and benefits both within the company and in the external environment, in the performance and synchrony between the links in the chain. Following this understanding, Pires (2004) argues that SCM, through the integration of key business processes, seeks to promote constructive collaboration between the links in the chain, covering several traditional areas in the industrial sector, especially in terms of operation management, purchasing, logistics, marketing, and innovative capabilities.

There are many improvements and benefits to be obtained from the implementation of Supply Chain Management (GCS) concepts and practices, which are widely discussed in the literature and necessary for the development of companies, especially industries (Siqueira & Alcântara, 2020). However, despite this need for improvement in research and practical application, not all companies have been able to effectively absorb it, specifically regarding the Supply Chain Integration movement (Mesa; Molenaar & Alarcón, 2020).

It is also noteworthy that, although the topic involving supply chain management (SCM) has aroused growing interest in academia and the industrial environment, there is still a lack of academic studies on topics such as methodologies to guide and support supply chain integration (Simon; Satolo; Scheidl & Di Sérgio, 2014).

Thus, Simon et al. (2014) sought to evaluate in their research how the Brazilian sugar and ethanol industry manages its supply chain. For this, they developed a methodology based on the conceptual model of SCM proposed by Cooper, Lambert and Pagh (1997) in which eleven reference axes of analysis were defined, based on eight key business processes of the reference model, in the horizontal structure of the supply chain and in SCM initiatives and practices. This methodology can be used to assess the company's situation in relation to supply chain management, and consequently, identify and implement actions to improve chain integration and enjoy the benefits attributed to SCM, whereas, according to Zhao, Wang and Pal (2021), in the supply chain, all actions must be understood as a system, making the performance of each member interfere with the overall performance of the chain.

In this sense, it is highlighted that the relationship between the members of the supply chain is a relevant element, considering a more active attitude towards the management processes of companies, as there is a need for total integration to create a collaborative environment among consumers and suppliers with economic, social and environmental issues (Bai & Sarkis, 2010; Blass & Corbett, 2017), so that integration can encourage the sharing of information and expertise between the company's areas (Siqueira & Alcântara, 2020).

Within this context, this study presents the following problem: what is the level of integration of the supply chain of a food industry located in the western region of the state of Santa Catarina? The objective of the study is to analyze the level of integration of the supply chain of a food industry located in the western region of the state of Santa Catarina.

The relevance of the research is justified, considering that there are shortages in the literature of studies that address the application of methodologies for evaluating the degree of integration in the supply chain in the food industry (Simon et al., 2014). In this perspective, from this study, managers will be able to use this instrument for analysis and reflections about the level of integration of the supply chain, as well as

identifying potential barriers to implementing SCM for the food industry and how these can be overcome.

2 LITERATURE REVIEW

2.1 Supply chain management

The terminology “Supply Chain Management” (SCM) can be considered a management tool of highly competitive power in the corporate environment, being used as an instrument to improve organizational performance (Simon, 2005; Hardy; Bhakoo & Mahuire, 2020) having as one of its objectives to provide products, services and information with maximum added value to customers and other stakeholders (Lizot & Andreade Júnior, 2020; Trojan, Magacho, Thesari & Goffi, 2020).

In the global competitive scenario, the business becomes increasingly promising when it can develop and integrate into the company’s network of commercial relationships (Simon et al., 2014; Terpend, Tyler, Krause & Handfield, 2008). Thus, it is the supply chain that needs to be competitive, which transfigures effective management for all companies involved (Simon et al., 2014; Lizot & Andreade Júnior, 2020).

In this sense, SCM assumed a significant role in the competitive environment, as companies stopped competing individually with each other, and competition began to occur between supply chains (Simon et al., 2014). In this context, supply chains occupy an important space in organizational processes, as competition does not only occur between a single company, but also throughout the chain in which it is inserted (Lizot & Andreade Júnior, 2020).

Mentzer et al. (2001) understand that the term “Supply Chain Management” develops tactical business functions both within certain companies and between the links of the chain itself, in a systemic and strategically coordinated way, aiming to maximize the long-term performance of individual companies and the supply chain, since in the supply chain all actions must be understood as a system, making

the performance of each member interfere with the overall performance of the chain (Zhao; Wang & Pal, 2021).

In a literary analysis, although there are several aspects that address the theme, there is still no consensus on the concept and application of the term 'Supply Chain Management', as each chain brings its own conception and definition (Simon, 2005; Ahi & Searcy, 2013; Zhao; Wang & Pal, 2021). Mentzer et al. (2001) defines a supply chain as a set of three or more entities directly involved in the upstream and downstream flows of products, services, finances, and information from a source to a customer.

Following the same thought, Fritz (2019) argues that SCM consists of managing a network of companies and service providers, including raw material producers, component manufacturers, product manufacturers, retailers and consumers, that is, the SCM it covers from the conception phase to the different production phases, starting with the extraction of the raw material and ending with the delivery of the product or service to the final consumer. In this sense, Cooper et al. (1997) associates SCM with the management philosophy that seeks to synchronize the total flow of a distribution channel from the supplier to the end user.

2.1.1 Governance structure in supply chains

Despite the subject of governance being in constant academic studies, Carnaúba, Boaventura and Telles (2012) assure that even though there are several theories about supply networks and others in full development, the definition of governance is still not consistent, thus needing to be deepened to have greater robustness on the subject.

