Environmental, Social, and Governance principles in meatpacking plants: addressing sustainability tensions in the swine and poultry industry

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Dossier: Building Organizational Resilience

Environmental, Social, and Governance principles in meatpacking plants: addressing sustainability tensions in the swine and poultry industry

Simone Sehnem [1 2] *
Taís Provensi [2]
Lucila Maria de Souza Campos [3]
Susana Carla Farias Pereira [4]

* Corresponding Author
[1] Universidade do Sul de Santa Catarina (UNISUL), Florianópolis, SC, Brazil
[2] Universidade do Oeste de Santa Catarina (UNOESC), Chapecó, SC, Brazil
[3] Universidade Federal de Santa Catarina (UFSC), Florianópolis, SC, Brazil
[4] Fundação Getulio Vargas (FGV EAESP), Escola de Administração de Empresas de São Paulo, São Paulo, SP, Brazil

Abstract
This study examines how the adoption of environmental, social, and governance (ESG) indicators by meatpacking plants in the swine and poultry industry contributes to mitigating sustainability tensions, while revealing key challenges and opportunities. A multiple case study was conducted using primary data from 203 questionnaires administered to integrated producers in southern Brazil and secondary data from sustainability reports published between 2018 and 2022 by two major integrating companies in the region. Results indicate that ESG indicators help mitigate sustainability tensions but also reveal emerging challenges (e.g., decoupled management, territorial degradation, cognitive dissociation, conflicting strategic priorities, asymmetries of interest between producers and firms, instrumental approach to sustainability). The study highlights the effectiveness of ESG indicators in promoting sustainability within the swine and poultry production chain while emphasizing the need for integrated approaches to address these tensions, also providing empirical evidence and practical insights for overcoming sustainability-related challenges in the sector.
Keywords: sustainability, ESG indicators, agribusiness, meatpacking plants, Sustainable Development Goals (SDGs).

Princípios ambientais, sociais e de governança em frigoríficos: abordando as tensões de sustentabilidade na indústria suína e avícola

Resumo
Este estudo examina como a adoção de indicadores ambientais, sociais e de governança (ASG) por frigoríficos do setor de suínos e aves contribui para mitigar tensões relacionadas à sustentabilidade, ao mesmo tempo em que revela desafios e oportunidades fundamentais. Realizou-se um estudo de casos múltiplos utilizando dados primários provenientes de 203 questionários aplicados a produtores integrados no sul do Brasil e dados secundários de relatórios de sustentabilidade publicados entre 2018 e 2022 por duas grandes empresas integradoras da região. Os resultados indicam que os indicadores ASG

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auxiliam na mitigação de tensões de sustentabilidade, mas também revelam desafios emergentes (por exemplo, gestão desconectada, degradação territorial, dissociação cognitiva, prioridades estratégicas conflitantes, assimetrias de interesse entre produtores e empresas e uma abordagem instrumental da sustentabilidade). O estudo destaca a eficácia dos indicadores ASG na promoção da sustentabilidade na cadeia produtiva de suínos e aves, enfatizando a necessidade de abordagens integradas para lidar com essas tensões, além de fornecer evidências empíricas e insights práticos para superar desafios relacionados à sustentabilidade no setor.
Palavras-chave: sustentabilidade, indicadores ASG, agronegócio, frigoríficos, Objetivos de Desenvolvimento Sustentável (ODS).

Principios ambientales, sociales y de gobernanza en plantas empacadoras de carne: cómo abordar las tensiones de sostenibilidad en la industria porcina y avícola

Resumen

Este estudio examina cómo la adopción de indicadores ambientales, sociales y de gobernanza (ASG) por parte de las plantas procesadoras de carne en la industria porcina y avícola contribuye a mitigar las tensiones de sostenibilidad, a la vez que revela desafíos y oportunidades clave. Se realizó un estudio de casos múltiples utilizando datos primarios de 203 cuestionarios administrados a productores integrados en el sur de Brasil y datos secundarios de informes de sostenibilidad publicados entre 2018 y 2022 por dos importantes empresas integradoras de la región. Los resultados indican que los indicadores ASG ayudan a mitigar las tensiones de sostenibilidad, pero también revelan desafíos emergentes (por ejemplo, gestión desacoplada, degradación territorial, disociación cognitiva, prioridades estratégicas conflictivas, asimetrías de intereses entre productores y empresas, enfoque instrumental de la sostenibilidad). El estudio destaca la eficacia de los indicadores ASG para promover la sostenibilidad dentro de la cadena de producción porcina y avícola, al tiempo que subraya la necesidad de enfoques integrados para abordar estas tensiones, proporcionando además evidencia empírica y perspectivas prácticas para superar los desafíos relacionados con la sostenibilidad en el sector.
Palabras clave: sostenibilidad, indicadores ASG, agronegocios, plantas procesadoras de carne, Objetivos de Desarrollo Sostenible (ODS).

INTRODUCTION

In recent decades, companies across various sectors have faced increasing pressure to adopt sustainable practices that reconcile economic performance, social responsibility, and environmental stewardship. In this context, environmental, social, and governance (ESG) principles have emerged as a strategic management system aimed at creating sustainable value while mitigating negative impacts throughout supply chains.

Although ESG principles are well-established in sectors such as finance (Kniaz et al., 2026), their application in agro-industrial sectors, particularly in meatpacking, still faces significant theoretical and practical challenges (Bialkovska et al., 2025).

Recent studies suggest that adopting ESG principles may provide significant benefits, but can also generate organizational tensions. These tensions often arise from conflicting stakeholder interests, regulatory demands, divergent strategic priorities, and power asymmetries along the chain (Hahn et al., 2015; Tura et al., 2019). In Brazil's swine and poultry production sector − one of the largest globally in terms of volume and exports, such tensions are especially visible in the vertical integration model − which links

agribusinesses and rural producers through formal contracts. While this model promises efficiency and supply stability, it also creates frictions that challenge the viability of sustainability within the chain.

Despite the growing body of literature on ESG and corporate sustainability, there remains a gap concerning how ESG principles are implemented in integrated agro-industrial chains and how this implementation interacts with sustainability tensions, particularly in emerging economies (Nehoda et al., 2026). Most existing research has focused on publicly traded firms or industrial urban sectors, overlooking rural contexts marked by structural dependence and limited decision-making power among producers (Perin, 2025).

The current study aims to address this gap by investigating how ESG principles adopted by meatpacking plants in the swine and poultry production chain contribute to mitigating sustainability tensions, and what the key challenges and opportunities are in this process. A multiple case study was conducted using primary data collected from 203 integrated producers in southern Brazil and secondary data from sustainability reports of two of the country's leading meatpacking companies.

The originality of this study lies in connecting Hahn et al. (2015) framework on sustainability tensions with the ESG perspective, analysing how ESG indicators influence the relationships between integrators and producers.

This approach aims to contribute to theoretical advancements in managing sustainability tensions, while offering practical insights for more sustainable agro-industrial supply chains. The remainder of this paper is structured as follows. Section 2 reviews the theoretical foundations of ESG and corporate sustainability, with particular attention to the concept of sustainability tensions as developed in the literature (Hahn et al., 2015). Section 3 describes the methodological approach, detailing the multiple case study design, data sources, and analytical procedures adopted. Section 4 presents and discusses the empirical findings, encompassing the ESG indicators adopted by the two meatpacking companies (Alfa and Beta) and the sustainability tensions that emerged from the triangulation of sustainability reports and producer questionnaires. Section 5 synthesizes the findings into a framework of key tensions, linking empirical evidence to theoretical categories. Finally, Section 6 offers concluding remarks, highlights the study's contributions and limitations, and suggests directions for future research.

ESG AND SUSTAINABILITY

In the past two decades, organizations have increasingly prioritized sustainability as a crucial strategy aimed at creating lasting value for their businesses and mitigating related adverse impacts on society and the environment (Feeney et al., 2023). As such, in recent years, a framework encompassing ESG factors has emerged.

The ESG framework underscores the three fundamental pillars of sustainability and is strongly aligned with the global Agenda 2030, signalling a tangible connection between sustainable investment practices (United Nations, 2023). The term 'ESG' does not have a single academic definition but encompasses a broad spectrum of factors, considering the ecological impact of a company, its social responsibilities, and governance systems at the core of its operations. Cornell and Shapiro (2021) assert that this new 'phase' of

sustainability in organizations brings a differentiated perspective, seeking more than just results but total harmony in the actions and initiatives that corporations adopt; therefore, the ESG framework can be considered a model to be followed as it encompasses themes that support companies in sustainable corporatism.

The environmental aspect ‘E’ in ESG focuses on a company's performance regarding its environmental (ecological) impacts, primarily involving efforts to mitigate or avoid adverse environmental impacts caused by business activities (Senadheera et al., 2021). It covers initiatives related to sustainability, clean energy, waste reduction, greenhouse gases (GHGs), reduced input consumption, waste generation, and emissions, among others (Khaw, 2024). The social dimension, the ‘S’ of ESG, encompasses a company's commitment to upholding principles of social responsibility, ethical labour practices, active community engagement activities, promotion of diversity, job creation, and meeting stakeholder expectations (Baid & Jayaraman, 2022). The governance dimension ‘G’ refers to the systems, policies, and practices that guide a company's decision-making and accountability, involving corporate governance structures, active markets, board diversity, transparency, and ethical business practices (Kouaib et al., 2020; Manita et al., 2018).

