

Identification of Sustainable Practices in Brazilian Companies: A Case Study in the Food Sector

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Received: February 27, 2023

Accepted: October 6, 2023

Online Published: October 29, 2023

doi:10.5539/jms.v13n2p139

URL: <https://doi.org/10.5539/jms.v13n2p139>

Abstract

This research seeks to verify the presence of sustainable practices in the Brazilian food industry and how these practices affect this sector. Through the case study applied in two food companies (*Alpha* and *Beta*) it was possible to characterize and quantify the sustainable practices used in these companies. With this, it was observed that *Alpha* company meets the criteria established by the legislation and the guidelines established in ISO 14000, it opted for no certification, and however, this is a goal to be achieved. Furthermore, *Alpha* company provides guidelines that prioritize suppliers that have socio-environmental certifications such as those of the ISO certification, but it does not yet have the sustainability reports. *Beta* company in following the criteria imposed by the legislation has the ISO 14001 certifications. The structuring of sustainability report and its publication has already been a reality in the *Beta* company through the Global Compact since 2003. The *Alpha* and *Beta* companies do not specify what internal and external factors are motivational in the application of sustainable practices, although they claim to be in accordance with the current legislation. Lastly, the companies surveyed, while presenting sustainable practices involving the three pillars, did not strive to respond in detail about each pillar, considering the practices in general. It was found that a lot of information about the priorities of companies was of compliance and could not be answered.

Keywords: environmental management, ISO certification, sustainable development

1. Introduction

The sustainability has become a focus in industries because of the limitation of available natural resources, changes in the pattern of consumption of society and greater strictness of environmental laws in the countries. Consequently, companies sought reducing raw material and sustainable life cycle to achieve economic and environmental efficiency by reducing the depletion of natural resources (Agyeman & Evans, 2004; Sadraei et al., 2023). For this, the companies adopt actions focused on sustainability: cleaner production, green products, technological development actions that mitigate the expenditure of resources, recycling, reuse, eco packaging design, eco labelling, reduced uses of resources and green areas, among other sustainable actions. Among the practices cited, eco-labelling is an approach that goes beyond sustainable agro-industrial practices valued by consumers seeking green production, aimed at preserving the environment (Ng & Shukor, 2016). These sustainable practices are actions present in industries that help guide corporate decisions developed within the industry in the search for sustainability (Ahmadi-Gh & Bello-Pintado, 2022; Chakrabarty & Wang, 2013).

Each industry has its own concerns and must have attitudes according to its objectives, while not neglecting to prioritize the reduction of the environmental impact it causes with its industrial practice (Villard et al., 2015). The use of Sustainability reports established by the Global Reporting Initiative (GRI), relating all aspects of the company or industry about the sustainable aspects is a tool in the company's evaluative process and a means of environmental disclosure that exposes economic, social, and environmental performance (Brown et al., 2009; García-Sánchez et al., 2013). These reports include indicators used for sustainability performance (Azapagic, 2004; Saulick et al., 2023) and provide unified information to stakeholders assessing the organization's socioeconomic and environmental performance (Calabrese et al., 2016). However, the companies that have annual reports, not all of them disclose sustainability reports, because it is not a compulsory requirement and the absence of control management mechanisms that allow the production of information.

Research focused on sustainability are addressed in all industries (Bagheri & Hjorth, 2007). Oil and gas sector was observed may limiting factors to implementation of sustainable practices (Raut et al., 2017). Electronics industry in Taiwan the sustainable practices arise in emerging market (Hsu & Chang, 2017). In metallurgical industrial sector also present sustainable practices (Muanretto et al., 2017). These surveys are examples of how industries have been trying to identify and analyse the factors that lead to less waste of natural resources, greater efficiency in the production and disposal of waste. In food industry has a variety of research, such as the supply chain (Monastyrnaya et al., 2017) ; sustainable supply chain management (Golini et al., 2017); sustainable practices in food service organizations (Adams et al., 2023; Ju & Chang, 2016); technological improvements and practices of water use management in the wine industry (Ene et al., 2013); sustainability of organic wine (Bonn et al., 2016). This has led companies in the food sector in countries such as Brazil to increase the production of sustainability reports.

Brazil food sector corresponds to US \$ 67 billion in the trade balance, with US \$ 33.5 billion in processed foods and a contingent of 35.6 thousand companies (*Associação Brasileira da Industrias de Alimentação*, 2017). However, some of these companies are unaware or just ignore the impacts of their activity on the environment and society (Landim et al., 2016; Strasburg & Jahno, 2017). Thus, the use of the Case Study methodology to identify sustainable practices in the Brazilian food industry seeks to know the reality of the food industry in the face of use of natural resources. Among the research focused on the application of sustainable practices in Brazilian food industry sector have been emphasized the concern with the safety of workers, products and processes, environmental impacts, use of fertilizers and agrochemicals, and habitat destruction due to the high dependence of agribusiness (de Area Leão Pereira et al., 2020; Pullman et al., 2009).

