

## **ANALYSIS OF SUSTAINABLE PRACTICES ADOPTED WITHIN THE SUPPLY CHAIN UNDER THE SUSTAINABLE DEVELOPMENT PERSPECTIVE**

*Análise de práticas sustentáveis adotadas na cadeia de suprimentos sob a perspectiva de desenvolvimento sustentável*

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### **ABSTRACT**

The understanding that natural resources are finite is leading organizations to redefine their supply chain toward sustainability. In this way, the purpose of this article is to investigate if the sustainable practices applied within the supply chain are following all the dimensions proposed by the concept of sustainable development. Therefore, a systematic review of the literature was carried out within the CAPES journal base from 2004 to 2017. From this sample, sustainable practices were segmented into economic, social and environmental, orientated by the sustainability tripod. The result shows that the economic and environmental dimensions have significant relevance regarding the adoption of sustainable practices in the supply chain whereas no significant evidence was found within the social context. New studies will be needed to understand why companies are not including the social issue in their sustainable practices within the supply chain and what can be done to reverse this situation.

**Keywords:** Sustainable supply chain management, Green supply chain management, Sustainable development.

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## **ANÁLISE DE PRÁTICAS SUSTENTÁVEIS ADOTADAS NA CADEIA DE SUPRIMENTOS SOB A PERSPECTIVA DE DESENVOLVIMENTO SUSTENTÁVEL**

*Analysis of sustainable practices adopted within the supply chain under the sustainable development perspective*

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### **RESUMO**

O entendimento de que os recursos naturais são finitos está levando as organizações a redefinir sua cadeia de suprimentos em direção à sustentabilidade. Desse modo, o objetivo deste artigo é investigar se as práticas sustentáveis aplicadas na cadeia de suprimentos estão seguindo as dimensões propostas pelo conceito de desenvolvimento sustentável. Para tanto, foi realizada uma revisão sistemática da literatura na base de periódicos da CAPES de 2004 a 2017. A partir dessa amostra, as práticas sustentáveis foram segmentadas em econômicas, sociais e ambientais, orientadas pelo tripé da sustentabilidade. O resultado mostra que as dimensões econômica e ambiental têm relevância significativa no que diz respeito à adoção de práticas sustentáveis na cadeia de suprimentos, visto que não foram encontradas evidências significativas no contexto social. Novos estudos serão necessários para entender porque as empresas não incluem a questão social em suas práticas sustentáveis na cadeia de suprimentos e o que pode ser feito para reverter esse quadro.

**Palavras-chave:** Gestão sustentável da cadeia de suprimentos. Gestão verde da cadeia de suprimentos. Desenvolvimento sustentável.

## INTRODUCTION

In recent years, the environmental issues reached global level. The industrial impacts to the environment became worrying and, consequently issues caused by pollution and environmental degradation started being internationally discussed. The understanding that the natural resources are finite and that the environmental capacity came to its limit is leading the organizations look for a balanced growth which doesn't damage the environment (ALKHIDIR; ZAILANI, 2009).

One of the most important factors to study the supply chain occurs according to the function of the relation and influence between the chain links. From that moment that a specific focal company decides to include green parameters, this company starts influencing other organizations both upstream and downstream. Sometimes the organizations start demanding and/or suggesting that suppliers, distributors and clients may introduce sustainable practices in the business.

In this context, Seuring and Müller (2008) point that suppliers, focal companies and clients are directly connected by the product. This product is associated to a household environmental and social value since the beginning of its production till its distribution to the final supplier. Thus, the supplier chains have to be accountable by social and environmental performances.