It is important to note, however, that the concept of sustainability itself is far from settled in the literature. The term has been subject to competing theoretical interpretations since the Brundtland Commission’s landmark definition — development that meets the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987) which, despite its widespread adoption, remains contested as to its substantive meaning and operationalisation. A foundational debate in sustainability theory distinguishes between ‘weak’ and ‘strong’ sustainability (Neumayer, 2013; Ott, 2003). Weak sustainability assumes that natural and human-made capital are substitutable that the depletion of ecological resources can be compensated by technological or economic gains and underpins most mainstream corporate sustainability frameworks, including market-oriented ESG approaches. Strong sustainability, by contrast, holds that certain natural systems and ecological thresholds are irreplaceable and must be preserved as absolute constraints on economic activity, regardless of potential trade-offs (Ott, 2003). This distinction carries direct analytical relevance for the present study: the ESG indicators adopted by the meatpacking firms examined here focused on internal resource efficiency, emission reductions, and compliance monitoring are firmly grounded in the weak sustainability paradigm, a point that partially explains the tensions observed when these indicators encounter the ecological and social realities of integrated producers. Beyond the weak/strong debate, corporate sustainability in academic literature has evolved through the lens of the Triple Bottom Line (Elkington, 1997), which frames sustainability as the simultaneous management of economic, environmental, and social performance. While influential, this framework has been critiqued for encouraging additive rather than integrative thinking treating the three dimensions as parallel objectives rather than as structurally interdependent (Hahn et al., 2015). It is precisely this integrative gap that gives rise to the sustainability tensions examined in this study.

The sector under analysis meatpacking warrants its own conceptual situating. Meatpacking plants are agro-industrial facilities engaged in the slaughter, processing, and commercialisation of animal protein, and occupy a structurally central position in vertically integrated production chains that link rural producers with global commodity

markets (Hall & Johnson-Hall, 2021). In the Brazilian context, these companies operate predominantly through formal integration contracts that bind smallholder and medium-scale rural producers to a single integrating firm, which controls inputs, technical standards, logistics, and pricing while the producer bears the costs of land, labour, and infrastructure (Zylbersztajn & Neves, 2000). This contractual architecture creates a structurally asymmetric relationship: the integrating firm captures the gains from economies of scale and brand equity, while the producer assumes significant operational risk with limited bargaining power. From a sustainability standpoint, meatpacking chains are particularly significant given the sector's global environmental footprint encompassing GHG emissions, land use, water consumption, and waste generation as well as its social dimensions related to labour conditions, rural livelihoods, and community development (Fan et al., 2023; Li et al., 2016). These structural features make the meatpacking sector a theoretically relevant and empirically demanding arena for examining how ESG frameworks interact with sustainability tensions, as the adoption of formal sustainability mechanisms does not automatically translate into improved outcomes for the most exposed actors in the chain.

With challenges associated with climate change, social inequality, and ethical governance gaining increasing prominence in global discussions, issues aligned with the ESG framework are becoming more common in the agribusiness sector. However, despite the clear growth in ESG incorporation in the sector, some resistance is still encountered, termed in this paper as 'sustainability tensions'. Overcoming these tensions is crucial for achieving sustainability-focused management and all the accompanying benefits − aspects addressed in this study.

To deeply understand how ESG criteria manifest within vertically integrated agro-industrial systems, it is essential to draw upon the literature on global supply chain governance and power relations (Gereffi et al., 2005). Rather than being neutral management platforms, agro-industrial value chains are inherently structured around asymmetric dependencies where focal firms (such as large meatpacking companies) exert dominant 'captive' governance over direct suppliers and smallholders (Zylbersztajn, 2010). This structural imbalance allows agribusiness corporations to set technical specifications, audit guidelines, and legal compliance boundaries unilaterally. Consequently, critical approaches to ESG suggest that corporate non-financial reporting frequently acts as an institutional 'legitimacy-seeking device' designed for external reputation management, which often leaves the underlying systemic power asymmetries and economic vulnerabilities of upstream actors untouched (Arvidsson & Dumay, 2022). In these asymmetric environments, ESG demands risk being operationalized through top-down enforcement mechanisms, mutating from a cooperative framework for value co-creation into a strategic instrument that pushes operational compliance costs onto the weakest nodes of the supply chain.

Sustainability Tensions

Tension is generally considered a negative consequence that emerges from conflicting objectives and interests among collaborating partners (Fang et al., 2011). For instance, ethical sourcing and purchasing enhance the reputation of a focal company but may force its suppliers to alter their operations or even terminate the relationship if certain requirements are not met (Govindan et al., 2021). Such a situation can generate organisational and financial stress among suppliers.

When discussing sustainability, tensions are not anomalies but structural manifestations of competing logics within organisations and across networks. These contradictions are often intensified by the adoption of ESG frameworks, which attempt to embed ESG priorities into core business strategies. While the ESG framework promotes transparency, long-term thinking, and stakeholder engagement, its implementation often reveals the 'darker side' of sustainability (Tura et al., 2019) unintended conflicts between sustainability objectives and traditional business imperatives.

An important work on sustainability tensions is that of Hahn et al. (2015), who, based on a literature review on strategic contradictions, tensions, and paradoxes (Ford & Ford, 1994; Lewis, 2000; Poole & Van de Ven, 1989; Smith & Lewis, 2011; Smith & Tushman, 2005), developed a framework for identifying and characterising tensions in corporate sustainability. According to Hahn et al. (2015), sustainability tensions are characterised by difficulties encountered by organisations vis-à-vis four main aspects: i) divergences between personal and organisational sustainability agendas; ii) short and long-term corporate orientation; iii) isomorphism and technological and structural change; and iv) efficiency and resilience. According to these authors, while the first three tensions have received considerable attention in the literature on corporate sustainability, the latter represents a dominant theme in the debate on sustainable development.

One of the main differentials proposed by the authors is that this framework goes beyond the traditional triad of economic, environmental, and social dimensions and suggests that tensions in corporate sustainability occur between different levels, in processes of change, and within a temporal and spatial context (Hahn et al., 2015). To capture the sources and characteristics of tensions in corporate sustainability, the authors present three additional dimensions: (1) level, (2) change, and (3) context, which combined with the three traditional dimensions (economic-environmental-social) result in a more comprehensive framework. This framework, which intersects the three dimensions of sustainability with level, change, and context issues, has the distinction of providing a better understanding of the nature of the relationships between different aspects of corporate sustainability (Hahn et al., 2015).

According to Hahn et al. (2015), the dimensions of sustainability tensions are as follows: temporal, spatial, value, organisational, stakeholder, and strategic. Table 1 presents the dimensions of sustainability tensions and their respective concepts.

Table 1
Dimensions of sustainability tensions

Dimension	Concept
Temporal tensions	These tensions arise from the discrepancy between short-term time horizons, often focused on immediate financial gains, and long-term sustainability objectives. Pursuing sustainability requires investments and actions that may not yield immediate benefits but are crucial for the long-term viability of the organisation and the environment.
Spatial tensions	They refer to conflicts between local versus global impacts of business activities. A company may improve its practices in a specific location but simultaneously cause or perpetuate environmental or social problems in other regions, especially in global supply chains.
Value tensions	These tensions occur when there are conflicts between different types of values, such as economic, environmental, and social values. For example,

	profit maximisation (economic value) may conflict with environmental preservation (environmental value) or with the well-being of workers and the community (social value).
Organisational tensions	These are internal conflicts within the organisation, often resulting from different views, cultures, or goals among departments. For example, the finance department may prioritise cost reduction, while the sustainability department aims to invest in environmentally and socially responsible practices.
Stakeholder tensions	These tensions arise from the different expectations and demands of various stakeholders, including shareholders, customers, employees, and local communities. Meeting the demands of one group may lead to conflicts or dissatisfaction in another.
Strategic tensions	They involve dilemmas about how to integrate sustainability into corporate strategy. This includes deciding between reactive versus proactive approaches to sustainability, as well as balancing the integration of sustainability into existing businesses versus innovation for new sustainable business models.

Source: Adapted from Hahn et al. (2015).

It is generally believed that sustainable business practices lead to advantageous situations for all involved, but in fact, implementation can give rise to potential tensions and conflicts. Tura et al. (2019) identified 20 different types of tensions categorised into four broad areas during the implementation of sustainable business practices. These broad categories encompass economic, structural, psychological, and behavioural factors in a business network composed of suppliers, focal companies, customers, and other partners.

According to these authors, economic tensions include higher investments, operational change costs incurred by suppliers to adapt to new processes, and codes of conduct or sustainability requirements. Regarding structural tensions, Huq et al. (2014) state that they arise when buyers need to exercise, monitor, and control their suppliers to ensure that suppliers comply with the code of conduct. For distant suppliers, buyers often rely on third-party audits, which sometimes lead to confrontational relationships with suppliers (Hannibal & Kauppi, 2018; Huq et al., 2014). When suppliers fail to comply with the buyer's code of conduct, the buyer tends to terminate commercial relationships.

Distrust between buyers and their suppliers is considered a psychological tension. Suppliers feel compelled to measure, monitor, and report sustainability indicators that are not relevant to their own business (Govindan et al., 2021). Finally, behavioural tensions can arise − for example, when there is resistance to the adoption of new work practices, process changes, learning new skills, and sharing sustainability-related operations and process data with buyers (Tura et al., 2019).

