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Voluntary Social and Environmental Disclosure of Brazilian Agribusiness Corporations

Disclosure voluntário socioambiental de empresas do Agronegócio Brasileiro

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Abstract: This study aims to analyze the social and environmental disclosure (SED) of large corporations operating in the Brazilian agribusiness industry. Brazil is globally recognized for its agribusiness, and the companies in this industry are increasingly being watched by the global community for possible negative externalities of their operations. The research sample consists of 25 large companies operating in one of the five sectors of the Brazilian agribusiness industry, which have been considered in the analysis. A multiple correspondence analysis was conducted to check if there exists any difference in the SED of large corporations across the various agribusiness sectors. To observe the behavioral variation within each sector, the Lorenz curve and the Gini index were employed. It is evident that Brazilian agribusiness companies are concerned about disclosing their corporate social responsibility, particularly in the case of environmental and human resource issues. In addition, results have shown a heterogeneous behavior toward the SED of large corporations both across and within the sectors. The results have important implications for the managers of agribusiness corporations because they enable the corporations to acquire information about the

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SED of other companies, which facilitates their decision-making process regarding their corporate social responsibility planning. For policymakers, the study results help to understand which agribusiness sectors need to be encouraged to develop their corporate social responsibility.
Keywords – Social and Environmental Disclosure; Agribusiness; Brazil; Correspondence Analysis.

Resumo: Esta pesquisa tem como objetivo analisar a divulgação socioambiental (DSA) de grandes empresas que atuam no agronegócio brasileiro. O Brasil é reconhecido como um país relevante para o agronegócio mundial, e as empresas do setor são cada vez mais acompanhadas pela sociedade devido às possíveis externalidades negativas de suas atividades. A amostra da pesquisa é composta por 25 grandes empresas que operam em um dos cinco setores do agronegócio brasileiro analisados. Foi adotada a análise de correspondência múltipla para observar se existe alguma diferença na DSA entre os diversos setores do agronegócio. Posteriormente, para observar a variação comportamental dentro de cada setor, foram adotadas a curva de Lorenz e o índice de Gini. A preocupação das empresas brasileiras do agronegócio em divulgar sua responsabilidade socioambiental ficou evidente, principalmente no que diz respeito a questões ambientais e de recursos humanos. Além disso, os resultados da pesquisa apontaram um comportamento heterogêneo em relação a DSA entre e dentro dos setores. Os resultados apresentados no estudo são úteis para gestores, pois oferecem a eles a oportunidade de conhecer a DSA de outras empresas, o que facilita o processo de tomada de decisão em relação ao planejamento da responsabilidade socioambiental de suas empresas. Para os gestores públicos, os resultados do estudo contribuem para o entendimento de quais setores do agronegócio precisam ser incentivados a desenvolver sua responsabilidade socioambiental.
Palavras-chave – Divulgação social e ambiental; Agronegócio; Brasil; Análise de Correspondência.

Introduction

Business management practices have always been linked to the economic benefits enjoyed by stakeholders. However, new concerns have emerged over time that directly affect business operations; these include the demands of the employees and social and environmental regulating agencies, quality improvements, protection of human rights, responsible production, and ethical behavior, among others (Castillo-Muñoz, Ripoll & Urquidi, 2017; Saini & Singhania, 2019).

In light of these new concerns, companies had to take measures to remain competitive in the market. Corporate social responsibility (CSR) practices are linked to ethical and moral values within the

scope of corporate decision-making and are directly related to complex issues, such as environment protection, human resource management, health and safety at work, relationships with communities, and relationships with suppliers and consumers (Branco & Rodrigues, 2006).

Prior to developing their CSR practices, companies need to understand the particularities of the industry in which they operate and the reasons behind their implementation of CSR (Cuganesan, Guthrie & Ward, 2010). Branco and Rodrigues (2008) point out two objectives in this regard: companies pursue a positive relationship with their stakeholders, hoping to improve their financial gains and valuate intangible assets that will provide a strong competitive advantage for the corporation, and attempt to design CSR practices to be used in the companies' voluntary disclosure in order to increase their legitimacy.

According to Ingenbleek and Dentoni (2016), the Netherlands provides an example of using CSR as a strategy to improve legitimacy, considering that government actions have long focused on investing in efficiency-oriented agricultural innovations; however, this has generated positive results with negative consequences, such as a severe natural environmental degradation. The authors examined the role of CSR practices as a strategy in the Dutch agribusiness and found that CSR practices can absorb stakeholder pressures and improve the overall image of agribusiness to influence product innovation, organizational innovation, and product positioning.