The term governance in its breadth can be understood as a degree of hierarchy, leadership, and command in the supply chain (Suzigan; Garcia & Furtado, 2007; Deboçã & Martins, 2015; Zanella & Leite, 2016). Governance is normally referred to management, cooperation, and collaboration actions.

In this sense, for the relationship between the supply network, formal and informal governance instruments are necessary and, according to Huang, Liu, Yen,

and Chiu, (2012) must be used in a combined way both in coordination and monitoring throughout the network for a better use of the relationship. In the perception of Yu, Liao and Lin (2006) governance mechanisms can be classified as formal and relational. In the case of formal ones, it is a financial commitment, as well as those mechanisms aimed at contractual arrangements. On the other hand, relational ones are based on trust (complacency).

In view of the above, in the Table 1 is presented on the main instruments of governance in an informal and formal way, according to studies by Poppo and Zenger, (2002); Alvarez, Pilbeam and Wilding (2010) and Oliveira; Machado; Queiroz & Telles (2019).

Table 1 – Formal and informal governance instruments

Formal instruments of governance	Informal instruments of governance
Statutes	Trust-based mechanisms
Standards	Commitment
Regulations	Cooperation
Formal rules	Information sharing
Written procedures	Values
	Cultures
	Social standards
	Reciprocity

Source: adapted from Oliveira et al. (2019)

The Table 1 points out the different instruments that are used in the supply chain. It is noted that the more formalized the instrumentation, the more robust the relationship the chain becomes, by regulated measures.

In an approach based on Transaction Cost Economics (Coase, 1937; Zanella & Leite, 2016) argues that the main aspects that guide the governance structure result from management focused on the efficiency and organization of companies and markets to obtain competitive advantage. These aspects consist of reducing transaction costs and measurement by the economic agents involved, which can be implemented through

contracts between interested parties. In short, for Transaction Cost Economics, the main reason companies exist is to reduce transaction costs between trades through the market.

In other words, organizational formats or governance structure are alternative ways of coordinating economic activities. Thus, they can be categorized as follows: a) the option to purchase on the market; b) own production, in a hierarchical form (vertical integration); c) the hybrid form (contracts) (Williamson, 1996, p.58). In the governance structure via the market, transaction costs are minimal, thus producing and buying assets have a universe of possibilities (hybrid forms), whose agents are aware of the specificities of the transacted products, and, in this action, uncertainty and frequency are factors considered irrelevant, given that, normally, reputation among interested people is not established. On the other hand, the hierarchical form is encouraged by possible opportunistic behaviors when dealing with the elevated level of frequency, uncertainty and, especially, the specificity of the products (Williamson, 1996).

However, it can still be understood that the hybrid forms (contracts) are arrangements that coordinate transactions via the market and hierarchically according to different organizational formats. In short, they are necessary conditions to guarantee that the interested parties do not suffer losses or expropriation of the economic value with the transaction of the asset (Ménard, 2004).

Therefore, it can be inferred that governance structures play a key role in the performance of organizations. In this sense, the organizational formats configure the integrated system of the supply chain, through the creation of contractual bases that allow investments in specific assets and in the specialization of activities.

2.1.2 Integration of supply chains

For Francisco, Colet and Wegner (2020) each company can be treated individually, as there is no need to have links related to other companies, therefore participation in the supply chain is not an obligation, but results of agreements previously made through relationships.

Integration in the supply chain favors better efficiency for the business, in addition to having stronger partners, thus improving delivery reliability, low inventory levels, quality and congruence of objectives (Afonso; Afonso & Santos, 2013; Molenaar & Alarcón, 2020). The literature points out that there is a direct relationship between operational and commercial performance and supply chain integrations (Narasimhan & Kim, 2002; Flynn; Huo & Zhao, 2010), since the relationship between members of the supply chain is a relevant element, considering a more active attitude towards the management processes of companies, as there is a need for total integration to create a collaborative environment between consumers and suppliers with issues economic, social and environmental (Bai & Sarkis, 2010; Blass & Corbett, 2017), so that integration can encourage the sharing of information and expertise between the areas of the company (Siqueira & Alcântara, 2020).

There are also authors who perceive a difficulty in conducting full integration. According to Novaes (2001), many barriers and difficulties encountered by companies need to be broken. Examples include implementing cost systems, which aim at greater transparency in the exchange of information; modernization of the company's organizational scheme; assembling and interconnect information systems.

A commercial relationship forms when a transaction requires a degree of asset specificity that generates a bilateral dependency. Therefore, they stand out in the studies of Harland, Zheng, Johnsen and Lammin (2004); Lazzarini, Claro and Mesquita (2008); Huang et al. (2012) that a highly integrated supply chain is a meta-organization of buyer-supplier and supplier-supplier ties involving a high degree of joint information sharing and interdependence, so that, according to Siqueira and Alcântara (2020), integration can encourage the sharing of information and expertise between the areas of the company.

Findings by Huang and Huang (2019) point out that in a highly integrated supply chain, where aggregate switching costs are higher than in other networks, suppliers are vulnerable if network advantages are not available. Thus, when it is a contractual requirement or cooperative tendency for a supplier to make transaction specific investments (TSI) in a

supply chain, the partner's resources/capabilities should be considered so that collective switching costs do not threaten the survival of network members.

