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Why companies adopt supply chain sustainability practices: A study of companies in Brazil

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ABSTRACT

With the increased concern about social and environmental impacts, managing sustainability in supply chains has become a focus of interest. In consequence, companies are adopting supply chain sustainability practices also due to pressures from various stakeholders. Questions arise about how certain types of pressures can influence the adoption of behavioral and technical practices related to sustainability and how these relationships vary along supply chains. The research utilizes data from Brazilian companies and employs structural equation modelling to investigate the adoption of sustainability practices in supply chains. Normative and mimetic pressures positively affect behavioral and technical practices. On the other hand, coercive pressures have no influence on the adoption of sustainability practices, whether technical or behavioral. The findings enhance the understanding of how institutional pressures shape the adoption of sustainability practices, benefiting companies and policymakers aiming to promote sustainable supply chains.

1. Introduction

In recent years, there has been a growing concern regarding living conditions and climate change due to the ongoing process of industrialization, resulting in increasingly significant environmental impacts (Razzaq et al., 2020; Chandio et al., 2021). More recently, academic studies have focused on sustainability practices in various supply chains, recognizing that addressing these issues can enhance organizational competitiveness (Feng et al., 2018). Supply chain management practices aiming to reduce energy consumption and pollution have shown long-term sustainability improvements (Romano et al., 2018; Nureen et al., 2022; Vidal et al., 2023), leading to competitive advantages (Nureen et al., 2022).

Successfully implementing sustainability practices in supply chains involves identifying technical and behavioral practices. Technical practices, such as eco-design and reverse logistics, have been studied extensively (Green et al., 2012; Yang et al., 2022; Nureen et al., 2022). However, behavioral practices, including top management support and engagement with customers and suppliers, have been overlooked in developing economies (Kumar et al., 2019; Adebayo et al., 2021). Furthermore, the precise understanding of the meaning of behavioral dimensions and their impact on technical practices is still in its early stages (Dubey et al., 2017; Anuar et al., 2022).

The pressures on companies have proved to be the main factors potentially motivating companies to adopt sustainability practices (Yang, 2018; Anuar et al., 2022; Nureen et al., 2022). Those practices stem from institutional issues, customer demands for environmental protection, pressure from regulatory agencies, government regulations, and the market's competitive nature. However, organizations in the same industry adopt similar practices and decision-making approaches to legitimize their actions and gain acceptance (Marculetiu et al., 2023).

Adopting and implementing sustainability practices aims to respond to a specific institutional pressure, which can change over time, serving as a driver of sustainability strategies (Chu et al., 2017; Zhang et al., 2021). A concept that has been gaining ground in recent years is Green Supply Chain Management (GSCM). This concept integrates a company's procurement plans with environmental initiatives in supply chain management, aiming to enhance the environmental performance of both suppliers and customers (Bowen et al., 2009; Herrmann et al., 2021).

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Institutional pressures drive organizations to adopt sustainability strategies and impact resource efficiency (Anuar et al., 2022; Marculetiu et al., 2023). While sustainable supply chain management is well-established in developed countries, its implementation in developing countries is still in its early stages (De Sousa Jabbour et al., 2017; Vanalle et al., 2017). This study highlights the significance of studying the adoption of sustainability practices, particularly behavioral practices, in Brazilian supply chains. Although technical sustainability practices are predominant, implementing behavioral practices lags in developing countries, underscoring the need for better understanding (Jabbour et al., 2017; Kumar et al., 2019). The focus on implementing behavioral sustainability practices in these countries is essential (Razzaq et al., 2020; Nureen et al., 2022).

Due to sustainability's multidisciplinary characteristics, involving economic, environmental, and social issues, problems do not always stay within traditional organizational boundaries (Garetti and Taisch, 2012). Thus, it is necessary to promote different sustainable practices in supply chains to deal with this complexity (Marshall et al., 2015). However, although the spontaneous adoption of sustainability practices by firms can occur, it is more likely that this adoption results from pressures from external stakeholders (Liu et al., 2020; Wong et al., 2020; Wang and Yang, 2021). In the literature, it has been found that different motives can lead organizations to adopt sustainability practices (Green et al., 2012; De Sousa Jabbour et al., 2017; Vanalle et al., 2017).

This research aims to surpass a mere identification of sustainable practices in supply chains by delving into the intricate dynamics of organizational decisions regarding sustainability. By comprehending institutional pressures shaping these choices, it seeks to understand incentives and challenges faced by companies. Consequently, this understanding can lead to informed strategies that foster the widespread adoption of sustainable practices across the supply chain.

Using a dataset from Brazilian companies, a theoretical model (detailed in Title 2) was tested using partial least squares structural equation modelling (PLS–SEM), which is often used to analyze complex relationships and test hypotheses in research models (Hair et al., 2014; Ringle et al., 2014). The study used a questionnaire as a research instrument, evaluated on a seven-point Likert scale, to test the proposed theoretical model and hypotheses. A pilot study with 5 experts validated the questionnaire's relevance for supply chain sustainability. This process ensures the questionnaire's reliability, validity, and practicality (Chen and Paulraj, 2004; Forza, 2016; Cohen et al., 2018).

This study was designed to answer the following Research Question (**RQ**):

(**RQ**): How can institutional pressures affect companies in adopting behavioral or technical sustainable practices in supply chains?

