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Governance and sustainability: Traceability as a strategy in ISE B3 companies

Governança e sustentabilidade: A rastreabilidade como estratégia em empresas do ISE B3

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Abstract

Purpose: This article aims to analyze aspects of strategic management, such as the decision-making process, transparency, and competitive advantage, based on the disclosure of traceability initiatives in the corporate sustainability reports of companies listed on the Corporate Sustainability Index created by Brasil, Bolsa e Balcão (ISE B3 [Brazil, Stock Exchange and Over-the-Counter Market]).

Originality/value: Although scientific literature related to sustainability and strategic management is available, the present article stands out by discussing traceability as a relevant element and a competitive advantage for companies, particularly those listed in ISE B3.

Design/methodology/approach: The selected sustainability reports were those of the 78 companies participating in the ISE B3 in 2024, but only those that were part of the index in 2021, 2022, and 2023 were considered, totaling 41 companies and 123 reports analyzed. This period was considered due to the methodological change from 2021 onward, which has a more sectoral approach.

Findings: This study reveals a greater interest among companies listed on the ISE B3 in traceability, particularly in sectors such as consumer goods, retail, and food products. Traceability is not considered a material topic; however, all companies have some form of socio-environmental certification. The analyzed companies utilize socio-environmental criteria in selecting their suppliers; however, most do not address traceability and circularity in an integrated manner within their operations.

Contribution/implications: The findings contribute to theoretical advancements in sustainability and strategic management, informing decision-makers about the challenges and possibilities of traceability as a strategic element.

Keywords: sustainability, sustainability reports, governance, traceability, transparency

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Resumo

Objetivo: Este artigo teve como objetivo analisar aspectos da gestão estratégica, como processo decisório, transparência e vantagem competitiva, a partir da divulgação de ações de rastreabilidade presentes em relatórios de sustentabilidade empresarial de empresas listadas no Índice de Sustentabilidade Empresarial do Brasil, Bolsa e Balcão (ISE B3).

Originalidade/valor: Apesar da existência de publicações científicas relacionadas com a sustentabilidade e a gestão estratégica, o artigo se destaca ao discutir a rastreabilidade enquanto elemento relevante e de diferencial competitivo para as empresas, especificamente aquelas listadas no ISE B3.

Design/metodologia/abordagem: Foram selecionados os relatórios de sustentabilidade das 78 empresas participantes do ISE B3 no ano de 2024, mas foram considerados somente aqueles que integraram o índice nos anos de 2021, 2022 e 2023, totalizando 41 empresas e 123 relatórios analisados. O período considerado deve-se à mudança da metodologia a partir de 2021, que utiliza uma abordagem mais setorial.

Resultados: Este estudo identifica um maior interesse das empresas listadas no ISE B3 a respeito da rastreabilidade, mais especificamente, em setores como consumo e varejo e produtos alimentícios. A rastreabilidade não é considerada um tema material; em contrapartida, todas as empresas possuem alguma certificação socioambiental. As empresas analisadas utilizam critérios socioambientais na escolha de seus fornecedores, porém, a maioria não aborda de maneira integrada a rastreabilidade e a circularidade em suas operações.

Contribuição/implicação: As descobertas contribuem para o avanço teórico no que tange aos temas sustentabilidade e gestão estratégica, informando os tomadores de decisão sobre os desafios e as possibilidades da rastreabilidade enquanto elemento estratégico.

Palavras-chave: sustentabilidade, relatórios de sustentabilidade, governança, rastreabilidade, transparência

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INTRODUCTION

Companies that communicate assertively, broadly, and realistically with their investors, using metrics based on the ESG agenda—Environmental, Social, and Governance—can provide a more transparent view of their operations. Developing new management methodologies to improve performance and investing in sustainable projects can give companies a more responsible appearance in the eyes of society (B3 S.A., 2024). In this context, organizations aligned with the ESG theme tend to perform better by positioning themselves as market leaders, which can result in a sustainable competitive advantage (Hsu & Chen, 2024).

The ESG concept refers to a broad set of issues, such as carbon footprint, labor practices, and anti-corruption measures. The ESG elements guide corporate decisions regarding practices to be adopted and the performance and returns expected by society (Irigaray & Stocker, 2022). As a way to measure corporate responsibility in relation to sustainability, a series of indexes, rankings, and recommendations have been developed by various companies, NGOs, and stock exchanges worldwide. Among these indexes, one of the pioneers (created in 1999) and of great prominence was the Dow Jones Sustainability Index (Nascimento et al., 2020). In Brazil, the Corporate Sustainability Index (ISE B3 [Brazil, Stock Exchange and Over-the-Counter Market]) was created in 2005.

The ISE B3 is the result of a theoretical portfolio of assets, as outlined in the index's official methodology. Its purpose is to serve as an indicator of the average performance of companies' assets that stand out for their commitment to corporate sustainability. It assists investors when making investment decisions and encourages companies to implement best sustainability practices, as these can bring companies into the spotlight and are fundamental for business continuity (B3 S.A., 2024).

The organizations that make up the index each year go through a selection process and must meet specific criteria, such as being among the 200 most liquid companies (ability to trade a stock quickly with limited effects on market prices) on the Brazilian Stock Exchange (B3) during the validity period of the three previous portfolios, having been traded on 50% of the trading sessions in this period, and not being classified as a penny stock (shares of companies traded at very low prices). In addition, it is a Total Return Index, in which, in addition to stock price variation, the evolution of dividends is also considered, thus reflecting the company's capacity to generate value for the investor (B3 S.A., 2024).

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These organizations publish their sustainability reports annually, demonstrating to society their environmental, social, and governance practices. Some also disclose progress in terms of product traceability. The central theme of this research, traceability, began to gain importance at the end of the 20th century, being related, at the time, to the level of food safety (Vinholis & Azevedo, 2002). The International Organization for Standardization (ISO) defines traceability as the ability to track the history of movement, application, use, and current location of any product through data in identification records (ISO, 2015).