It appears, therefore, that the success of a supply chain depends on the level of integration of the business processes, as well as on the sharing of information between the links regarding the market and the need to identify its structure (Aragão; Scavarda & Hamacher, 2004; Green; Zelbst; Meacham & Bhadauria, 2012; Siqueira & Alcântara, 2020). It is also considered that, as the supply chain works in an integrated manner, the links involved start to compete together in such a way that challenges can be overcome, and competitive performance strengthened.

3 RESEARCH METHODOLOGY

The present research is configured, in terms of procedures, as a case study; this approach is characterized by "the deep and exhaustive study of one or a few objects, in order to allow its broad and detailed knowledge, a practically impossible task through the other types of designs considered" (Gil, 2008, p. 57-58).

As for the problem, the research is characterized as qualitative. According to Richardson (2017), the qualitative approach differs from the quantitative approach in that it does not use statistical instruments as the basis for analyzing a problem. According to Lakato and Marconi, (2017, p. 32) "the qualitative study is developed in a natural situation, offering a wealth of descriptive data, as well as focusing on reality in a complex and contextualized way".

Regarding the objectives, the approach is descriptive, as a more detailed study is conducted, focusing on the description of the characteristics of a given population or the establishment of relationships between variables (Gil, 2008). In the case of this analysis, it is essential that the researcher records carefully so that there are no discrepancies or manipulation of information (Cervo; Bervian & Silva, 2007).

The company under study was selected using the intentional method (Creswell, 2007), since the selection criterion was based on studying the level of integration of a

large company belonging to the food supply chain. After selection, contact was made with the company's management, which agreed to participate in the research. The chosen industry is part of an agro-industrial conglomerate located in the western region of the State of Santa Catarina, which belongs to 11 agricultural cooperatives, supports 32,000 direct jobs, and has a slaughtering capacity of 25,000 pigs/day, 1 million birds/day and a processing of 1.5 million liters of milk/day.

Regarding the instrument for data collection, a structured interview script was used, whose technique consists of social interaction or asymmetric dialogue, in which the researcher seeks to obtain data through the interviewee (Gerhardt & Silveira, 2009), using a script set of questions (Gil, 2008).

The question script was composed of 9 axes related to the main management processes, according to the proposed model Simon et al. (2014), which was adapted from Cooper et al., 1997. Each reference axis of analysis has a set of requirements, and each requirement is assigned a set of categories and measurement scale to measure the depth and breadth of each process, as explained in Table 2, comprising 100 requirements.

It is important to point out that the methodology used is a diagnostic tool and not a quantitative one, whose objective is to indicate to company's possible actions necessary to achieve effective Supply Chain Management, with a higher level of integration. Therefore, the script and interview aim to provide guidance to improve supply chain management, coordinated by the focal company (Simon, 2005).

Table 2 presents the nine reference axes of analysis related to business processes, which assess the management and integration of processes with suppliers and customers (Simon et al., 2014). To assess the breadth and depth that the company manages business processes along the supply chain, the methodology establishes process variables (requirements) to be listed by reference axis of analysis.

Table 2 – Referential axes related to business processes

Axes	Business process	Requirements
A1	Customer Relationship Management	13
A2	Customer service management	9
A3	Demand Management	11
A4	Order Fulfillment	10
A5	Manufacturing Flow Management	14
A6	Supplier Relationship Management	12
A7	Product Development and Marketing	12
A8	Return Management (from customers)	10
A9	Return Management (Supplier)	9
Total		100

Source: adapted from Cooper et al. (1997) and Simon et al. (2014)

The proposed methodology aims to organize the data in terms of variables and define the categories according to a measurement scale. Each requirement variable is assigned a set of categories to describe the type of variation associated with the characteristic (variable). Each variable is described by five categories and each category reflects a situation that the company finds itself in relation to that variable. Thus, a numerical value is assigned to each category, which reflects its ordering or degree of adherence (Simon, 2005), as provided in Table 3. The requirement that presents the highest degree of adherence is formal and covers most of the items related to the variable under analysis and is assigned an ordering of 5. On the other hand, for the last category (it does not include the variable) ordering 1 is assigned.

Table 3 – Depth and breadth used in the category set scale

Ordering	Depth		Breadth	
	Formal	Non-formal	With most	Not with most
5	X		X	
4	X			X
3		X	X	
2		X		X
1				Not included

Source: adapted from Simon et al. (2014)

To verify the degree of adherence of the company to the conceptual model of Supply Chain Management - ADA - SCM, the classification levels shown in Table 4 are adopted.

Table 4 – ADA-SCM Degree according to adherence (A)

Adherence (A)	ADA - SCM Degree
94<A≤100	Ideal
84<A≤94	High
74<A≤84	Medium
A≤74	Low

Source: Simon et al. (2014)

The interview was conducted with the Operations Manager responsible for the areas of activity to contemplate the nine reference axes. The interviewee has been an operation manager for 27 years at the company and has a degree in Agricultural Engineering; therefore, he has expertise on the subject in question. The interview was recorded in audio, lasting one hour, with the consent of the participant and took place via videoconference via the Google Meet tool. Considering that the interviewee has knowledge and experience in managing the entire chain process, he presented sufficient conditions to answer all questions on all axes. So, there was no need to interview another team member.