Similar to the case of Brazil, European agribusinesses have been heavily criticized by consumers and other stakeholders, who are increasingly conscious of the risks associated with their operations (Haddock, 2005). How consumers view food production and the agricultural reality may affect the legitimacy of such businesses. A growing dissatisfaction with agribusiness has put it at the center of social debates (Heyder & Theuvsen, 2012).

Food production is the most discussed activity within agribusiness due to the critical health and environmental issues associated with it. In particular, pesticide and fertilizer producers are accused of polluting the environment and adversely impacting animal welfare. The industrialization of agriculture and the resultant extinction of small farmers are other related issues (Heyder & Theuvsen, 2012; Visser, Kurakin & Nikulin, 2019; Hajdu, Daziano & Visser, 2021). Furthermore, seed companies are criticized for engaging in the genetic engineering of crops, while the food and beverage sectors are blamed for

causing health issues such as obesity and alcohol abuse, among others (Heyder & Theuvsen, 2012; Kapelko, Oude Lansink & Guillamon-Saorin, 2021).

Disclosing CSR practices is known as voluntary social and environmental disclosure (SED), that is, disclosing information as non-mandatory data in corporate reports or websites. These are generally composed of CSR practices but may also include information on the negative impacts caused by a company's business (Bushman, Piotroski & Smith, 2004). Luhmann and Theuvsen (2016) examined the state-of-the-art CSR practices in agribusiness. They concluded that CSR in agribusiness is complex and sensitive to a company's relationships with its stakeholders. Although it is necessary to precisely define CSR, it is impossible to do so, as CSR is a dynamic concept that involves many variable factors. The authors suggest that an exploratory analysis could highlight the specifics of CSR in agribusiness. From the results, agribusiness corporations could understand which CSR practices really affect them, and this information would help them define what is important when designing a CSR strategy.

The complexity and sensitivity of agribusiness with regard to its stakeholders may originate from sector-specific factors. As an example, concerns regarding sustainability are always raised with respect to the global agribusiness. Agribusiness has several negative implications for sustainability, and there is a rising social pressure to improve sustainability (Ingenbleek & Dentoni, 2016). Due to the recurring criticism leveled at agribusinesses' socio-environmental practices and their impact, this sector is always mentioned in relation to the discussions on sustainability, food safety, and health. However, there is no evidence of studies analyzing the SED of companies operating in the Brazilian agribusiness sectors.

Climate change, natural resource constraints, and other socio-environmental issues influence SED practices to maintain or regain legitimacy (Gerged, Beddewela & Cowton, 2021; Leung & Snell, 2021). The studies evaluating CSR in the agribusiness context are still incipient throughout Latin America, in spite of Brazil's great relevance in the global scenario (Mello et al., 2021). As a relevant and underexplored theme, studies on CSR and the SED on CSR can help to create awareness among people and thus build legitimacy for agribusiness companies (Mello et al., 2021).

Therefore, this study aims to analyze the SED of large companies in the Brazilian agribusiness sector. This paper is organized into five sections. It begins introducing the concept of SED and CSR

applied to agribusiness. Next, the methodological procedures used for data collection and analysis are presented, followed by the results. Finally, the article ends with its main considerations and contributions.

Literature Review

CRS in agribusiness

CSR practices can be implemented by any company in the market, regardless of sector. The concept of CSR is becoming popular in the field of agribusiness, but the concept of CSR observed in this study is linked to environmental, health, and food safety issues, as they are related to many controversies. For this reason, agribusiness has always been under greater government control (Poetz, Haas & Balzarova, 2012). CSR is expanding into agribusiness, but this is complex because of its multidimensionality; this has caused studies in the field of agribusiness to remain underexplored (Biró & Szalmáné Csete, 2020).

Regarding food production, there are three main subjects that underlie CSR issues: security regarding equal access to healthy food for everybody; disproportionately high environmental impact of agribusiness through both production and consumption; and balance between social, environmental, and economic objectives (Poetz, Haas & Balzarova, 2013). Affected by changes in the values, lifestyles, and preferences of citizens, a new corporate culture has emerged, which considers the environmental and social impacts of productive activity. This contributes to a greater interest in agribusiness and its relationship with CSR (Nazzaro, Stanco & Marotta, 2020).

The CSR in agribusiness is widely discussed as it faces a wide range of economic and social challenges. Considering CSR practices, agribusiness companies aim to meet the highest level of interests of farmers and rural communities by raising awareness of their stakeholders, serving as a response to social demands. Companies can also manage to create a win-win situation for all stakeholders (agribusiness and society) (Levkivska & Levkovych, 2017). For example, specific innovations are linked to patterns in CSR and there is a correlation between the improvements focused on customers,

employees, and production, a CSR-innovation-performance connection (Coppola, Ianuario, Romano & Viccaro, 2020).

