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Analysis of the sustainable management of the supply chain and innovation in a textile company in Vale dos Sinos

Análise da gestão sustentável da cadeia de suprimentos e da inovação em uma empresa têxtil do Vale dos Sinos

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ABSTRACT

Objective: This study aims to analyze the organizational processes to verify if there is alignment between sustainable supply chain management and innovation practices in a textile industry in Vale dos Sinos

Design/methodology/approach: the methodology employed was a case study with the Lambda Company, which used as a basis a conceptual model on innovation and sustainable management of the supply chain, where data were collected through an open semi-structured interview with the financial manager, non-participant observation and documentary research analyzed through the comparison between empirical and bibliographic data.

Results: The results show that the company has been structuring programs and positioning itself in a more sustainable way, but it needs to stimulate activities that align innovation and sustainable management of its supply chain supporting its organizational strategy.

Originality / value: the value of this study consists in highlighting the company's existing practices and discussing them in relation to the existing literature to propose a reflection on possible improvements in organizational processes.

Keywords: Environmental management; Innovation management; Footwear industry; Qualitative study

RESUMO

Objetivo: este estudo tem como objetivo compreender o desempenho inovador da gestão da cadeia de suprimentos sustentável em uma indústria têxtil do Vale dos Sinos

Design/metodologia/abordagem: a metodologia emprega foi um estudo de caso com a Empresa *Lambda*, no qual utilizou como base um modelo conceitual sobre inovação e gestão sustentável da

cadeia de suprimentos, onde os dados foram coletados por meio de entrevista semiestruturada aberta com o gerente financeiro, observação não participante e pesquisa documental a analisados através da comparação entre os dados empíricos e bibliográficos.
Resultados: Os resultados evidenciam que a empresa vem estruturando programas e se posicionando de maneira mais sustentável, porém necessita de estimular as atividades que alinhem a inovação e gestão sustentável da sua cadeia de suprimentos apoiando a sua estratégia organizacional.
Originalidade / valor: o valor deste estudo consiste em evidenciar as práticas existentes da empresa e discuti-las em relação a literatura existente de maneira a propor uma reflexão acerca de possíveis melhorias em processos organizacionais.

Palavras Chaves: Gestão ambiental; Gestão da inovação; Indústria calçadista; Estudo qualitativo

1 INTRODUCTION

The idea of sustainability in organizations has been gaining ground (Tomasetto & Brandalise, 2018), due to the importance to the sustainable development, in the context of economic development (Souza, 2017). Increasing mobilization of the society and customers, requiring products, processes and services, with low impact in the environment, is considered another aspect that helped to highlight sustainability at organizations. To meet new demands of society, government issued laws to rule organizational practices and protect environment. In this way, environmental management is becoming relevant in the competitive business scenario through correct environmental strategies (Bánkuti & Bánkuti, 2014).

Environmental management can be guided by three approaches proposed by (Kopicki, Berg, & Legg, 1993): (I) reactive, where companies commit to the minimum; (II) proactive, with anticipation of risks and (III) the pursuit of value in which it integrates environmental activities into the business strategy. According to van Hoek (1999), within the latter approach, environmental management assumes responsibility throughout the supply chain, where the environmental commitment is shared among supply chain partners. It should be noted that to create a sustainable supply chain, a capacity for innovation is required, providing these premises with a specific management orientation (Morais & Barbieri, 2019; Pagell & Wu, 2009).

Carter e Rogers (2008) point out that innovative companies also tend to assume leadership in sustainability and (Fighera, Kneipp, Treptow, Müller, & Gomes, 2018) adds that both (innovation and sustainability) stand out due to the growth of socio-environmental problems derived from the economic model based on the excessive exploitation of natural resources. Many companies consider innovation with a focus on sustainability as a source for competitive differentiation, since, in addition to reducing the environmental impacts of the business, it can also increase efficiency and create competitive advantages in organizational operations (Pinsky, Dias, & Kruglianskas, 2013; van Hoek, 1999). In this way, this study has as a research question: how can sustainable management be influenced by innovation practices in the industrial company of the textile sector?

In this context, this study aims to analyze the organizational processes to verify if there is alignment between sustainable supply chain management and innovation practices in a textile industry in Vale do Sinos. The justification for choosing the footwear industry lies in both the theoretical and empirical finding that it can be highly polluting, which has worried European countries that import Brazilian footwear (Plentz & Tocchetto, 2014) and the fact that Vale dos Sinos is still considered one of the largest footwear clusters worldwide (Zingano, 2014). The theoretical background that oriented this study was separated in two topics, Sustainable Supply Chain Management and Innovation. The other topics that follow are, the methodology, presentation and analysis of results and discussions and final remarks.