Regardless of whether the market's concern is genuinely focused on socio-environmental issues or merely a strategy to boost sales (Teixeira et al., 2024), what is evident is that consumers have been showing greater interest in sustainability and choosing to maintain commercial relationships with companies aligned with the ESG theme (Zanirato & Rotondaro, 2016). Being able to track the origin, application, and location of products provides security and transparency for interested parties, which shows the importance of supply chain traceability (Ahmed & MacCarthy, 2023). The growing concern of society in addressing environmental and social problems has driven the adoption of circular production and consumption models, highlighting the relevance of disclosing efforts and achievements in implementing these models (L'Abate et al., 2024).

Although there are several scientific publications in specialized literature showing the importance of ESG issues for the development and consolidation of organizations (Hristov & Searcy, 2025; Sánchez-Garcia et al., 2024; Hsu & Chen, 2024), this article stands out by analyzing traceability as an important element and a competitive advantage for the companies participating in the ISE B3.

Traceability is a strategic element and a competitive advantage for the companies participating in the index mentioned above, as it enables greater transparency, control, and accountability in their value chains, aspects required by investors and stakeholders (Eccles et al., 2012; Porter & Kramer, 2011). In addition, traceability, when digitally integrated into supply chains, enhances corporate governance and improves the ESG performance of listed companies, resulting in benefits such as reduced financial constraints and increased productivity—attributes highly valued by investors and regulators (Zhu & Zhang, 2024).

Based on the above, this article aims to analyze aspects of strategic management, including the decision-making process, transparency, and competitive advantage, by examining the disclosure of traceability actions in

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corporate sustainability reports of companies listed on the Corporate Sustainability Index of the Brazilian Stock Exchange (ISE B3). To this end, there was an initial selection of the sustainability reports of the 78 companies participating in ISE B3 as of November 14, 2024, and the inclusion criterion was defined as companies that were part of the ISE B3 in the years 2021, 2022, and 2023, totaling the analysis of 41 companies.

The criterion of evaluating companies with at least three years of participation in the ISE B3 is justified by the change in the format of the reports starting in 2021, when they began to present a more sectoral approach, using as a reference the Corporate Sustainability Assessment model (CSA), the same one adopted in Switzerland (Damas et al., 2022). This reformulation aimed to enhance comparability among companies within the same economic sector, acknowledging that ESG risks and opportunities vary significantly according to each organization's core activity. By incorporating sector-specific questionnaires, the ISE B3 began to assess material topics with greater precision (B3 S.A., 2024; S&P Global, 2023).

Until 2020, the Environmental, Social, Corporate Governance, and Economic-Financial dimensions were analyzed; from 2021 onward, the dimensions analyzed were switched to Human Capital, Corporate Governance and Top Management, Business Model and Innovation, Social Capital, and Environment. This change brings the Brazilian index closer to international best practices, promoting greater transparency and facilitating decision-making by investors aligned with ESG criteria (B3 S.A., 2024).

In addition to this introduction, the article presents the theoretical framework that was used. The research methodology is then described; following that, the results are analyzed and discussed. Finally, the article ends with its conclusions.

ESG AND TRACEABILITY OF (AND IN) THE SUPPLY CHAIN

Communication is an essential element in today's societal context. Companies that effectively communicate assertively, broadly, and realistically with interested parties through the ESG agenda can achieve a form of competitive advantage. By presenting a more transparent view of their activities, organizations can, in addition to improving financial profitability, be recognized for their role in society and the environment (B3 S.A., 2024). In this way, organizations aligned with the ESG theme tend to improve performance, positioning themselves as market leaders, which can result in sustainable competitive advantage (Hsu & Chen, 2024; Sánchez-Garcia et al., 2024).

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As mentioned in the introduction, the concept of ESG encompasses a broad range of issues, including carbon footprint, labor practices, and anti-corruption measures. These factors are essential and justify the development of criteria and practices that guide and hold organizations accountable regarding environmental, social, and corporate governance elements (Irigaray & Stocker, 2022). In addition, both investors and consumers are increasingly attentive to these issues, highlighting that ESG is a relevant criterion for organizations to achieve long-term success and build a solid and responsible reputation (Zanirato & Rotondaro, 2016).

It should be noted that, in recent years, the growing social and environmental challenges (climate change, child labor, and social inequalities) have led companies to rethink their business strategies and adopt a more systematic approach regarding the disclosure of their ESG reports. With the increasing demands for ESG metric disclosure from society, a broader audience can better understand the implications of organizational activities and policies on social well-being (Zhang et al., 2023).

Thus, companies need to respond to the challenges of managing various pressures arising from activities that shape environmental, social, and governance (ESG) impacts. In this regard, ESG factors emerge as essential guidelines for organizations pursuing sustainable development, enabling them to respond quickly to institutional pressures through a paradoxical view (Annesi et al., 2024). Accordingly, the adoption of a sustainability strategy is strongly influenced by corporate governance, and this can significantly impact decision-making processes (Li et al., 2021).

With the limitation of natural resources, the increase in social awareness, and the risks associated with socio-environmental issues, sustainability and the pressure to adopt it have become increasingly relevant. Legal requirements, best practices, recommendations, and stakeholders' own expectations demand that market participants, especially companies, bring sustainability into their operations. To meet these demands, organizations implement various adaptation measures, generating sustainable value based on their business models (Ziolo et al., 2023).

Moreover, society's growing attention to solving environmental and social problems has stimulated a shift toward circular production and consumption models, highlighting the importance of communicating efforts and achievements regarding the implementation of circular models (L'Abate et al., 2024). The circular economy is the path that must be followed to protect an environment at risk, promote social justice, and advance sustainable and balanced regional economic development (Roshan et al., 2024), which is particularly important in a society marked by social inequalities.

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In this sense, the disclosure of ESG information reflects a company's actual performance in the environmental, social, and governance areas, aiming to develop a positive image before the public and increase the confidence of investors and consumers. Furthermore, this disclosure plays a fundamental role in promoting corporate social responsibility, encouraging green innovation initiatives, and supporting the transformation and improvement of best business practices (Ruan et al., 2024).