Considering this reality, the adoption of sustainable practices in the industries is essential. In this way, this paper seeks to identify the sustainable practices present in the Brazilian food industry. For this, this paper intends to answer the following questions:

- Which sustainable practices are identified in the food industry surveyed?
- Do sustainable practices in the industry encompass the three pillars of sustainability?
- What is the main goal of the food industry in adopting sustainable practices?

Considering this reality and the increasingly incorporated and essential need to adopt sustainable practices in industries, the objective of this paper is:

- Identify the implementation of these sustainability practices in the food industry.
- Investigate what are the priorities of the food industry for the use of sustainable practices.
- Investigate how sustainable practices impact the logistics of the food industry in Brazil.

The industries selected for the development of the Case Study are two industries in the food sector. The real names of the two companies were not disclosed for reasons of confidentiality. The Brazilian dairy industry, known as “Beta”, has eight units located in the Southeast and Northeast of Brazil, known for its high production in Fresh Dairy Products, Waters, Early Life Nutrition and Specialized Nutrition, showing a high business venture. The “Alpha” industry is one of the seven largest Brazilian companies in the meat processing, pasta, and raw material for industry. It also supplies raw material for the industry, with its factories of feed, composed ofmatrizeiros (stock plant) and hatcheries. It has units in several regions of Brazil, including the Southeast and Midwest.

2. Materials and Methods

2.1 Methodology

The methodology used in this paper is the Case Study. The research is classified as exploratory about sustainable practices present in the food industry, social, environmental and economic aspects addressed in company decisions. Regarding the research, it is classified as a Case Study of a qualitative nature, applied in two companies that have relevant aspects on the approach of aspects involving sustainability in different stages of application. In the qualitative research the researcher must basically seek to collect data, relational information, raise the point of view of the participants of the research maintaining impartiality (Cauchick Miguel, 2007).

2.2 Case Study

The Case Study is empirical research that seeks to investigate a current fact or “case” in detail and its context, especially when the boundaries between the case studied and its context are not yet clearly evident (Baxter & Jack, 2008). It is a research process that involves procedures that start from the formulation of a question,

including observation, description, classification, experimentation and interpretation of the case (Lukoff et al., 1998). Figure 1 presents a sequential model for conducting a Case Study:

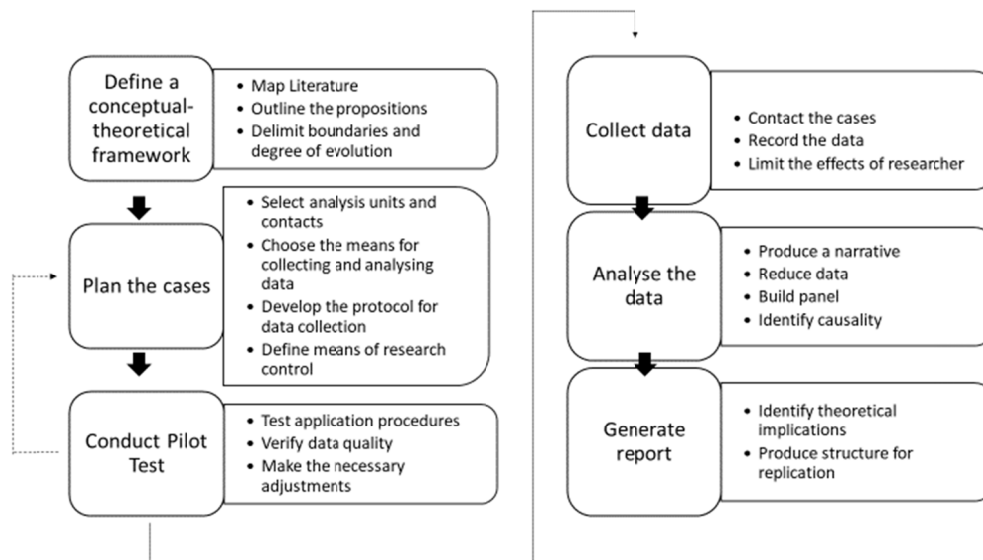


Figure 1. Conducting the case study

Source: Miguel, 2007, p. 221.

2.2.1 Definition of a Theoretical Conceptual Framework

Information from the two selected companies is collected for research through interviews. Among the various information, it was collected what sustainable practices are developed by the companies, carrying out an evaluation including the environmental, economic, and social dimensions and framing them within the sustainable perspectives, addressing within the principles of TBL. It is intended to jointly evaluate the benefits and implementation of these practices to the industry.