2 LITERATURE REVIEW

2.1 Sustainable Supply Chain Management

The concept of supply chain refers to a set of activities that add value to the consumer. Supply chain consists of companies that provide everything that is necessary to manufacturing operations, from raw material suppliers to the end user,

integrating transformation activities and the flow of goods, services and information in order to provide joint benefits for the organizations. In this context, it is necessary for companies to employ practices that generate greater effectiveness and efficiency in supply chain management. Additionally, supply chain management involves collaboration and trust, alignment, integration, and sharing best practices among partners. (Ballou, 2004; Gohr & Faustino, 2018; Silva, 2019).

To assure for companies' competitiveness and profit, supply chain management assumed a prominent role within organizations, so that it also began to contemplate environmental issues such as waste management, reverse logistics and sustainable production, as was evidenced that operations, especially industrial ones, have generated unfavorable consequences for organizations that only aim to maximize profit (Costa, Teixeira, Pimenta, & Cezarino, 2017). According to Das (2017) an organization cannot be reluctant or hesitate to adopt green practices or mistreat workers and the surrounding community by narrowing the focus of its performance and investment only for the operational improvement of its supply chain, being necessary to incorporate social and environmental aspects.

In line with this assumption, supply chain management has incorporated sustainability due to demands imposed by its stakeholders and the growing deterioration and environmental challenges such as climate change, green consumerism and global environmental regulations (Lee, 2015; Santarem & Begnis, 2021; Srivastava, 2007). In this way, the concern with the sustainable management of the supply chain has been consolidated, as a trend, for organizations of all sizes and economic sectors (Seuring, 2013).

Brito & Berardi (2010) highlight the line of debate of the socio-environmental agenda in the formulation of business strategy in a study of Sustainable Management of the Supply Chain, where the need to adapt to environmental pressures and the search for eco-efficiency, or lower costs, are identified as main factors. However, management orientation is necessary as a precursor vector for the consolidation

of sustainable supply chain management (Pagell & Wu, 2009) to make it proactive, effective, and aligned with the business model, to combine the demands of the three dimensions of sustainability of the supply chain (Ceretta, Cunha, & Rocha, 2016).

Regarding practices within the context of green supply chain management, companies aim to reconcile cost reduction, savings in environmental impact, waste reduction and operational productivity to obtain better operational efficiency (Moshood, Nawanir, Mahmud, Sorooshian, & Adeleke, 2021). Pagell & Wu (2009) presents a list of important practices reported in the literature such as, for example, lean manufacturing, selection and collaboration of suppliers, proactive posture and others. Also, scientific literature shows up that is necessary to understand the integration of innovation practices that enable the generation of value through environmentally friendly processes and competitive advantages for organizations (Assumpção & Campos, 2018).

Organizational innovation can represent a way of dealing with environmental, economic and environmental issues in the supply chain, through the introduction of management methods and systems, according to Carvalho & Barbieri (2013). Also, Hall (2001) suggests that companies should invest in innovations in the supply chain to reduce environmental risks between supplier and customer. According to the study of Junaid, Zhang e Syed (2021) sustainable supply chain integration promotes green innovations for companies, making it possible to increase financial performance. In summary, studies indicate that the first step to attain successful sustainable supply chain management is the organizational capacity to innovate (Ceretta et al., 2016; Pagell & Wu, 2009).

2.2 Innovation

Trott (2012) presents the concept of innovation as the management of activities in the process of generating ideas and developing, manufacturing or marketing a product or process. The concept of innovation was first suggested by Schumpeter,

who defined the process of “creative destruction”, where old technologies are replaced by new technologies, promoting economic growth through innovative actions such as the introduction of new products and production methods, opening new markets, developing new suppliers and creating new market structures in an industry (Schumpeter, 1982). Scientific literature suggests several types of innovation, but Oslo Manual, most usual reference of innovation classification, indicate four types, as described in Table 1(Organização para Cooperação e Desenvolvimento Econômico [OCDE], 1997).

Table 1– Types of innovation

Types of Innovation	Concept
Product	means introduction of a new or significantly improved good or service about its characteristics or intended uses.
Process	is the implementation of a new or significantly improved production or distribution method.
Marketing	implementing a new marketing method with significant changes in product design or packaging, product positioning, promotion or pricing.
Organizational	A set of new organizational methods in the company's business practices, its workplace or its external relations.

Source: Adapted of ODCE (1997)

Noted that innovation drives modern economic growth (He, 2022). Each of the companies has its own reasons that lead them to seek innovations. According to Vanzella (2016) innovation can arise in the reconfiguration of markets in which it operates, in increasing the efficiency of processes, in develop new or improve products, being able to learn and to accept changes. In this way Banmairuroy, Kritjaroen e Homsombat (2021) describe that the first factor of organizational innovation is the promotion of the organizational climate to foster innovation within the organization, resulting in innovative work behavior and organizational innovation, which assure sustainable competitive advantage.