After collecting the information, the data were tabulated and then the radar graphs were created to verify the level of integration of the industry's supply chain, for which Cooper's et al. (1997) SCM reference model was used, named AGA- SCM Methodology and proposed by Simon et al. (2014).

4 RESULTS ANALYSIS

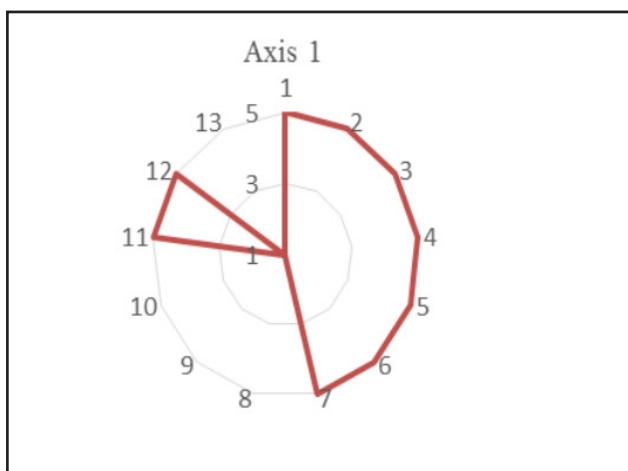
This section begins with the analysis of the methodology that aims to assess the degree of adherence of companies to the conceptual model of Supply Chain

Management based on nine proposed axes, in order to have an overview of the intensity and application of the requirements of the business processes adopted by the industry under study, however it should be noted that such results do not indicate that the company has a successful Supply Chain Management (Simon et al., 2014).

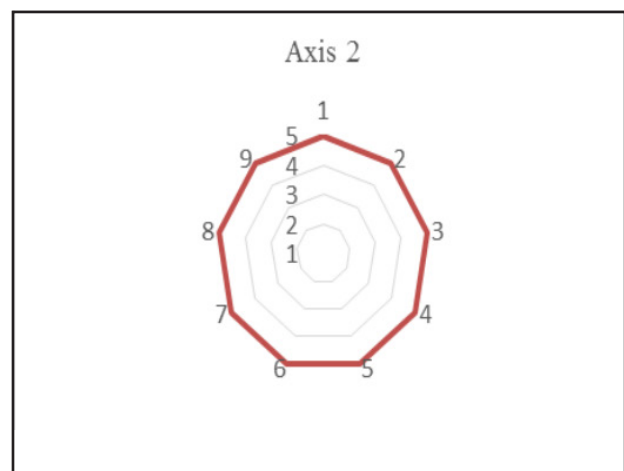
Figures 1 and 2 are shown below, which aim to assess the level of integration of the supply chain with respect to processes: Customer Relationship Management and Customer Service Management, respectively.

Figure 1 – Customer Relationship Management

Figure 2 – Customer Service Management



Source: prepared by the authors



Source: prepared by the authors

In the initial approach, we seek to analyze the 13 requirements listed in axis 1, as shown in Figure 1 - Customer Relationship Management, thus, it is observed that the company practices the following items in a formalized way for most customers: the company differentiates between clients, defining which are the key clients; it has a cross-functional team designated to manage the Customer Relationship Management process; has a procedure for customer relations, with defined contract rules; develops and implements customized supply contracts with customers; develops and implements standard contracts with customers; develops process improvement programs with clients; develops efforts, together with customers, to reduce demand variability; there is a procedure for periodically analyzing the customer in relation to the products purchased, sales growth and its

position in the Segment in which it operates; and there is a procedure to assess the customer's financial impact on the company.

The Director of Operations points out that the company collaborates with different customers, who are classified by category, such as retail or wholesale customers, and, for each type of customer, there is a series of pre-defined and formalized procedures. On the other hand, with respect to the requirement "develops actions, with customers, to eliminate activities that do not add value" the operations manager signaled that "if the customer has a step in the middle of the process that increases the cost of this product the industry does not interfere in the customer's process, that is, it does not influence its management", this indicates that the company does not adopt the culture or practice of Supply Chain Management. In addition, the items 'identifies opportunities with customers'; "has guidelines to share benefits of process improvements with customers" and "there is a procedure to assess the company's financial impact on the client" are also not contemplated in its management practices.

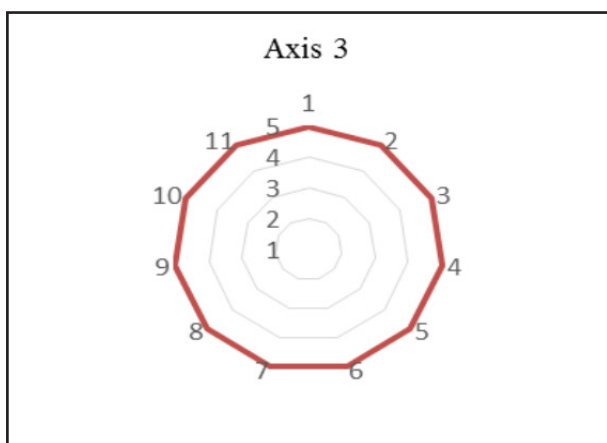
Zhao, Feng and Wang's (2015) study reflects a sample of 195 companies in China and it was observed that the integration of the supply chain is a great facilitator of financial performance, highlighting the robust performance in strategic management to boost financial numbers throughout the chain. It is noteworthy that the chain under study operates in agro-industrial production and the formalization of procedures for different customers (wholesale and retail) becomes important, since the processes are highly standardized, and production is in large volumes.