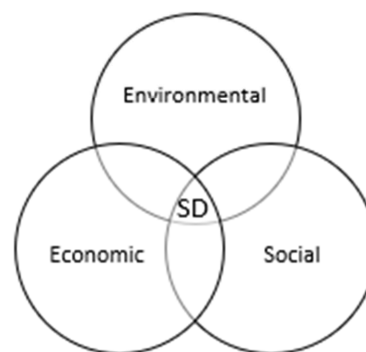
In addition, Wolf (2011) says that the managing supply chain plays a major position in the integration of the sustainability in the organizations. This fact can be easily perceived as long as the raw-materials purchasing sector can use its purchase power and direct its distributors to insert environmental and social practices in its business scope.

On this line, Zhu and Sarkis (2004) bring some examples, such as IBM which became to encourage its distributors to adopt a 14001 ISO certification and the companies Ford, GM and Toyota which start to require the 14001 ISO from its distributors. In the same way, Wolf (2014) highlights two companies which have become to influence all the Nestlé and Wall-Mart chain. Nestlé became to require that its distributors would adopt sustainable practices in the extraction of the oil palm and Wal-Mart makes its chain of suppliers of the fishery products sustainable when decided to buy fish only from distributors certified by *Marine Stewardship Council*.

In this way, companies are redesigning their entire supply chain (ZAILANI et al., 2012). Geng et al. (2017) reinforce that the green supply chain appears as a new concept that encompasses aspects of sustainability not only within organizations, but also downstream. Carter and Rogers (2008) argue that sustainable supply chain management needs to take into account the environmental, economic and social dimensions in the adoption of its practices.

According to Oliveira (2008, p. 23), the concept of sustainable development was widely disseminated by the report "Our Common Future" - Brundtland Report in 1987 and states: "Sustainable development is one that meets the needs of present generations without compromise the ability of future generations to meet their own needs" (BRUNDTLAND, 1987). The concept is linked to the perception that sustainable development must occur in the economic, social and environmental dimensions according to Figure1.

**Figure 1 - Concept of Sustainable Development**



Source: Adapted from Oliveira (2008).

In this context, this study has as main objective to identify if the sustainable practices adopted by the companies within the supply chain are following all the dimensions proposed by the concept of sustainable development.

For that, the article was divided into four sections. The first section consists of the presentation of the methodology used. The second section presents the theoretical framework in which the concepts of supply chain management and sustainable supply chain management are explained in order to facilitate the understanding of this. In the third section, the practices found within the supply chains are evidenced from the perspective of the concept of sustainable development. The fourth section is the final considerations of this article and the possibilities of future studies are also indicated.

## 1 METHODOLOGY

The systematic review of the literature is a tool used to obtain the best evidence and to verify which policies and practices are most used in a given area (TRANFIELD; DENYER; SMART, 2003). The systematic review is a specific methodology that not only identifies the existing studies but also analyzes and synthesizes the data obtained, thus allowing the collection of evidence of a specific study object (DENYER; TRANFIELD, 2009).

The methodology applied for this research was a systematic review of the literature with the purpose of identifying if the sustainable practices found within the supply chain are following all the dimensions proposed by the concept of sustainable development. Therefore, it followed the step by step proposed by Denyer and Tranfield (2009).

According to the authors, the first step should establish the focus of the research. For this work, the objective considered was the sustainable practices within the supply chains guided by the assumption formulated by Carter and Rogers (2008) in which the management of the sustainable supply chain must include the environmental, economic and social aspects.

For step 2, Denyer and Tranfield (2009) suggest that evidence should be found by defining the base and keywords. The database was defined as the CAPES (Coordination for Improvement of Higher Level Personnel) and the key words used were: sustainable supply chain management, green supply chain management, sustainable supply chain management and green supply chain management. National and international articles were considered for this study from 2004 to 2017 aiming to identify if the sustainable practices found within the supply chain are following the dimensions proposed by the concept of sustainable development

Step 3 proposed by the authors indicates that it is necessary to review and select the studies. The search brought 128 articles, of which 22 clearly and objectively evidenced the sustainable practices adopted by companies within the supply chain.