Vanzella (2016) states that the reasons that lead companies to innovate should be identified, to help understand which forces drive innovation activities

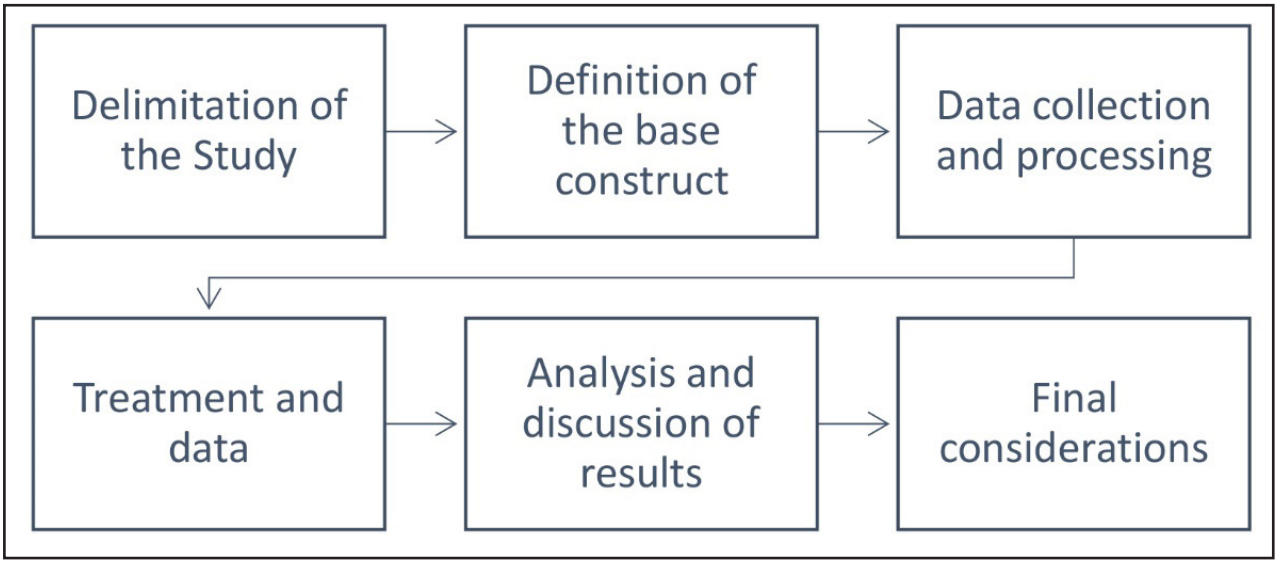
such as competition and opportunities in new markets. In the empirical results of her research, (Bevilacqua, Freitas, & DePaula, 2020) describe that the managers cite competitiveness and individual motivation as a reason to innovate. The same authors also state that the management practices carried out to instigate innovation are the creation of innovation centers, financial rewards through programs for better ideas, implementation and prospecting of partnerships with startups, maintenance of the infrastructure and lay-out in a way that stimulates the innovation and exploration of shared resources destined to stimulate innovation.

In organizations, innovative performance is usually associated with several concepts that represent various forms of manifestation of innovative activities (Fernandes, Lourenço, & Silva, 2014). Gunday, Ulusoy, Kilic e Alpkan (2011) suggests that innovative performance consists of a construction represented by a set of performance indicators, with emphasis on patents, announcement of new products, projects, processes and new organizational arrangements. The same authors also state that these results depend on several aspects of the company's innovation, such as process, products and organizational structure. There are difficulties to measure innovation, as evidenced by (Makkonen & Have, 2013) that suggested the application of composite innovation indices, including also qualitative aspects to assess innovation. Authors consider necessary to measure the capacity to innovate, because the company's competitiveness increasingly depends on innovating to survive (Speroni, Dandolini, Souza, & Gauthier, 2015).

3 METHODOLOGY

To achieve the objective of this study, research with a qualitative approach was adopted, with documentary and bibliographical research procedures and a case study (Prodanov & Freitas, 2013; Yin, 2010). Six stages of the planning process, that preceded the collection of empirical data, is shown in Figure 1.

Figure 1– Study procedure



Source: elaborated by the authors

The delimitation of the study consisted of initially defining the objective of the study, highlighting arguments that justify its realization, in relation of the underlying problem, presented in the introduction of this work. Considering the set of the definitions formulated *ex-ante*, it was decided to use a conceptual model, developed by Ceretta et al. (2016), based on results of studies of Gunday et al. (2011) e Pagell e Wu (2009). However, it is worth mentioning that the model was adapted for this study, considering characteristics of this study, object and the context of the research, maintaining, however, the dimensions and categories of analysis, described in Table 2.