Through Figure 2, it is visualized that of the nine requirements of the Customer Service Management Process, all are treated in a formal way, most of them, in the case of customers, as well as competition or orders. In this sense, it can be inferred that the industry is at the upper limit of the scale, that is, in order 5 in all the requirements of these reference axes of analysis, namely: there is a multifunctional team designated to manage the Service Management process to the client; there is a defined customer service strategy; there is a communication channel that provides information about

the customer's order; there is an action plan in case problems occur, with solution alternatives that lessen the impact on internal and customer operations; the team works with experts from the functions affected by the incident to assess the situation and determine solutions/actions; the team coordinates the implementation of actions/solutions; the occurrence and its solution are recorded in a database that can be used for future reference; the team monitors the evolution of the solution implementation and the team informs the customer about the evolution of the occurrences.

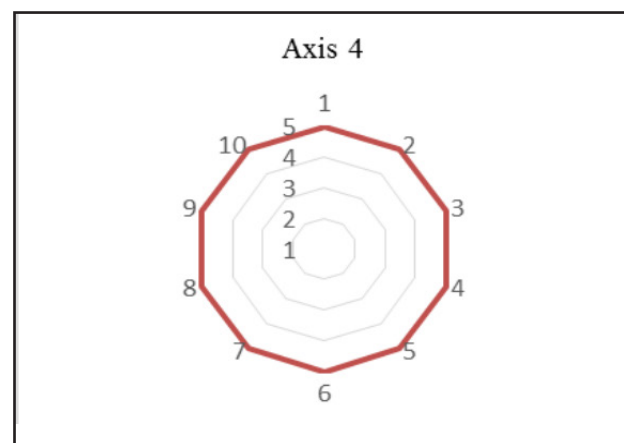
For this service with the customer, the way of dealing with the industry's problems and suggesting improvements in processes and products, corroborates the study by Agarwal and Helfat (2009), which, according to the company's strategic renewal, investments in P&D, in service, product, and process innovation, reengineering is purposefully conducted to help service companies improve capacity and keep pace with changes in customer demand. In the sequence, Figures 3 and 4 are presented, which address the business processes of Demand Management and Order Fulfillment.

Figure 3 – Demand Management



Source: prepared by the authors

Figure 4 – Order Fulfillment

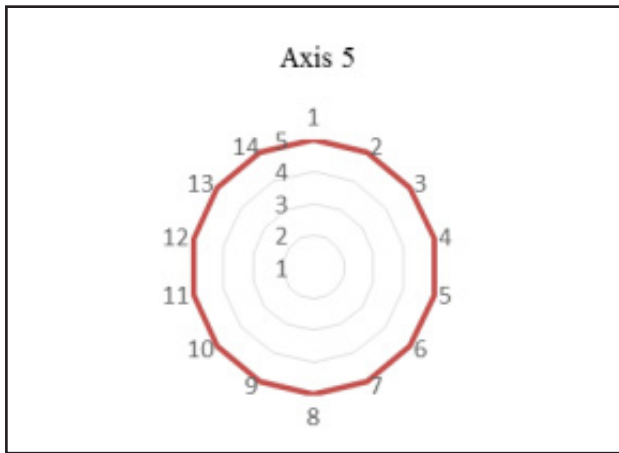


Source: prepared by the authors

Regarding the two axes (Figures 3 and 4), we can see the high degree of adherence by formally adopting the requirements of business processes, whose company reaches the highest order in all requirements. Figure 5, which deals with Manufacturing Flow Management, shows that the company adopts a defined culture and formalizes its

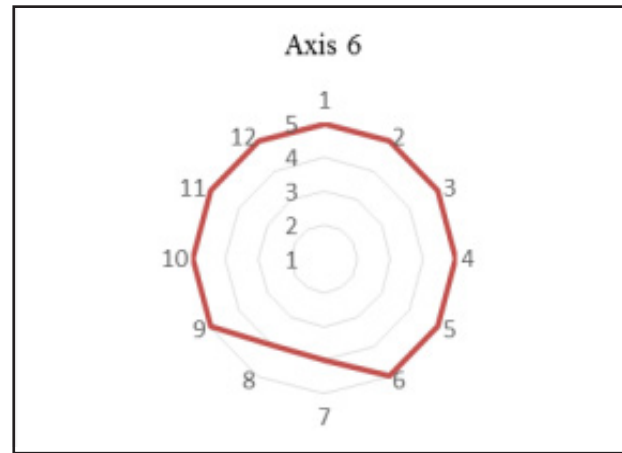
practices and management improvements, given that the cooperative reaches the maximum index in all requirements.

Figure 5 – Manufacturing Flow Management



Source: prepared by the authors

Figure 6 – Supplier Relationship Management



Source: prepared by the authors

Porter (1996), Hayes and Upton (1998), Rosenzweig, Roth and Dean (2003), found that the traditional manufacturing strategy and competitiveness capacity can increase transformation opportunities and help a company to survive and maintain its full development.