It is noteworthy that society is undergoing a significant historical moment regarding the production, consumption, and capitalization models, making it essential to know whether companies are adapting in terms of ESG and how they are doing so. This is reflected in the effort to determine how much the company is contributing to reducing its environmental, social, and financial impact during this transition to a new production and consumption paradigm, which seems to be irreversible. This fact demonstrates that measuring sustainability means calculating how much the company contributes to this transition in terms of material impact and understanding to what extent it gains advantages by being part of this new scenario (B3 S.A., 2024).

In order to measure organizational responsibility with respect to sustainability, various indices, rankings, and recommendations have begun to be developed by several companies, NGOs, and stock exchanges. Among these indices, one of the pioneers, of great prominence, was the Dow Jones Sustainability Index (Nascimento et al., 2020). In 2005, the Corporate Sustainability Index (ISE B3) was created in Brazil, responsible for evaluating the sustainability practices and socio-environmental responsibility of companies listed on the Brazilian stock exchange.

The ISE B3 is the result of a theoretical portfolio of assets, prepared in accordance with the criteria established in this methodology. The companies that make up the index each year go through a selection process and must meet several established criteria, such as being among the 200 most liquid companies on the Brazilian Stock Exchange (B3) during the validity period of the three previous portfolios, having been traded on 50% of the trading sessions in this period, and not being classified as a penny stock. The ISE B3 is also a Total Return Index, in which, in addition to stock price variation, the evolution of dividends is also considered, reflecting the capacity to generate value for the investor (B3 S.A., 2024).

The companies that comprise the ISE B3 are required to publish their sustainability reports annually, demonstrating their environmental, social, and governance actions to society. Some of these companies also disclose in

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their reports the progress in terms of product traceability, which enables interested parties to verify the entire product lifecycle, from production to transportation and delivery to consumers.

The disclosure of these reports is essential for society. Companies, in general, are facing increasing pressures regarding the environmental damage caused by their activities, making it necessary to improve processes and supply chains toward sustainability (Heeb et al., 2024; Annesi et al., 2024). An important strategy for addressing the challenges related to supply chain and logistics operations is to adopt technologies based on Industry 4.0 (4IR) in business processes (Shakur et al., 2024).

The new technologies present in 4IR, such as Big Data, Autonomous Robots, Simulation, Vertical and Horizontal System Integration, Internet of Things, Cybersecurity, Cloud Computing, Additive Maintenance, and Augmented Reality (Vaidya et al., 2018) can be used for traceability, monitoring, inspection and quality control, environmental monitoring, precision agriculture, optimization of agricultural inputs, process automation, among others, as a way to enhance the circularity and sustainability of supply chains (Kumar et al., 2024).

The growing demand for verifiable information, aligned with global climate goals and human rights standards, has led to the exploration of digital technologies that aim to improve the traceability and verification of supply chains. These technologies can be applied, generating several benefits, such as increased reliability and transparency; however, they also present challenges, including privacy issues. In addition, they can be used to create more sustainable and resilient supply chains, addressing issues ranging from the traceability of ecological products to transparency in agri-food supply chains, with various proposals to overcome current limitations and enhance the efficiency of these technologies in the future (Heeb et al., 2024).

However, the factors that integrate 4IR technologies into supply chains remain poorly understood. Even while acknowledging the benefits of adopting 4IR in supply chains, several barriers to its implementation must be highlighted, including technological immaturity, high investment costs, a lack of customer awareness and acceptance, technological limitations, and the absence of eco-innovation (Kumar et al., 2024). It is therefore understood that, within the supply chain, the adoption of these new technologies could make companies more efficient, agile, and transparent, as well as improve inventory management and market demand forecasting.

Regarding the supply chain, it is essential to have clarity about its structure. Supply chain management is defined as the integration of various business

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processes, ranging from the end customer to suppliers, which provide products, services, and information that generate value for the customer (Cooper et al., 1997). The growing fragmentation of the various activities that add value to products has significantly heightened the need for operations that add higher value to the final product (Talamini et al., 2005).

From this perspective, the importance of supply chain management becomes apparent for organizations. In a context of complex and globalized supply chains, it is important to verify the accuracy of what companies claim regarding sustainability, since organizations that adopt sustainability practices may achieve better prices for their products. For this purpose, all parties involved in the supply chains must agree to share essential data along the chain, seeking to increase traceability (Heeb et al., 2024).

Traceability is increasingly recognized as a fundamental concept in supply chain management, as it enables the monitoring and recording of a product's or material's entire history from origin to final consumer. It is worth noting that this process involves collecting and storing detailed information regarding the route, quality, and conditions under which the item was produced, transported, and distributed. Supply chain traceability has become increasingly important for several reasons, including the ability to verify regulatory compliance, ensure quality, identify counterfeit products, promote sustainability, and address customers' concerns about product origin (Ahmed & MacCarthy, 2023).

In this sense, traceability strengthens consumer trust because it not only enables verification of the products' origin and how they were produced, distributed, and delivered, but also improves processes and reduces costs, bringing organizations closer to the elements of sustainability. Traceability began to gain prominence at the end of the twentieth century due to the food safety crisis (Vinholis & Azevedo, 2002) and has been consolidating as an important mechanism for product monitoring. ISO 9000 (2015) has defined traceability as the ability to track the history of movement, application, use, and current location of any product through data in identification records.

From a traceability perspective, transparency is essential in the sustainable supply chain to enhance the disclosure and visibility of sustainability information, both within and outside the supply chain. However, due to the complexity and uncertainty of accessing supply chain information, these assessments pose a significant challenge (Bui, 2024). Incorporating transparency into decision-making processes and aligning business strategies with sustainability goals becomes an even greater challenge for organizations.

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METHODOLOGY

This article is a result of a qualitative research study conducted through the analysis of sustainability reports. First, the inclusion criteria were defined as: 1. companies that participated in the ISE B3 on November 14, 2024 (defined by the authors as it was the moment when data collection was being conducted); 2. companies that were part of the ISE B3 in 2021, 2022, and 2023; and 3. companies that were exclusively services providers, since it was understood that, even if not directly involved in the production of goods, they maintain commercial relationships with suppliers of finished products. Initially, there were 78 active companies; however, only 41 of these were included in the ISE B3 portfolio during the time sample considered.