Table 2 – Conceptual model

Continue...

Analysis Dimensions	Analysis Category	Practices/ Variables
Sustainable management practices in the supply chain	Practices carried out in the company's internal environment	Proactive commitment regarding sustainable management practices
		Integration of sustainable development into the decision-making process
		Practices of Total Quality Management, Lean Production, among others.

Table 2 – Conceptual model

Conclusion

Analysis Dimensions	Analysis Category	Practices/ Variables
Sustainable management practices in the supply chain	Practices carried out in the company's internal environment	Similarities of criteria adopted by the company and its partners (suppliers and customers)
		Certification of processes or products
		Traceability of the practices in supply chain
		Assessment strategies and periodicity
		Analysis of the components that make up supply chain
	External practices involving suppliers	Selection, criteria and development of suppliers
		Risk analysis of supply sources
		Purchasing decisions (total cost or prices)
		Strengthen sustainability in the local chain
	External practices involving clients	Process of commercialization, projects and brands
		Development practices, use, reuse, recycling and disposal of products
		Customer awards and certificates
Innovation	Innovation in process	Research and Development
		New products and services
		Patents, certifications and trademarks
		Work methods and processes
		Waste reduction
		Management of variable costs related to production processes and distribution logistics
		Agility of logistics and distribution processes
	Capacity for innovation	Human Capital a) Availability b) Learning and training
		Market a) Future demand b) Available technology
		Infrastructure

Source: adapted from Ceretta et al. (2016); Gunday et al. (2011); Makkonen e Have (2013); Pagell e Wu (2009)

Some additional questions were prepared for the empirical data collection, which took place in December 2021 at the company Lambda. The collection of empirical data took place through a semi-structured interview with open questions listed in Attachment I, unsystematic non-participant observation, made at occasion of the visit to the company and documentary research on the company's website and documents supplied by company.

The data treatment began with saving the collected evidence in an electronic document and, next, during analysis process, the questions were read and the empirical findings were compared with the recommendations and indications found in the theoretical review. The procedures of comparative analysis, of empirical evidence, with theory, meet the assumptions of scientific methodological procedures (Domingos & Boeira, 2015). The discussions and analysis of results were elaborated in the sequence, relating empirical and theoretical data to find existing adherence and gaps, seeking to propose improvements for the identified gaps.

The unit of analysis in this study was named as *Lambda Company*, since it requested anonymity due to marketing issues. *Lambda* was founded in 1994 and in 2021 had a staff of 120 employees. Its main activity is the manufacture, distribution, and sale of textile articles for the Brazilian women's fashion industry, focusing on footwear, bags, belts and other accessories. The financial manager of the company was interviewed, and interview audio, of approximately two hours, recorded. This executive was chosen because he is responsible for the company's supply chain management and innovation activities. The consulted documents, made available by the company, were, for the most part, internal records, of meetings, board´s decisions, technical and operational situations reports and descriptions of specific operational activities monitored by a set of indicators, both in terms of innovation, environmental management and supplies (related to the content of negotiations with suppliers).

4 DISCUSSIONS OF THE RESULTS OF THE RESEARCH

The results are presented with aim to facilitate the reading and understanding of the collected empirical data, as well as their comparison with the theoretical background, highlighting the categories of analysis, demonstrated *ex-ante*. The first category of analysis addressed refers to the practices carried out in the company's internal environment, which are summarized in Table 3. The requirements imposed by the stakeholders due to environmental degradation, demanded the integration of

sustainability into the management of the supply chain, reflecting it in its strategy and operation (Lee, 2015; Santarem & Begnis, 2021; Srivastava, 2007).

Table 3– Sustainable management practices in the supply chain

Sustainable management practices in the supply chain	
Practices/ Variable	**Answer**
Proactive commitment regarding sustainable management practices	*The company seeks to comply with the legislation and environmental requirements of customers, in addition to its new strategic planning, including sustainability as priority in the year 2021. Sustainability issues are one of the topics discussed at all monthly meeting*
Integration of sustainable development into the decision-making process	*Nowadays these issues are being considered by director´s board and beside this was observed that sustainability represents a mandatory topic in the decisions process*
Practices or systems of Total Quality Management, Lean Production, etc.	*The company has a quality management system implemented and intends soon obtain certification ISO 9001. Internal records showed up that company worked hard, in past, to consolidate lean production practices and production cleaner*
Similarity of criteria adopted by the company to its partners (suppliers and customers)	*The company has been constantly aligning itself with its customers, as most of them are requiring improvement in technical terms of product requirements and orders. During year 2021 most of suppliers implemented a qualification system, aligned with socio-environmental issues (Operating License, employee care, etc.)*
Certification of processes or products	*Currently, the company has a Sustainable certification for its process, granted by an external audit firm*
Practices traceability in chain	*The company has implemented the Information System, that track all invoices and material movements*
Assessment strategies and periodicity	*A system dedicated to this purpose is being elaborated; in year 2022 company will begin to work following a framework with sustainability management indicators with a periodic evaluation system.*
Analysis of the components that make up supply chain	*Formally, company doesn´t have sustainability indicators about performance of customers and suppliers, to avoid conflict and hamper commercial strategies of the company*