For step 4, Denyer and Tranfield (2009) recommend that the analysis should be performed in a careful manner always taking into account the focus of the research. Thus, all articles were cataloged by year and authors. The sustainable practices found were analyzed and segmented in environmental, economic and social. Step 5 established by the authors is the presentation of the results and conclusion. These last two will be shown in topics 2.2 and in the final considerations respectively.

## 2 THEORETICAL FRAMEWORK

### 2.1 Supply Chain Management and Sustainable Supply Chain Management

The supply chain comprises from the process of issuing a purchase order until the delivery of that request to the end user. Ballou (2006) states that the supply chain management encompasses everything that is related to the operations related to transportation and manufacturing of products from the moment of obtaining inputs to the final consumer. According to Levi and Kaminsky (2003), supply chain management can be defined as an efficient integration between suppliers, producers and warehouses. According to the authors, this efficiency always aims at reducing costs, but without impacting the level.

The Council of Supply Chain Professionals (2017) recognizes supply chain management as supply and demand management within and between organizations. In this way, planning and management of all the activities involved in procurement, production, supply and transportation is essential. It is also important to

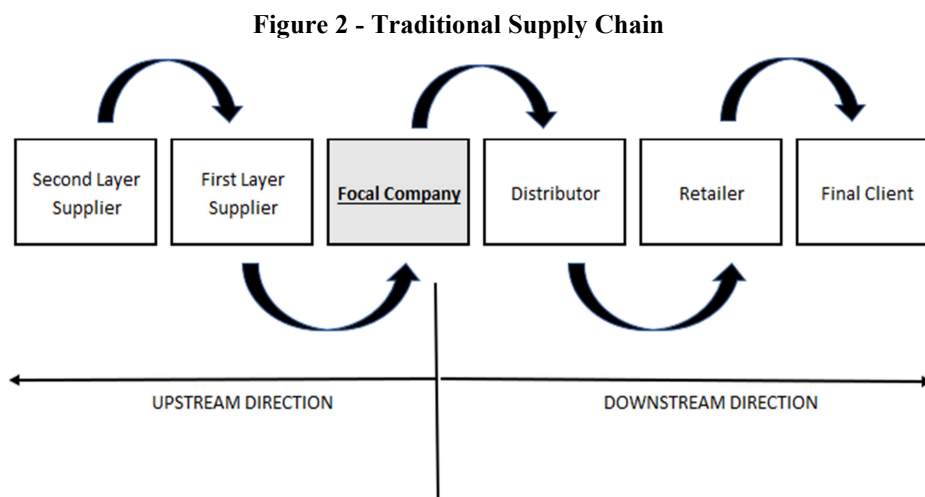
coordinate and collaborate between suppliers, service providers and customers, forming a connection between all members of the chain.

In this context, Seuring and Müller (2008) affirm that the supply chain integrates all operations related to the flow of materials. This operation begins with the extraction of raw material, transformation of the input and distribution to the final customer. It is worth mentioning that the authors also address the issue of information flow that permeates the entire chain both downstream and upstream.

Novaes (2004) states that supply chain management is the long path from input sources, through component factories, product manufacturing, distributors to the end consumer through a retailer. According to Novaes (2004), the supply chain management has as main focus the final consumer and the chain must adapt to serve it in the way it expects.

The main purpose of the supply chain is to maximize the value generated (CHOPRA and MEINDL, 2003). This value can be defined as "the difference between the value of the final product for the customer and the effort made by the supply chain to fulfill its request" (CHOPRA, MEINDL, p. 5, 2003). According to the authors, for most commercial supply chains, the value is directly related to profit.

Like Novaes (2004), Chopra and Meindl (2003) also consider that one of the main objectives of a supply chain is customer satisfaction. Mentzer et al. (2001) assume as the fundamental purpose of the supply chain to deliver products without errors in the right place as desired by the customer. Ballou (2006) describes that the supply chain should aim to achieve a sustainable competitive advantage. According to Cavinato (1992), the supply chain management should promote cooperation and contribute to the manufacture of products at lower cost. The Figure 2 below represents a traditional supply chain.