Axis 5 includes the following items: there is a multifunctional team designated to work with Manufacturing Flow Management (MFM); there is a cross-functional team assigned to work with MFM; Implements previously defined master programming; it performs detailed capacity and need planning; defines manufacturing capacity and bottlenecks; balances capacity and demand; the MFM team reviews and discusses the supply contract; the team reports capacity to the Demand Management, Order Fulfillment, and Returns Management teams; the company has strategies of make or buy defined; programs and implements actions to increase manufacturing flexibility; the team measures cycle time; the team measures work-in-process inventory levels; the team measures quality scores; there is a procedure to determine the causes of nonconformities and there are procedures to establish priorities in manufacturing.

This finding corroborates the research by Sezen (2008), which observed 125 manufacturing companies in Turkey and realized that information sharing is correlated

with resource and production performance measures, which contribute to an increase in the level of integration of the supply chain.

Regarding the requirement “the team measures quality indices”, the Operations Director argues that “one way to measure it is through customer complaints and another way through analyses carried out internally, for example, to verify if your product standards are within of the specifications; there is the quality department that carries out the follow-up by sampling”; the director adds, that another way used is by laboratory analysis, but that the biggest indicator is by customer complaints.

These findings reinforce that an integration in the supply chain favors better efficiency for the business, in addition to having stronger partners, thus improving delivery reliability, low inventory levels, quality and congruence of objectives (Afonso; Afonso & Santos, 2013; Molenaar & Alarcón, 2020).

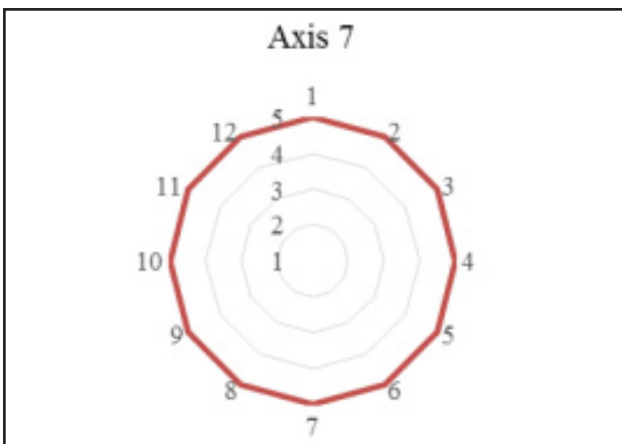
Figure 6, which addresses supplier relationship management, shows that, among the 12 items investigated, 10 were classified as 5 on the scale, whose practices are well established in the company. However, requirements seven and eight, “there are procedures to quantify the benefits arising from process improvements” and “there are guidelines to share benefits arising from process improvements” respectively, although they are formally elaborated, this practice does not cover the most suppliers (assigned ordering 4).

Regarding the item “there is a multifunctional team designated to manage the Supplier Relationship Management process”, the Director explains that “since we are a food company, all suppliers need to be approved, there is the R&D and Quality department that are responsible for the approval of this supplier, be it meat, packaging, raw material, seasoning or other input associated with the product”. And he adds that this approval procedure “does not cover all suppliers, only those related to the essence of production”, that is, suppliers linked to the company’s economic activity.

In view of the size of the company and its influence on the supply chain, as a leading company, the high level of requirements imposed on key suppliers

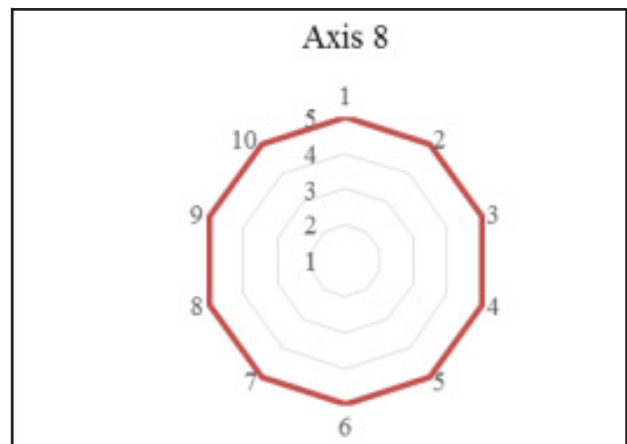
is observed; it is also noted that the company develops formal and customized contracts with all key suppliers, as well as how it establishes formal guidelines for sharing benefits arising from process improvements with most suppliers (so that integration can encourage the sharing of information and expertise between the areas of the company (Siqueira & Alcântara, 2020). It appears, therefore, that the success of a supply chain depends on the level of integration of the business processes, as well as on the sharing of information between the links regarding the market and the need to identify its structure (Aragão, Scavarda & Hamacher, 2004; Green, Zelbst; Meacham & Bhadauria, 2012; Siqueira & Alcântara, 2020). Figure 7 shows the business process “Product Development and Marketing”, and Figure 8 shows the “Customer Return Management”.