This study explores institutional pressures affect companies on adopting sustainable practices in supply chains, considering behavioral and technical aspects. Drawing on institutional theory (Dubey et al., 2017; Ahmed et al., 2019) and sociotechnical systems theory (Govindan et al., 2015; Liu et al., 2020), it investigates coercive, normative, and mimetic pressures' influence on practice adoption, aiming for a comprehensive understanding of this complex relationship.

The paper is structured as follows: section 2 presents the review of previous research, the theoretical framework, and the presentation of the hypotheses; section 3 presents the research method used; section 4 presents the results and discussion, and section 5 presents the conclusions of this study.

2. Conceptual model development

The theoretical foundation of this research comprises two elements: institutional pressures and sustainability practices. Institutional pressures may be assessed by institutional theory. Studies involving this theory have become increasingly frequent in the literature on sustainability assessment in supply chains (Dubey et al., 2017; Saeed et al., 2018; Ahmed et al., 2019). Institutional theory, originally developed by Di Maggio and Powell (1983), has proven to be an important way of explaining organizational decisions.

Recent studies indicate that the rationale that leads companies to adopt sustainable management practices in supply chains comes mainly from institutional pressure to become more sustainable (Dai et al., 2021; Kauppi and Luzzini, 2022). Therefore, Institutional theory might help to explain how external pressures can influence a company to adopt organizational practices in a similar way to sustainability practices in supply chains (Ahmed et al., 2019; Dai et al., 2021; Kauppi and Luzzini, 2022).

When organizations in a particular industry adopt similar institutionalized practices and decision-making approaches, it may just be an attempt to legitimize their actions (Marculetiu, et al., 2023). The means of consolidating legitimacy is the alignment of the rationalized goal (March and Olsen, 1983), manifested by adopting the structural attributes of other relevant organizations, and can happen in the following ways:

(i) Regulatory or coercive pressure, when they occur by formal and informal pressures from one organization on others, such as government agencies, regulatory standards, or customers, especially linked to societal expectations (Darnall et al., 2008; Yang, 2018; Nath and Eweje, 2021). When considering the actions of a manager of a manufacturing company, coercive pressures from regulators to implement green supply chain practices in pursuit of better performance are common.

ii) Normative pressure can occur through a professionalization process in the search for legitimizing better and more professional practices (Liang et al., 2007; Kauppi and Luzzini, 2022). Different groups can push for change, ranging from educational institutions, industry associations, non-governmental organizations, suppliers, and customers (Chu et al., 2017). The implementation of such organizational practices acts as a central normative pressure from customers and the market for environmental expectations (Yang, 2018). Companies serving international markets, experience pressure to adopt and implement green supply chain practices (Lai et al., 2015).

(iii) Cognitive or mimetic pressure, which originates from replicating the actions of successful competitors, in the quest to reproduce their success (Aerts et al., 2006). Mimetic pressures are isomorphic actions that encourage organizations to replicate the processes or business models of other successful industrial organizations (Saeed et al., 2018). In the case of suppliers from developing countries, it is possible to use this pressure as a learning opportunity in relation to supply chain partners or international competitors and is also a way to upgrade green products (Zhu et al., 2010; Saeed et al., 2018).

The isomorphic pressures indicated by institutional theory may motivate companies to comply with the law, a supply chain requirement, or to increase their competitiveness. Although different institutional demands may occur simultaneously in some markets, the current global stage of resource depletion and amplification of human health and environmental degradation, has led manufacturers to face additional pressure from end consumers and governments to implement sustainability practices (De Sousa Jabbour et al., 2017; Vanalle et al., 2017).

However, the literature presents contrasting evidence with reference to the presence of these pressures. The literature indicates the existence of positive relationships between institutional pressure and sustainability practices where regulatory, customer and competitive pressure are the main drivers that lead firms to implement sustainable supply chain management practices (Zhu et al., 2013; Chu et al., 2017). The institutional environment can also help companies to adopt sustainable

supply chain management practices. In China, the influence of institutional pressures on the adoption of environmental management practices has been visible in the manufacturing sector (Zhu et al., 2013). Manufacturers have been adopting practices by following the standards, rules, and requirements imposed by different international trade entities, to improve operations in ecological terms (Zhu et al., 2013).

For Ahmed et al. (2019), institutional pressures are important in influencing organizations to adopt sustainable practices in supply chains. According to these authors, normative pressure exerted by customers and supply chain partners has the greatest effect, followed by mimetic and coercive pressures. As stressed earlier studies have identified a positive relationship between institutional pressures and adopting sustainable management practices in supply chains, with a bias towards green practices, without, however, evaluating the three types of pressures in isolation (Vanalle et al., 2017).

Numerous empirical studies have examined the effects of institutional pressures on the adoption of green sustainability practices in supply chains (Zhu et al., 2013). Previous studies indicate that institutional pressures can affect how companies view and adopt sustainability practices in supply chains (Dubey et al., 2017; Vanalle et al., 2017; Ahmed et al., 2019). However, the existing literature lacks a comprehensive understanding of how these institutional pressures specifically shape the adoption of both behavioral and technical sustainability practices in supply chains. Therefore, further research is needed to bridge this gap.