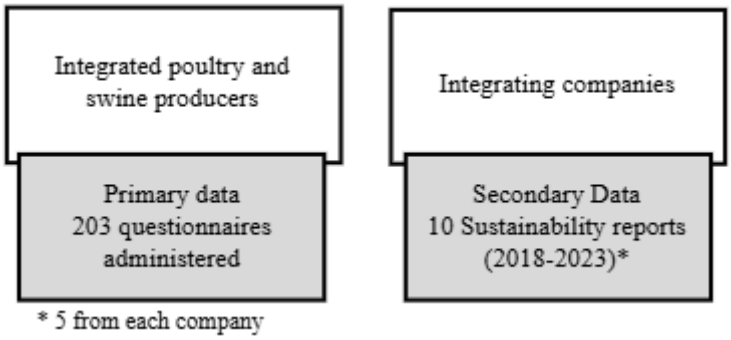
In an attempt to reduce these tensions, Soundararajan et al. (2019) proposed the concept of collective stakeholder orientation in the context of the global supply chain. The authors argue that this would enable participants to seek and share value, share responsibilities, engage in voluntary and sustainable collaborations, seek collective ownership of responsibilities, and provide mutual benefits to all participants, thereby overcoming their differences.

METHODOLOGY

The meatpacking sector represents a large system in Brazil, given its significance to the national economy and association with the country's global prominence in the export sector and agribusiness context, also generating numerous jobs and livelihoods and income for many families. Focused on this context, the research question of the present study is as follows: How can ESG indicators adopted by meatpacking plants in the swine and poultry production chain mitigate sustainability tensions, and what are the main challenges and opportunities in this process?

Recent research conducted by the authors of this article, examining evidence in major scientific databases, revealed that there is limited existing research that integrates ESG principles and meatpacking plants. Only research by Shamsuddoha and Woodside (2023) was identified, which investigated sustainability process innovations resulting in new value-added by-products through key lessons from second-order dynamic systems engineering. Daroshka et al. (2022) analysed the pursuit of ESG goals in agriculture and processing. Schiavo and Scavarda (2024) examined sustainable development goals and the role of environmental legislation in Brazilian poultry companies. In the present study, we address the unit of analysis described in Figure 1.

Figure 1
Integration system



Note: * Research unit analysis.
Source: Elaborated by authors.

The rural producers who responded to the questionnaire operate in different phases of pig production: farrowing unit, nursery, finishing, and complete cycle. The complete cycle of pigs lasts approximately 120 days. Chicken producers are referred to as finishers, as they receive day-old chicks and raise them until the slaughter stage, which occurs between 42 and 46 days of age.

Our work is based on a methodological approach similar to the studies by Sehnem et al. (2019) and Sehnem et al. (2022), and the Brazilian firms analysed in this research are among the most important companies in the meatpacking sector in Brazil in terms of revenue, economic significance, job creation, and presence in different municipalities. Each case was analysed based on the analytical framework presented in Figure 2, with the intention of exploring the under-researched relationship between ESG factors and sustainability tensions in the meatpacking sector in an emerging country. It is assumed that various critical success factors namely, economic return, workplace well-being, job satisfaction, and revenue support cooperative practices and the activation of relational capabilities with varying levels of effectiveness.

Following the principles of data triangulation in an exploratory case study approach (Yin, 2015), the data collection process for this research involved multiple data sources, including questionnaire surveys and secondary data from five years of sustainability reports (2018−2022). In utilizing corporate sustainability reports as a primary source of secondary data, this study explicitly acknowledges and problematizes the potential biases inherent in such voluntary non-financial disclosures. Corporate reporting frequently operates as a legitimacy-seeking device designed for impression management, which can introduce a social desirability bias and underreport systemic operational friction (Arvidsson & Dumay, 2022). Rather than treating these disclosures as neutral representations of organizational reality, this study intentionally incorporates this methodological limitation into its core analytical framework. By confronting the formal corporate narratives against the primary data obtained from the integrated producers' questionnaires, the research design directly addresses the potential dissociation between corporate discourse and operational practice. This systematic triangulation prevents the uncritical acceptance of managerial rhetoric, transforming the tension between corporate self-representation and field-level realities into an explicit object of academic analysis. The questionnaires were developed based on the literature and included inquiries about the following topics: property characteristics, respondents' profiles, adopted practices, social indicators, environmental indicators, and governance indicators. They were administered both in person directly on rural farms and online via WhatsApp.

The data obtained from the questionnaire were tabulated in a Microsoft Excel spreadsheet and analysed using descriptive statistics, employing mean and relative frequency. For analysis of the sustainability reports, the Atlas.ti 23 software was utilised to categorise the ESG dimensions and construct Sankey diagrams. The procedure of within-case analysis followed by cross-case analysis was adopted. Table 2 presents the ESG analysis dimensions adopted for this study. The reports were searched for evidence of indicators related to each dimension, whose focus was directly or indirectly related to integrated producers.

Table 2 ESG analysis dimensions

Dimension	Concept	Sub-Dimension	Key Authors
Environmental	Evaluates the company's performance regarding natural resource management and the impact of its operations on the environment.	Emissions Energy efficiency Waste management Biodiversity management Climate change Transparency	Halbritter & Dorfleitner (2015); Khan (2022); Arvidsson & Dumay (2022)
Social	Focuses on the company's relationships with its employees, suppliers, customers, and the communities where it operates.	Fair and decent work Health and safety Diversity and inclusion Relationships	Halbritter & Dorfleitner (2015); Khan (2022); Arvidsson & Dumay (2022)
Governance	Analyses the quality of management, corporate governance structure, and business practices of the company.	Corporate governance Ethics Compliance Risk management Anti-corruption	Halbritter & Dorfleitner (2015); Khan (2022); Arvidsson & Dumay (2022)

Source: Elaborated by the authors.

Although a questionnaire was administered to 203 integrated rural producers, this instrument served as a primary data source within each case study consistent with Yin (2015) mixed-evidence approach to case research rather than constituting a standalone survey design. The unit of analysis remains the meatpacking companies (Alfa and Beta), with questionnaire data providing the perspective of producers operating within each firm's integration system.

The unit of analysis in this study is the meatpacking company operating within a vertical integration system in the swine and poultry sector. Two firms referred to here as Alfa and Beta were selected as cases due to their economic significance, geographic relevance, and the availability of longitudinal sustainability reports. Rural producers and the production chain as a whole constitute the broader context within which ESG tensions are examined, and their perspectives were captured through questionnaire data as supplementary evidence.

The questionnaire administered to 203 integrated producers served a specific analytical purpose: to capture the producers' lived experience of ESG practices as reported by the integrating companies. Given that both Alfa and Beta publish sustainability reports that reflect the firms' own perspectives, the questionnaire provided a contrasting source of evidence representing those most directly affected by integration arrangements. This design choice is consistent with the principle of multiple-informant triangulation in case research (Yin, 2015), where different data sources illuminate different facets of the same phenomenon.

For analysis of sustainability tensions, the dimensions presented in Table 1 were utilised, following the proposed approach (Hahn et al., 2015). The results obtained through questionnaire and sustainability report analyses were triangulated, and sustainability tensions emerged from that point onwards. A framework was developed synthesising the findings.

Data integration followed a convergent triangulation logic (Yin, 2015): within each ESG dimension (environmental, social, governance), findings from sustainability reports were systematically compared against questionnaire responses to convergences, divergences, and gaps. For instance, reports indicated full monitoring of environmental compliance by integrated producers, whereas questionnaire data revealed widespread unawareness of incentive programs such as biodigester installation — a divergence that constituted evidence of the cognitive dissociation tension. which sustainability tensions were surfaced and validated.

An evidence unit was classified as a sustainability tension when it met two simultaneous criteria: (1) it revealed a verifiable contradiction between data sources specifically, between what the integrating company reported in its sustainability disclosures and what integrated producers reported in the questionnaire; and (2) the contradiction was mappable onto at least one of the six tension dimensions identified by Hahn et al. (2015): temporal, spatial, value-based, organizational, stakeholder-related, or strategic. Single-source evidence (e.g., a producer complaint without a corresponding corporate claim, or vice versa) was treated as a contextual finding rather than a tension indicator.