Source: elaborated by the authors

It is possible to verify that environmental management at the company Lambda is in the process of consolidation, but, at least, the company started to consider the dimension of sustainability, in the decision-making process, in meetings of board´s directors and management level, since the year 2021. This situation becomes evident when the compared with recommendations of Kopicki

et al. (1993), enabling classification of the company as proactive, not yet as a search for value, even considering that it started this integration process. The proactive approach began at 1990s, when companies became aware of demands related to the sustainable development and started to anticipate their actions that until then were not regulated, and not just react to regulation, seeking to attain competitive advantages (Potrich, Cortimiglia, & Medeiros, 2019).

It is noted that the company still does not have a table of indicators and a methodology for assessing sustainability, what represents a fragility, because to communicate the degree of sustainability, indicators are relevant, an essential management tool to implement proactive management and turn sustainability issue friendly for all involved in the process (Chassé & Boiral, 2017; Hojnik, Biloslavo, Cicero, & Cagnina, 2020).

As for the management system practices employed on a daily basis, it is observed that the company has an implemented management system and will seek its certification with ISO 9001:2015 in 2022, showing several specific actions regarding Lean Production and Production Cleaner. According to Vaz, Fagundes, Olivera e Selig (2011) Lean Production and Cleaner Production can contribute to competitiveness and sustainability by not generating waste and waste in the production process. As for certifications, it is evident in the interview that the company has a sustainability certification, since these when endorsed by third-party organizations are more useful to promote their sustainable actions than just self-publishing a sustainable report in isolation, in addition to being a proactive action to be announced (Feng, Lai, & Zhu, 2020).

Regarding the relationship with suppliers, was observed that the company is aligned with requirements of its customers and suppliers demands in relation to the socio-environmental dimensions. Was evidenced, also, that company isn´t monitoring progress in the adoption of sustainability practices at suppliers and customers. It is worth mentioning that companies must align business processes

and technological infrastructure in order to guarantee the operation and according to the conditions of the groups of customers served (Takahashi, Santa-Eulalia, Ganga, Araujo, & Azevedo, 2015). Was noted that the company isn´t monitoring sustainability performance of all actors of supply chain and, therefore, may be exposed to risks, because it is necessary that the supply chain has a proactive approach to manage risk, considering that each member need to carry out an analysis of possible interruptions in advance, minimizing operational impacts (Nimmy, Hussain, Chakrabortty, Hussain, & Saberi, 2022).

Was observed that the company has a tracking system through invoices in its information system. Traceability technologies are a very interesting way to solve problems of unethical supplier behavior such as, for example, the delivery of products that do not meet quality standards. It´s worth to cite the example of traceability in food production, that is a legal rule, applied along the supply chain (Liu, 2022; Silvano, Marcelino, & Vigil, 2021). Table 3 contains practices involving suppliers.

Table 4– Practices involving suppliers

Practices involving suppliers	
Practices/ Variable	**Answer**
Selection, criteria and development of suppliers	*We have a set of rules that supplier must read, sign and follow ... auditing service contact suppliers verify accomplishment of the norms, to ensure commitment to sustainability requirements.*
Risk analysis of supply sources	*Today, the assessment of these risks is carried out in a meeting when data provided by tool powered by AI*
Purchasing decisions (total cost or prices)	*Basically, we evaluate the price, market availability, national and international, product quality and delivery time, in addition to buying only from suppliers engaged with socio-environmental responsibility.*
Strengthen sustainability in the local chain	*A small part of the raw material is national, but to encourage the national chain, we are developing a product with 100% national and sustainable products*

Source: elaborated by the authors

To mitigate possible risks in the selection of suppliers, is presented for them a set of rules, they must agree, reading them and signing. According to Rodrigues & Corso (2020) the activity of selecting suppliers is an old concern in business in

relation to cost, quality and the risks involved. Corsi, Barbosa e Moro (2020) state that this activity has a strategic connotation in decision-making in the organization, as they generate competitive advantage for it.

Risks are assessed by a group of managers, based on data produced by a tool controlled by artificial intelligence. Unfortunately, it was shown that this process is still fragile, because a supply chain is complex, with too many suppliers, what turn almost impossible to obtain data from all of them. Nowadays company is working in alternative forms to mitigate risks, such as diversification of resources and raw materials, supply chain integration, increased process resilience, technological innovation and product shelf life, long-term contracts and integration with suppliers (Auer & Rauch, 2021).