The literature supports the influence of coercive institutional pressures on the adoption of behavioral and technical sustainability practices in supply chains (Govindan et al., 2015; Laari et al., 2016; Chu et al., 2017; Liu et al., 2020). Coercive pressures, such as those resulting from regulations and norms, positively affect the adoption of behavioral practices, such as leadership and customer and supplier engagement (Green et al., 2012; Govindan et al., 2015; Liu et al., 2020). Additionally, these pressures also positively influence the adoption of technical practices, such as cleaner production, total quality environmental management, and reduction of environmental impacts (Luthra et al., 2015; Laari et al., 2016). Therefore, there is support in the literature to propose the following hypotheses:

H1. coercive pressures positively affect the adoption of sustainability behavioral practices in supply chains.

H2. coercive pressures positively affect the adoption of technical sustainability practices in supply chains.

The literature indicates that normative pressures influence the adoption of sustainable practices in supply chains Liang et al. (2007); Yang (2018); Kauppi and Luzzini (2022). Normative pressure, arising from the professionalization process, seeks to legitimize better and more professional practices (Liang et al., 2007; Kauppi and Luzzini, 2022). Different groups, such as educational institutions, industry associations, non-governmental organizations, suppliers, and customers, can drive change (Chu et al., 2017). Implementing these organizational practices is a central normative pressure from customers and the market concerning environmental expectations (Yang, 2018). Moreover, companies serving international markets face additional pressure to adopt and implement sustainable practices in the supply chain (Lai et al., 2015). Based on this evidence, the following hypotheses can be inferred:

H3. normative pressures positively affect the adoption of sustainability behavioral practices in supply chains.

H4. normative pressures positively affect the adoption of technical sustainability practices in supply chains.

Academic literature indicates that mimetic pressures influence the adoption of sustainable practices in supply chains (Aerts et al., 2006; Zhu et al., 2010; Saeed et al., 2018). The pursuit of replicating the actions of successful competitors, known as mimetic pressure, aims to reproduce their success (Aerts et al., 2006). These mimetic pressures encourage organizations to imitate other successful industrial firms' processes or business models (Saeed et al., 2018). In the case of suppliers from developing countries, this mimetic pressure can be seen as a learning opportunity in relation to supply chain partners or international competitors, as well as to enhance sustainable products (Zhu et al., 2010; Saeed et al., 2018). Furthermore, behavioral practices play a crucial role in the successful implementation of technical sustainability practices. Leadership, relationship-building, and customer and supplier engagement are essential factors in this process (Green et al., 2012; Govindan et al., 2015; Liu et al., 2020). These behavioral practices are influenced by mimetic pressures, which stimulate the replication of behaviors adopted by other successful organizations (Saeed et al., 2018). Therefore, based on this evidence, we can formulate the following hypotheses:

H5. mimetic pressures positively affect the adoption of sustainability behavioral practices in supply chains.

H6. mimetic pressures positively affect the adoption of technical sustainability practices in supply chains.

Based on earlier literature, the following hypotheses were then posited, as presented in Fig. 1, to try to contribute to answering the research question earlier pointed out.

This study proposes a conceptual framework to explore the influence of pressures on the adoption of sustainability practices in supply chains. The framework includes six hypotheses, examining the effects of coercive, normative, and mimetic pressures on behavioral and technical sustainability practices. This framework contributes to sustainable supply chain management research by providing a systematic approach to understanding institutional pressures and their impact on sustainability practices. The findings offer valuable insights for organizations seeking to implement sustainable practices and contribute to a more environmentally and socially responsible supply chain.

3. Research methods

In this study, a research instrument was used to test the proposed theoretical framework and associated hypotheses empirically. The questionnaire items were developed based on the literature and measured on a seven-point Likert scale. A pilot study was conducted with 5 experts to assess the questionnaire's relevance in sustainability in supply chains. The pretest was crucial in establishing the validity of the research structure, considering the experts' opinions on the questionnaire's practical suitability. This process is essential to enhance the developed questionnaire's reliability, validity, and practicality (Chen and Paulraj, 2004; Forza, 2016; Cohen et al., 2018).

The questionnaire aimed to assess the relationships between institutional pressures and the adoption of sustainability practices in Brazilian companies. The measures related to the questionnaire were based on preliminary studies on institutional pressures (Dubey et al., 2017) and sustainability practices in supply chains (Muduli et al., 2013; Liu et al., 2020). Following the conceptual model (see heading 2) institutional pressures were categorized as coercive (CP), normative (NP), or mimetic (MP) constructs (see Appendix 1).

Senior management's commitment to implementing sustainability can be demonstrated through various practices, such as aligning the organization's understanding of sustainability, providing education and training to employees on environmental and social issues, using environmental and social criteria in selecting suppliers, setting environmental and social goals and sharing information about clean technologies with suppliers (Luthra et al., 2015; Jabbour et al., 2017; Liu et al., 2020). These practices are detailed in Appendix 1.