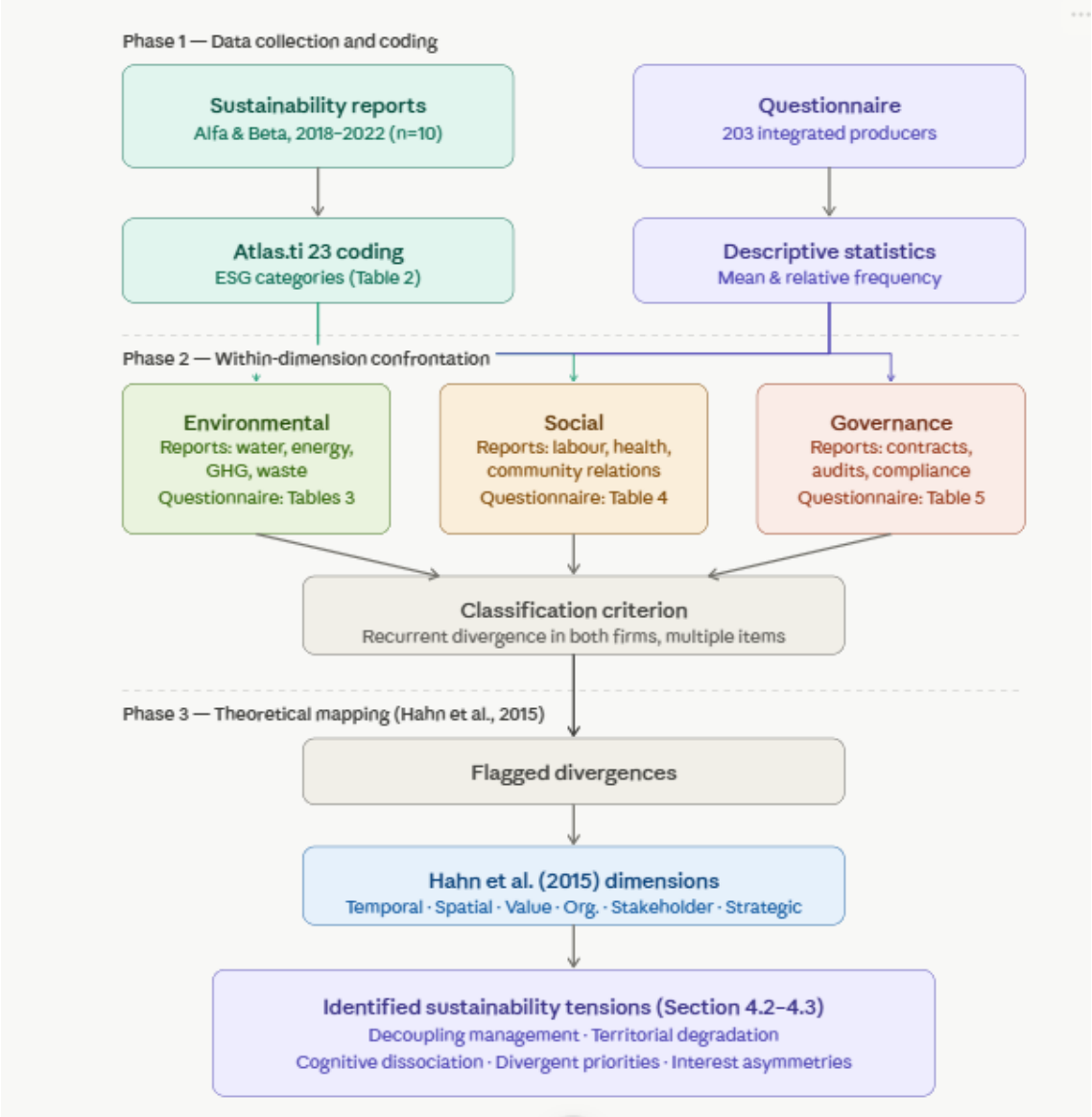
The identification of tensions followed a three-phase procedure. First, sustainability reports were coded using Atlas.ti 23 according to the ESG dimensions presented in

Table 2, with the selection criterion being any passage directly or indirectly referencing integrated producers. Second, questionnaire data were tabulated in Excel and organized according to the same ESG dimensions, enabling comparison across data sources. Third, for each ESG dimension, a systematic confrontation was performed between corporate disclosures and producer-reported experiences. Divergences that were recurrent across both firms and across both firms and across multiple items within a dimension were flagged as tension indicators. Each flagged indicator was then matched to the tension typology of Hahn et al. (2015) confirming its theoretical classification before being included in the final framework.

Evidence was classified as a strain when: (a) it revealed a verifiable and recurring contradiction between what sustainability reports stated and what integrated producers reported in questionnaires, and (b) this contradiction mapped to at least one of the six strain dimensions of the proposed framework (Hahn et al., 2015). Single-source evidence a producer complaint without a counterpart in corporate statements, or vice versa was treated as contextual findings, not as indicators of strain.

Tension identification followed a structured three-phase procedure. In Phase 1, sustainability reports were coded in Atlas.ti 23 using the ESG dimensions in Table 2 as a priori categories, selecting passages with direct or indirect reference to integrated producers. In Phase 2, questionnaire data were tabulated in Excel and organised by the same ESG dimensions, enabling systematic source comparison. In Phase 3, a within-dimension confrontation was performed: for each ESG dimension (environmental, social, governance), corporate disclosures were compared against producer-reported experiences. Divergences that were recurrent across both firms and across multiple items within a dimension were flagged as tension indicators and subsequently matched to Hahn et al. (2015) typology for theoretical classification. Look Figure 2.

Figure 2
Analytical scheme from data sources to identified sustainability tensions



Source: Elaborated by the authors based on Crilly et al. (2016) and Hahn et al. (2015).

Divergences were flagged as tensions when recurrent across both firms and mappable onto at least one dimension of Hahn et al. (2015) framework.

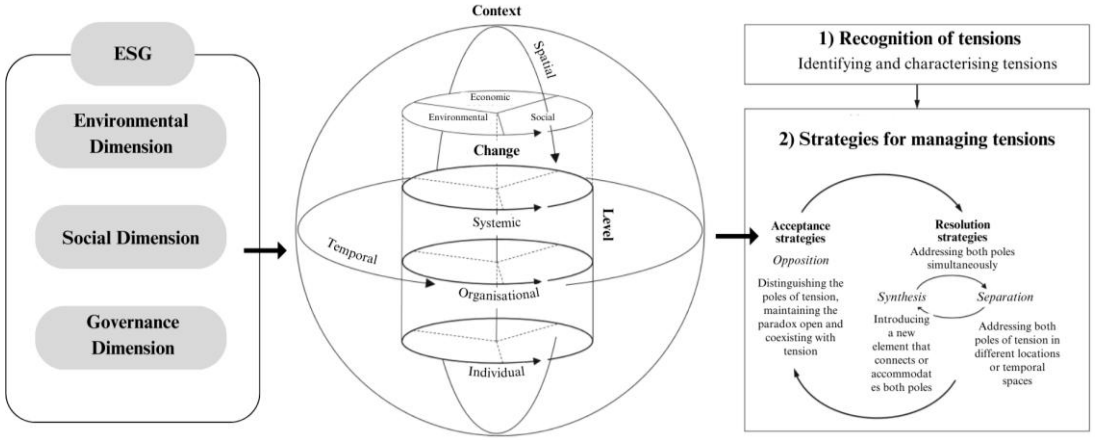
PRESENTATION AND ANALYSIS OF DATA

ESG Indicators Adopted by the Alfa and Beta Meat Processing Companies

Environmental Indicators

The Alfa and Beta meat processing companies report a series of ESG indicators in their sustainability reports. In the environmental aspect, both highlight indices related to water and energy use, waste and effluent generation and management, and GHG emissions, in addition to an indicator related to environmental compliance, observed in Beta. Figure 3 (see Appendix) provides a visual representation of how indicators related to water, energy, and waste and effluents gain greater visibility in the reports.

Figure 3
Analysis dimensions of the study



Source: Elaborated by the authors based on Hahn et al. (2015).

Both companies recognise water as an indispensable input, the absence of which results in the interruption of their activities. In Alfa and Beta, surface water capture predominates, with relatively small variations in terms of water volume used. There is significant effort towards increasing the percentage of reused water by both Alfa and Beta, demonstrating success in these efforts.

Alfa and Beta monitor the overall energy consumption and, primarily, the evolution of their sustainable energy matrix. Over the five years analysed, there was an increase in the use of renewable energy sources: 42.3% of Alfa's energy consumption in 2022 and 90% of Beta's consumption in 2021 came from renewable sources.

Regarding waste and effluents, the analysed meat processing companies monitor the amount of waste produced, percentage of reuse, and disposal methods for each waste group. Alfa has initiatives to use waste for thermal and electrical energy production, using by-products from the production process for new products and materials, and has two units dedicated to circular economy principles. Composting, recycling, energy cogeneration, and energy reuse are strategies adopted by the companies in managing their waste and effluents.

Regarding GHG emissions, the companies monitor and compile their emissions reports by scope, classifying by emission type. Therefore, the main emission sources, the amount of emissions, and the percentage reductions achieved by actions developed throughout the year are observed. In all analysed years, Alfa and Beta report reductions in GHG emissions, with reduction rates ranging from approximately 3% to 5% per year.

Lastly, environmental compliance is worked on as an indicator by Beta, which compiles reports of non-compliance cases with environmental laws and regulations. This indicator has high and positive indices, demonstrating monitoring of 100% of the productive units and integrated properties in terms of applicable legislation and regulations. Alfa, although not directly mentioning this indicator, has a Sustainability Index, through which it measures sustainable practices of its integrators, which began implementation in 2020.

Overall, the environmental indicators of Alfa and Beta are directed towards monitoring the internal activities of the organisations, with no reported data regarding the use of

natural resources on the integrated producers' properties. This topic is relatively superficially addressed in prior literature, with mentions of the following incentives: for integrated producers for groundwater capture to combat scarcity Beta; for the installation of solar panels, by establishing a partnership between the integrator and a banking institution for financing to support producers Beta; for the installation of biodigesters on the properties Alfa; and for reverse logistics programs for the collection of hazardous waste used in animal health Beta.

Despite Alfa and Beta reporting rigorous monitoring programmes for compliance with current environmental legislation by their integrators, there is no mention of quantitative measurements of the volume of waste or water consumption in animal production, for example. Thus, it can be understood that the monitored environmental indicators are capable of measuring the impacts of the production chain partially.

From the rural producer's perspective, the questionnaire captured environmental indicators related to manure absorption capacity, water availability, and animal concentration on the properties Table 3 − the latter constructed based on data on the number of housed animals and the property area.