About the purchasing decision, a positive point of the company Lambda is that it does not purchase from suppliers that do not meet socio-environmental requirements. The interviewee considered the fact relevant, as there are indications that the socially responsible behavior of companies affects the attitude of consumers (Silva & Bertrand, 2009). It is noted that the company evaluates most common requirements such as price, delivery time, availability, and quality. However, it is important to emphasize the relevance of controlling and reducing costs by the purchasing function of an organization by reducing possible hidden environmental liabilities, as evidenced in the scientific literature (Souza, Bacic, & Bernardes, 2009).

Another aspect is that the company works to strengthen the local supply chain through a sustainable product line. This type of action is important, as it is essential to organize the local (or short) supply chain to meet the demands of the Brazilian population, as in the Guimarães, Sant'Anna, Saito e Melo (2020) case presented in relation to the production of masks to prevent spreading of COVID-19 in Brazil. Table 4 presents external practices involving customers.

Table 5– External practices involving clients

External practices involving clients	
Practices/ Variable	**Answer**
Commercialization of processes, projects and brands	*Today we are developing and consolidating the company's first line of sustainable products, that will be offered first to the existing customer base and later to potential customers.*
Development practices, use, reuse, recycling and disposal of products	*We currently do not have reverse logistics programs, as our product is used together with other materials in shoes, bags and belts. We also use recycled materials in the production process and dispose of waste correctly and legally.*
Customer awards and certificates	*We have already won product and innovation awards at footwear sector fairs*

Source: elaborated by the authors

The company has already received awards at fairs in the footwear sector, as stated by the financial manager, and is consolidating its sustainable product line in its current customer base and using it to attract new customers. As for reuse, reuse, recycling and product disposal practices, the company seeks to reuse its waste internally and dispose of what cannot be recycled. As for products, there is no reverse logistics program, as the legislation does not require it and it becomes difficult to apply it to footwear and clothing. Thus, it is noted that the finding does not corroborate with the literature, which highlights reverse logistics as a strategic way to prevent risks and reduce impact management (Oliveira, Aparecida, Abreu, & Fernandes, 2021; García-Rodríguez, Castilla-Gutiérrez, & Bustos-Flores, 2013), since it becomes unfeasible from a financial and operational point of view depending on the product.

It is noted that the company has several actions in its sustainability practices along the supply chain, many of them in the initial phase and in maturation, demonstrating that the company has been changing its strategic position in the face of these issues, validating Seuring's statement (Seuring, 2013) that the sustainable management of the supply chain has become a concern for companies of different sizes and economic sectors.

Next, the results related to innovation are presented, starting with process innovation, in which Table 5 is presented. Innovative performance can be interpreted

through several indicators such as new products, processes and organizational arrangements and patents, highlighting It is known that economic growth is driven by innovation (Gunday et al., 2011; He, 2022).

Table 6– Process innovation

Process innovation	
Practices/ Variable	**Answer**
Research and Development	*We have a sector with two people dedicated to R&D activities, in addition to two consultants providing support in design and technology*
New products and services	*We currently develop products by internal initiative and by market demand, in which they are always developed with a focus on meeting customer demands.*
Patents, certifications and trademarks	*We currently have no patents, just a brand*
Work methods and processes	*We are currently structuring an innovation program in the company; routine management occurs with little incentive for innovation yet.*
waste reduction	*These are actions discussed in the areas and dealt with by them, but which do not follow a formal process*
Management of variable costs related to production processes and distribution logistics	*There are indicators in the BSC about these costs, so the industry and logistics area evaluate them monthly. There are ongoing initiatives to reduce the consumption of raw materials.*
Agility of logistics and distribution processes	*We distribute via CIF and FOB freight. Indicators demonstrate efficiency and effectiveness in meeting customer demands. We have a satisfaction rate above the market average today.*

Source: elaborated by the authors

Lambda has a structured R&D sector and a product development process oriented by market demands and internal initiatives. According to (Jung, 2004) R&D is the combination of the words Research and Development, where research is the search tool for new knowledge and development is the application of this knowledge. It should be noted that creating an R&D structure means allocating human, structural and organizational resources to centralize this activity (Castro, 2008).

Although the company has a structured R&D, it was found that the company has only one registered trademark and has no patents. According to Ayub & Bacic (2019) the existence of patents can be evidence of innovation, in addition, the patent

provides a right of ownership and generate profits that allow it to pay back the R&D expenses it has spent. It was not clear why there are no patents in the company, there is a possibility that is a missing opportunity to strengthen its R&D area so that it can self-finance through patents in the future.