A representative sample of Brazilian companies was created using the database of the Brazilian Sustainability Association (www. https://abraps.org.br/). A total of 350 invitations to respond to the questionnaires were sent out, and 152 responses were received. The sustainability managers were the primary respondents, holding positions of

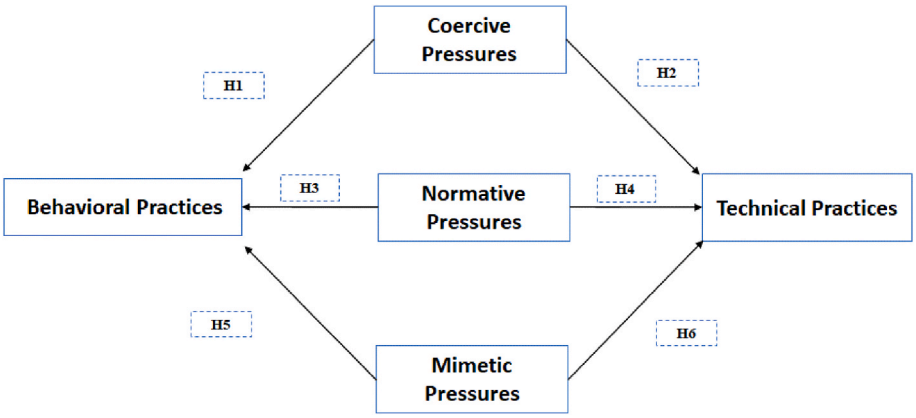

Fig. 1. Relations between the research variables Model.

responsibility and involved with supply chain management and sustainability in the company. This approach is valuable for exploring perceptions and sustainability practices in committed organizations, obtaining relevant and significant insights into their sustainable practices, and reinforcing the validity of the study's results. The response rate corresponds to an effective rate of 43.42%. This sample size is sufficient to study the hypotheses developed in this study (Hair et al., 2019).

The results were interpreted using partial least structural equation modelling (PLS-SEM - Version 3 of SmartPLS was used). This process begins with the evaluation of the measurement model, based on the relationships between the indicators and constructs, and in a second phase, the structural model is evaluated, along with the relationships between the constructs. The evaluation of the measurement model considered items such as discriminant validity, average variance extracted, internal consistency (Cronbach's alpha), and composite reliability (Ringle et al., 2014; Hair et al., 2014).

The evaluation of the structural model involved calculating coefficients of determination (R^2) using Pearson's correlation, which indicates the proportion of variance in endogenous variables explained by the model. Cohen et al. (2018) suggest that R^2 values of 2% represent a small effect, 13% moderate, and 26% large. According to a research study conducted by Hair et al. (2019) on marketing issues, R^2 values of 0.75, 0.50, and 0.25 for endogenous latent variables can be considered substantial, moderate, and weak, respectively. These values serve as an approximate rule of thumb. Additionally, significance levels (p-values) are assessed, with ≤ 0.05 indicating statistical significance. The null hypothesis (Ho) assumes no relationship ($r = 0$) for correlations and no effect (path coefficient $= 0$) for regressions between variables.

Some biases may be observed in surveys of this nature, with non-response bias being one of the most common, which refers to the difference between the responses of respondents and non-respondents (Chen and Paulraj, 2004). To evaluate non-response bias, the approach suggested by Mentzer and Flint (1997) was followed by contacting a randomly selected sample of 20 non-respondents and asking them to respond to a set of non-demographic questions. No statistically significant differences were found between the responses of respondents and non-respondents. Additionally, non-response bias was tested by comparing the differences between early ($n = 55$) and late respondents ($n = 97$), and no statistically significant differences were found between them. These results indicate that non-response bias does not appear to be a concern in this study.

All responses were treated anonymously, and the survey questions were divided into different parts of the questionnaire. A marker variable technique was also employed to test for common method variance. Two marker variables were inserted, MQ1. "The people in our company have a high level of job satisfaction here." and MQ2. "Our products can be considered innovative in the markets where we operate."

To validate the model, the values of average variance extracted (AVEs) were evaluated using the Fornell and Larcker criterion (Fornell and Larcker, 1981; Henseler, 2018), where AVE values should be greater than 0.50 (AVE >0.50). Other measures of validity were also used, such as Cronbach's Alpha (CA) and Composite Reliability (CR), with presented satisfactory values above 0.7 (Ringle et al., 2014; Hair et al., 2014). Additionally, discriminant validity was assessed using the Heterotrait-Monotrait Ratio (HTMT) matrix (Henseler, 2018). The HTMT value is below 0.90, which allows us to assume there is discriminant validity between reflective constructs.

This research also employed a categorical variable moderation analysis, which is recommended when a priori variable is used to define comparison groups (observed heterogeneity), such as gender, or company size, among others. Initially, the measurement model is evaluated to determine if it is invariant across different groups. This study adopted the supply chain position as a categorical variable. The position in the supply chain can guide organizations to replicate successful industrial processes or business models or to comply with legislation (Saeed et al., 2018).

Studies that conduct multigroup SEM analysis, particularly in international and cross-cultural contexts, typically distinguish between various levels of invariance (Steenkamp and Baumgartner, 1998). These levels include configural invariance, metric invariance, scalar invariance, and error variance invariance. These levels test the similarity of factor structures, item loadings, measurement intercepts, and measurement errors across different groups.

4. Results

4.1. Sample

This survey involved a sample of Brazilian companies ($N = 152$), characterized in Table 1. The study focused on companies in the state of São Paulo, in the southeastern region of Brazil.

4.2. Measurement properties

4.2.1. Step 1: Evaluation of the measurement model

The model evaluation focuses on the measurement model, examining discriminant validity, internal consistency, and composite reliability (Hair et al., 2014). Results indicate higher factorial loadings for observed variables in their respective constructs, supporting the model's validity (Hair et al., 2014; Chin et al., 2008).

It is possible to assess in Table 2 the item loadings and cross-loadings for the variables and observe that the item loadings of the factors are higher than those of other potential factors, and the distinction's validity meets the cross-loading criteria. Discriminant validity is a widely accepted premise for analyzing the relationship between potential

Table 1
Sample description (n = 152) – model.

