

Supply Chain Sustainability: Organizational Culture, Institutional Pressures, and Complexity in Risk Perception in Brazilian Companies

Sustentabilidade nas Cadeias de Suprimentos: Cultura Organizacional, Pressões Institucionais e Complexidade na Percepção de Riscos em Empresas Brasileiras

Sostenibilidad en las Cadenas de Suministro: Cultura Organizacional, Presiones Institucionales y Complejidad en la Percepción de Riesgos en Empresas Brasileñas

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Resumo: A literatura sobre riscos de sustentabilidade em cadeias de suprimentos tem avançado, mas ainda há lacunas na compreensão detalhada de sua ocorrência e da influência de fatores culturais, institucionais e da complexidade organizacional. Este estudo investiga como esses aspectos impactam a percepção dos riscos de sustentabilidade em empresas brasileiras com áreas de sustentabilidade formalmente estruturadas (N=152). Por meio de análises descritivas, o estudo examina padrões associados à cultura organizacional, pressões institucionais e complexidade das cadeias na percepção de riscos internos e externos. Os resultados destacam a importância das pressões coercitivas e miméticas e o papel da cultura organizacional na interpretação dos riscos. Além de oferecer subsídios para a gestão estratégica da sustentabilidade, o estudo contribui para os ODS 12 (Consumo e Produção Responsáveis) e ODS 9 (Indústria, Inovação e Infraestrutura) ao reforçar a necessidade de práticas sustentáveis e inovação na cadeia de suprimentos.

Palavras-Chave: Riscos de sustentabilidade; Pressões institucionais e cultura.

Abstract: The literature on sustainability risks in supply chains has advanced, but gaps remain in understanding their occurrence and the influence of cultural, institutional, and organizational complexity factors. This study investigates how these aspects impact the perception of sustainability risks in Brazilian companies with formally structured sustainability departments (N = 152). Through descriptive analyses, the study examines patterns associated with organizational culture, institutional pressures, and supply chain complexity in the perception of internal and external risks. The results highlight the importance of coercive and mimetic pressures and the role of organizational culture in shaping risk interpretation. In addition to providing insights for strategic sustainability management, this study contributes to SDG 12 (Responsible Consumption and Production) and SDG 9 (Industry, Innovation, and Infrastructure) by reinforcing the need for sustainable practices and innovation in supply chains.

Keywords: Sustainability Risks; Institutional Pressures and Culture.

Resumen: La literatura sobre los riesgos de sostenibilidad en las cadenas de suministro ha avanzado, pero aún existen brechas en la comprensión de su ocurrencia y de la influencia de factores culturales, institucionales y de complejidad organizacional. Este estudio investiga cómo estos aspectos impactan la percepción de los riesgos de sostenibilidad en empresas brasileñas con departamentos de sostenibilidad formalmente estructurados (N = 152). A través de análisis descriptivos, el estudio examina patrones asociados con la cultura organizacional, las presiones institucionales y la complejidad de la cadena de suministro en la percepción de riesgos internos y externos. Los resultados destacan la importancia de las presiones coercitivas y miméticas, así como el papel de la cultura organizacional en la interpretación de los riesgos. Además de proporcionar aportes para la gestión estratégica de la sostenibilidad, este estudio contribuye a

los ODS 12 (Producción y Consumo Responsables) y ODS 9 (Industria, Innovación e Infraestructura) al reforzar la necesidad de prácticas sostenibles e innovación en las cadenas de suministro.

Palabras Clave: Riesgos de sostenibilidad; Presiones institucionales y cultura.

Introduction

Supply chain management has become a critical factor for organizational success, particularly in the face of increasing market complexity and the growing interactions among economic agents. Supply chains may be defined as vertical sequences of transactions that add value to the final consumer (Christopher, 2005) or as networks of firms that provide products and services to a specific market (Mani & Delgado, 2019). In the context of the competitiveness and resilience of these networks, aspects such as innovation (Roy et al., 2004), collaboration (Nagarajan & Sošić, 2008), integration (Flynn et al., 2018), and sustainability (Seuring & Gold, 2013; Liu et al., 2020) are essential. In this regard, the adoption of sustainable practices within supply chains is aligned with SDG 12 (Responsible Consumption and Production) and SDG 9 (Industry, Innovation and Infrastructure), promoting operational efficiency, innovation, and the mitigation of environmental impacts.