Table 3
Environmental indicators reported by surveyed producers

Integrator	**Alfa**						**Beta**					
Production Chain	**Poultry Producers**		**Swine Producers**		**Poultry and Swine Producers***		**Poultry Producers**		**Swine Producers**		**Poultry and Swine Producers***	
Environmental Indicator	**%**		**%**		**%**		**%**		**%**		**%**	
Manure absorption capacity	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
	67,2	32,8	40,4	59,6	33,3	66,7	57,9	42,1	25	75	75	25
Incentive from the integrator for biogas generation	2,2	97,8	4,8	95,2	0	100	5,3	94,7	25	75	0	100
Water scarcity issues	46,8	53,2	29,2	70,7	66,7	33,3	33,3	66,7	25	75	50	50
Animal concentration	**Average**		**Average**		**Average**		**Average**		**Average**		**Average**	
	~ 3.080 animals/hec		~ 103 animals/hec		~ 1.120 animals/hec		~ 2.862 animals/hec		~ 724 animals/hec		~ 998 animals/hec	

*Integrated producers reporting both activities on their properties.
Source: Elaborated by the authors.

Waste absorption is a recurring issue. Poultry and swine producers from both companies mention that their properties are unable to absorb all the waste generated by their production activities, leading them to enter into contracts with third parties to comply with the regulations established by legislation. Although Alfa mentions the existence of incentives for the installation of biodigesters, this practice is not known by the vast majority of producers, indicating a possible lack of communication on the part of the integrator.

Regarding the water resource, the analysed properties are located in a region frequently affected by drought, implicating losses in agriculture due to the lack of rainfall (Borges

& Amorim, 2022). Although some producers indicate that they do not face this problem, its occurrence is still significant, as shown in Table 3. Considering the low identification of actions by integrators regarding water availability in the properties, this is a warning indicator for the continuity of poultry and swine production, as high animal concentration per property is frequent.

Social Indicators

The social indicators mentioned by Alfa and Beta mainly relate to the themes of employment, diversity, worker health and safety, consumer health, and impacts on local communities. With the exception of monitoring activities related to community relations, social indicators are focused on internal employees. For example, Beta in its sustainability report, mentions that, '[...] it does not control cases of occupational diseases of outsourced employees'.

Initiatives to support the socio-economic development of local communities focus on financial support for projects, non-governmental organizations, and entities, among others. In 2019, the five areas identified by Alfa as priorities for community support were health, education, basic conditions, disasters, and others (i.e., welfare and mental health). In subsequent years, the company continued to support educational initiatives for training young people and adults, trainings for the social inclusion of people with disabilities, and support efforts to combat COVID-19. Meanwhile, Beta operates in two main areas: education and food for people experiencing food insecurity; in 2022, more than 47,000 people were supported by the food-related project.

In the 10 reports analysed, dozens of initiatives aimed at employees' occupational health and safety were identified, including internal training and capacity-building practices. However, clear evidence of actions by the slaughterhouses for the integrated producers in terms of health and ergonomics was not found. An exception is found in Beta's report mentioning remote medical and psychological support channels established during the COVID-19 pandemic for the integrated producers throughout 2020.

Alfa and Beta frequently mention the existence of partnership and proximity relationships with their integrated producers, with constant visits by the technical team to the properties; however, these visits are aimed at improving production-related aspects and conducting audits, as seen in the following transcripts:

> The management of these producers is carried out by about 500 professionals who periodically visit the properties and who, in addition to technical assistance in poultry and swine breeding and sanitation, provide technical support during and after construction and improvements to the facilities, train and assist producers in managing production costs and cash flow of the activity, seeking opportunities for reduction and best practices to increase performance, productivity, animal welfare, and profitability of the activity (Alfa).

> The team of rural extensionists visits 100% of the integrated properties to assist and guide producers in relation to the needs linked to business management and animal production (Beta).

The relationship with the integrated producers is measured by Beta in a satisfaction survey. The 2022 report indicates an approval rating of 84.25% for the company by the

integrators, higher than the 84% observed in 2021. Both companies highlight that the relationship with the producers is in accordance with the Integration Law (Law no. 13.288/2016, which establishes rules and forms for the elaboration of the so-called integration contracts, involving agro-silvopastoral activities, published on 17th May 2016 and regulating an economic activity until then lacking its own legislation), and include awards and incentives for the integrators to strengthen the relationship: Alfa has been granting a recognition award since 2014 that acknowledges producers with the best results and management practices; Beta, similarly, holds events where it awards the best producers in each production segment. Additionally, in 2022, Beta mentions the transfer of R$ 33 million to the integrators in incentives for the adaptation of their production structures, and reiterates the expansion of its payment policies based on zootechnical performance.

When observing social indicators from the perspective of the integrated producer, the absence of occupational health actions within the integrated producers becomes evident: in the vast majority of cases, producers indicate that poultry and swine production activities have caused some type of harm to health. These and other social indicators reported by the producers are presented in Table 4.

Table 4
Social indicators reported by surveyed producers

Integrator	**Alfa**						**Beta**					
Production Chain	**Poultry Producers**		**Swine Producers**		**Poultry and Swine Producers***		**Poultry Producers**		**Swine Producers**		**Poultry and Swine Producers***	
Social Indicator	**%**		**%**		**%**		**%**		**%**		**%**	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Existence of a successor	16,7	68,3	54,8	45,2	33,3	66,7	47,6	52,4	100	0	75	25
Health damage caused by the activity	78	22	37,5	62,5	66,7	33,3	57,1	42,9	0	100	100	0
Daily hours dedicated to the activity	**Average**		**Average**		**Average**		**Average**		**Average**		**Average**	
	~ 15,7 h/day		~ 9,4 h/day		~ 10 h/day		~ 14,5 h/day		~ 14 h/day		~ 14 h/day	
Willingness to give up the activity**	Maybe yes (29%)		Absolutely not (35,8%)		Depends (100%)		Maybe yes (28,6%)		Absolutely not (75%)		Depends (50%)	
Satisfaction with the activity**	Dissatisfied (48,4%)		Satisfied (79,2%)		Dissatisfied (66,7%)		Dissatisfied (52,4%)		Satisfied (75%)		Satisfied (50%)	
Reason for dissatisfaction**	Low profit from the activity (28,6%)		Low appreciation of the producer (39,5%)		Low appreciation of the producer (66,7%)		Low profit from the activity (44,8%)		Low appreciation of the producer (50%)		Low profit from the activity (50%)	
Feeling towards the integrator**	Not valued (45,3%)		Business partner (42,7%)		Not valued (66,7%)		Not valued (70%)		Business partner (100%)		Not valued (50%)	

*Integrated producers reporting both activities on their properties.
**The most predominant response in the groups is presented.
Source: Elaborated by the authors.

The highest rates of inclination to abandon the activity are found among poultry producers, who also have the highest average of daily hours dedicated to the productive activity. The working hours of the integrated producers, in all cases, exceed 9 h/day, meaning their routines are longer than those stipulated by the Consolidation of Labour Laws (CLT), which is 8 h/day (Decreto-Lei nº 5.452, 1943).

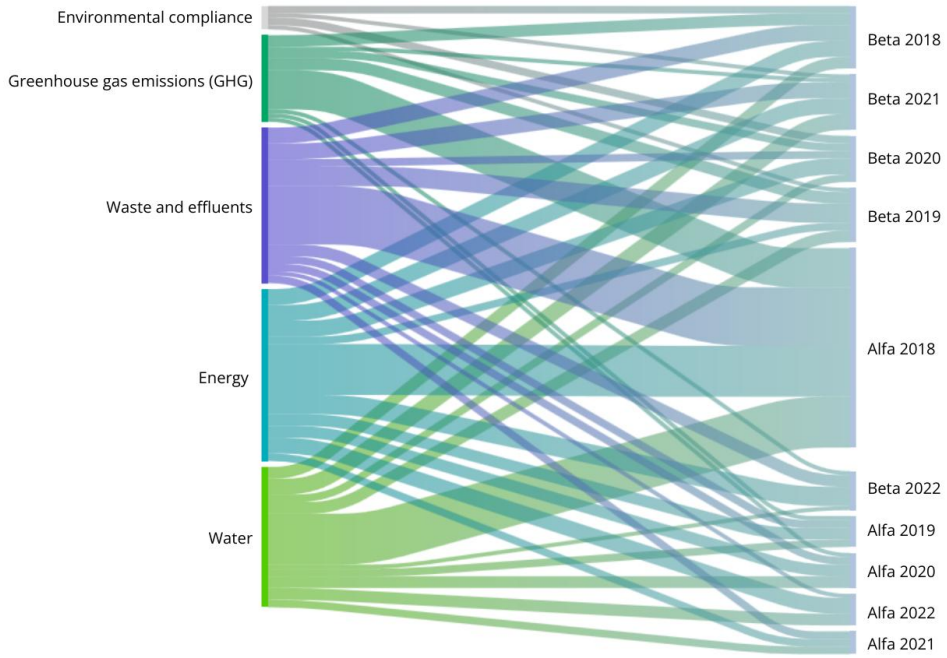
The questionnaire also aimed to identify the levels of satisfaction and feelings of the producers towards the integrator. The swine producers of Alfa and Beta appear to be more satisfied compared with the poultry producers. The low appreciation of the producer and profits considered low by the producers are the main reasons for dissatisfaction in the integration.

Although the integrators, companies A and B, mention rural producers as their direct suppliers and partners in their businesses, the perception from the perspective of the producer is different. Only a portion of the producers perceives the integration system relationship as a partnership, in fact; the feeling of not being valued by the integrator is predominant among producers. This factor, associated with dissatisfaction, may be a possible explanation for the results of the succession indicator: significant portions of producers signal the absence of a successor, which means that when the current generation decides to end or no longer has the physical and/or mental conditions to continue the activity, there is no new producer to take it ahead. Considering that the raw material of the production chain of Alfa and Beta comes from the integrated producers, this indicator is of great relevance and requires monitoring by the integrators.