Variable Definition		Qty	Percentage
Company size (number of employees)	Up to 50	5	3,30%
	51 to 100	12	7,90%
	From 101 up to 200	25	16,40%
	From 201 up to 300	24	15,80%
	Over 301	86	56,60%
Company position in the chain ([a])	Raw material supplier	9	5,90%
	Sub-supplier	15	9,90%
	Indirect supplier	14	9,20%
	Direct supplier	56	36,80%
	Original Equipment Manufacturer	58	38,20%
Company's sector of activity	Others	26	17%
	Oil and gas	5	3,30%
	Medical equipment	6	3,90%
	Building construction and building materials	9	5,90%
	Automotive and parts	11	7,20%
	Paper And Cellulose	12	7,90%
	Household goods and personal care	14	9,20%
	Chemical	17	11,20%
	Food and drinks	18	11,80%
	Mechanical metal	34	22,40%

[a] Vertical complexity - assesses the position of the company in each supply chain.

Table 2
Cross loading values - Model.

		(1)	(2)	(3)	(4)	(5)
Coercive Pressures (1)	CP1	0.965	0.222	0.211	0.150	0.014
	CP2	0.645	0.238	0.287	0.063	0.061
Normative Pressures (2)	NP1	0.197	**0.700**	0.250	0.331	0.342
	NP2	0.142	**0.795**	0.406	0.427	0.358
	NP3	0.262	**0.772**	0.658	0.468	0.300
Mimetic Pressures (3)	MP1	0.146	0.445	**0.844**	0.429	0.326
	MP2	0.297	0.466	**0.847**	0.319	0.179
	MP3	0.273	0.568	**0.843**	0.428	0.401
Behavioral Practices (4)	BP1	0.159	0.413	0.380	**0.711**	0.223
	BP2	0.298	0.394	0.432	**0.666**	0.217
	BP3	0.093	0.474	0.426	**0.841**	0.445
	BP4	0.006	0.461	0.331	**0.775**	0.561
	BP5	0.144	0.420	0.410	**0.818**	0.396
	BP7	0.071	0.309	0.312	**0.636**	0.306
	BP8	0.090	0.328	0.260	**0.751**	0.227
	BP9	0.051	0.492	0.405	**0.869**	0.434
	BP10	0.110	0.479	0.353	**0.778**	0.404
	BP11	0.142	0.378	0.369	**0.757**	0.424
	BP12	0.076	0.407	0.349	**0.794**	0.504
	BP13	0.021	0.421	0.313	**0.834**	0.460
Technical Practices (5)	TP5	−0.037	0.435	0.274	0.494	**0.775**
	TP6	0.145	0.250	0.359	0.417	**0.615**
	TP7	0.029	0.233	0.180	0.243	**0.561**
	TP9	0.038	0.399	0.285	0.431	**0.897**
	TP10	0.060	0.291	0.245	0.314	**0.777**
	TP11	−0.044	0.405	0.306	0.415	**0.896**
	TP12	−0.017	0.274	0.153	0.275	**0.843**
	TP13	0.053	0.185	0.140	0.219	**0.697**
	TP14	−0.005	0.234	0.179	0.274	**0.764**

factors (Hair et al., 2014). In this study, three techniques were used to evaluate discriminant validity. Adjustments were made, including the exclusion of some items such as BP6, TP1, TP2, TP3, TP4, TP8, CP3, and CP4, due to their initially low factor loadings (Hair et al., 2014; Ringle et al., 2014). The criteria for assessing discriminant validity include analyzing factor correlations and the square root of AVE (Average Variance Extracted), cross-loadings, and the Heterotrait-Monotrait Ratio (HTMT).

When examining the association between factor correlations and the square root of AVE, as shown in Table 3, the diagonal values indicate that the square root of AVE is greater than the coefficients of the correlations between all variables. This demonstrates good discriminant validity according to the Fornell-Larcker criterion.

Regarding cross-loadings, the questionnaire items were examined to endorse the correlations. The adjustments made, and the removal of variables with low cross-loadings ensured that all constructs had values above 0.5 (Ringle et al., 2014). Internal consistency was evaluated, and variables (1), (2), (3), (4), and (5) demonstrated satisfactory reliability, with Cronbach's alpha and composite reliability above 0.7 (Table 3).

Regarding the analysis of the Heterotrait-Monotrait Ratio (HTMT), the significance of the HTMT values was tested against 1 using bootstrapping (Henseler, 2018; Hair et al., 2019). As observed in Table 4, the highest value is 0.806, which is below the threshold and indicates that the discriminant validity of this study is adequate.

4.2.2. Step 2: Evaluation of the structural model

As can be seen in Fig. 2, Normative Pressure has the strongest effect on Behavioral Practices (H3 = 0.408), and then on Technical Practices (H4 = 0.360), followed by Mimetic Pressure on Behavioral Practices (H5 = 0.244), and on Technical Practices (H6 = 0.126), Coercive Pressure on Behavioral Practices (H1 = -0.032) and on Technical Practices (H2 = -0.105). Further, the three institutional pressure constructs in Fig. 2 explain 33.3% of the variance of the endogenous construct Behavioral Practices sustainability (R^2 = 0.333) and 19.3% of the variance of the endogenous construct Technical Practices sustainability (R^2 = 0.193).