2.2.2 Site Selection for Research

The field research includes two companies. The case companies are from the food sector. These companies were chosen based on two criteria: first criterion analysed the economic representation of these companies for the region in which they are located; second criterion was based on the impact that these companies cause to the environment and the representativeness in the Brazilian economic market. It is believed that this sector brings in its management great environmental, social, and economic impact for the society, involving all its life cycle, ranging from the aspects of production, industrialization, and commercialization of the products.

The companies considered for the Case Study are the dairy industry *Beta* and the food company *Alpha* (The true names of the companies were kept confidential for the preservation of the marks). *Beta* began its activity in 1970. It has four divisions: Water, Early Life Nutrition, Specialized Nutrition and Fresh Dairy Products. There are eight factories in Brazil, located in the Southeast and Northeast. While *Alpha* operates with the processing of poultry, pork, pasta and vegetables. It is in Brazilian states in the southeast and central-west regions. Both selected industries are multinational, leaders in the specific sectors.

2.2.3 Search for Sustainable Practices in the Literature

The questions addressed in the interview were elaborated from a literature review. This previous research allowed that through keywords and Boolean expression, articles referring to the theme of sustainability and industries were selected. The interview structured according to Appendix A, provides the information that was collected for the Case Study, allowing an analysis and interpretation of companies without comparing them with one another.

2.2.4 Elaboration of the Interview Questions

The elaboration of the interview questions was supported by extensive research in the literature on the various

aspects that involve the reality of companies and the sustainable practices carried out by them. Interviewing is one of the ways to gather information that is essential for research and one of the forms of interaction between the researcher and the interview. The elaboration of the structured interview allows a standard of applicability in companies, allowing organization as to the application and responses of the interviewees (Rowley, 2012). The interview questions were subdivided into environmental, social, and economic, and general aspects, seeking to know all the aspects that involve the sustainability issues of the food sector in question.

2.2.5 Conduction of the Pilot Test

In the conduction of the pilot test through the previous interview, it was found there was no response in questions that could not be answered by the interviewees. One of the reasons listed by the interviewees was the compliance policy developed in companies, which would prevent the possibility of answers. The questions were again analysed and modified and complemented. In this way, the interviewees were asked again, that in case of compliance these questions could be answered only in parts or else the questions were disregarded. Thus, adjustments were made in the application of the interview to reach the objectives of the research, through the increase of the number of questions and the change in the preparation of some questions, there were also the complementation of two general questions for a complete analysis of the existing issues that address the three pillars of sustainability.

2.3 Data Collection

2.3.1 Application of the Interview in Companies

The application of the interview in companies was done by prior scheduling by email and phone calls, with employees responsible for the area of project management focused on the sustainability sector. The interview did not occur through a single contact. Several contacts were made with both industries for various phases of the research. Initially the interview was conducted, and after analysing the answers, new contacts were made until full clarification was reached. In the view of questions that were not answered, the respondent argued that confidential company issues were explicitly addressed, and data collection adjustments were required to ensure that there were no harms to the survey.

The questions asked sought to include the tripod of sustainability and identify the main characteristics of the industry that led to the knowledge of the practices developed and how much they are valued by the industry in question. And for the finalization of the research done in the companies, a table containing examples of sustainable practices were sent to the interviewees, in which they should mark the practices that were addressed in the actions of the industry.

2.3.2 Data Analysis

The data analysis was performed through of Intra and Inter-case analysis.

3. Results and Discussions

3.1 Intra-Case Analysis

3.1.1 Alpha Company Case

Analyses made in the Alpha company covered several aspects that go through the three pillars of sustainability, ranging from ISOs, certifications, indicators, technological adequacies, and Environmental Management System (EMS). The EMS, implemented by ISO 14000 standards, seeks improvements in the management of processes and products in the most diverse industrial sectors and sizes. Although the Alpha company meets the criteria established by the legislation and the guidelines established in ISO 14000, it opted for no certification, however, this is a goal to be achieved. According to the sustainability policy, the Alpha company provides guidelines that prioritize suppliers that have socio-environmental certifications such as those of the ISO system.

Alpha company does not yet have the sustainability reports, however, it is expected that in the next two years will have. This search for the environmental suitability of the company, through ISO 14001 certification and the sustainability report, demonstrates the company concern with environmental management to ensure a follow-up of the whole process, from the use of raw materials, process, distribution of products to the correct waste disposal or reuse, phases present in the food sector. For this, the use of indicators that provide information on the reality, synthesizing numerous information of the analysed aspects in a quantitative way allowing the understanding and monitoring of certain processes regarding the achievement or not of the goals or minimum standard of performance is necessary. Through these indicators it is possible to measure the degree of success of implementing an implemented strategy. The Alpha company, in addition to reporting the use of indicators, reported some indicators used by the industry, among which were listed the following: in the Gross Effluents:

DBO5 (mg/L), DQO (mg/L), OLGX (mg/L), Suspended Solids (mg/L), Settleable Solids (ml/L), pH, ABS (mg/L). Treated Effluent: DBO5 (mg/L), DQO (mg/L), OLGX (mg/L), Suspended Solids (mg/L), Settleable Solids (ml/L), pH, ABS (mg/L).