Verifying work methods was found that the company is structuring an innovation program and that its routine management has little incentive to innovation. It was noted that the company does not have a well-defined organizational innovation process, but it is structuring a program for this purpose. In this way, it is worth noting that financial rewards through programs for the best ideas can be considered an important management practice to instigate innovation (Bevilacqua et al., 2020).

As for the reduction of waste, there is no formal process in the organization, but actions in specific sectors of the company. In this context, Lean Production and Cleaner Production can be used as ways to facilitate the reduction of waste and generate better economic, social and environmental results, as postulated by Vaz et al. (2011). It is noteworthy that in the case of Lean Production, it is not necessary to apply all its range of tools and methodologies to reduce waste, in addition to not being restricted to it to do so.

For cost management, the company has indicators, such as the BSC (Balanced Scorecard), that aid to evaluate monthly the results of their operations and there are ongoing initiatives to reduce the cost of raw materials. Due to the need to adapt to the market, companies act to improve their processes to reduce costs and have better quality (Oliveira et al., 2016). Regarding the logistical speed of distribution, the company has control indicators and performs above the market average. It is noted that there is a concern to maintain good order processing management, which is extremely important to guarantee customers the desired level of service (Rodrigues, Vital, Formigoni, Albuquerque, & Campos, 2010). Next, Table 6 on the ability to innovate is presented.

Table 7– Capacity for innovation

Capacity for innovation	
Practices/ Variable	**Answer**
Human Capital a) Availability b) Learning and training	*a) We look for people in the market according to the need, but preferably we provide internal human resources.* *b) We train as necessary, today we do not have a formalized training program.*
Market a) Future demand b) Available technology	*A) We have a forecast based on consumption and we are improving it to expand and involve more than it already is in the purchase process, such as commercial, purchasing, PCP and finance* *B) We currently have basic technology, but we are modernizing some things like IT and some ways of making a product.*
Infrastructure	*We have good infrastructure and good logistical access. High expenditures are not necessary because the Company is in an excellent location next to a highway that facilitates the flow of products.*

Source: elaborated by the authors

It is observed that the company has a good infrastructure and logistical access. For the market, the company has been improving its way of forecasting demand and modernizing its information technology infrastructure. It is noted, with regard to human capital, that the company provides internal growth, but also seeks in the market. However, it is evident that the company does not have a formalized training program, what can be a relevant weakness. It should be noted that the fundamental input of R&D to generate innovations that catalyze economic growth is human capital, and innovation in training and development programs are extremely important for any organization, since this must be in line with the company strategy to promote its innovation and sustainability (Reis & Gomes, 2017; Ribeiro, Mesquita, Marques, Silva, & Barros, 2017).

It is observed that in terms of innovation, the company is also reviewing its processes, so it was not possible to verify whether the company measures its capacity to innovate, because to evaluate something, it is necessary to measure it (Speroni et al., 2015). It was noted that the company has several gaps to be worked on, which are shown in Table 7.

Table 7– Capacity for Innovation

Dimension	Suggestion
Sustainable management practices in the supply chain	Identifying characteristics of the supply chain and measure risks involved
	Implement the systematic and panel of sustainability indicators as described in the interview
	Implement Lean Production and Cleaner Production programs
Innovation	Implement the company-wide innovation program
	Implement a training program with employees in order to encourage innovation.
	Invest in the development of technologies that generate patents

Source: elaborated by the authors

It was possible to show that the company has been restructuring internal processes and positioning itself in a more sustainable way, but it still needs to improve some processes, as well as consolidate others, and thus develop better so that it can reach the highest level in the scale of approaches to environmental management Kopicki's et al. (1993).

5 FINAL CONSIDERATIONS

The objective of this article was to understand the innovation of sustainable supply chain management in a textile industry in Vale dos Sinos, using the methodology adapted from Ceretta et al. (2016) which was originally validated on aluminum hydrogen. It is noted that we reached the established objective, being possible to obtain results that show the current situation of the company in relation to the innovation and sustainable management of the supply chain. The research results evidenced that the analyzed company aligned sustainable management with organizational innovation, especially in process innovation, through the adoption of Lean Production and Cleaner Production practices.

In order to show up sustainable management practices in the supply chain, was observed that the company already carries out several initiatives and that its environmental management is enabling to migrate from reactive to proactive. It was

evident that many actions are carried out informally and are not systematized, as was identified in risk management involving suppliers.

In innovation, it was observed that the company needs to improve the employee training process and encourage more innovation in processes. In general, the company is consolidating most of its processes and aligning them with the concepts of sustainability and innovation, but greater commitment and investment by the organization is needed to obtain better results, as these two dimensions together have become imperative for business competitiveness and no longer is considered as differentials but an obligation of the company, since customers and financial institutions are demanding from companies commitment in socio-environmental aspects.