Sustainability in supply chains has gained increasing prominence in both academic literature and business practice, driven by stricter regulations, consumer market pressures, and stakeholder demands. Its multidisciplinary nature, encompassing economic, environmental, and social dimensions, challenges traditional organizational boundaries and requires interorganizational approaches to mitigate risks and capture opportunities (Garetti & Taisch, 2012). Several studies have examined the relationship between managerial practices, technical capabilities, and sustainability performance, highlighting the need for strategic alignment to address these challenges (Mitra & Datta, 2014; Dubey et al., 2017).

The management of sustainability risks in supply chains has become a topic of growing relevance in both academia and organizational management. This interest can be observed through the increasing number of publications in high-impact journals in the fields of operations and supply chain management (Sarkis et al., 2011; Ahmadi et al., 2017; Syed et al., 2019; Romano et al., 2021). The literature indicates that sustainability risks may result in negative financial impacts, reputational damage, and adverse stakeholder reactions (Busse et al., 2016). In the Brazilian context, recent studies suggest that companies are becoming increasingly aware of these risks, adopting sustainable practices as a means of mitigation and seeking organizational benefits arising from such initiatives (Romano et al., 2023).

The adoption of sustainable practices throughout the supply chain is an essential factor in reducing exposure to environmental and social risks. Empirical studies demonstrate that companies implementing such practices not only mitigate risks but also achieve significant competitive advantages, such as improved reputation and operational efficiency (Romano et al., 2025). However, the transformation of these practices into organizational benefits depends on multiple factors, including cultural characteristics both internal and external to organizations (Romano & Ferreira, 2022). Furthermore, the literature indicates that institutional pressures play a crucial role in companies' decisions to adopt sustainable practices, whether through regulatory coercion, competitor imitation, or sectoral standardization (DiMaggio & Powell, 1983; Aerts et al., 2006; Sarkis et al., 2011; Romano et al., 2023).

This study seeks to expand this understanding by analyzing the interactions among supply chain

complexity (Chakravarthy, 1997; Bozarth et al., 2009; Mangla et al., 2014; Bode & Wagner, 2015; Busse et al., 2017), institutional pressures (DiMaggio & Powell, 1983; Aerts et al., 2006; Sarkis et al., 2011; Dubey et al., 2017; Romano et al., 2023), and cultural characteristics (Baumgartner, 2009; Romano et al., 2015; 2018; 2022) in the perception of sustainability risks.

The analysis of organizational complexity in globalized supply chains enables a deeper understanding of the challenges and opportunities associated with more efficient sustainability risk management (Prigogine, 1984; Choi & Krause, 2006; Sarkis et al., 2011). In addition, institutional theory clarifies how external factors influence the adoption of sustainable practices, emphasizing the importance of considering both coercive and mimetic pressures as well as internal organizational aspects. At the same time, cultural characteristics play a fundamental role in the development and implementation of sustainability strategies, requiring distinct management profiles and different levels of organizational maturity (Baumgartner & Ebner, 2010; Liu et al., 2010; Cao et al., 2015).

In the cosmetics sector, for instance, sustainability risk modeling has proven fundamental for strategic decision-making, demonstrating that more complex supply chains require more sophisticated approaches to risk mitigation (Romano et al., 2021). Similarly, companies that adopt sustainable practices more intensively are better able to minimize systemic risks and promote more robust sustainable performance over time (Romano et al., 2025).

Therefore, this study aims to investigate the relationship among supply chain complexity, institutional pressures, and cultural characteristics in the perception of sustainability risks, contributing to the advancement of the literature by proposing new insights into the interaction among these factors. The findings may support new theoretical propositions and guide future research in this field.

Despite the advancement of the literature on sustainability risks in supply chains, most studies remain concentrated in developed countries, with predominantly quantitative approaches focused on descriptive and specific sectors. Consequently, there is still a gap in understanding how factors such as organizational culture, institutional pressures, and complexity influence risk perception in emerging contexts such as Brazil.

The remainder of this article is organized as follows: Section 2 presents the literature review on the topics addressed; Section 3 details the research method employed; Section 4 presents the research results; Section 5 discusses the implications of the findings; and Section 6 presents the conclusions and suggestions for future studies.

Theoretical Background

The management of sustainability risks in supply chains has attracted increasing attention from both academia and organizations, reflecting the need to balance economic, environmental, and social objectives (Sarkis et al., 2011; Ahmadi et al., 2017; Syed et al., 2019; Romano et al., 2021). The inability to effectively mitigate such risks may lead to severe consequences, including labor incidents, safety failures, adverse environmental impacts, and supply chain disruptions (Hallikas et al., 2020). Even organizations with strong governance structures and well-established practices face significant sustainability-related challenges, often resulting from the interdependence among suppliers and other stakeholders (Busse et al., 2016). Furthermore, sustainability risks may trigger adverse stakeholder reactions, affecting corporate reputation and resulting in substantial financial losses (Hofmann et al., 2014; Ahmadi et al., 2017; Syed et al., 2019; Busse et al., 2016, 2017; Hofmann et al., 2014; Bregman et al., 2015).