The 123 sustainability reports analyzed are also referred to as "integrated reports" or "annual reports," depending on the companies' preferred practice. As the second stage of the research, it was defined that, in the search to be conducted within these documents, the following keywords were to be used: "rastrea", "certifica", "circular", and "fornecedores". The terms "rastrea" and "certifica" were used because, in this way, it was possible to identify any variations in their usage.

An effort was made to understand whether traceability practices are included in the materiality matrix and defined as a material topic. Additionally, it was investigated whether the companies' certifications had a positive impact on traceability. Table 1 presents the companies selected for analysis.

Table 1

Analyzed companies

Company	Code on B3	IPO Year	Industry sector
AES Brasil	AESB3	1999	Electric power
Ambipar	AMBP3	2020	Environmental solutions
Azzas 2154	AZZA3	2011	Consumer and retail
Azul Linhas Aéreas	AZUL4	2017	Air transport and logistics
Banco do Brasil	BBAS3	1906	Banking services
Banco BTG Pactual	BPAC11	2012	Banking services
Bradesco	BBDC4	1977	Banking services

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Table 1 (continuation)

Analyzed companies

Company	Code on B3	IPO Year	Industry sector
CCR	CCRO3	2002	Highway concession
Cemig	CMIG4	1972	Electric power
Cielo	CIEL3	2009	Banking services
Copel	CPLE3/5/6	1994	Electric power
Cosan	CSAN3	2005	Fuel distribution
CPFL Energia	CPFE3	2004	Electric power
Dexco	DXCO3	1951	Construction
Ecorodovias	ECOR3	2010	Highway concession
Engie	EGIE3	2002	Electric power
Eletrobrás	ELET3/6	2000	Electric power
Fleury	FLRY3	2009	Medicine and healthcare
Grupo Pão de Açúcar	PCAR3	1995	Consumer and retail
Iochpe-Maxion	MYPK3	2021	Automotive industry
Itaú Unibanco	ITUB4	1944	Banking services
Itausa	ITSA4	1966	Banking services
Klabin	KLBN3/4/11	1979	Pulp and paper industry
Lojas Renner	LREN3	2005	Consumer and retail
M Dias Branco	MDIA3	2006	Food products
Magazine Luiza	MGLU3	2011	Consumer and retail
Minerva	BEEF3	2007	Food products
Movida	MOVI3	2017	Vehicle rental
MRV	MRVE3	2007	Real estate market
Natura	NTCO3	2004	Hygiene and beauty products
Neoenergia	NEOE3	2019	Electric power
Raia Drogasil	RADL3	1977	Pharmaceutical retailer
Rumo	RAIL3	2015	Railway logistics

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Table 1 (conclusion)

Analyzed companies

Company	Code on B3	IPO Year	Industry sector
Santander	SANB11	2009	Banking services
Sendas	ASAI3	2021	Retail trade
Simpar	SIMH3	2021	Logistics services
Suzano	SUZB3	2012	Pulp and paper
Telefônica Brasil	VIVT3	1998	Telecommunications
Tim	TIMS3	1998	Telecommunications
Vibra	VBBR3	2017	Fuel distribution
Weg	WEGE3	2000	Electronic equipment

Once the companies were determined, the sustainability reports were evaluated from the following perspectives:

- The number of companies that disclose traceability.
- Verification of whether traceability is considered a material topic by the companies and identification of the frameworks used.
- Presence of certifications focused on the ESG agenda.
- Description of policies and guidelines adopted in supplier management.
- Communication of actions related to the circular economy or circularity.

The analysis was conducted through categories that emerged from the literature and supported the elaboration of the perspectives previously described, as shown in Table 2.

Table 2

Description and references of the categories analyze

Categories	Description	References
Traceability	Food safety, current location of the product, quality, and sustainability.	Vinholis & Azevedo, 2002; ISO 9000/2015; Ahmed & MacCarthy, 2023.
Materiality	Material topic: relevance of the topic.	Betti et al., 2018;
Certifications	Competitiveness, company value, and better market visibility.	Xu & Sam, 2025; Kheireddine et al., 2024.

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Table 2 (conclusion)

Description and references of the categories analyze

Categories	Description	References
Supplier management	Integration of business processes, data sharing, and supply chain transparency.	Cooper et al., 1997; Heeb et al., 2024; Su et al., 2025.
Circular economy	Sustainability, environmental protection, and changes in production and consumption models.	Roshan et al., 2024; L'Abate et al., 2024.

The organization of the data was conducted through a systematic document analysis based on the reading of the reports considered. The occurrences of the topics "traceability", "circularity", "supplier management", "certifications", and "materiality" were mapped throughout the content of the documents, with each instance recorded along with the page number and the context of the citation. Subsequently, a critical re-reading and categorization of the collected excerpts was carried out, allowing the construction of an interpretative summary of how companies declare applying practices related to the researched topics in their operations. From this, it was possible to proceed with the analysis and discussion of the results.

ANALYSIS AND DISCUSSION OF RESULTS

In order to meet the objectives of this research, the subsection "Companies that disclose traceability" outlines the companies that disclose traceability in their reports. The subsection "Traceability as a material topic" discusses traceability as a material topic, while the subsection "Certifications" examines certifications. The subsection "Supplier management" discusses the policies and guidelines adopted by organizations and their suppliers. Finally, the subsection "Communication of circularity in operations" analyzes how companies report actions related to the circular economy or circularity in their sustainability reports.

Companies that disclose traceability

It was observed that, out of the 41 companies analyzed, 40 disclosed their traceability in some way in the evaluated three-year period. The sector with the highest average volume of information disclosed was food production and distribution, especially those related to the beef supply chain,

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followed by the production of hygiene and beauty products, and the retail and consumer goods sector.

Table 3 presents the companies analyzed, their respective sectors, and the page numbers where each addresses traceability during the considered period.