Governance Indicators

Governance is a widely addressed theme by Alfa and Beta in their sustainability reports. Both provide a detailed description of the composition and structure of their internal governance, present the risk and materiality matrix, as well as numerous other pieces of information of interest to their stakeholders. In Figure 4, we highlight the governance aspects directly related to the integrated rural producers, identified in the reports from direct suppliers of the meatpacking plants.

Figure 4
Environmental indicators reported in the sustainability reports of Alfa and Beta



Source: Elaborated by the authors.

According to information from their reports, the supply chains of Alfa and Beta are defined as legalized. In all the reports analysed, there are mentions of the selection and approval of suppliers based on social and environmental criteria. For example, Beta has the Chain Monitoring Program, and Alfa refers to the Code of Conduct for Business Partners. In both cases, suppliers, including integrated producers, undergo rigorous assessment − both to start operations in the integration system and to remain in it. These actions ensure compliance and satisfaction with the successful monitoring of suppliers:

> In 2020, all our integrated agricultural partners were evaluated regarding social impacts. All are in compliance with our purchasing policy and internal norms, which respect the legislation in force in the regions where we operate (Beta).

> Through the Chain Monitoring Program, 100% of producers in Brazil are monitored on sustainability and compliance aspects, which include topics such as compliance with labour legislation, prevention of child labour, and prevention of forced or slave-like labour (Beta).

Despite producers being treated in the reports as partners, failure to meet the conditions imposed by the integrating companies results in sanctions for the integrated producers:

> If the criteria are not 100% met, we suspend the housing of the animals until any possible pending issues are resolved (Beta).

> Through the integration contract, which follows Law 13.288/2016, there is formal monitoring between the company and the integrated producer. A group of checklists divided by theme is applied to all integrated producers, with varying periodicity according to the relevance of the subject. In all these processes, if non-compliance with quality or sustainability criteria is identified, appropriate sanctions are applied (Alfa).

To mitigate cases of non-compliance, Alfa mentions the existence of permanent educational programs, technical guidance from extensionists, online training for producers, provision of management apps for farm automation, and a guide to best practices, among other strategies. Training and information dissemination through manuals and management apps are also adopted by Beta. The companies control the percentage of audited and monitored producers; for example, in 2019, Alfa trained approximately 9,000 producers.

Audits on the properties are strongly associated with animal welfare, which is an integral part of the integration contract Beta. The importance given to the subject is highlighted by Beta in the 2021 report, the year in which the issue of animal welfare was elevated to the company's vice presidency level, with stakeholders establishing the Animal Welfare Management the same year. Alfa and Beta value the origin and quality of their animal-origin raw materials, which is guaranteed, as in the case of Alfa, by the partnership between the company and its producers.

According to Table 5, asymmetries in perception regarding the relationship between the integrated parties and the integrator can be observed. Integration Law No. 13.288 (Lei n. 13.288, 2016) is mentioned by the integrators as governing the relations with the integrated parties; however, a large part of the poultry and swine producers are unaware of this legislation and, when they are aware, they do not know the rights and duties established by it.

Table 5
Governance indicators reported by surveyed producers

Integrator	**Alfa**						**Beta**					
Production Chain	**Poultry Producers**		**Swine Producers**		**Poultry and Swine Producers***		**Poultry Producers**		**Swine Producers**		**Poultry and Swine Producers***	
Governance Indicator	**%**		**%**		**%**		**%**		**%**		**%**	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Knowledge of the Partnership Law	48,3	51,7	57,7	42,3	33,3	66,7	52,4	47,6	50	50	75	25
Awareness of the rights established by the Partnership Law	53,3	46,7	61,1	38,9	100	0	52,6	47,4	50	50	25	75
Occurrence of fair distribution of outcomes	1,6	98,4	12,5	87,5	0	100	9,5	90,5	25	75	25	75
Existence of negotiation power with the integrator	9,8	90,2	17,5	82,5	0	100	14,3	85,7	50	50	0	100
Investment in local development by the integrator	14	86	29,3	70,7	33,3	66,7	4,8	95,2	66,7	33,3	0	100

*Integrated producers reporting both activities on their properties
Source: Elaborated by the authors.

Further, rural producers do not consider there to be a fair distribution of the results of the productive activity, nor do they indicate the existence of negotiation power. Such perceptions denote asymmetries in the relationship, which, in theory, is understood as a partnership, with equal rights and duties, reinforcing the notion that the rural producer is the weakest link in the chain, with little decision-making power (Zylbersztajn & Neves, 2000).

Ultimately, a new asymmetry is observed when analysing the producers' perception regarding the integrators' investment in local development. The vast majority of producers signal that there is no such investment or that they do not know if such investment exists. Although this perception does not allow us to affirm the non-existence of such investments, the data corroborate the absence of evidence in the reports of actions that directly impact the communities of integrated producers.

Sustainability Tensions that Emerged

By analysing the Environmental, Social and Governance (ESG) factors of the Alfa and Beta meatpacking plants, it is possible to identify and understand the emerging tensions within the corporate sustainability practices of these companies. The main tensions identified in these meatpacking plants can be grouped as follows:

a) Environmental Tensions: Both meatpacking plants operate under the dilemma of resource management versus operational efficiency a configuration that maps, in the framework of Hahn et al. (2015), primarily onto the spatial and temporal dimensions of sustainability tensions. The spatial dimension captures how environmental burdens are not uniformly distributed across the production system: companies internalise the gains from resource efficiency while the ecological costs unabsorbed waste, water scarcity, land degradation are displaced to the territories and properties of integrated producers. The temporal dimension reflects the divergence between short-term operational imperatives and the long-term ecological viability of intensive production in drought-prone regions. These tensions are further compounded by what Ott (2003) identifies as the logic of weak sustainability: by monitoring internal compliance and reuse rates, the companies satisfy the formal requirements of ESG without confronting the structural ecological limits of their production model. The challenge of managing large volumes of waste and effluents while attempting to implement circular economy practices constitutes a particularly acute manifestation of this tension. The soil does not have the capacity to absorb all the volume of waste generated, resulting in the generation of degraded areas, contamination risks, and effluent flow management issues that involve a broader set of social actors beyond the firm’s direct governance boundary. In this sense, the environmental tensions identified are not reducible to operational inefficiency; they reflect a deeper structural condition in which the ecological costs of vertically integrated agro-industrial production are systematically externalised to the weakest actors in the chain.

b) Social Tensions: The social tensions identified in Alfa and Beta correspond primarily to the stakeholder and value dimensions in the framework (Hahn et al., 2015). The stakeholder dimension captures the divergence between the interests and lived experiences of integrated producers and the sustainability

narratives promoted by the integrating firms: producers report working hours exceeding legal norms, perceive their labour as undervalued, and express low satisfaction with the economic returns of integration conditions that are systematically absent from the companies' sustainability reports. This divergence is not incidental but reflects a structural feature of the integration model: producers are formally categorised as partners or direct suppliers, yet they bear disproportionate operational risks without commensurate decision-making power or economic participation (Zylbersztajn & Neves, 2000). The value dimension of the tension becomes visible in the conflict between the integrators' strategic priority of maintaining chain productivity and profitability and the substantive social sustainability of rural livelihoods. Tura et al. (2019) characterise this as a behavioural tension: resistance to change, dissatisfaction, and disengagement emerge when actors at the base of the chain perceive that sustainability demands are imposed rather than co-constructed. The absence of succession planning among producers a finding with direct implications for the long-term reproduction of the production chain itself represents perhaps the starkest expression of this tension: when the social sustainability of producers collapses, the economic sustainability of the integrating firm is ultimately threatened as well, revealing the interdependence that additive sustainability frameworks tend to obscure (Hahn et al., 2015).

c) Governance Tensions: The governance tensions in Alfa and Beta are best understood through the organisational and strategic dimensions of Hahn et al. (2015) framework, and are further illuminated by the concept of means-ends decoupling (Wijen, 2014). The organisational dimension captures the disconnect between the formal governance architecture integration contracts, compliance checklists, audit systems, codes of conduct and the substantive governance conditions experienced by producers on the ground: unawareness of the legislation governing their contracts, absence of negotiation power, and exposure to unilateral sanctions. This is the hallmark of what Wijen (2014) terms opaque institutional fields: environments in which the complexity and power asymmetry of the production system make it structurally difficult for compliance requirements to translate into genuine behavioural change at the level of the most exposed actors. The strategic dimension of the tension is expressed in the conflict between the companies' corporate governance priorities accountability to shareholders, reputational management, and stakeholder reporting and the democratic participation of producers in decisions that directly affect their livelihoods. Arvidsson and Dumay (2022) note that ESG reporting can function as a legitimacy-seeking device rather than a substantive governance instrument, and the findings in this study are consistent with this reading: governance indicators record formal compliance as evidence of partnership and transparency, while producers report feeling unheard, undervalued, and structurally subordinate. This configuration reproduces rather than resolves the power asymmetry at the heart of the integration model, suggesting that governance tensions in agro-industrial chains cannot be addressed through reporting improvements alone, but require structural redesign of the contractual and relational architecture of integration.

The identified tensions are similar in the Alfa and Beta meatpacking plants, reflecting common challenges in integrating sustainable practices into complex value chains that

are dependent on natural resources. However, the intensity and specific focus of tensions may vary due to differences in the implementation of sustainable practices. The effectiveness with which each company implements and communicates its sustainable practices can influence the perception and reality of the tensions faced, especially with regard to the social and environmental aspects. Another relevant aspect is organizational culture and strategic priorities, as related variations can affect how tensions are managed, with some companies prioritizing certain aspects of sustainability over others. Finally, the relationship with producers with an emphasis on the quality of the relationship and the level of communication between integrators and integrated producers may explain variations in the perception of valorisation and participation, affecting social and governance tensions.