The literature has advanced in proposing conceptual frameworks for sustainability risk management (Busse, 2016; Busse et al., 2017; Romano et al., 2021), generally focusing on quantitative risk assessment approaches. However, these studies often prioritize only one dimension of sustainability, neglecting the interactions among environmental, social, and economic aspects. Recent studies indicate that the adoption of sustainable practices throughout the supply chain can minimize these risks while promoting organizational benefits such as greater resilience and competitive advantage (Romano et al., 2025).

The analysis and mitigation of sustainability risks in supply chains require the application of different theoretical lenses capable of explaining the organizational dynamics involved. In this context, institutional theory highlights the role of coercive, normative, and mimetic pressures in the adoption of sustainable practices, demonstrating how external factors such as regulations, stakeholder expectations, and market standards influence organizational behavior (DiMaggio & Powell, 1983; Aerts et al., 2006; Sarkis et al., 2011; Romano et al., 2023).

At the same time, cultural characteristics exert a significant influence on how these practices are internalized and implemented within organizations. Organizational culture guides values, beliefs, and behavioral patterns, directly affecting companies' ability to incorporate sustainability into their strategies and processes. In this sense, organizations with more flexible and innovative cultures tend to demonstrate a greater capacity to adapt to environmental and social demands, whereas more rigid structures may limit the speed and depth of such transformations (Baumgartner, 2009; Romano et al., 2015; 2018; 2022).

Additionally, organizational complexity theory contributes to understanding the challenges associated with risk management in increasingly interconnected and dynamic supply chains. The growing complexity resulting from the multiplicity of actors, geographic dispersion, and interdependence among supply chain members intensifies unpredictability and makes the monitoring and control of sustainable practices more difficult. Therefore, the integration of these theoretical perspectives enables a more comprehensive analysis of the factors influencing the perception and management of sustainability risks within organizations (Chakravarthy, 1997; Prigogine, 1984; Choi & Krause, 2006; Sarkis et al., 2011).

Bode and Wagner (2015) propose a model for measuring the structural complexity of supply chains based on three fundamental dimensions:

- Horizontal complexity – related to the number of suppliers and the specialization of knowledge required throughout the supply chain (Daft, 2021).
- Vertical complexity – refers to the possibility of cascading disruptions and the company's position within the hierarchical structure of the supply chain (Vachon & Klassen, 2002).
- Spatial complexity – involves the geographic dispersion of operations and the difficulties associated with logistical and regulatory coordination across different territories (Simchi-Levi et al., 2014).

The intersection between organizational complexity, sustainability risks, and sustainable management practices has been the subject of recent empirical studies, particularly in emerging markets, where institutional and cultural pressures significantly shape business strategies. In the Brazilian cosmetics sector, for example, sustainable risk modeling has been used to mitigate supply chain vulnerabilities and promote greater alignment with international sustainability guidelines (Romano et al., 2021). Moreover, companies adopting more advanced sustainable practices are able

not only to reduce systemic risks but also to achieve superior financial and operational returns (Romano et al., 2025).

A deeper understanding of supply chain complexity and the innovations adopted by suppliers will enable more efficient management, ensuring greater resilience in the face of emerging risks (Choi & Krause, 2006; Sarkis et al., 2011). Table 1 presents the main constructs associated with the organizational complexity dimension and their impact on sustainable risk management.

Table 1
Constructs Related to Complexity

	CODE	Type of Complexity	Sources
CX	CX1	Horizontal – Number of firms in the first supply tier	Bode and Wagner (2015)
	CX2	Vertical – Company position within the supply chain	
	CX3	Spatial – Geographic distance of suppliers	

Source: Prepared by the authors.

Thus, the following research proposition is suggested:

P1: *Supply chain complexity increases sustainability risks, making monitoring and control more challenging. It is crucial for companies to manage this complexity and mitigate the associated risks.*

Organizational processes are shaped by institutional dynamics that promote organizational adaptation and, consequently, institutional isomorphism, leading to the imitation of practices, norms, and organizational structures (DiMaggio & Powell, 1983; Aerts et al., 2006; Sarkis et al., 2011; Dubey et al., 2017). The search for legitimacy within organizational fields occurs through the alignment of business practices with accepted standards, often driven by three types of isomorphism: coercive (regulatory and governmental pressures), normative (the influence of professional associations and sector standards), and mimetic (the adoption of practices already implemented by leading firms) (DiMaggio & Powell, 1983; Liang et al., 2007).