Among the actions reported by the Alpha company, it stood out the fact that they still do not have established environmental goals, but it is in the sustainability plan to adopt waste generation targets, as well as reuse and/or recycling, reinforcing that the company seeks new technologies that allow the adoption of these actions. The waste generated in the production units is packed in areas suitable for storage in accordance with ABNT standards, they also have partner companies licensed for this task to guarantee the correct destination of each waste whether it is hazardous or not. It is also worth mentioning that in the Central Office there is the selective collection of waste that benefits a group of waste-pickers in large urban centres, in which a network of cooperatives of recyclable waste-pickers is part. It is worth mentioning that in addition to the donation of waste, according to the National Solid Waste Policy—PNRS, the industry makes the financial contribution to improve the productivity of the network by supporting education and entrepreneurship projects of the private network and in large urban centres.

In addition to the use of indicators as tools in management, companies use other measures to monitor and mitigate impacts, more specifically environmental ones. In the Alpha company, an annual review of the Environmental Aspects and Impacts Survey is carried out to ensure that environmental impacts are evidenced and managed according to each productive unit, so the management is fully aware of the risks of each aspect and from this, prepare a mitigation plan for the productive units. Environmental Aspects and Impacts Survey like assessment tool essential for good planning and management of companies, including in the food sector (Cruz & Araújo, 2015; Detzel et al., 2022). Alpha company uses the indicators that are discussed and treated monthly by management and each productive unit. Each deviation is treated by an action plan to improve the performance of the industry.

Among these sustainable practices, the social biases present in the Alpha company were developed to serve the society in which it is inserted. In this way, among the social practices present in the Alpha company stand out the actions developed in a Foundation, maintained by the company itself with the objective of promoting and making feasible projects and actions in accordance with the practices to meet the needs of the local community. The criteria used by Alpha to define practices as sustainable are the impacts that these actions carried out by the company itself can generate in the community, as well as the needs that the community can present. On the other hand, the benefits and/or efficiency are generated from impact studies, that is, after an intervention; a social study is done to evaluate the effectiveness and impacts of a given action. Regarding technological adaptations, Alpha has technological investments with implementation that are considered clean and less aggressive to the environment and describes in a direct way that it believes that investment in new technologies brings benefits to the environment, as well as lower consumption of water, energy, and reduction in the emission of gases.

3.1.2 Beta Company Case

Just as in the Alpha company, the analyses made in the Beta company also address the social, environmental, and economic aspects of sustainability and through interviews allows us to know the reality of company in question. The Beta company in addition to following the criteria imposed by the legislation has the ISO 14001 certifications. This ISO 14000 environmental management is a joint action aimed at managing all the factors related to the environmental focus of an organization, with the objective of improving the quality of the product, service or process in the corporate environment.

The structuring of sustainability report and its publication has already been a reality in the Beta company through the Global Compact since 2003, related to Human Rights, Labour Rights, Environmental Protection and Fight against Corruption in all its forms, which seeks by means of publication to reinforce the objectives of the Global Compact and its guiding principles. Beta company is concerned with environmental management to ensure a follow-up of the entire process, from the use of raw materials, process, and product distribution to the correct disposal of waste or reuse, phases present in the food sector.

The monitoring of all actions is done through indicators. The indicators used in relation to effluents are not specified, however, in relation to water consumption the company makes use of the indicator of Reduction of water consumption per kg of product and Reduction in Chemical Oxygen Demand (COD) disposal. COD is a parameter used to indicate the water quality of effluents. Confirming that although many companies use indicators, many do not report the totality of indicators that guide their corporate actions, reinforcing the degree of competitiveness among sectors.

Environmental assessments are present in companies, but they reserve to disclose what tools and indicators are

used as strategies for mitigation and assessment of environmental damage in companies. The Beta company does not mention which assessment tool is used for its environmental management, but describes a consultative council composed of external experts, which provides management advice related to the main decisions to be taken on specific issues related to sustainability. To develop the sustainability strategy “Nature” and keep it relevant to stakeholders, a consultative committee, the KOL, was created, the Key Opinion Leaders Board. This permanent committee, composed of ten external sustainability experts, is part of the “Nature 2020” strategy for agriculture, packaging, water, and climate. It also has an Independent Steering Committee for the *Beta Ecosystem Fund*, which includes members of the *Beta Executive Committee*, as well as key figures from civil society policy and trade unions. The role of this committee is to define the general strategic and investment guidelines for the Ecosystem Fund.