Figure 7 - Product development and marketing



Source: prepared by the authors

Figure 8 - Return management - from customers



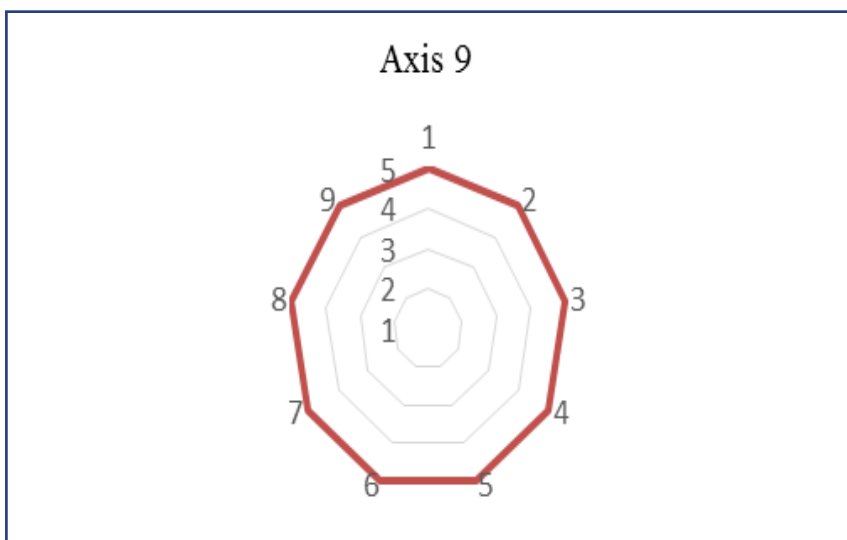
Source: prepared by the authors

When analyzing the reference axis (E7) of analysis “Product Development and Commercialization” and axis 8 - Management of Returns, it can be inferred that the cooperative reaches the upper limit of the scale, since it presents ordering 5 in all the requirements of the axis under review.

As for the requirement “there are defined rules for the disposition of returns in accordance with the company’s policy” associated with axis 8 of Management of returns, the interviewee adds that this item needs to be “aligned with the company’s values”.

Damanpour (1996) indicated that innovations such as improved products, processes or procedures can increase the value and performance of these outputs. Innovative companies have greater ability to successfully respond to their environment, develop new capabilities and maintain a competitive advantage and superior performance (Hurley & Hult, 1998). According to Figure 9 - Returns management, the company is also at the upper limit of the scale in the eleven requirements.

Figure 9 – Return Management – Suppliers



Source: prepared by the authors

Regarding the requirement “There is a program for returnable packaging”, it is noted that in addition to the company formalizing each stage of the process, it seeks to plan and implement socio-environmental sustainability practices to assess risks and opportunities in its operations, to guarantee the appropriate destination and reduce the amount of waste in the environment. Thus, the interviewee explains that the company is committed to establishing the reverse logistics policy of packaging, such as “all wooden pallets are returnable involving millions and millions of pallets and reals, so take advantage of the trucks that take products, to make a return trip to bring the wooden pallets back to be used again”.

Through the results, it can be inferred that the company prepares plans and establishes well-defined rules for the returns management process, whose team formalizes each stage. Table 5 summarizes the results of the company's evaluation.

Table 5 – Result of applying the ADA - SCM methodology

Ordering	A1	A2	A3	A4	A5	A6	A7	A8	A9	Frequency	(%)
5	9	9	11	10	14	10	12	10	9	94	94.0
4	0	0	0	0	0	2	0	0	0	2	2.0
3	0	0	0	0	0	0	0	0	0	0	0.0
2	0	0	0	0	0	0	0	0	0	0	0.0
1	4	0	0	0	0	0	0	0	0	4	4.0
Total	13	9	11	10	14	12	12	10	9	100	100.0

Source: prepared by the authors.

It can be noted, from Table 5, that the company presents adherence A equal to 94, which indicates that according to the criteria established for evaluation, the company presents an ADA - SCM Grade considered "Ideal". When analyzing orderings 3 and 2, a zero frequency of occurrence is observed, and regarding categories 4 and 1, it can be inferred that there is a low frequency of results, that is, 2 and 4 requirements, respectively.

The findings can be justified by the fact that it is a food company, which is audited by customers from all over the world, and by the submission of a sanitary inspection by the Ministry of Agriculture, otherwise food companies are unable to register their products. Thus, the processes need to be defined and consolidated in the company.

The Director of Operations explains that "companies in the food sector with federal inspection and that export to countries with high requirements such as Europe, China, USA, Japan, which is a totally detailed customer, follow this line", in which they need to establish rules, policies and processes well defined and formalized to meet strict federal inspection standards as well as global buyers' requirements. Such processes and procedures need to contemplate not only the industry, but the production chain.

The Director mentions that the company fits as one of the leading companies in the food sector because the segment itself establishes specific requirements and adds

that “one has to consider that it is more due to the characteristics of our production process and this is practically part of the day’s activities the day-to-day of the company, when there is an ISO 9001, where you control all your indicators, you have a quality management process, when you have federal inspection within your company, which require a lot of procedures and that follow standards”.

He also argues about the existence of technical standards for facilities and equipment for slaughtering and industrializing pigs “there is the regulation 711 from the Ministry of Agriculture that guides the entire process of how to produce internally in the slaughterhouse and the need for you to be audited, not by customers , but by countries, for you to be able to export to that country, because it is food; this means that you have to walk at a different level both in terms of management and quality, then consider a company like [.. .] which values its standards and its mission within the company is very clear, so it automatically takes you to that level of management and monitoring of your processes”.