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These findings require repositioning ESG frameworks not as a silver-bullet solution for corporate sustainability, but as an explicit object of academic analysis that carries structural limitations. The empirical tension between the flawless compliance records claimed by Alfa and Beta and the lived friction reported by integrated producers exemplifies a profound limitation of current market-driven ESG metrics. Grounded heavily in a 'weak sustainability' paradigm, these corporate frameworks treat social and environmental criteria as additive indicators for risk mitigation rather than systemic variables. By detaching indicators from the relational realities of power and value distribution, corporate ESG governance can paradoxically coexist with—and mask—structural degradation at the field level. This systematic displacement demonstrates that when ESG metrics focus exclusively on the firm's immediate organizational perimeter and formal compliance checklists, they fail to alter the deep-seated contractual asymmetries of the integration system, thereby reproducing the very socio-ecological tensions they claim to mitigate.

Beyond their individual characterisation, the tensions identified in Alfa and Beta are not independent: they form a structurally interconnected system in which governance tensions function as the generative mechanism from which environmental and social tensions derive and are reproduced. The mechanism operates as follows. The captive governance structure of the integration model concentrates regulatory and reporting authority in the hands of the integrating firm, which defines what is measured, what is disclosed, and what is counted as sustainability performance (Gereffi et al., 2005; Wijen, 2014). This structural authority enables the firm to design ESG indicators that are bounded by its own operational perimeter, systematically excluding the ecological and

social conditions of producers from the formal sustainability account. The environmental tensions that emerge waste displacement, unmonitored water consumption, territorial degradation are thus not failures of measurement alone: they are the predictable output of a governance architecture that assigns sustainability responsibility selectively. Once the governance mechanism excludes producer-level impacts from ESG metrics, social tensions are amplified through a second mechanism: cognitive dissociation (Hahn et al., 2015). Producers who are simultaneously subjected to compliance requirements, productivity standards, and audit visits while being excluded from the sustainability benefits and recognition that those same systems generate for the integrating firm experience a deep incongruence between what the integration model claims to be and what it delivers. This incongruence does not merely produce dissatisfaction; it erodes the relational conditions trust, perceived fairness, sense of partnership that would be necessary for producers to genuinely internalise and co-produce sustainability objectives, rather than merely complying with them instrumentally. The result is a self-reinforcing cycle: governance asymmetry displaces environmental burdens onto producers; displaced burdens generate social tensions that weaken relational quality; weakened relational quality limits the communicative and participatory channels through which governance could be reformed. ESG indicators, in this cycle, do not interrupt the reproduction of tensions they formalise it, by producing a narrative of sustainability progress that is decoupled from the structural conditions that generate the tensions in the first place (Crilly et al., 2015; Haack & Schoeneborn, 2015). This analytical reading suggests that the treatment of environmental, social, and governance tensions as parallel but separate categories as they are commonly presented in ESG frameworks obscures their structural interdependence and the directional causality that runs from governance design to environmental displacement to social deterioration. Addressing sustainability tensions in vertically integrated agro-industrial chains therefore requires not the optimisation of individual ESG indicators, but the restructuring of the governance conditions contractual, informational, and relational that determine whose sustainability counts, and who bears its costs.

Rather than operating as isolated occurrences, the identified sustainability tensions function within a structured, interconnected causal network driven by specific organizational mechanisms. At the core of this dynamic is the mechanism of instrumental decoupling, wherein corporate ESG frameworks prioritize standardized, easily quantifiable metrics to satisfy external institutional pressures while neglecting the underlying socio-ecological frictions at the production level. This instrumental approach triggers a cascading effect across different categories of tensions: strategic priorities focused on cost-efficiency directly induce territorial degradation and resource depletion at the farm level. To manage the resulting friction without altering the core economic model, integrating firms deploy compliance mechanisms that generate asymmetries of interest and cognitive dissociation among integrated producers. Consequently, the producers find themselves in a structural double-bind, internalizing operational risks while being excluded from the governance and value distribution of the sustainability gains, thereby transforming institutional compliance into localized vulnerability.

Therefore, the emerging tensions in the Alfa and Beta meatpacking plants reflect intrinsic challenges in integrating sustainability into complex operations and highlight the importance of holistic and integrative strategies to mitigate these tensions. The approach of Hahn et al. (2015) provides a valuable framework for understanding these dynamics, suggesting that effective tension management requires a careful balance between

economic, environmental, and social objectives, as well as governance that promotes the inclusion and valorisation of all stakeholders. The next section presents the framework that synthesises these mapped tensions and their structural relationships, following the dimensions proposed by Hahn et al. (2015) and incorporating the analytical distinctions mitigation, displacement, and reproduction developed from the empirical evidence.

Framework of Key Tensions

The findings reveal that ESG indicators do not produce uniform effects on sustainability tensions. Rather, their impact varies systematically depending on where the tension is located, who bears its costs, and whether the firm's incentive structure aligns with the interests of the affected stakeholder. Three distinct types of effect can be identified from the empirical evidence: mitigation, displacement, and reproduction.

ESG contributes to mitigation primarily in the domain of intra-organisational environmental performance, where tensions are bounded within the firm's operational control and where quantifiable indicators align with financial incentives. The consistent reduction in GHG emissions, the growth of renewable energy use, and the expansion of water reuse practices across both firms are genuine examples of tension reduction. In these cases, ESG performs as theorised: it provides a governance structure that channels organisational attention and resources toward sustainability outcomes.

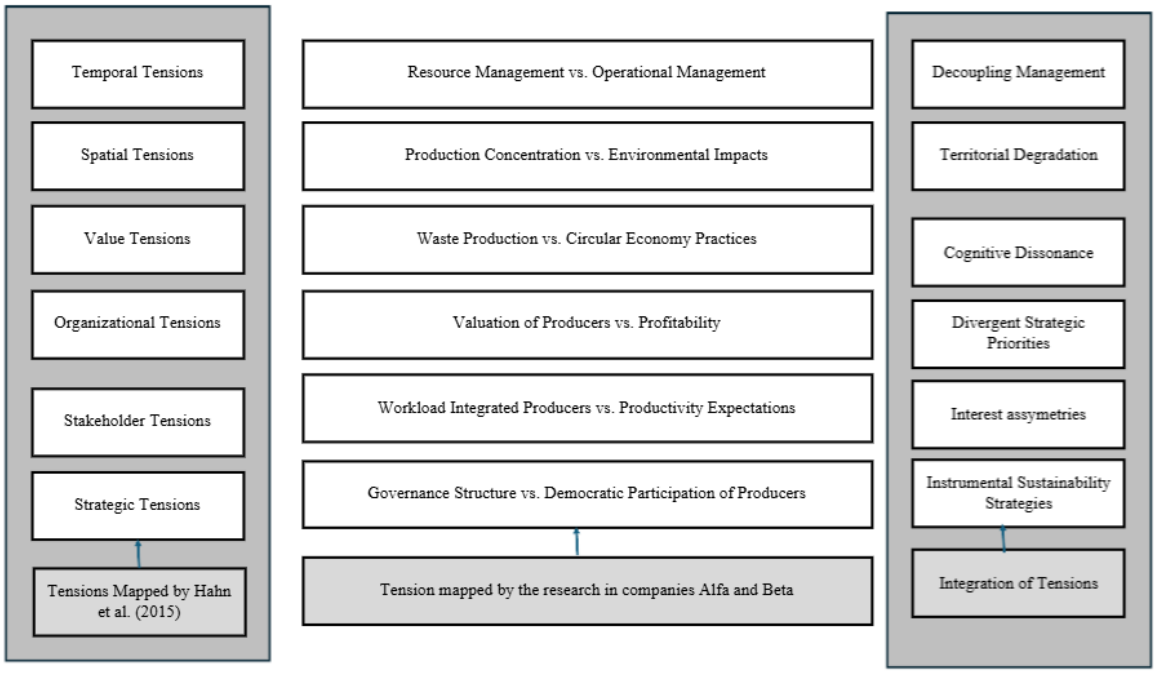
ESG contributes to displacement when the measured indicator captures the boundary of a tension rather than its source. Waste management illustrates this pattern: Alfa and Beta rigorously monitor internal waste generation and reuse rates, yet collect no quantitative data on waste absorption capacity or water consumption at the producer level. The tension is not resolved it is transferred to the producer, who must contract third parties to manage what the land cannot absorb, without this appearing in corporate sustainability metrics. Compliance monitoring covers 100% of integrated properties, but what is monitored is legal conformity, not ecological burden. The indicator remains clean; the tension moves downstream.

ESG contributes to reproduction when its formal mechanisms audits, contracts, certification, compliance checklists are themselves counted as governance indicators while simultaneously reinforcing the power asymmetry that generates the tension. Producers face unilateral sanctions for non-compliance, lack awareness of the legislation that governs their contracts, and report no meaningful negotiation power yet the governance dimension of ESG records these contractual arrangements as evidence of partnership and transparency. The form of governance is institutionally present; the substance that would make it transformative is absent. This is the dynamic Wijen (2014) describes as means-ends decoupling: the adoption of ESG instruments fulfils the symbolic requirements of sustainability without achieving its substantive goals.