Among the actions aimed at the social bias, the Beta company created the *Beta University*, a global structure that brings together all development initiatives with the mission of accelerating the transmission of culture and the growth of people together with on-site and on-line training. It also highlights in its actions the Project *Novo Ciclo Sul de Minas* (South of Minas New Cycle), created in 2012, in accordance with the National Policy on Solid Waste, and with the objective of collecting part of the volume of material that Beta company places on the market through packaging and waste-pickers i.

The Beta company evaluates that social innovation using sustainable practices should seek employment and income focused on entrepreneurship. One of the actions to achieve these goals was the launch of the Respect program in 2015, in which it created a specific process to ensure the protection of the principles of sustainable development for all its suppliers. Beta company extends social and environmental responsibility throughout the supply chain. If by chance, suppliers do not meet these standards, a solution is sought through audits and corrective action plans, for example to ensure the continuous improvement of supply chain sustainability.) The sustainable practices aimed at social bias should bring about sustainable social improvements for all involved (Constantino et al., 2022; Wu et al., 2015). Thus, the great responsibility of social sustainability in the awareness of stakeholders in the supply chain, both in where, how and under what conditions the products are produced (Desiderio et al., 2022; McCarthy et al., 2010). Regarding technological adequacy, Beta company has technological investments with implementation that are considered clean and less aggressive to the environment. But it does not directly describe how the investments in new technologies are and how they bring benefits to the environment, as well as lower water consumption, energy, and reduction in gas emissions.

3.2 Inter-Case Analysis

Environmental assessments, as well as the use of environmental indicators, bring actions to reduce the environmental impacts of industrial actions. These actions are called sustainable practices, among them in (Table 1).

Table 1. Description of practices/citations

Sustainable Practices with Environmental Bias	
Alpha Industry	Beta Industry
Proper distillation of waste	Reduction in carbon emissions
Water reuse	Water management.
Treatment of effluents	Adoption of circular economy of packaging.
Reducing GHG emissions—Greenhouse Gases	Reverse logistic.
Mitigation of noise	Sustainable agriculture

Thereby the use of indicators, among which the suppliers stand out, which through purchasing policies by some industries privilege those with certifications, but this is not yet a reality in the industrial sectors. This prioritization is a socio-environmental action present in industries that have certifications such as ISO (Drohomeretski et al., 2015), however it is not a privilege, but a prioritization for suppliers that have socio-environmental attitudes. Among the indicators used to monitor certain processes, those related to waste, specifically waste reduction, reuse, and recycling, were reported. These indicators are intrinsically linked to the product life cycle and have a major impact on the logistics of the sector.

Companies generally do not disclose environmental assessments and the criteria used to define practices as sustainable in this case study, Beta did not report what environmental criteria and assessments it uses. The Alpha companies notes that the Environmental Aspects and Impacts Survey allows each unit to present priorities as well as practices that should be adopted. This methodology is a tool for qualitative identification of

environmental aspects and impacts which stand out the products, services, current processes and the interrelated ones that are identified and evaluated (Cruz & Araújo, 2015; Sacchi et al., 2022).

Beta and Alpha companies use of the benefits of certain internal actions such as analysis of the index of illiteracy and eradication, index of schooling, development of training, female participation, participation of blacks, safe working conditions and childcare. These social benefits (Table 2) positively reflect all stakeholders when performed by companies for their employees regardless of whether they present social certifications. Both companies emphasize that they respect the applicable legislation, they refuse any discriminatory practice. Possibilities and equality are internalized in all company processes.

Table 2. Description of social practices in the food industry

Sustainable Practices with Social Bias	
Alpha Industry	Beta Industry
Cultural development	Product donation—Mesa Brazil Program
Social development	Carrying out sports activities—tournaments
Sports development	Action of Food and Nutrition Education—1, 2, 3 and dairy.
Health development actions.	Disclosure of newsletters
Improve people's quality of life.	Recycling—waste-pickers movement.

It is also observed in research that social issues in a corporate environment are not always easy to measure, and there is no methodology that covers all social aspects, so that they are often removed from the assessment of sustainability impacts because they are a challenge in the evaluation of social sustainability (Rafiaani et al., 2018). Companies also encompass social aspects that are part of the Sustainability Tripod and should not correspond to greater or lesser relevance in the industrial reality when compared to the environmental aspects. In general, social aspects do not have the same relevance as other aspects of sustainability (Missimer et al., 2017a, 2017b). This demonstrates the need for further development in the social dimension to move society towards sustainability. Within this aspect, the commitment to the valorisation of cultural diversity, with actions such as cultural initiatives, investment in local culture, maintenance of local cultural heritage, are social actions foreseen in both industries surveyed.