The remaining structural model results are presented in Table 5, and the f^2 is calculated for each independent variable, indicating the magnitude of their effects on the dependent variable (Chin et al., 2008). The effect sizes can be classified as small (0.02), medium (0.15), and large (0.35), respectively. According to this classification, the f^2 values for CP, MP, and NP variables are 0.002, 0.156, and 0.363, indicating that the effects of independent variables on behavioral practices are small, medium, and large, respectively. However, for the technical variables, the effects are low in all evaluated pressure relationships. Regarding the Q^2 coefficient (cross-validated redundancy), a value greater than 0 indicates that the model could predict endogenous variables. The Q^2 values for CP, MP, and NP for behavioral and technical practices are 0.291 and 0.136, respectively. Acceptable predictive relevance of the structural model is provided with Q^2 values greater than zero. The f^2 effect size of the model indicates how much each exogenous latent variable contributes to the R^2 value of an endogenous latent variable. Summarizing the effect size assesses the magnitude or strength of the relationship between the latent variables.

Because the software calculates Student's t-tests between the original data values, and those obtained by the resampling technique, for each observed variable-latent variable correlation relationship and for each latent variable relationship, SmartPLS displays the *t*-test values and not the p-values. Therefore, it should be interpreted that for high degrees of freedom, values above 1.96 correspond to p-values $\leq$0.05 - between −1.96 and + 1.96 corresponds to 95% probability and outside this range 5%, in a normal distribution (Ringle et al., 2014).

4.3. Hypothesis testing

The results of path coefficient (β) and significance level (t-statistic) were used to assess the correlation between institutional pressures and sustainability practices, with support from the structural model. Considering the structural model, four hypotheses were accepted, and two hypotheses were rejected, as presented in Table 6. The findings indicated that while coercive pressures did not show a significant positive impact on sustainability behavioral or technical practices, mimetic and normative pressures were found to have a positive impact on the adoption of sustainability practices.

The results of this research indicate that coercive pressures do not have a significant influence on behavioral practices (H1: CP => BP) and

Table 3
Convergent and discriminant validity analysis - Model.

Results								
	AVE	CA	CR	CP	MP	NP	BP	TP
				(1)	(2)	(3)	(4)	(5)
CP (1)	0.689	0.827	0.812	**0.830**				
MP (2)	0.713	0.824	0.882	0.272	**0.844**			
NP (3)	0.573	0.712	0.801	0.262	0.587	**0.757**		
BP (4)	0.596	0.941	0.946	0.141	0.475	0.543	**0.772**	
TP (5)	0.587	0.929	0.926	0.028	0.325	0.416	0.473	**0.766**

Note: n = 152, reliability coefficients are shown on the diagonal. No validity problems.

Table 4
Heterotrait-monotrait ratio (HTMT) analysis - model.

	CP	MP	NP	BP	TP
CP					
MP	0.441				
NP	0.449	0.806			
BP	0.190	0.527	0.698		
TP	0.112	0.339	0.526	0.487	

The model fit tests are assessed using the normed fit index (NFI) and the standardized root mean square residual (SRMR). It is expected that the SRMR value is below 0.08 and the NFI value is above 0.90 (Garson, 2016). The structural model fit indices are SRMR = 0.075 and NFI = 0.925, indicating that this model is acceptable (Hair et al., 2014). The results indicate that the model has a goodness-of-fit (GoF) value of 0.52, surpassing the acceptance threshold of 0.36 (Wetzels et al., 2009).

technical practices (H2: CP => TP). On the other hand, normative pressures have a positive and significant influence on both behavioral practices (H3: NP => BP) and technical practices (H4: NP => TP). Additionally, mimetic pressures also have a positive and significant influence on behavioral practices (H5: MP => BP) and technical practices (H6: MP => TP). These findings provide a deeper understanding of how institutional pressures shape the adoption of sustainability practices in supply chains and are helpful for companies and policymakers seeking to promote sustainable supply chains.

4.4. Categorical variable moderation

In this study, configurational invariance is guaranteed from the beginning, because the groups and their differences are estimated in the same round. It was found that compositional invariance was obtained for all the constructs in the study. From these results, it is possible to accept compositional invariances for all the constructs, which makes the comparison of the structural coefficients possible (Bido e Silva, 2019).

Groups were tested based on the position of the company in the supply chain (Bode and Wagner, 2015). This cut-off analyzed the following groups (group 1 = companies further up the chain, close to the raw material, with n = 58 firms), and group 2 = companies closer to the finished product, with n = 94 companies). The results of path coefficient (β) and significance level (t-statistics) were adopted to evaluate the correlation of this group, with support from the structural model.

For group 1, only one hypothesis was confirmed, which was that normative pressures have a significant positive effect on behavioral practices. The remaining five hypotheses were rejected, indicating that no other pressure had a significant impact on practices. In contrast, for group 2, three hypotheses were confirmed, showing that normative pressures have a significant positive influence on behavioral and technical practices and mimetic pressures have a significant positive influence on behavioral practices. However, three other hypotheses were rejected, meaning that no other pressure had a significant impact on sustainability practices.

5. Discussion of the results

This study distinguishes between behavioral and technical sustainability practices and theorizes the effects of different institutional pressures on their adoption in supply chains, reinforcing the importance of institutional theory in sustainability research (Dubey et al., 2017). The results of this study provide valuable insights into the relationship

Table 5
Exploratory power.