Through the findings of the present study, it was possible to verify that the industry studied is at an elevated level of integration in the food supply chain. The business becomes increasingly promising when it can develop and integrate into the company’s network of commercial relationships (Simon et al., 2014; Terpend et al., 2008).

This fact can be justified by the vertical governance structure present in this chain. Generally speaking, the term governance in its breadth can be understood as a degree of hierarchy, leadership, and command in the supply chain (Suzigan; Garcia & Furtado, 2007; Deboçã & Martins, 2015; Zanella & Leite, 2016) or even the term governance is normally referred to management, cooperation, and collaboration actions.

5 FINAL CONSIDERATIONS

This study aimed to analyze the level of integration of the supply chain of a food industry located in the western region of the state of Santa Catarina. The literature made it possible to review the theoretical basis about the importance of Supply Chain

Management in competitive environments, in the context of governance structure in supply chains, as well as evidenced the approach of supply chain integration.

The tool used to conduct the research allowed the interviewers to make inferences to understand details about the methodology to assess the degree of adherence of a food industry, from the perspective of a conceptual reference model that includes nine business processes used as benchmarking.

Faced with a systemic analysis contemplating the nine proposed axes, the results indicate that the company under study presents an "A" adherence degree, equal to 94, which indicates, according to the criteria established for assessment, that the company presents an "A" degree of adherence to the conceptual model of supply chain management (ADA - SCM) considered to be "ideal". Thus, it can be concluded that the level of integration of the supply chain of this food industry was identified as ideal.

In addition to the audits and procedures that the industry goes through and needs to comply with, such as strict production planning and control, whose actions integrate all operations and extend to the other links in the chain (as mentioned by the interviewee), it was also found that this supply chain presents a high level of integration; this fact can be justified by the very verticalization of the chain. According to Zanella, Leite, Fiates and Cario (2013), Zanella and Leite (2016), and Zanella (2017) verticalization favors the control of organizations' activities, both in terms of meeting quality requirements, standardization, guarantee of supply, and cost reduction. In this study, verticalization also contributes to the elevated level of integration of this chain.

The results demonstrate the high adherence to the requirements classified in categories in order 5 in all reference axes. Of the nine axes, only two, Customer Relationship Management and Supplier Relationship Management, presented requirements lower than the maximum ordering, 4 and 1, respectively. These requirements can be reassessed and improved so that the industry can achieve a higher level of supply chain integration.

Based on the findings, it is also concluded that the industry under study acts as a focal company in the face of the food supply chain, due to its great power of influence and performance as a fundamental link in chain management, both for the incorporation of innovations aimed at sustainable practices, as well as monitoring more responsible organizational processes of products, processes and relationships of the entire supply chain (Alves, Silva & Santos, 2018; Ashby, Leat & Hudson-Smith, 2012; Carvalho & Barbieri, 2013).

It is important to point out that the focal company plays a fundamental role in the management and integration of key processes in a supply chain. It is the focal company that directs, directly and indirectly, the actions of the other links in the chain, either through formal requirements, indicated in operational procedures or contracts, or even informally, through guidelines and procedures not necessarily formalized. In this study, the direct action of the industry, which is the focal company of the chain, can be seen in actions beyond its borders, interfering in the action of the upstream and downstream links of its process.

It is also noteworthy that the fact that the chain belongs to the agro-industrial food sector, the appeal for the quality of the products requires the companies participating in the chain to integrate processes to generate reliability and guarantee the quality of the supplied products. For this reason, agribusiness chains operate in governance structures with elevated levels of vertical integration, that is, they directly coordinate links upstream and downstream of the transformation process, considering the attributes of transactions (frequency, uncertainty and specificity of assets) and behavioral aspects (bounded rationality and opportunism).

In this way, it is worth emphasizing that the integration of processes depends on several factors, among which we can highlight: the sector to which the chain is part, the present governance structure, the legal requirements imposed and regulated (as is the case in Brazil of the action of the Ministry of Agriculture, Livestock and Supply – MAPA), in addition to the legal composition of the focal company, since there are different

aspects to be considered, for example, cooperatives tend to follow the principles of cooperativism, while corporations have rules, regulatory requirements and controls.

As a proposal for future work, it is suggested to carry out research in various branches of agribusiness, contemplating the other links in the chain, as well as carrying out studies in other Brazilian regions, to generate more comprehensive reflections on improvements and management practices, as well as how to reassess actions to improve the level of interaction between the links in the chain. It is also suggested to study the supply chain from the perspective of the agency theory, the NEI (transaction costs). Another key point to be observed is the fact that the focal organization is a cooperative, in which cooperative principles can be deepened. Finally, we highlight the relevance of the model of Supply Chain Management - ADA - SCM used in this work as a tool for diagnosing and improving and integrating internal processes so that integration can be expanded beyond the frontiers of the focal company, involving the other supply chain links.

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1. Definition of research problem	√	√	√	√
2. Development of hypotheses or research questions (empirical studies)	√	√	√	√
3. Development of theoretical propositions (theoretical work)	√	√		√
4. Theoretical foundation / Literature review	√	√	√	√
5. Definition of methodological procedures	√	√		
6. Data collection	√	√		
7. Statistical analysis	√	√	√	√
8. Analysis and interpretation of data	√	√	√	√
9. Critical revision of the manuscript	√	√	√	√
10. Manuscript writing	√	√	√	√

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