The implementation of sustainable business is driven by social, environmental, and economic reasons and is reported in an orderly manner according to the weight that these reasons are considered in the decisions of the company in relation to aspects of technological innovations and in relation to the implementation of sustainable business practices within the company commercial network. Priority is given to economic reasons, then to environmental reasons, and finally to social aspects. The Beta company does not cite what sustainability tripod factors are considered most relevant in their corporate decisions aimed at sustainable technological implementations and business decisions within the commercial management network.

The adoption of sustainable practices is based on environmental, social, and economic bias, and issues related to the economic bias are the ones with the least results obtained in the industries surveyed. Although in the economic bias it is reinforced that in the use of any renewable resource, the demand must balance supply (Damery et al., 2009; Dubbert et al., 2023), stressing that economic factors influence the actions of the industry as well as their decision-making in the other pillars of sustainability. The main incentives to implement sustainable business are economic practices (Ali et al., 2023; Høgevoid et al., 2015). However, in Alpha Company social and environmental issues prevail when compared to economic interests. Regarding the absence of a relation of sustainable practices with the economic bias there is still some reluctance to implement sustainable practices, mainly on expected economic benefits (Hassini et al., 2012). It is noticed the absence of answers related to the economic factor with justifications of confidential information.

The Alpha and Beta companies do not specify what internal and external factors are motivational in the application of sustainable practices, although they claim to be in accordance with the current legislation. Comparing to other sectors, as well as those of high technology, where internal factors (reputation, cost and support to top management) and external factors (legislation, clients and competitors) that drive the implementation of the legislation are mentioned (Lo, 2014). In this way, the specification may or may not occur in other sectors, as well as its benefits, corroborating those regulatory activities, while increasing attitudes of compliance with legislation, do not reflect the reduction of waste emissions (Gray et al., 2014; Shooshtarian et al., 2022). Thus, Beta and Alpha companies have technological investments with implementation that are considered clean and less aggressive to the environment. However, only Alpha directly describe that investments

in new technologies bring benefits to the environment, as well as lower consumption of water, energy, and reduction in gas emissions. Companies with advanced manufacturing practices are not actively involved with environmental management in their organizations (Green et al., 2012; Hegab et al., 2023).

As for the use of certifications, the Beta company, besides following the criteria imposed by the legislation, also has the ISO 14001 certification, bringing benefits that are also present in the literature, such as the reduction of resource consumption and waste management (Bansal & Bogner, 2002; Riaz et al., 2022), improved reputation and relationship (Amorim et al., 2023; Potoski & Prakash, 2005), reduces environmental impacts (Jeong & Lee, 2022; Wiengarten et al., 2013). The number of certifications is increasing, but still low in developing countries, although Brazil, mainly companies and industries of the southeast region, is among one of the countries in the Americas that had one of the highest number of certifications in 2014 (Hikichi et al., 2017). In contrast, one of the possible explanations for the non-certification of some industries are the high costs (Potoski & Prakash, 2005). In addition to the use of Certifications in the environmental management decisions, the companies have been seeking to make publications of environmental management information, which allows to make an evaluation of the environmental profile of the industry in question. The industrial sector already understands that sustainability is a premise for industrial competitiveness and that environmental management is crucial to the sector's environmental future. (Campos & Melo, 2008; Rajabloo et al., 2022).

The Beta company performs the Global Reporting Initiative (GRI) Guidelines. Being a multinational, this company adopts this approach due to the international markets that require this report, as for example in Europe (González et al., 2018). Latin American countries also show an increase in the adoption of GRIs. One of the objectives of the industries in the adoption of GRIs is to improve economic decisions and performance (Alonso-Almeida et al., 2015; de Villiers et al., 2022).

Regarding the main objectives of both food companies in relation to the adoption of sustainable practices in its management, Alpha reports that their main objective is to be a sustainable reference organization. Beta, on the other hand, has the objective of having a strong, profitable and sustainable growth. Both companies do not report a model in which they mirror for the sustainable development of the company. In business model for sustainable food companies were raised the following points: (1) customer demand, (2) stakeholder interest, (3) alignment of stakeholders to chain value for sustainability, (4) creation of shared sustainable value, (5) flexibility of the guidelines that encompass stakeholders, sustainable practices and indicators, (6) communication between actors in the chain, and (7) a concise tool that efficiently communicates performance to stakeholders (Monastyrnaya et al., 2017). This model requires the collaboration of three general steps: plan of action, collaboration and communication and aims to provide general guidelines for the creation of a sustainable food business model. In engineering, there has been progress in adopting sustainable practices aimed at minimizing environmental impacts as well as in social and economic aspects for a more sustainable future (Kumar et al., 2023; Thorpe, 2018).

After the interview, the interviewees were given a table (Table 3) with sustainable practices. In this table, the interviewees pointed out the practices that the company develops. This table discusses practices that had not yet been reported by the interviewees.