Regarding the methodological design adopted in this research, the limitations of the study may be considered qualitative approach, of a case study, in only one company. It is suggested, therefore, to carry out research with a quantitative approach with scales of evaluations of the categories of analysis and adopted practices. It is also suggested the development of multiple case studies in the same footwear manufacturing segment and its suppliers so that these companies can be evaluated and compared in relation to their practices of innovation and sustainable management of the supply chain.

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3. Development of theoretical propositions (theoretical work)	√	√
4. Theoretical foundation / Literature review	√	√
5. Definition of methodological procedures	√	√
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7. Statistical analysis		
8. Analysis and interpretation of data	√	√
9. Critical revision of the manuscript	√	√
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ANNEX

Annex– Questions listed

Continue...

Analysis Dimensions	Analysis Category	Practices/ Variable	Answer
Sustainable management practices in the supply chain	Practices carried out in the company's internal environment	Proactive commitment regarding sustainable management practices	Does the company seek to comply with legislation and customer requirements of an environmental nature? In addition, does the company have sustainability guidelines in its strategy? Is Sustainability taken as a mandatory agenda in management meetings?
		Integration of sustainable development into the decision-making process	When making a decision, is there a concern to analyze sustainability issues?
		Practices or systems of Total Quality Management, Lean Production, etc.	Does the organization use Quality Management practices or systems, Exuta Production, Cleaner Production or similar?
		Values or criteria adopted by the company are similar to the values and criteria adopted by its partners (suppliers and customers)	Does the Organization adopt values and criteria similar to or in line with its suppliers and customers? Do these have an alignment with sustainable issues?
		Certification of your processes or products	Does the Organization have its processes or products certified? Is this certification environmental? Who granted this certification?
		Chain traceability practices	Does the Organization have systems or practices to achieve traceability in the value chain? how does this happen?
		Assessment strategies and periodicity	How does the company evaluate its sustainability actions? Is there a periodicity for this evaluation?
		Analysis of the components that make up your supply chain	Has the company mapped and analyzed which companies and organizations make up its supply chain? Is there an analysis of the impact of each company versus the commodity supplied?

Annex– Questions listed

Continue...

Analysis Dimensions	Analysis Category	Practices/ Variable	Answer
Sustainable management practices in the supply chain	External practices involving suppliers	Selection, criteria and development of suppliers	Does the organization have criteria for selecting, evaluating and developing suppliers? Which are they?
		Risk analysis of supply sources	Is there a risk analysis of sources of supply? Are monopoly and oligopoly risks, costs and supply capacity assessed? Is there a methodology for this?
		Purchasing decisions (total cost or prices)	What are the dimensions evaluated in a purchase? (Quality, Price, Delivery?)
		Strengthen sustainability in the local chain	How does the company strengthen the sustainability of the local supply chain? Are there examples of strengthening actions?
	External practices involving clients	Commercialization of processes, projects and brands	How does the organization market its products, service, brand, project or processes to its customers? How is prospecting carried out? How is character sold in sustainability?
		Development practices, use, reuse, recycling and disposal of products	Does the Organization develop practices or actions for the reuse, recycling and disposal of its products? Does the company have a reverse logistics program in place?
		Customer awards and certificates	Does the Company have certifications or customer awards on sustainability? and about other aspects, there is?
Innovative performance	Innovation in process	Research and Development	Does the company have a process and/or structure for research and development?
		New products and services	How does the company develop new products or services? how does this occur?
		Patents, certifications and trademarks	Does the company have product or process patents and/or trademarks in its possession? Has the Company won any innovation awards? Do you have any recognized innovation certification?
		Work methods and processes	How does the company manage its day-to-day work processes? How does it foster innovation?
		waste reduction	How does the company evaluate and treat waste in processes (administrative and operational)? There is a system to evaluate with methodology and periodicity

Annex– Questions listed

Conclusion

Analysis Dimensions	Analysis Category	Practices/ Variable	Answer
Innovative performance	Innovation in process	Management of variable costs related to production processes and distribution logistics	How does the company manage variable costs related to production and logistics? There is an effort to reduce these costs
		Speed related to logistics and distribution processes	How does the company distribute its products and services? How does the company manage the efficiency, effectiveness and productivity of the ordering company??
	Capacity for innovation	Human Capital a) Availability b) Learning and training	a) How does the company capture talent in the market? How does the company provide opportunities for employee growth? b) Is there training for people? How does this happen?
		Market a) Future demand b) Available technology	a) Does the company have a demand forecasting process and does it extrapolate to sales, supply and financial planning? b) Does the company have technology available to meet these demands? Are there investments in new product and process technologies?
		Infrastructure	Does the company have a good infrastructure to run its operations? Are there good logistical conditions in place? Are high expenditures necessary to remedy infrastructure and logistics problems?