Source: Adapted from Pires (2007).

From these definitions, it can be seen that the supply chains formed a link with the following objectives indicated in Table 1.

**Table 1 - Purpose of the Traditional Supply Chain**

PURPOSE OF THE TRADITIONAL SUPPLY CHAIN	AUTHORS
SATISFY THE CUSTOMERS	MENTZER ET AL (2001), CHOPRA AND MEINDL (2003); NOVAES (2004)
MAXIMIZE VALUE GENERATED	CHOPRA AND MEINDL (2003)
DECREASE COSTS	LEVI AND KAMINSKY (2003)
ACHIEVE SUSTAINABLE COMPETITIVE ADVANTAGE	BALLOU (2006)

Source: Developed by authors.

Sukati et al. (2012) corroborate these objectives by stating that the supply chain can contribute significantly to the achievement of competitive advantage. They further point out that supply chain management is capable of leveraging the value of the company, since there is greater connectivity between suppliers and customers.

Within this line, Kherbach and Mocan (2016) affirm that supply chain management must be seen as a holistic process in which all areas of the organization are directly or indirectly involved. This comprises the company, supplier, seller, customers, etc., ie those who are involved in the process of manufacturing and delivering products to end customers both upstream and downstream. It is important to emphasize that all these chain links act together and with the purpose of achieving high levels of performance.

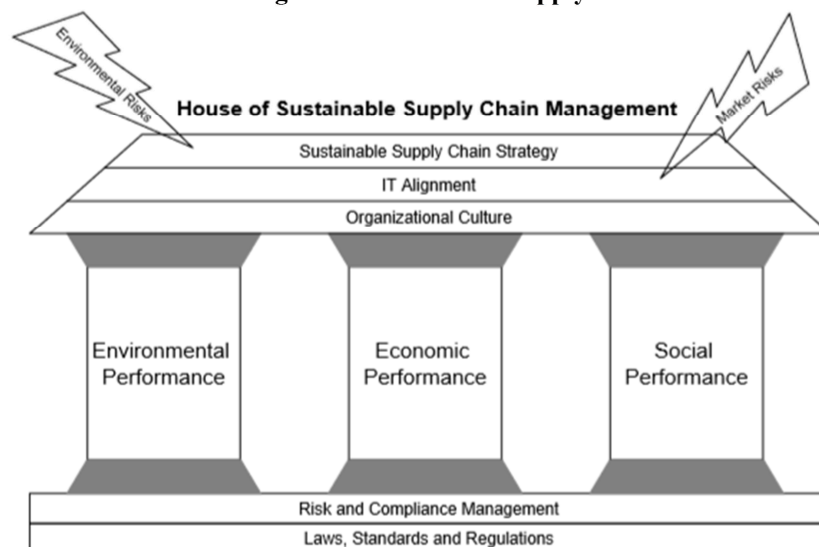
Thus, it can be affirmed that traditional supply chains did not have the sustainability theme from the environmental and social points of view inserted in their scope of business. The sustainable supply chain definitions are very recent, some concepts will be listed below.

Geng et al. (2017) emphasize that the green supply chain has arisen due to the increase of the environmental conscience in the world. The supply chain started to include environmental aspects not only inside and outside the company, but also between the links in the chain. Alkhidir and Zailani (2009) understand that the green supply chain is linked to the assessment of the total environmental effects of the product throughout its entire product, service and life cycle. The notion of green supply chain is related to the broader concept of sustainable economy and directly affects customers, suppliers, etc.

According to Srivastava (2007), the green supply chain encompasses not only the implementation of proposals for environmental management but also simpler pipelines such as: reduce, reuse, recycle, etc. Some factors are pressing organizations to use greener criteria, including regulatory issues and consumer perception. The author states that green supply chain management understands the environmental factor in the chain and encompasses product design, supplier selection, production, final product delivery, and end-of-life management of the product after its useful life.