Table 3. Description of sustainable practices in the Beta and Alpha food companies

Sustainable Practices	Brazilian Industries	
	Alpha	Beta
Waste Management	Yes	Yes
Use of Clean Technology or Clean Production		
Reuse/recycling	Yes	Yes
Water/waste/energy management	Yes	Yes
Environmental Management System (EMS)	Yes	Yes
Stakeholder management	Yes	Yes
Sustainable use of natural resources	Yes	Yes
Training and development	Yes	Yes
Community Relations/Corporate Citizenship and Philanthropy	Yes	Yes
Design for environment (DfE) (packaging).	Yes	Yes
Certifications of the environmental management system of suppliers	Yes	Yes
Risk and crisis management	Yes	Yes
National environmental regulations (e.g., waste emissions, cleaner production, etc.).	Yes	Yes
Eco Design	Yes	Yes
Contract with suppliers that have environmental policies and action plans	Yes	Yes
Life Cycle Assessment - LCA	Yes	Yes
Technology and innovation	Yes	Yes
Sustainable transport management	Yes	Yes
Carbon Management	Yes	Yes
Sustainable consumption	Yes	Yes
Green chemistry	Yes	Yes
Eco-efficiency	Yes	Yes
Reducing social impact	Yes	Yes
Eco certification (ISO 14000, ISO 50001, LEED, GBI, GRADE, EMAS)	Yes	Yes
Reduction of solid waste	Yes	Yes
Reduction in energy consumption	Yes	Yes
Reduction in water consumption	Yes	Yes
Recycling of rainwater/grey water and industrial water	Yes	Yes
Supply chain management	Yes	Yes
Code of conduct/compliance/corruption and bribery	Yes	Yes

It is concluded that the companies were analysed differently without comparisons because the literature itself proposes that in a single sector there may be diverse sustainable practices, levels of implementation, and understanding of sustainable practices which lead to different analyses due to the diversity of sectors. In companies surveyed, the practices suggested in the interview were presented in (Table 3) to address not only the practices cited by companies, but also to exemplify the diversity of practices present in the literature. It allowed to show the general practices that both companies perform. This presentation of practices was analysed without the objective of comparisons, since the literature itself proposes that in a single sector there may be diverse sustainable practices, levels of implementation, understanding of sustainable practices which lead to different analyses due to diversity even within the sectors.

4. Conclusion

This paper made it possible to identify the sustainable practices present in the Brazilian industries of the food sector and whether these practices encompass the three pillars of sustainability. The companies surveyed, while presenting sustainable practices involving the three pillars, did not strive to respond in detail about each pillar, considering the practices in general. It was found that a lot of information about the priorities of companies was of compliance and could not be answered. As a result, some questions remained unanswered: Do companies adopt these practices? And what practices are priorities for these companies?

The questions related to the three pillars obtained a large amount of information, but the economic bias was the one where there was more reluctance to respond by both industries, including sustainable economic practices. Alpha company, use of indicators for assessing the benefits/efficiency of adopting sustainable practices, while Beta does not report any type of evaluation in this way. However, the fact that the Beta company did not report in this study the use of evaluation does not imply that it does not perform, however, this showed how the company makes use of the privacy policy to avoid any kind of clarification.

Nevertheless, it is expected that the analysis of companies in Brazilian food sector will serve to characterize

adopting sustainable practices by companies. For future studies, it is important to expand the research to other companies and seek to analyse larger amounts of information incorporating other aspects on the three pillars of sustainability. Lastly, the analysis of the companies was done differently without comparisons because the literature itself confirms that the practices, implementation and understanding are diverse, which lead to different analyses both within the same sector and in the diversity of industrial sectors. The implementation of these practices among the companies is not unique, on the contrary they differ from each other.

Acknowledgment

This work was supported by the Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG) (APQ-03812-16) and the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) – Finance Code 001.

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Running title

Sustainability of food companies in Brazil

Appendix A**Interview to be applied in the selected company.****ENVIRONMENTAL**

1. Does the company publish information about its environmental management?

YES

NO

If so, what publications?

2. Does the company monitor waste (solid, effluent, atmospheric emissions) with indicators?

YES

NO

If so, what indicators?

3. Does the company have waste reduction, reuse, and recycling goals?

YES

NO

If so, what goals does the company have?

4. Does the company invest in technology and/or actions to reduce waste generation?

YES

NO

If so, what technologies?

5. Does it carry out selective waste collection?

YES

NO

If so, does it have any related projects?

6. It is described by Brazilian legislation that companies must monitor and be aware of the potential risks arising from their activities to the environment and society, as well as evaluate them and promote mitigation actions. From the terms described below, the company presents:

Periodic environmental assessment;

Environmental Impact Assessment;

Measures to prevent environmental damage.

If possible, exemplify each term marked.

- Does the company present any other measures to monitor or mitigate the impacts?

7. Does the company have any environmental certification issued by accredited organizations in its environmental performance assessment system?