Institutional theory explains how external factors drive the adoption of sustainable practices in supply chains, influenced by regulations, stakeholder expectations, and market pressures (Romano et al., 2023). Companies adopt such practices to improve environmental and social performance, minimize risks, and meet institutional requirements (Romano et al., 2025).

Institutional pressures shape both the internalization of sustainability and the perception of risks, varying according to the organizational environment and culture (Baumgartner & Ebner, 2010; Romano et al., 2015, 2018, 2022). Highly regulated sectors respond to coercive pressures, whereas companies operating within global networks face mimetic pressures, replicating sustainable practices to maintain competitiveness (Sarkis et al., 2011; Romano et al., 2021). These factors reinforce the role of institutional pressures in the evolution of corporate sustainability.

Furthermore, studies demonstrate that the way companies respond to institutional pressures is directly related to supply chain complexity and the level of organizational maturity. Companies with highly complex supply chains face greater challenges in implementing sustainable standards due to supplier diversity, production fragmentation, and regulatory differences across markets (Busse et al., 2017; Romano et al., 2021). In the cosmetics sector, for example, Brazilian companies have used risk modeling to mitigate institutional pressures and align themselves with global sustainability requirements, demonstrating how these pressures shape business practices (Romano et al., 2021).

Table 2

Constructs Related to Institutional Pressures

	CÓD	Institutional Pressures	Sources
PO	PO1	Companies that fail to comply with legal standards face legal actions.	Khalifa & Davison, 2006; Colwell & Joshi, 2013; Dubey et al., 2017
	PO2	Companies are aware of environmental fines and penalties.	
	PO3	Violations result in negative market reports.	
	PO4	Noncompliance with regulations leads to negative consequences.	
	PO5	Trade associations encourage greater responsibility throughout the supply chain.	
	PO6	Companies are expected to be environmentally and socially responsible.	
	PO7	Being environmentally and socially responsible is a requirement for participating in the supply chain.	
	PO8	Leading companies serve as examples of sustainable conduct.	
	PO9	Companies in the sector are recognized for their environmental and social practices.	
	PO10	Leading companies have reduced their environmental impacts.	

Source: Prepared by the authors.

Thus, the following research proposition is suggested:

P2: *Institutional Theory may help clarify how external pressures affect the adoption of sustainable practices in supply chains, helping mitigate risks related to noncompliance with stakeholder expectations.*

Organizational culture is essential in the formulation of strategies and the adoption of sustainable practices, encompassing values, beliefs, and norms (Baumgartner, 2009; Romano et al., 2015; 2018; 2022). Sustainable strategies require organizational maturity (Baumgartner & Ebner, 2010). The Competing Values Framework evaluates the balance between control and flexibility in sustainability (Quinn & Rohrbaugh, 1983; Liu et al., 2010; Cao et al., 2015).

The literature suggests that organizational culture may be characterized across different dimensions, including flexibility and change, organizational development, hierarchy, and rationality (Dubey et al., 2017). Companies with more flexible and innovative cultures tend to demonstrate greater adaptability to environmental and institutional changes, valuing aspects such as creativity, loyalty, and continuous learning. In contrast, organizations with more rigid and control-oriented cultures emphasize rules, policies, and stability, prioritizing predictability and operational efficiency (Liu et al., 2010; Cao et al., 2015).

Organizational culture influences the adoption of sustainable practices in supply chains. Dynamic companies internalize such practices proactively, whereas hierarchical organizations tend to respond primarily to external pressures (Romano et al., 2023; 2025). Moreover, shared values influence the conversion of these practices into organizational benefits, affecting sustainability performance and risk management (Romano & Ferreira, 2022).

Thus, organizational culture not only shapes how companies adopt sustainable practices but also influences the perception of sustainability risks throughout the supply chain. Table 3 presents the main constructs associated with cultural characteristics, highlighting how different cultural profiles impact the adoption and effectiveness of sustainable practices.