Predictor	Outcome (s)	R^2	f^2	Q^2
CP	BT	0.193	0.002	0.291
MP			0.156	
NP			0.363	
CP	TP	0.333	0.014	0.136
MP			0.014	
NP			0.109	

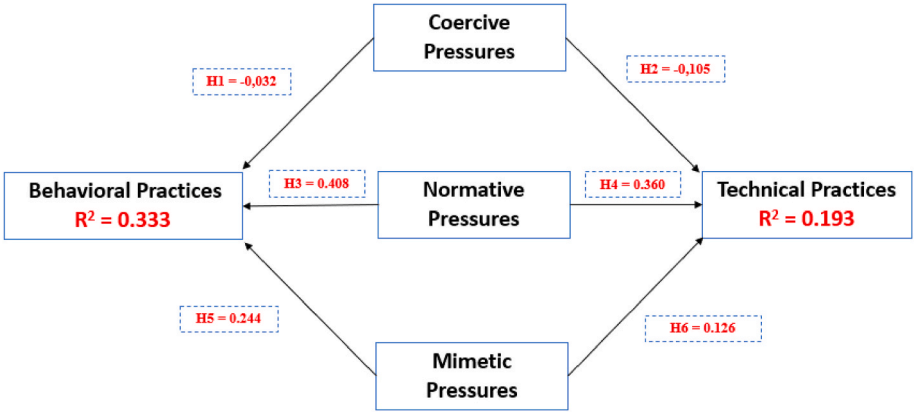

Fig. 2. Structural equation model I.

Table 6
Hypothesis tests model.

Hypotheses	Construct	Path	Construct	Stat	S.E.	RC	P-values	Result
H1	CP	=>	BP	−0.032	0.087	0.370	0.712	Not
H2	CP	=>	TP	−0.105	0.103	1.021	0.307	Not
H3	NP	=>	BP	0.408	0.087	4.692	0.000	Support
H4	NP	=>	TP	0.360	0.103	3.507	0.000	Support
H5	MP	=>	BP	0.244	0.079	3.092	0.002	Support
H6	MP	=>	TP	0.126	0.061	2.071	0.038	Support

between institutional pressures and the adoption of sustainability practices in Brazilian supply chains. Specifically, the findings highlight the significant positive impact of mimetic and normative pressures on behavioral and technical sustainability practices. These results suggest that companies in the sampled population are more inclined to adopt sustainability practices based on the desire to achieve results and improve performance rather than solely due to legal obligations.

The prevalence of mimetic and normative pressure among the studied companies indicates a tendency to imitate the practices of others and conform to industry norms to enhance their competitive position and reduce costs. This aligns with previous research emphasizing the role of pressure in driving the adoption of sustainability practices (De Sousa Jabbour et al., 2017; Vanalle et al., 2017).

Furthermore, the observed relationship between institutional pressures and the adoption of sustainability practices in Brazilian supply chains may be influenced by technological and equipment gaps between emerging markets like Brazil and more developed countries. These gaps can shape the adoption and implementation of sustainable practices, as companies may face different resource constraints and challenges (De Sousa Jabbour et al., 2017; Vanalle et al., 2017).

The analysis of company position in supply chains revealed differences between groups. Upstream-located companies showed that only normative pressures positively influence behavioral practices, while this was not confirmed for downstream companies. Access to guidance and legislation can vary based on the supply chain position, leading to different pressures affecting agents differently (Saeed et al., 2018).

Coercive pressures were not found to have a significant relationship with these practices, possibly due to weak regulatory action and acceptance of legal risks by companies. This differs from studies conducted in developed countries where regulatory pressure was associated with coercive power in implementing sustainable practices (Darnall et al., 2008).

Brazil's performance in governance indexes, such as regulatory quality and control of corruption, may contribute to this lack of pressure (World Bank, 2022). Corruption in Brazil remains a significant problem, impacting access to services, environmental protection, and the achievement of Sustainable Development Goals (Transparency International, 2022). To reach the SDGs, Brazil must combat corruption, enhance governance, and increase transparency and accountability in all sectors.

Another finding of this research is that the Brazilian companies in the sample exhibit a behavior inclined towards normative pressure. This fact can be due to the process of professionalization, since companies seek better professional resources, to legitimize their changes (Liang et al., 2007). In this way, the company will implement a sustainability area and focus on sustainability practices, seeking market professionals and information systems that have already achieved satisfactory results. The works of Liang et al. (2007), Yang (2018); Nath and Eweje (2021), explore professionalization, as a kind of collective struggle of the individuals of an occupation to establish working methods and conditions to control and legitimize operations.

According to Ahmed et al. (2019), normative pressures have the greatest effect on sustainability practices, followed by mimetic and coercive pressures. However, it was found in this work that the companies in the sample exhibit behavior more strongly skewed towards mimetic pressure, which, originates from imitating the actions of successful competitors, in the quest to replicate their success (Aerts et al., 2006). Mimetic pressure arises from uncertainty, which tends to encourage the imitation process (Di Maggio and Powell, 1983). Brazilian companies often adopt this strategy, mainly, because they do not know the best way, so a constant benchmarking of practices, when it comes to management systems, becomes common (Carvalho et al., 2019).

According to March and Olsen (1983), although there is no complete mastery of the technology available, when there are environments with an ambiguity of goals, or in which symbolic uncertainties are created, organizations tend to imitate other organizations, even without much certainty of the reason or origins. This occurs because it is mimetic behavior, a low-cost alternative to combat uncertainty.