YES

NO

-If so, which ones?

-If not, is there any specific reason why the company does not have a certification yet?

8. Since the licensing process, has the company been prosecuted as described below? Check the alternatives.

Current environmental proceedings;

Environmental pending matters;

Environmental accidents (history);

Irreversible environmental impact.

If so, has it already been solved or finalized?

9. Does it monitor natural resources (water, electricity, fuels, natural resources) with indicators?

YES

NO

If so, what indicators?

10. Is it ISO 14001 certified?

- Yes, for up to two years
 Yes, from 2 to 5 years
 Yes, from 5 to 10 years
 Yes, for over 10 years
 No, but wants to implement
 If not, does it have another certification related to sustainability?

11. Does it have a purchasing policy that privileges those suppliers who have socio-environmental certifications?

- YES NO

If so, what certifications?

12. What sustainable environmental practices are performed by the industry?

13. What criteria are used to define these environmental practices as sustainable?

14. How are the benefits/efficiency of the use of such practices measured?

SOCIAL

1. Commitment to the appreciation of local cultural diversity is of utmost importance to maintain a good relationship between external, internal communities and the company. Being the local culture of previous knowledge of the organization, the company has as characteristics in cultural investments:

- The implementation of cultural initiatives;
 Investment in local culture;
 Maintenance of local cultural heritage.

- If possible, exemplify the marked options.

- Has the society enjoyed and considers these investments as positive?

2. Does the company have social certification that must be issued by accredited organizations?

- YES NO

- If so, does the company consider that after acquiring this certification the relationship with society has been optimized?

3. Does the company have mechanisms to verify the level of knowledge, commitment, and growth possibilities of the organization's internal public? If so, mark the alternatives that correspond to the activities carried out in the daily life of the company.

- Analysis of the illiteracy index;
 Analysis of the schooling index of employees;
 It has development and training policies, aiming at the continuous improvement of all its personnel
 It maintains an illiteracy eradication program (absolute and/or functional) of supplementary education or completion of basic education for employees with defined goals and resources.

With this, does the company believe that employee income starts from the principle of valuation and investment in them?

4. It is described that companies must have in their management system a corporate policy that addresses aspects related to quality of life, health, safety, and eradication of inequality between gender and colour. Indicate among the alternatives below, those that correspond to the planning and management of employees.

- Female participation (positions held);
 Participation of blacks;
 Safe working conditions;
 Childcare assistance;

Security in the maintenance of employment.

5. Regarding diversity, are there explicit policies of non-discrimination (race, gender, age, religion, and sexual orientation) in wage policy, admission, promotion, training and dismissal of employees?

6. Does the company have formal policies with the aim of contributing to the eradication of child labour and forced labour by discussing the issue with suppliers and encouraging them to comply with the law?

YES NO

Justify:

7. Does it have a Profit-Sharing Plan for employees?

YES NO

If so, describe it:

8. Does it offer professional and personal improvement courses to its employees? Exemplify:

9. Does it comply with the legislation on the hiring of people with disabilities and do you maintain programs for the insertion of these people in the company?

10. Does it have sustainable practices aimed at the social focus in the industry?

YES NO

If so, list them

11. What criteria are used to define these environmental practices as sustainable?

12. How are the benefits/efficiency of the use of such practices measured?

ECONOMIC

1. Does the company use local suppliers as a source of resources to carry out its activities?

YES NO SOMETIMES

Does the company consider that by using local suppliers it is contributing to municipal economic development?

2. What is the current number of employees in the company today?

3. What is the annual production achieved by the company in the last 5 years?

4. Since many companies have invested in technologies considered clean and less aggressive to the environment, does the company have any investments or plans to implement them?

YES NO

What reason led the company to this decision?

5. Does the company receive any financial help or benefits from the government?

YES NO

If so, is this benefit designed to provide services to the municipality?

6. After the installation period, does the company consider that there has been an increase in net municipal income available (purchasing power of each citizen)?

YES NO

Not able to comment

What leads you to this statement?

7. Rate from 1 to 3 the main reasons for the implementation of sustainable business:

Practices within your company (where 1 is the most important and 3 is the least important)

Economic reasons.

Social reasons.

Environmental reasons.

Justify your answer:

8. Rate the main reasons for implementing sustainable business practices within your company's business

network (where 1 is the most important and 3 is the least important)

() Economic reasons.

() Social reasons.

() Environmental reasons.

Justify your answer:

9. What sustainable environmental practices are performed by the industry? Cite them:

10. What criteria are used to define these environmental practices as sustainable?

11. How are the benefits/efficiency of the use of such practices measured?

GENERAL ASPECTS

1. Are all the environmental practices addressed in the social, environmental, and economic pillars implemented effectively?

2. What are the main objectives of the company in relation to the adoption of sustainable practices?

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