Table 3

Constructs Related to Cultural Characteristics

	CODE	Cultural Characteristics	Sources
CO	CO1	The company prioritizes tradition and loyalty in relationships with customers and suppliers.	Liu et al., 2010; Dubey (2017)
	CO2	There is a predisposition to take risks and explore new opportunities.	
	CO3	The supply chain values innovation and continuous development.	
	CO4	The focus is on growth through the generation and implementation of ideas.	
	CO5	Formal rules and policies are strictly followed.	
	CO6	Permanence and stability are highly valued.	
	CO7	The supply chain is oriented toward measurable results and goals.	
	CO8	Meeting targets is of great importance.	

Source: Prepared by the authors.

Thus, the following research proposition is suggested:

P3: *Cultural characteristics influence sustainability risks in supply chains, since flexible and innovative cultures adapt more effectively to sustainability demands, whereas cultures focused on rules and stability may face greater challenges in adapting.*

Methods

This study is characterized as exploratory-descriptive, with a quantitative approach, using the survey method to analyze the relationship among organizational culture, institutional pressures, and supply chain complexity in the perception of sustainability risks. Descriptive analyses were conducted to evaluate the impact of these factors on the Brazilian business context.

The research was conducted with Brazilian companies that possess a formally structured sustainability department (n = 152). Initially, companies located in the state of São Paulo were contacted. Due to the low response rate, the sample was expanded to include companies from the Southeast region of Brazil, increasing the representativeness of the data. The structured questionnaire included the methodological approach, objective, unit of analysis, population, sample, and selection criteria. The items were logically organized, and responses followed a seven-point Likert scale.

The variables were operationalized based on constructs identified in the literature and organized into seven-point Likert scales. Data analysis involved descriptive statistics to characterize response patterns associated with the investigated constructs.

This study contributes to a better understanding of the factors the perception of sustainability risks, supporting the formulation of more effective business strategies aligned with institutional and cultural demands.

To ensure the validity and reliability of the data, the instruments were based on scales previously validated in the literature. In addition, a pre-test was conducted with specialists in the field to verify the clarity and consistency of the questions.

Table 4

Research Summary for Answering the Research Questions

Aspect	Description
Approach	Quantitative
Method	Survey research
Objective	To analyze quantitative results from Brazilian companies
Unit of analysis	Brazilian companies with a sustainability department
Sample	152 companies (43.42%)
Data source	Structured questionnaire
Platform used	https://www.limesurvey.org/pt/
Literature Review	Cultural characteristics; Institutional Pressures; Complexity; Sustainability risks

Source: Prepared by the authors.

A large portion of the literature on sustainability in supply chains is concentrated in developed countries. This study seeks to expand this body of knowledge to developing countries such as Brazil, contributing to filling research gaps in management studies in Latin America (Aguinis et al., 2020). A quantitative approach was adopted, allowing the testing of existing theories and the development of new interpretations. The method employed was a survey, as recommended by Forza (2002), focusing on sustainability managers and directors.

Data collection took place between January and May 2021 through structured questionnaires in Portuguese administered via the LimeSurvey platform (repository of the Universidade Aberta). The sample was obtained from the contact database of the Associação Brasileira de Sustentabilidade (ABRAPS), totaling 152 responses and a response rate of 43.42% (350 invitations sent). The sample size was considered adequate for testing the study propositions, according to Hair et al. (2006). The selection of companies with formal sustainability departments is justified by the need to ensure that respondents possess structured knowledge regarding socio-environmental practices and risks. However, this delimitation may restrict the generalization of the findings to smaller companies or organizations with lower levels of sustainability maturity.

Results

The analysis of the general data of the companies made it possible to outline the profile of the participating organizations. The metal-mechanical sector was the most representative, accounting for 22.4% of the sample. This was followed by the food and beverage (11.8%), chemical (11.2%), and household goods and personal care (9.2%) sectors. Together, these four sectors represent 54.6% of the responses, indicating a significant concentration in these segments. This initial analysis contributes to understanding the sectoral profile of the companies and may support more in-depth investigations regarding differences in the perception of sustainability risks across sectors.

Table 5

Business Segments of the Respondent Companies

Sector	Absolute Frequency		Absolute Frequency	
	Absolute Frequency	Cumulative Absolute Frequency	Relative Frequency	Cumulative Relative Frequency
Metal-mechanical	34	34	22.4%	22.4%
Food and beverages	18	52	11.8%	34.2%
Chemical	17	69	11.2%	45.4%
Household goods	14	83	9.2%	54.6%
Paper and cellulose	12	95	7.9%	62.5%
Automotive and auto parts	11	106	7.2%	69.7%
Civil construction	9	115	5.9%	75.7%
Medical equipment	6	121	3.9%	79.6%
Oil and gas	5	126	3.3%	82.9%
Others	26	152	17.1%	100.0%
Total	152		100.0%	

Source: Prepared by the authors.