Incorporating this tripartite distinction mitigation, displacement, reproduction as an analytical axis rather than treating it as a limitation clarifies the theoretical contribution of this study. It suggests that ESG frameworks are not simply effective or ineffective, but differentially effective depending on structural conditions: the proximity of the tension to the firm's operational core, the degree of informational symmetry between parties, and the alignment (or misalignment) between the firm's incentive structure and the interests of structurally weaker stakeholders. In vertically integrated agro-industrial chains, where

power asymmetries are embedded in the contractual architecture itself, ESG adoption without structural redesign of the integration relationship is more likely to displace or reproduce tensions than to mitigate them, Figure 5 synthesises the tensions into a framework following the dimensions and sub-dimensions proposed in the framework (Hahn et al., 2015).

Figure 5
Governance indicators reported in the sustainability reports of Alfa and Beta



Source: Elaborated by the authors

The tensions identified in the Alfa and Beta companies offer a complex panorama that directly impacts sustainability management and reveals significant challenges in creating legitimate and effective sustainable strategies. These tensions interfere with different aspects of corporate sustainability, including decoupling management, territorial degradation, cognitive dissociation, divergent strategic priorities, interest asymmetries, and the consolidation of an instrumental sustainability strategy.

Regarding decoupling management (Crilly et al., 2015; Wijen, 2014), this refers to the phenomenon where sustainable practices are adopted superficially, without real integration into the company's core operations and strategies. For example, tensions between operational efficiency and resource management can lead to decoupling, where environmental measures are implemented only to comply with regulations or improve public image, without a genuine commitment to sustainability (Haack & Schoeneborn, 2015). This is counterproductive to the development of a legitimate sustainability strategy, as it weakens the integrity of sustainability initiatives and undermines the credibility of statements, advertisements, and disclosures that boast meatpacking plants committed to true sustainability.

Inadequate waste management and water scarcity, along with production intensification, contribute to territorial degradation. These environmental tensions reflect the challenge of balancing intensive production with the conservation of natural resources (Ott, 2003). Territorial degradation not only harms the local ecosystem but also compromises the

long-term viability of production activity, demonstrating the importance of integrated sustainable approaches that consider the total environmental impact of production (Thomas & Lamm, 2012).

Cognitive dissociation occurs when there is a disconnect between knowledge of the importance of sustainability and effective action to implement it (Hahn et al., 2015). The perception of producers not being valued and the lack of effective communication about sustainable practices, such as the installation of biodigesters, exemplify this dissociation. This hinders the adoption of consistent sustainability practices and undermines the ability to align production chain operations with sustainability goals.

Tensions between the need to keep the production chain profitable and the importance of ensuring fair and equitable relations with producers reflect divergent strategic priorities. This divergence can lead to an instrumental sustainability strategy, where sustainable practices are adopted only when aligned with immediate financial objectives, compromising the legitimacy and effectiveness of sustainability initiatives (Arvidsson & Dumay, 2022).

Interest asymmetries between rural producers and integrating companies are evidenced by producers' dissatisfaction with perceived valuation and profits. This social tension highlights the difficulty of aligning producers' interests with integrating companies' corporate strategies, which is essential to promote a solid sustainable strategy throughout the production chain. Finally, the adoption of an instrumental sustainability strategy − where sustainable practices are seen as means to achieve economic ends − is evident in the tensions described. This approach limits the potential to create a genuine and integrated sustainability strategy, as decisions are often made based on short-term economic criteria, at the expense of long-term environmental and social considerations (Neumayer, 2013).

Therefore, the results indicate that the tensions mapped in the Alfa and Beta companies are counterproductive to creating a legitimate and effective sustainability strategy (Reihlen et al., 2022). To overcome these challenges, it is crucial for companies to adopt a holistic and integrated approach to sustainability, which recognises and addresses the complexities and interdependencies of ESG dimensions (Neumayer, 2013). This involves not only the implementation of genuine sustainable practices but also the development of equitable and transparent relationships with rural producers, ensuring that their needs and interests are fully considered in the production chain sustainability strategy.

Moving beyond a taxonomy of sustainability frictions, this study provides an analytical explanation of how ESG frameworks can paradoxically coexist with—and inadvertently reinforce—systemic tensions. The analytical linkage between ESG adoption and production-level tension lies in the asymmetry of the governance architecture. ESG indicators in the meatpacking industry function primarily as risk-mitigation tools for corporate reputation and market access, rather than cooperative mechanisms for value co-creation. When environmental and social criteria are operationalized through rigid, top-down compliance checklists, they fail to address the structural dependencies inherent in the integration system. Instead of resolving tensions, the indicators commodify sustainability requirements, shifting the financial and operational burden of compliance onto the weaker node of the chain (the producers). This explains why compliance statistics in corporate reports improve while field-level dissatisfaction and

decoupling persist, demonstrating that without a fundamental realignment of governance power and outcome distribution, ESG frameworks merely institutionalize and mask structural asymmetries.

CONCLUDING REMARKS

This study aimed to investigate how ESG indicators adopted by meatpacking plants in the swine and poultry production chain contribute to mitigating sustainability tensions, while exploring the main challenges and opportunities involved in this process.

The findings indicate that ESG adoption produces differentiated effects on sustainability tensions: mitigation where tensions are located within the firm's operational control and where financial and sustainability incentives align; displacement where indicators measure legal compliance rather than underlying impacts, transferring the burden to structurally weaker actors; and reproduction where ESG governance mechanisms formalise and legitimise existing power asymmetries. This differentiation constitutes the core theoretical contribution of the study and suggests that the effectiveness of ESG in agro-industrial chains depends less on the sophistication of the indicator system than on whether the structural conditions that generate tensions are themselves addressed.

The primary theoretical contribution of this study lies in its detailed analysis of how ESG indicators, when integrated into meatpacking plant operations, can serve as strategic tools for addressing sustainability challenges in agribusiness. The study underscores the importance of a holistic approach that balances economic, environmental, and social dimensions, recognizing both the obstacles and opportunities for advancing sustainability in the production chain. Moreover, it enhances the understanding of the interaction between ESG indicators and sustainable practices in swine and poultry production, providing pathways for improved integration.

From a practical standpoint, the study offers key recommendations for meatpacking plants, including investing in technologies and processes that enhance environmental sustainability, fostering fair and inclusive labour practices aligned with ESG principles, strengthening transparency and ethical governance to build stakeholder trust, and collaborating with suppliers and value chain partners to ensure ESG compliance throughout the production process.

Beyond its theoretical and practical contributions, the study also presents social and educational implications. The findings contribute to raising awareness about the importance of sustainability in food production and enriching academic debates on ESG implementation in agribusiness.

Despite these contributions, some study limitations must be acknowledged. First, the findings may not be fully generalizable across different regions and contexts due to variations in production practices and local regulations. Second, reliance on self-reported data from companies and rural producers introduces the risk of biases, potentially limiting the accuracy of ESG practice assessments. Finally, measuring the direct impact of ESG adoption on sustainability remains complex due to the multifaceted nature of production systems and external influencing factors.

For future research, several avenues are proposed: (i) in-depth case studies to examine how ESG indicators are implemented and managed in diverse geographic and production settings; (ii) research on consumer perceptions of sustainable production chains and their influence on ESG adoption in meatpacking plants; (iii) analyses of the financial impact of ESG adoption across the entire value chain, including return on investment in sustainable practices; and (iv) the development of more robust methodologies to assess the long-term effects of ESG indicators on sustainability.

By addressing these gaps, future research can further refine ESG strategies in the meatpacking industry, supporting the transition towards a more sustainable and responsible agribusiness sector.

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Simone Sehnem
ORCID: https://orcid.org/0000-0002-2416-4881
Current professor and researcher at the Universidade do Oeste de Santa Catarina (UNOESC) in the Academic Doctorate in Administration and the Professional Master's in Administration; Professor and researcher in the graduate program in Administration at the Universidade do Sul de Santa Catarina (UNISUL). E-mail: simone.sehnem@unoesc.edu.br

Taís Provensi
ORCID: https://orcid.org/0000-0003-3905-1297
Ph.D. student in Business Administration in the Graduate Program in Administration at the Universidade do Oeste de Santa Catarina (UNOESC). E-mail: taisprovensi@gmail.com

Lucila Maria de Souza Campos
ORCID: https://orcid.org/0000-0002-1610-7617
Full Professor in the Department of Production and Systems Engineering (EPS) and Permanent Professor in the Graduate Program in Production Engineering (PPGEP) at the Universidade Federal de Santa Catarina (UFSC). E-mail: lucila.campos@ufsc.br

Susana Carla Farias Pereira
ORCID: https://orcid.org/0000-0002-3952-7489
Full Professor at the São Paulo School of Business Administration from Fundação Getulio Vargas (FGV EAESP). E-mail: susana.pereira@fgv.br

AUTHORS' CONTRIBUTION

Simone Sehnem: Conceptualization (Lead); Data Curation (Lead); Formal analysis (Lead); Funding acquisition (Lead); Investigation (Equal); Methodology (Lead); Project administration (Lead); Resources (Lead); Validation (Equal); Visualization (Lead); Writing - original draft (Lead); Writing - review & editing (Equal).
Taís Provensi: Investigation (Equal); Validation (Equal); Writing - review & editing (Equal).

Lucila Maria de Souza Campos: Writing - review & editing (Equal).
Susana Carla Farias Pereira: Supervision (Lead).

RESEARCH DATA AVAILABILITY

The entire dataset supporting the results of this study is available upon request to the corresponding author (dataset available in Portuguese only). The dataset is not publicly available as it contains confidential information regarding the participating companies.

CONFLICT OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

ARTIFICIAL INTELLIGENCE USAGE

AI tools were used to create Figures 1 and 2.

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