Table 3

Companies analyzed and the number of pages with references to traceability

Company	Industry sector	2021	2022	2023	Average
AES Brasil	Electric power	1	3	1	1,67
Ambipar	Environmental solutions	6	6	3	5
Azzas 2154	Consumer and retail	6	5	11	7,33
Azul Linhas Aéreas	Air transport and logistics	3	1	1	1,67
Banco do Brasil	Banking services	3	2	3	2,67
Banco BTG Pactual	Banking services	0	1	1	0,67
Bradesco	Banking services	1	1	0	0,67
CCR	Railway concession	1	2	0	1
Cemig	Electric power	0	0	3	1
Cielo	Banking services	3	4	3	3,33
Copel	Electric power	1	1	2	1,33
Cosan	Fuel distribution	1	0	1	0,67
CPFL Energia	Electric power	1	1	0	0,67
Dexco	Construction industry	2	4	5	3,67
Ecorodovias	Highway concession	1	1	1	1
Engie	Electric power	0	0	3	1
Eletrobrás	Electric power	1	4	1	2
Fleury	Medicine and healthcare	1	0	1	0,67
Grupo Pão de Açúcar	Consumer and retail	16	11	13	13,33
Iochpe-Maxion	Automotive industry	1	1	1	1
Itaú Unibanco	Banking services	2	0	0	0,67

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ISSN 1678-6971 • *RAM. Rev. Adm. Mackenzie,* São Paulo, *26*(6), eRAMD250083, 2025
https://doi.org/10.1590/1678-6971/eRAMD250083

Table 3 (conclusion)

Companies analyzed and the number of pages with references to traceability

Company	Industry sector	2021	2022	2023	Average
Itausa	Banking services	0	0	0	0
Klabin	Pulp and paper industry	0	0	5	1,67
Lojas Renner	Consumer and retail	4	9	8	7
M Dias Branco	Food products	0	0	2	0,67
Magazine Luiza	Consumer and retail	1	2	1	1,33
Minerva	Food products	15	15	18	16
Movida	Vehicle rental	6	6	10	7,33
MRV	Real estate market	0	2	2	1,33
Natura	Hygiene and beauty products	7	8	9	8
Neoenergia	Electric power	4	4	4	4
Raia Drogasil	Pharmaceutical retailer	1	0	1	0,67
Rumo	Railway logistics	6	4	1	3,67
Santander	Banking services	0	4	3	2,33
Sendas	Retail trade	9	9	6	8
Simpar	Logistics services	0	3	2	1,67
Suzano	Pulp and paper industry	2	2	1	1,67
Telefônica Brasil	Telecommunications	1	0	2	1
Tim	Telecommunications	1	2	2	1,67
Vibra	Fuel distribution	2	2	0	1,33
Weg	Electronic equipment	0	0	2	0,67
Total		110	120	133	121

Table 3 shows an increase in the frequency of traceability being addressed in the reports. In 2021, it was mentioned on 110 pages, and in 2023, on 133 pages, representing a 21% increase. Comparing the 2023 reports to the three-year average, it can be observed that 15 companies (37%) decreased the number of pages with references to traceability, while 22 (54%) increased their mentions; of these, five reported traceability for the first time in the analyzed three-year period. This may suggest that the companies surveyed

ISSN 1678-6971 • *RAM. Rev. Adm. Mackenzie*, São Paulo, *26*(6), eRAMD250083, 2025
https://doi.org/10.1590/1678-6971/eRAMD250083

consider traceability a crucial element of competitive advantage. Furthermore, this growth may be associated with increased regulatory requirements, advancements in ESG practices, and the need for greater transparency in production chains (Ahmed & MacCarthy, 2023).

Furthermore, traceability has become an essential tool to ensure compliance with international standards, facilitate audits, and demonstrate organizations' commitment to sustainability and the circular economy. It also indicates that some companies are beginning to adopt a long-term strategic management approach focused on the transparency of their operations and respect for the customer, seeking to achieve some form of competitive advantage. This represents a strategic pursuit by managers.

Organizations operating in the food products sector lead the way in traceability communications, particularly Minerva, which mentions traceability on 18 pages of its 2023 sustainability report. The company's concern with this aspect is highlighted in the management message, which reports on the whole traceability experience of the supply chain, with the first full-traceable leather export to China, occurred in November 2023 (Minerva Foods, 2024, p. 5), and goes over topics such as strategy, management, training, events and meetings with internal and external public and aims. However, it is exceptionally detailed in a dedicated chapter addressing the traceability of the beef and leather production chain. The company describes the technology used, the monitoring of farms, the countries in which it operates, the traceability percentages achieved in each country, as well as the policy and methodology for selection, and the type of relationship and monitoring adopted with direct and indirect suppliers to ensure the traceability of the products marketed by the company.

Still regarding traceability disclosures aimed at ensuring food safety, companies such as Grupo Pão de Açúcar and Sendas detail various actions under development to certify the sustainable origin of products such as beef, chicken and pork, palm oil, sugar, banana, cocoa, coffee, milk, corn, eggs, soy, and textile products. The reports specify that the actions undertaken utilize technology as an essential tool to enable product monitoring and traceability, primarily through geomonitoring systems, blockchain, and other technologies established in partnership with the supply chain. The higher frequency of mentions of traceability in the sustainability reports by companies operating in the food products sector seems easy to explain, as they market perishable products that can directly impact consumer health. This type of concern started gaining prominence at the end of the twentieth century (Vinholis & Azevedo, 2002).

ISSN 1678-6971 • *RAM. Rev. Adm. Mackenzie,* São Paulo, *26*(6), eRAMD250083, 2025
https://doi.org/10.1590/1678-6971/eRAMD250083

The citations found in the traceability reports span the food, leather, and animal welfare sectors. Companies operating in retail trade and in the footwear and textile industries report actions aimed at ensuring the sustainability of production chains for cotton, palm, viscose, mica, soy, among others, which are used as inputs in the textile, footwear, cosmetics, and hygiene industries. In addition to traceability, the certification of the origin of products such as paper, ethanol, and palm oil ensures the environmentally responsible origin of the raw materials used.