The analysis of the distribution of companies according to their founding year reveals a predominance of organizations established from the 1970s onward. This result suggests that most respondent companies are relatively recent, possibly reflecting the expansion of the Brazilian business sector during this period. The presence of only 7.9% of companies founded before 1950 may indicate difficulties in maintaining older organizations or challenges in obtaining responses from this group. This information is relevant for characterizing the sample and should be considered in subsequent analyses, especially in investigations concerning historical trajectories and organizational sustainability.

Additional data useful for characterizing the sample are presented below. The sample is predominantly composed of companies founded after the 1970s, reflecting the expansion of the Brazilian business sector during this period. Only 7.9% of the companies were founded before 1950, possibly indicating organizational longevity challenges or difficulties in obtaining responses from this group. With respect to revenue, the sample essentially consists of medium-sized and large companies, with 48.7% classified as large and 42.1% as medium-sized companies. Small-medium companies represent only 9.2%, and there are no micro or small enterprises in the sample.

These data are relevant for understanding the profile of the analyzed companies, supporting the interpretation of the impacts of institutional pressures, supply chain complexity, and organizational culture on the adoption of sustainable practices. Furthermore, the findings may provide insights for the development of specific strategies aimed at encouraging small companies to adopt sustainability practices.

Supply Chain Complexity

The structure of the supply chains of the analyzed companies reveals different levels of structural complexity, with nearly half of the companies having up to 100 direct suppliers, indicating lower fragmentation in the supplier base. On the other hand, 15.8% of the companies have more than 301 direct suppliers, characterizing a more complex structure. This differentiation reflects distinct

challenges in supplier management, including quality control, sustainability, and regulatory compliance. The analysis of positions occupied within the supply chain reveals that 75% of the companies operate as direct suppliers or final manufacturers, while only 5.9% are raw material suppliers. This scenario suggests that sustainability tends to be more relevant for companies closer to the final consumer, where market and stakeholder pressures are more evident. However, the lower participation of upstream suppliers highlights the need to encourage sustainable practices from the earliest stages of the supply chain.

Regarding the origin of purchased inputs, 52% of the companies acquire materials within the state of São Paulo, followed by suppliers from other states in the Southeast region (25.7%). Only a small proportion acquires materials from other regions of Latin America or the rest of the world (6.6%), suggesting a more regionalized rather than globalized sourcing profile. This concentration may imply logistical and regulatory advantages but also represents risks associated with dependence on local suppliers.

These findings are fundamental for understanding the challenges involved in managing sustainability within supply chains, indicating that factors such as the number of suppliers, supply chain position, and origin of inputs may significantly influence the adoption and dissemination of sustainable practices.

Institutional Pressures

The results indicate the influence of institutional pressures on the adoption of sustainable practices by companies, as identified in the literature (Khalifa & Davison, 2006; Colwell & Joshi, 2013; Dubey et al., 2017). The perception of these pressures was evaluated on a scale ranging from 1 (strongly disagree) to 7 (strongly agree), revealing three main types of influence: coercive, normative, and mimetic.

Coercive pressures demonstrate that companies partially recognize the existence of legal sanctions (27%), fines and penalties (33%), negative reports (32%), and consequences resulting from regulatory noncompliance (38%). Normative pressures highlight the role of professional associations in encouraging environmental responsibility (36%), as well as expectations regarding sustainable conduct (39%) and the requirement of responsibility for participation in the supply chain (34%). Mimetic pressures reflect a strong influence of leading companies, which are recognized for their sustainable practices (40%) and their active efforts to reduce environmental impacts (37%).

These findings reinforce the importance of institutional pressures in environmental and social compliance, encouraging companies to adopt sustainable practices in order to maintain competitiveness and meet regulatory requirements.

Cultural Characteristics

The analysis of cultural dimensions reveals the coexistence of flexible and control-oriented approaches within the studied companies, as evidenced by the organizational culture codes (CO1 to CO8). The flexible orientation is characterized by commitment within the supply chain (36%) and growth based on new ideas (36%), indicating a predisposition toward adaptation and innovation. However, the propensity to take risks (45%) and commitment to innovation (42%) present only partial

agreement, suggesting that although there is an environment favorable to change, organizational culture has not yet fully explored its innovative capacity.

On the other hand, the control-oriented approach highlights an environment focused on efficiency and compliance, with companies demonstrating strong appreciation for formal rules and policies (41%), organizational stability (37%), results orientation (41%), and goal achievement (42%). This organizational profile contributes to greater predictability and operational control, facilitating compliance with environmental and social standards.