Seuring and Müller (2008) recognize sustainable supply chain management as the management of materials, information and capital flows that permeate the entire chain but take into account the dimensions of sustainable development, ie the environmental, social and economic. The authors state that in sustainable supply chains environmental criteria must be met by the members that remain within the chain. However, competitiveness must be maintained to meet customer needs. This definition is very broad and associates the sustainability and management aspects of the supply chain. Figure 3 shows a sustainable supply chain.

Figure 3 - Sustainable Supply



Source: Teuteberg and Wittsteuck (2010).

It is understood, then, that there is no single definition of what a sustainable supply chain would be. However, most of the authors surveyed affirm that there must be a sustainable aspect within the supply chain, but without neglecting the economic issue.



## 2.2 Sustainable Practices Found within the Supply Chain

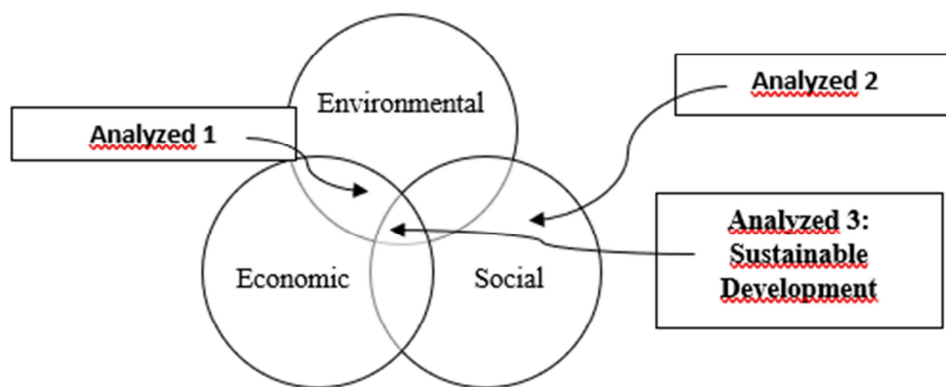
As previously mentioned, the systematic literature review was carried out within the CAPES (Coordination of Improvement of Higher Level Personnel).

National and international articles were considered for this study from 2004 to 2017. The research strategy found 128 articles, of which 22 were considered for this study because they clearly and objectively evidenced the sustainable practices adopted by the organizations within the chain of supplies. It is important to emphasize that, because it is a new concept, there is still no expressive publication.

The definition of sustainable supply chain management adopted for this study was proposed by Carter and Rogers (2008) that define sustainable supply chain management as the strategic and transparent integration of social, environmental and economic dimensions within the organization. Thus, a catalog of articles was elaborated and the sustainable practices were segmented from this perspective.

However, some practices have intersections between dimensions. In this way, the information collected was analyzed according to Figure 4.

Figure 4 - Sustainable Practices Analysis



Source: Adapted from Carter and Rogers (2008).

The first analysis was based on practices considered both environmental and economic, as shown in Table 2 below.

The most evident environmental and economic sustainable practices were the green purchases that favor the acquisition of environmentally friendly products. This is clear evidence that companies are not only adopting the price criterion for the acquisition of their products. Betiol et al. (2012) corroborate this idea by stating that organizations are including the sustainable dimensions in the choice of their suppliers and not only taking into account the financial aspect.

Green shopping was mentioned in seven articles (ZHU; SARKIS, 2004; CHAN et al., 2012; SILVA, 2013, LIN, 2013, MIRHEDAYATIAN et al., 2014, SCUR; BARBOSA, 2017; ZHU, et al., 2017). This factor is significantly positive for the environmental and economic issue, since organizations can induce their suppliers to include green practices in their activities. Betiol et al. (2012, p. 71) agrees with this idea by stating that:

The acquisition of goods and services can represent more than 50% of a company's expenses, exceeding the 80% mark in sectors such as retail and electronics and automotive. All this capability gives companies a huge power to influence the market.