Considering the origin of the applicability of traceability and its link to production, especially in companies operating in the food sector, it was initially assumed that service-providing companies would report the topic less frequently or not mention it at all, a fact confirmed in the analysis of traceability information in the sustainability reports of service-providing companies. In 2023, six companies, all service providers, did not address topics related to traceability. Demonstrating to society that a company is committed to ESG elements can create competitive advantages, thereby improving its reputation and strengthening relationships with stakeholders. Still, it may mask whether the market is merely seeking to boost sales (Teixeira et al., 2024).

However, even with a lower average number of traceability reports, it was still possible to identify approaches relevant to sustainability, as was the case with companies in the electric energy and greenhouse gas emission sectors. Most service-providing companies in the electric energy supply sector reported actions and investments in the traceability of electricity provided to their clients, with the possibility of renewable origin certification through the acquisition of International Renewable Energy Certificates (I-RECs). Clients use these certificates to offset their carbon emissions and ensure the use of clean energy in their facilities, among other environmental benefits and commitments. Companies such as Lojas Renner S.A. report that they acquire I-REC for 100% of the electricity consumption of all the Group's consuming units in all countries (Lojas Renner S.A., 2022, p. 146).

Logistics service providers and vehicle rental companies report investments and goals related to the traceability of transported cargo and shipments/or vehicle fleets, including the commercialization of specific vehicle tracking services. Additionally, some banking institutions report offering specific credit lines to clients who intend to invest in stocks related to animal welfare and the implementation of animal traceability systems for human food. These conditions imposed on companies can be viewed as positive, given the growing consumer interest in sustainability. Conscious consumers

ISSN 1678-6971 • *RAM. Rev. Adm. Mackenzie*, São Paulo, *26*(6), eRAMD250083, 2025
https://doi.org/10.1590/1678-6971/eRAMD250083

tend to maintain commercial relationships with companies aligned with the ESG theme (Zanirato & Rotondaro, 2016).

Traceability enables various applications that can encompass any sector in which the company operates. Among these, the monitoring of workers' health and processes, as well as administrative decisions, stands out, aiming for greater transparency in management, certification of waste disposal, and monitoring of systems and internal controls. These and other tracking possibilities enable companies to communicate more effectively to the market the practices they have adopted to fulfill their goals, which are aligned with ESG.

Traceability as a material topic

The second perspective proposed by this study sought to understand whether traceability is considered a material topic by companies and to identify the frameworks used in the reports. It was found that, over the three years analyzed, only three companies (Rumo, 2021; Dexco, 2022; 2023; and Minerva, 2021; 2023) considered traceability a material topic. However, another 22 companies identified the management of suppliers, sustainable purchasing, or the sustainability of the value chain as material, variations that refer to concerns regarding the supply chain and the possibility that traceability is embedded within the development of these topics. It is important to note that materiality refers to the significance a given topic holds for a particular company, indicating that society expects the private sector (companies and stakeholders) to support the 17 Sustainable Development Goals (SDGs) (Betti et al., 2018).

The research found that the Global Reporting Initiative (GRI) was the framework chosen by 41 companies for developing the sustainability reports analyzed. Of all the companies analyzed, 36 also utilized the standards required by the Sustainability Accounting Standards Board (SASB) in 2023, representing a three-company increase from 2021. It was also found that some companies report their statements according to the standards of the Task Force on Climate-related Financial Disclosures (TCFD), International Financial Reporting Standards (IFRS), International Integrated Reporting Framework (IIRC), and Carbon Disclosure Project (CDP), providing information and/or specific indicators for the mentioned standards. The disclosure of reports in accordance with international standards shows these companies' commitment to sustainability. Furthermore, this option can be viewed as a crucial strategic element in the pursuit of a competitive advantage (D'Adamo, 2023).

ISSN 1678-6971 • *RAM. Rev. Adm. Mackenzie,* São Paulo, *26*(6), eRAMD250083, 2025
https://doi.org/10.1590/1678-6971/eRAMD250083

Certifications

The third perspective aimed to verify whether companies report having certifications related to ESG elements, as these certifications represent external validation of the practices adopted and may demonstrate the organizational commitment to internationally recognized environmental, social, and governance standards. Furthermore, obtaining these certifications may indicate a strategic alignment with market and stakeholder demands, showing transparency, risk mitigation, and compliance with regulations.

All the sustainability reports analyzed indicate that the companies hold some type of ESG certification, seals, and/or recognitions. Some certifications are specifically focused on environmental issues, such as the International Organization for Standardization ISO 14001, I-REC, Aquaculture Stewardship Council (ASC), Forest Stewardship Council (FSC), Carbon Trust, Food Safety System Certification (FSSC 22000), GHG Protocol, Globescan Top Sustainability, Carbon Efficient Index (ICO2), and Leadership in Energy and Environmental Design (LEED), as well as the seal of the Brazilian Association of Textile Retail (ABVTEX), among others. These certifications can contribute to increasing companies' profitability, making them more competitive compared to their competitors (Xu & Sam, 2025), while also enhancing their value and improving their image in society (Kheireddine et al., 2024).

Other certifications are aimed at social, ethical, and quality-related issues, such as Great Place to Work, the AB2L Departamento Jurídico 4.0 certification, the internal certified audit by the Institute of Internal Auditors (IIA), ISO 45001, ISO 27001, ISO 9001, ISO 37001, among several other types of certifications, some of which are specific to the company's area of activity.

All 41 companies analyzed report a commitment to the SDGs and mention them in their sustainability reports. Some incorporate their goals into the context of the reported topics and select priority themes with links to their materiality matrix. It is worth noting that companies with superior ESG performance are more likely to invest in green innovation, underscoring their crucial role in promoting responsible corporate behavior and fostering environmental innovation, while also facilitating easier access to funding from the financial sector (Li & Li, 2025).

Supplier management

The fourth perspective aimed to understand how organizations describe, in their sustainability reports, the policies and guidelines they adopt in

ISSN 1678-6971 • *RAM. Rev. Adm. Mackenzie*, São Paulo, *26*(6), eRAMD250083, 2025
https://doi.org/10.1590/1678-6971/eRAMD250083

supplier management. This analysis enabled a deeper understanding of how organizations structure their supply chains and implement monitoring and traceability mechanisms to ensure compliance with ESG standards. Investing in processes that make the supply chain more transparent can contribute to improving quality and reducing companies' environmental impact (Su et al., 2025).