The findings indicate that the interaction between organizational culture and sustainability may be strengthened through the integration of flexibility and control, enabling companies to innovate without compromising stability and regulatory compliance. This balance may be decisive for advancing sustainability within supply chains, promoting structural changes aligned with market demands and institutional requirements.

Sustainability Risks

The perception of internal sustainability risks indicates that companies partially agree with the absence of past incidents and their consequences. There is moderate agreement that they have never experienced negative media exposure (34%), worker strikes related to labor conditions (32%), loss of customers due to poor sustainability practices (39%), or lawsuits resulting from noncompliance with environmental and social regulations (38%). These findings suggest that although companies are aware of internal risks, they have already faced sustainability-related challenges in their operations.

Regarding supplier-related risks, the results also indicate partial agreement. Companies recognize that their suppliers have never compromised the commercialization of sustainable products (45%), nor have they been criticized due to their partnerships (41%). There is also a moderate perception that relationships with suppliers have not affected their reputation (41%), negatively impacted operational performance (38%), or influenced stakeholder reactions (41%).

These findings reflect a growing awareness of sustainability risks, both internally and throughout the supply chain. However, the partial agreement suggests the need to improve socio-environmental risk management by strengthening monitoring mechanisms and supplier engagement in order to ensure greater transparency and mitigation of negative impacts.

Discussions

The descriptive analysis reveals that the sample is predominantly composed of large companies from the metal-mechanical, food and beverage, chemical, and household goods sectors, with a strong concentration in the Southeast region of Brazil and a high level of complexity in supplier structures. These findings reinforce the predominant profile of companies leading the adoption of sustainable practices and facing challenges in managing sustainability within their supply chains. The analysis of institutional pressures indicates that coercive, normative, and mimetic factors are perceived as relevant elements associated with the adoption of sustainable practices. The perception of legal sanctions, fines, and penalties (Dubey et al., 2017) reinforces the role of regulation as a mechanism for environmental compliance (Khalifa & Davison, 2006; Colwell & Joshi, 2013). In addition, normative pressures highlight the role of trade associations and certifications in disseminating sustainable practices (Liang

et al., 2007).

The results related to mimetic pressures may be interpreted in light of institutional theory, as leading companies are recognized for their sustainable practices, encouraging other organizations to adopt similar strategies (Aerts et al., 2006; DiMaggio & Powell, 1983). However, the partial agreement observed suggests that although corporate leaders promote sustainable standards, there is still room for more active engagement in the diffusion of these practices. Recent studies show that mimetic influence may be intensified through the integration of environmental strategies and economic value creation for companies (Romano et al., 2023, 2025). The results indicate that the studied companies exhibit both flexible and control-oriented approaches, reflecting a balance between innovation and regulatory compliance. Organizations with more flexible cultures demonstrate a greater predisposition to adopt new ideas and adapt to change (Dubey et al., 2017; Romano et al., 2018). However, the partial agreement regarding risk acceptance and innovation (Cao et al., 2015) indicates that barriers to experimentation with new environmental practices still remain.

On the other hand, the strong presence of a control-oriented approach, emphasizing formal rules, stability, and performance delivery, suggests that the adoption of sustainability is associated with regulatory compliance and the efficient management of environmental and social performance (Quinn & Rohrbaugh, 1983; Liu et al., 2010). This finding reinforces studies highlighting that sustainability may be strengthened through well-defined organizational structures, provided they are complemented by innovation-oriented initiatives (Baumgartner & Ebner, 2010; Romano et al., 2022). The need to balance control and flexibility in sustainability management is a central issue, as highly hierarchical companies may face difficulties integrating new environmental practices, whereas excessively flexible organizations may fail to consistently implement their sustainable strategies. The development of hybrid models combining strict governance with strategic adaptability may represent a pathway for optimizing the benefits of both approaches (Romano & Ferreira, 2022).

The analysis of internal and external sustainability risks indicates that companies are aware of environmental and social challenges, although the findings suggest only partial agreement regarding the potential impact of these risks on corporate reputation and performance. This suggests that although sustainability practices are being adopted, risk perception is still not broadly disseminated within organizational culture (Sarkis et al., 2011; Romano et al., 2021). Relationships with suppliers also represent a critical factor, as many companies recognize challenges in maintaining sustainable standards throughout the supply chain (Busse et al., 2016). Dependence on suppliers that do not comply with environmental requirements may compromise both company reputation and market performance (Busse et al., 2017; Hallikas et al., 2020).