This type of behavior can be spread involuntarily, either by transferring employees between units or explicitly, by hiring advisors, consultants, or exchanges generated in environments of trade and industrial associations (Di Maggio and Powell, 1983). This tends to lead Brazilian companies not to be better every day, but only more similar.

This research analyzed sustainable practices adoption in Brazilian supply chains, relating them to institutional pressures. The findings indicate that mimetic and normative pressures have a significant influence on sustainability practices. Differences were observed between companies based on their position in the supply chain, with regulatory pressures positively impacting the behavioral practices of upstream companies. Coercive pressures had no significant relationship, attributed to weak regulation and acceptance of legal risks by companies. Fighting corruption and improving governance are essential to achieving the Sustainable Development Goals.

6. Conclusions

The objective of this study was to understand the motivational role of institutional pressures to adopt behavioral and technical sustainability practices in a sample of companies in Brazil. This survey was answered by 152 Brazilian companies, comprising 43% of the questionnaires sent. The tested framework model was validated and confirmed its statistical robustness. Three different types of institutional pressures were explored, and it was found that not all these pressures exert the positive effects expected in motivating company sustainability practices in supply chains. Coercive pressures were found to have no influence on the adoption of behavioral and technical sustainability practices in supply chains. Some examples of coercive pressures are lawsuits for non-compliance with pollutant emission standards or collective bargaining agreements, fear of fines and penalties associated with irresponsible behavior, negative reporting against the company, or negative consequences for not complying with federal and state labor or environmental regulations. These results are in accordance with the World Bank's data that shows an unfavorable evolution of Brazil's performance in governance indexes.

The data from the companies surveyed also indicated that their behavioral and techniques practices tended towards normative pressure, generally based on professionalization processes, in which companies seek to acquire better professional resources, to legitimize their organizational changes. In this way sustainability will be sought by attracting professionals and market information systems that have previously

obtained satisfactory results.

The Brazilian companies in the sample also display a behavior inclined towards mimetic pressure, which corresponds to imitating the actions of successful competitors, trying to replicate their success, in what was also called competitive benchmarking. The uncertainty of these companies tends to encourage them in the imitation process. This perspective is usually observed in environments without a complete domain of the available technology, and in situations where there is an ambiguity of goals, called symbolic uncertainty. In this situation, organizations tend to imitate other organizations, even without a clear conviction about the real reason for the imitation. This occurs because it is a mimetic behavior, a low-cost alternative to combat uncertainty, however, without any clear causal relationship.

The most likely result is only that the company will become more and more like its competitors. This will not lead to competitive advantage, but only competitive equality. This research further concludes that at companies further up the chain, only normative pressures have a positive influence on behavioral practices. In companies closer to the final consumer, normative pressures influence behavioral and technical practices while mimetic pressures influence sustainability behavioral practices in supply chains. Examples of normative pressures include companies that adopt environmentally friendly practices and technologies to conform to strong environmental norms in their industry. Furthermore, an organization with a strong culture of integrity and transparency may implement rigorous ethical policies and procedures to align with its normative values. On the other hand, mimetic pressures refer to the influence of imitating or copying the behavior of others within the same industry or field. For instance, a firm may adopt a specific technology or business practice because its competitors have already done so and have seen positive outcomes. A company may also adopt the sustainability practices of a leading firm in its sector to keep up with the industry norms and expectations.

For companies, an important finding of this research is that behavioral practices are most affected by normative and mimetic pressures. However, technical practices are affected only by normative pressures, making clear the relevance of behaviors in interpreting pressures, which can sometimes help organizations reflect on how they work. In summary, this study developed a conceptual model that can help understand the relations between institutional pressures and behavioral and technical sustainability practices along the supply chains, contributing to guiding companies for better social and environmental responsibility.

This study has several limitations that must be considered. Firstly, the research is based on the responses of one representative from each company, which raises the risk of a lack of in-depth knowledge due to the multidisciplinary nature of the subject. Secondly, although the sample is representative of the population, the results cannot be generalized to other Brazilian companies. The model is also dependent on the opinions of company experts, further limiting its generalizability.

Additionally, it is recommended to research other agents in the supply chain of Brazilian companies in order to complement the supply chain perspective and consider the views of outside stakeholders such as associations, unions, and other parties. Lastly, it is suggested to apply this approach to specific sectors to confirm any interconnections found.

Declaration of competing interest

I wish to resubmit my manuscript titled “Why companies adopt supply chain sustainability practices: a study of companies in Brazil” for consideration by the Journal of Cleaner production.

This article has been submitted for publication and as corresponding authors; we declare that there are no conflicts of interest regarding the content of this work. We do not maintain financial or personal relationships with other individuals or organizations that may inappropriately influence (bias) our work. We do not receive compensation for consultations, we do not own stocks, we were not invited to provide testimony as paid experts, we do not have registered patents or grants, or any other type of funding related to the subject addressed in this article.

We guarantee that this work was carried out independently and objectively, without external interferences that may affect the integrity and quality of the conclusions presented. We are committed to ensuring the transparency and reliability of the information presented in this article.

We sign below, as corresponding authors, the Declaration of Interest, confirming that there are no conflicts of interest to be declared in relation to this article.

Data availability

Data will be made available on request.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jclepro.2023.139725.

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