In assessing the sustainability reports of the 41 companies analyzed, it was found that 40 companies dedicate a specific chapter to reporting actions and metrics that guide their relationships with suppliers. All of them mention the existence of a formal and particular policy to direct the relationship between the company and its suppliers. In addition, they indicate the existence of a selection process for suppliers, with a pre-established procedure and, in most cases, the adoption of socio-environmental criteria in the supplier selection process. It was verified that 39 organizations carry out homologation, in which the relationship is formalized.

After the service begins or materials/products are supplied, all companies must describe the existence of processes for tracking and monitoring suppliers to ensure the maintenance of the conditions initially agreed upon. Aiming at improvement and development, as well as compliance with adopted regulations and policies, 35 companies report providing training and promoting the development of suppliers that operate as partners. Furthermore, 22 companies describe recognition practices for suppliers that stand out.

The relationship with suppliers enables the adoption of socio-environmental best practices from the supply chain to the finished product (Arezzo & Co, 2023, p. 64). The traceability process requires investment in modern technologies but promises to enhance supply chain management by verifying the suppliers' sustainable practices. This is challenging, as companies are part of supply networks that operate in an interconnected manner within complex networks (Blaettchen et al., 2025).

Communication of circularity in operations

The fifth perspective addressed the analysis of how organizations communicate actions related to the circular economy or circularity in their reports. It was possible to verify that 38 companies mention the term at least once in their sustainability reports between 2021 and 2023. Among them, five companies consider the circular economy a material topic (Ambipar, CPFL, and Natura, from 2021 to 2023; Lojas Renner S.A., in 2022 and 2023; Klabin in 2023), while 12 report circularity actions by promoting traceability

ISSN 1678-6971 • *RAM. Rev. Adm. Mackenzie,* São Paulo, *26*(6), eRAMD250083, 2025
https://doi.org/10.1590/1678-6971/eRAMD250083

and control of the supply chain, ensuring that the process was carried out in accordance with Brazilian regulations (Telefônica Brasil, 2022, p. 122).

The assessment of the sustainability reports over the three years suggests a growing concern in reporting initiatives and actions aimed at fostering the circular economy. It began with 28 companies in 2021, with a total of 126 pages addressing the topic at least once, and expanded to 33 companies in 2023, with a total of 197 pages reporting on circularity or the circular economy. This represents a 56% increase in the number of pages with references to the topic. Table 4 summarizes the companies analyzed and the number of pages in which circular economy or circularity is mentioned in each corresponding year.

Table 4

Companies analyzed and the number of pages with references to the economy/circularity

Company	Industry sector	2021	2022	2023	Average
AES Brasil	Electric power	0	0	1	0,33
Ambipar	Environmental solutions	19	35	36	30
Azzas 2154	Consumer and retail	12	10	7	9,67
Azul Linhas Aéreas	Air transport and logistics	2	2	1	1,67
Banco do Brasil	Banking services	1	0	0	0,33
Banco BTG Pactual	Banking services	0	1	0	0,33
Bradesco	Banking services	2	1	0	1
CCR	Railway concession	1	0	1	0,67
Cemig	Electric power	0	2	2	1,33
Cielo	Banking services	1	1	1	1
Copel	Electric power	0	0	0	0
Cosan	Fuel distribution	2	1	1	1,33
CPFL Energia	Electric power	3	2	3	2,67
Dexco	Construction industry	4	3	3	3,33
Ecorodovias	Highway concession	0	0	5	1,67
Engie	Electric power	0	4	3	2,33
Eletrobrás	Electric power	1	1	1	1

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ISSN 1678-6971 • *RAM. Rev. Adm. Mackenzie*, São Paulo, *26*(6), eRAMD250083, 2025
https://doi.org/10.1590/1678-6971/eRAMD250083

Table 4 (conclusion)

Companies analyzed and the number of pages with references to the economy/circularity

Company	Industry sector	2021	2022	2023	Average
Fleury	Medicine and healthcare	0	0	0	0
Grupo Pão de Açúcar	Consumer and retail	4	5	1	3,33
Iochpe-Maxion	Automotive industry	3	3	4	3,33
Itaú Unibanco	Banking services	0	0	0	0
Itausa	Banking services	0	1	1	0,67
Klabin	Pulp and paper industry	6	3	10	6,33
Lojas Renner	Consumer and retail	13	23	26	20,67
M Dias Branco	Food products	0	1	1	0,67
Magazine Luiza	Consumer and retail	0	1	3	1,33
Minerva	Food products	1	1	4	2
Movida	Vehicle rental	1	2	1	1,33
MRV	Real estate market	1	1	5	2,33
Natura	Hygiene and beauty products	24	22	20	22
Neoenergia	Electric power	3	8	11	7,33
Raia Drogasil	Pharmaceutical retailer	7	7	4	6
Rumo	Railway logistics	0	0	1	0,33
Santander	Banking services	1	1	0	0,67
Sendas	Retail trade	2	0	5	2,33
Simpar	Logistics services	2	0	0	0,67
Suzano	Pulp and paper industry	3	8	4	5
Telefônica Brasil	Telecommunications	5	13	15	11
Tim	Telecommunications	1	1	4	2
Vibra	Fuel distribution	0	2	3	1,67
Weg	Electronic equipment	1	0	9	3,33
Total		126	166	197	163

The circular economy ensures that materials and products can be reused, recycled, or properly traced, reinforcing a commitment to sustainable practices. It is important to highlight that the current economic system is based on a

ISSN 1678-6971 • *RAM. Rev. Adm. Mackenzie,* São Paulo, *26*(6), eRAMD250083, 2025
https://doi.org/10.1590/1678-6971/eRAMD250083

linear approach to capital acquisition, which inevitably leads to the imminent exhaustion of natural resources. Furthermore, the global transition to a more sustainable economic model, which benefits society as a whole, can be facilitated through technological innovations and strategic financial investments. This line of thinking centers on the concept of the circular economy, which is grounded in the principles of eliminating waste and regenerating natural systems (Kumar et al., 2025).