In this context, the application of institutional theory and organizational complexity theory helps explain how supply chain structure influences the adoption of sustainable practices (Romano et al., 2015; 2018). The integrated management of environmental and social risks, aligned with stakeholder expectations and regulatory requirements, is essential to ensure organizational resilience and competitiveness (Hofmann et al., 2014).

Regarding the responses to the research propositions, it is possible to indicate that:

Proposition 1: Supply chain complexity represents a challenge for sustainability management. The descriptive results indicate evidence consistent with the proposition; the findings show that most companies face difficulties in monitoring and controlling suppliers' sustainability practices, relying on audits and certifications to ensure compliance. **Proposition 2:** Institutional pressures influence the adoption of sustainable practices. The descriptive results indicate evidence consistent with the

proposition; the perceived importance of regulatory compliance and stakeholder expectations reinforces that external factors are decisive for the implementation of sustainability throughout the supply chain. **Proposition 3:** Companies' cultural characteristics influence sustainability management. The descriptive results are partially consistent with the; the findings indicate a balance between flexible and control-oriented approaches; however, innovation and risk acceptance still need to be further explored to optimize sustainability outcomes.

Final Considerations

This study adopted a theoretical and empirical approach to investigate how supply chain complexity, institutional pressures, and cultural characteristics influence the perception of sustainability risks in Brazilian companies. The descriptive analysis allowed the characterization of the profile of the participating companies, revealing that the sample is predominantly composed of large companies from the metal-mechanical, food and beverage, chemical, and household goods sectors, with relatively lean supply chains and a strong dependence on suppliers located in the state of São Paulo. The findings of this study reinforce the need to integrate sustainable practices into supply chain management, aligning with SDG 12 (Responsible Consumption and Production) and SDG 9 (Industry, Innovation and Infrastructure). The implementation of sustainable strategies may not only reduce operational and reputational risks but also strengthen supply chain resilience by promoting innovation and efficiency. Thus, this study contributes to advancing the understanding of sustainability in complex supply chains, highlighting the importance of institutional and cultural policies that encourage the adoption of sustainable practices across different industrial sectors.

The results indicate that although companies recognize the importance of regulatory compliance and the adoption of sustainable practices, there is only partial confidence regarding the control of internal and supplier-related risks. This finding reinforces the complexity of sustainability management in supply chains, which requires consideration of institutional, cultural, and corporate governance factors to mitigate socio-environmental impacts and ensure greater organizational resilience. The influence of institutional pressures was evidenced in companies' perceptions regarding environmental regulations, stakeholder expectations, and market requirements. However, adherence to sustainable practices still occurs in a reactive manner, leaving room for greater strategic engagement, especially among leading companies within the sector.

The analysis of cultural characteristics revealed the presence of both flexible and control-oriented approaches, suggesting the need for a balance between innovation and compliance in order to maximize the benefits of sustainability. Companies adopting a hybrid approach, combining organizational adaptability with regulatory rigor, may achieve greater success in implementing sustainable strategies and mitigating risks throughout the supply chain.

Given the complexity of the topic, future investigations may further explore the following aspects:

- **Evolution of sustainability management over time** – A longitudinal study evaluating how sustainable practices evolve across different markets and sectors, considering regulatory changes and technological innovations.
- **Suppliers' perspective on sustainability implementation** – Investigating the barriers and facilitators affecting the adoption of sustainable practices by suppliers, especially smaller firms that may face structural challenges.

- **Impact of sustainable management on business performance** – Assessing the effects of sustainability on environmental, social, and economic indicators, including the costs and benefits associated with the adoption of such practices.
- **Relationship between supply chain complexity and sustainability risks** – A more in-depth analysis of how supply chain structures influence the ability to manage environmental and social risks, especially in global supply chains.

These investigations may contribute to expanding academic knowledge and provide support for the formulation of more effective business policies and strategies, promoting more sustainable, resilient, and competitive supply chains. This study presents some limitations. First, the sample is concentrated on companies with formal sustainability structures, which may limit the generalization of the findings to smaller organizations. In addition, the use of perceptual data may introduce response biases. Finally, the cross-sectional approach does not allow causal inferences over time.

From a practical perspective, the findings indicate that managers should prioritize the balance between organizational control and flexibility in order to improve sustainability management. Furthermore, public and regulatory policies may play a fundamental role in strengthening sustainable practices, especially through coercive and normative pressures. Companies should also invest in supply chain monitoring mechanisms to mitigate supplier-related risks.

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