**Table 2 - Intersecting Environmental and Economic practices**

Year	Authors	Found Practices
2004	ZHU, Q.; SARKIS, J.	Reduction of gas emissions
		Reduction of effluent generation
		Reduction of solid waste
		Decreased consumption of hazardous, harmful and toxic materials
		Decreased frequency of environmental accidents
		Improve the company's environmental situation
		Increase costs for purchasing environmentally friendly materials
		Decreased energy consumption
2011	WOLF, J.	Sustainability goals can be integrated with existing suppliers
		Sustainability Training
2012	CHAN, R. Y.; HE, H., CHAN, H. K.; WANG, W. Y.	Green shopping
		Customer cooperation
		Investment in product recovery
2013	SILVA, M. E. da	Water management
		Power management
		Management of generated waste
		Commitment to buying reforestation products
2013	LIN, R. J.	Green shopping
		Eco-design
		Product recovery
		Collaboration between customers and suppliers
2013	HSU, C. W.; KUO, T. C.; CHEN, S. H.; HU, A. H.	Carbon management
2013	MUDULI, K.; GOVINDAN, K.; BARVE, A.; GENG, Y.	Reduction of energy and material used
2014	MIRHEDAYATIAN, S. M.; AZADI, M.; SAEN, R. F.	Green shopping
		Green Design
		Product recovery
2014	ZHAO, R.; LIU, Y.; ZHANG, N.; HUANG, T.	Management that minimizes the risk of handling hazardous materials
2014	GOVINDAN, K.; SARKIS, J.; JABBOUR, C. J. C.; ZHU, Q.; GENG, Y.	Eco Efficiency
2015	ROCHA, A. C. da; GOMES, C. M.; KNEIPP, J. M	Definition of sustainability goals
		Reduction of: energy, water, greenhouse gases
		Reset volume sent to landfill
		Prioritization of local suppliers
		Reverse logistic
		Investment in green process innovation
		Recycling Campaigns

Source: Developed by authors.



**Table 2 - Intersecting Environmental and Economic practices (continuation)**

Year	Authors	Found Practices
2015	ROCHA, A. C. da; GOMES, C. M.; KNEIPP, J. M.; CAMARGO, C. R.	Integrate sustainable development into the decision-making process
		Analyze the impacts of business activities on ecosystems
		Reverse logistic
		Reuse
		Correct disposal
		Innovative investment in process with the objective of reducing socio-environmental liabilities
2015	COSIMATO, S.; TROISI, O.	Logistic innovation that minimizes ecological impacts through cost reduction, quality reliability, performance and energy efficiency
2015	JABBOUR, C. J. C.; NETO, A. S.; GOBBO JR, J. A.; SOUZA RIBEIRO, M. De; SOUSA JABBOUR, A. B. L. de.	Low carbon eco-innovation projects
2015	FAHIMNIA, B.; SARKIS, J.; CHOUDHARY, A.; ESHRAGH, A.	Carbon Emission Control
2016	VARGAS, J. R. C.; MANTILLA, C. E. M.	ISO 14001
		Packaging reduction
		Develop suppliers
2016	XING, K.; QIAN, W.; ZAMAN, A. U.	Life cycle assessment
2016	TSENG, M. L.; TAN, K.; CHIU, A. S.	Selecting green suppliers
2017	SCUR, G.; BARBOSA, M. E.	Internal environmental management
		Reverse logistic
		Green shopping
		Green Design
		Life cycle assessment
		Management of generated waste
		Green production
2017	ZHU, Q.; FENG, Y.; CHOI, S. B.	Green Innovation
		Green shopping
		Environmental and economic performance
2017	ROEHRICH, J. K.; HOEJMOSE, S. U.; OVERLAND, V.	Selecting green suppliers

Source: Developed by authors.