However, when analyzing the sustainability reports, it is observed that traceability and circularity are not always addressed in an integrated manner. While traceability is widely associated with supply chain monitoring, regulatory compliance, transparency, and risk management, circularity focuses on maximizing resource efficiency, reducing waste, and reintroducing materials into the production cycle. The absence of an explicit connection between these concepts in the reports may indicate challenges in implementing systemic strategies that align traceability as an essential mechanism to ensure the effectiveness of circular practices.

Thus, traceability could act as a facilitator of circularity by providing verifiable data on the origin, use, and destination of materials, strengthening the measurement and verification of sustainable practices within organizations. Table 5 was prepared to provide better visibility of the research results.

The five perspectives evidenced through the analysis of the 123 sustainability reports demonstrate that traceability represents a structuring element of strategic management, guiding the configuration of the organizational decision-making process, in alignment with transparency and contributing to the establishment of competitive advantage.

Table 5

Synthesis of the research results

Perspectives	Research results
Disclosure of traceability in sustainability reports	The sectors with the highest average volume of information disclosure were food production and distribution, with an emphasis on information related to the beef production chain, followed by the production of hygiene and beauty products, and consumer and retail.
Traceability as a material topic	Only three companies (Rumo, Dexco, and Minerva) considered traceability a material topic. Another 22 indicated that the management of suppliers, sustainable purchasing, or the sustainability of the value chain are material, variations that reflect concerns with the supply chain and the possibility that traceability is included in the development of these topics.

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Table 5 (conclusion)

Synthesis of the research results

Perspectives	Research results
Certifications	All analyzed reports indicate that companies have some type of ESG certification, seal, and/or recognition. Some certifications are specifically focused on environmental issues, such as ISO 14001, I-REC, Aquaculture Stewardship Council (ASC), Forest Stewardship Council (FSC), Carbon Trust, Food Safety System Certification (FSSC 22000), GHG Protocol, Globescan Top Sustainability, Carbon Efficient Index (ICO2), and Leadership in Energy and Environmental Design (LEED), as well as the seal of the Brazilian Association of Textile Retail (ABVTEX), among others.
Supplier management	It was verified that 40 of the 41 companies analyzed dedicate a specific chapter to report actions and metrics guiding the relationship with the company's suppliers. All of them mention the existence of a formal and particular policy to direct the relationship between the company and its suppliers. All also indicate the existence of a selection process for suppliers, with a pre-established procedure and, in some cases, the adoption of socio-environmental criteria in this selection. Thirty-nine of them carry out homologation, in which the relationship is formalized.
Communication of circularity in operations	Thirty-eight companies mention the term at least once in their sustainability reports. Five companies consider the circular economy a material topic, while 12 report circularity actions that use traceability resources to verify the completion of the products' life cycle and the destination of waste.

CONCLUSIONS

This article examines aspects of strategic management, including decision-making, transparency, and competitive advantage, based on the disclosure of traceability actions in reports from companies listed on the ISE B3. A large number of scientific articles address the ESG agenda, but few specifically deal with traceability as an element of strategic management, highlighting the relevance of this research.

Five perspectives guided the data collection and analysis, namely: 1. the number of companies disclosing traceability; 2. traceability being considered a material topic by companies and the frameworks that were used; 3. the presence of certifications focused on the ESG agenda; 4. the description of

ISSN 1678-6971 • *RAM. Rev. Adm. Mackenzie*, São Paulo, *26*(6), eRAMD250083, 2025
https://doi.org/10.1590/1678-6971/eRAMD250083

policies and guidelines adopted in supplier management; and 5. the communication of actions related to the circular economy or circularity.

Primarily, it was possible to verify an increase in the frequency of the topic of traceability being addressed in the reports, particularly in specific sectors, such as consumer and retail, as well as food products. These findings suggest the need for greater regulatory requirements, the advancement of ESG practices, and increased transparency in production chains. Regarding the second perspective, it was observed that most companies do not consider traceability a material topic, but rather supplier management, sustainable purchasing, or the sustainability of the value chain. These variations reflect the (strategic) concern of the companies analyzed with the supply chain, as well as the possibility that traceability is included in the development of these topics. The GRI was the framework adopted by all 41 companies for developing their sustainability reports.

The third perspective revealed that all analyzed sustainability reports include some form of ESG certification, seal, and/or recognition. These certifications can demonstrate the companies' commitment to internationally recognized environmental, social, and governance standards. The fourth perspective revealed that most of the companies analyzed have a formal and specific policy for developing relationships with their suppliers. The reports (except for one) indicate that the supplier selection process follows a pre-established procedure, with companies using socio-environmental criteria in the selection.

Finally, the fifth perspective showed that traceability and circularity are not always addressed in an integrated manner. The reports suggest that traceability is closely linked to supply chain monitoring, regulatory compliance, transparency, and risk management. At the same time, circularity, which also emerged more prominently during the analyzed period, focuses on maximizing resource efficiency, reducing waste, and reintegrating materials into the production process. The lack of clarity in these reports may indicate difficulties in implementing strategies that integrate traceability as a fundamental mechanism to ensure the effectiveness of circular practices.

Supply chain traceability stands out as a crucial factor in the ESG agenda, as it enables the monitoring of products and/or services from their origin to their destination. This enables the identification of socio-environmental risks in operations, allowing organizations to make more assertive and transparent decisions. Furthermore, demonstrating in their sustainability reports the actions taken in terms of product and/or service traceability can represent an essential competitive advantage and put organizations in a positive light in the market.

ISSN 1678-6971 • *RAM. Rev. Adm. Mackenzie*, São Paulo, *26*(6), eRAMD250083, 2025
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The research findings contribute to the theoretical advancement of issues related to sustainability and strategic management, informing decision-makers about the challenges and opportunities of using traceability as a strategic element in decision-making processes, transparency, and competitive advantage.

As a limitation, there is a need for further exploration of the topic, with research that examines traceability from other perspectives, including its direct relationship with socio-environmental certification criteria in different sectors. It is proposed that analyses be conducted on reports from companies in other countries, from both the Global South and the Global North, and that the findings be compared with the results presented here.

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