Following the analysis, the second most common practice is the organizations commitment to reduce energy and water consumption, as shown in four articles (ZHU; SARKIS, 2004; SILVA, 2013; MUDULI et al., 2013; ROCHA et al., 2015b). This practice is in line with the sustainable production pillar proposed by the United Nations Supply Chain Sustainability Guide known as the Global Compact (2010). The guide confirms the importance of reducing water and energy consumption as one of the ways to reduce the ecological footprint of the organization, thus minimizing the environmental and economic impact of companies.

The second moment of the analysis was exclusively focused on the social practices found by companies within the supply chain as shown in Table 3. The social pillar is directly linked to the Social Responsibility of organizations, more commonly known as Corporate Social Responsibility or Corporate Social Responsibility (Oliveira, 2008).

**Table 3 - Social Practices**

Year	Authors	Found Practices
2011	WOLF, J.	Organizational structure motivates and inspires employees
		Interaction with NGOs
2013	SILVA, M. E. da	Diversity of Employees
		Relationship with the community
2015	ROCHA, A. C. da; GOMES, C. M.; KNEIPP, J. M.	Security for the community
		Education Campaigns
		Human capital development with company employees
		Dialogue with the community where it is inserted
2015	ROCHA, A. C. da; GOMES, C. M.; KNEIPP, J. M.; CAMARGO, C. R.	Analyze business impacts on the community
		Focus on human capital
2016	VARGAS, J. R. C.; MANTILLA, C. E. M.	Social responsibility

Source: Developed by authors.

According to the institute Ethos apud Oliveira (2008), Corporate Social Responsibility can be defined as a way to manage the business based on transparency and ethics. In addition, the company must set goals based on the concept of sustainable development that preserves the environment, diversity and favors the reduction of social inequalities. Following this definition, only five articles were found within the sample, which corresponds to 23% of the research. This data indicates that companies are not adopting the social dimension as a sustainable practice to be followed.

The third analysis of the research is the ideal situation, since it encompasses the three dimensions of the concept of sustainable development. According to Carter and Rogers (2008) this is the best scenario within sustainable supply chains. However, only four articles were found covering these three dimensions, which corresponds to 18% of the research as shown in Table 4 below.

**Table 4 - Intersecting Environmental, Economic and Social practices**

Year	Authors	Found Practices
2004	ZHU, Q.; SARKIS, J.	Decreased frequency of environmental accidents
		Improve the company's environmental situation
2015	ROCHA, A. C. da; GOMES, C. M.; KNEIPP, J. M.	Prioritization of local suppliers
2015	ROCHA, A. C. da; GOMES, C. M.; KNEIPP, J. M.; CAMARGO, C. R.	Integrate sustainable development into the decision-making process
		Development of local suppliers
2016	VARGAS, J. R. C.; MANTILLA, C. E. M.	Develop suppliers

Source: Developed by authors.

## CONCLUSION

It is noticed, therefore, that more and more companies are seeking to achieve their profits, but always taking into account the environmental impacts caused and investing in actions that can mitigate these damages. Thus, the sustainable supply chain appears as an indispensable tool for organizations to respond to the problems of these environmental issues.

In recent years, companies are realizing the importance of conserving the environment for the maintenance of their business in the long run. The perception that natural resources are finite and the

consequence of what this can bring to organizations is contributing to the adoption of sustainable practices within the supply chain.

This study aimed to identify if the sustainable practices used by companies within the supply chain are following all the dimensions proposed by the concept of sustainable development. According to Carter and Rogers (2008), a sustainable supply chain must encompass environmental, economic and social issues.

However, research shows that the economic and environmental dimensions are being considered as sustainable practices, while the social dimension has been significantly ignored. In addition, from the twenty-two articles found, only four articles showed sustainable practices in all dimensions, a situation considered ideal by Carter and Rogers (2008), which represents only 18% of all research.

In this way, organizations need to focus on basic change and look for business strategies that offer opportunities in the three spheres of sustainability. This work suggests that further research is carried out in a more in-depth way to understand why companies are not adopting all sustainable criteria within the sustainable supply chain.

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