Dhaliwal, Li, Tsang and Yang (2011) analyzed the benefits of SED and found that companies began to implement SED to reduce their capital costs and came to the conclusion that companies implemented CSR practices primarily for the gains that these practices could yield. The Theory of Legitimacy states that the SED can improve the company's image perception among internal and external stakeholders. It also suggests that companies with poorer environmental performance should focus on disclosing their CSR practices voluntarily (Cho & Patten, 2007).

Gamerschlag, Möller and Verbeeten (2011) conducted a study to ascertain the reasons that lead companies to disclose social and environmental information based on the theory of political costs. Their results showed that the company's visibility and their intention to have more shareholders positively influence SED. The sector, the company size, and the potential impact on the environment also affect SED practices but not to the same extent. The authors justified the use of the political cost theory by showing that companies practice SED to reduce the impact of regulations, taxes, and other political factors that may adversely affect them.

Heyder and Theuvsen (2012) addressed the determinants and effects of CSR practices as a strategy for agribusiness companies. This study found some managerial implications: companies in this sector need increased professionalism to implement CSR actions, as some organizations treat CSR merely as the means for mitigating social conflict.

Voluntary Social and Environmental Disclosure

Voluntary disclosure concerns information disclosed by companies in addition to that required by the law. In other words, it is information that the company deems interesting to make public, regardless of the purpose of such disclosure (Cooke, 1989). Analytical and empirical accounting researchers are interested in the voluntary disclosure of companies (Eng & Mak, 2003). During the globalization of financial markets, the subject was widely discussed in the finance and accounting literature (Hossain, Perera & Rahman, 1995).

Studies on voluntary disclosure usually relate to the economic scope and are based on the analysis of financial reports; however, studies on voluntary environmental (Patten, 1992; Cormier, Gordon & Magnan, 2004) and social (Cooper & Owen, 2007; Azim, Ahmed & Islam, 2009) disclosure can be found in many countries. Some studies combine these subjects as they are very closely related and cannot be distinguished in certain cases; they are termed as social and environmental disclosure (Cuganesan, Guthrie & Ward, 2010; Patten & Zhao, 2014). Therefore, the set of social and environmental issues focused on agribusiness is the object of this research.

Initially, SED practices were criticized for lacking relevance and credibility; they were also seen as incapable of influencing sustainable development (Michelon, Pilonato & Ricceri, 2015). Today, large companies take initiatives and contribute toward SED. However, companies should only disclose information that reduces costs or generates benefits; if this is properly conducted, there is a great chance for companies to achieve their desired benefits (Gamerschlag, Möller & Verbeeten 2011).

Although there exist several studies on the subject, there is no theory on voluntary disclosure (Rover & Santos, 2014). Due to the variety of voluntary disclosure methods, which are driven by the goal with which the company operates and its social environment, it is difficult to establish a concrete theory. Therefore, to understand voluntary disclosure, other theories, such as the Stakeholder Theory and the Legitimacy Theory, are used (Rufino & Machado, 2017).

Legitimacy Theory discusses the connection between organizational values and the existing behavioral standards in the social system in which the organization operates (Dowling & Pfeffer, 1975). Legitimacy is defined as an assumption according to which the actions of an organization should conform with the norms, values, beliefs, and definitions of a given society. The greater the likelihood of unfavorable changes in how the society sees the company is operating, the greater the need for the organization to change how the society is perceiving it (O'Donovan, 1995).

However, as it is not mandatory, some authors argue that companies implement SED as a way of enhancing their image rather than increasing accountability (Patten & Zhao, 2014). Companies with greater social and environmental impact usually contribute more toward SED in order to enhance their legitimacy, but it is important to highlight that there is no pre-stipulated relationship with what

information should be disclosed. Each market sector will have its own characteristics, and the impact of its activities will determine the purpose of SED and the recipients of SED (Cuganesan et al., 2010).

According to Suchman (1995), there are two main approaches in the legitimacy theory: institutional legitimacy and strategic (or organizational) legitimacy. In the strategic approach, the organization is motivated to act to maintain or improve its economic situation by improving its image. In the institutional approach, the organization responds to the institutional pressure, leading to the isomorphism of the group. In Brazil, researches on SED generally address publicly traded companies; few studies have analyzed companies from a single sector, as in the case of Herrera-Rodríguez and Macagnan (2016), who studied the banking sector. However, there is no evidence of previous studies addressing the agribusiness sector.

Methodological Procedures

This study analyzed the companies listed in the Brazilian stock exchange, BM&Fbovespa. To decide which sectors of BM&Fbovespa would be included in the study, the institution's sectors were crosschecked with the agribusiness activities defined by the Center for Advanced Study in Applied Economics (CEPEA) (Barros, Silva & Fachinello, 2014). The BM&Fbovespa classifies companies by analyzing the contribution of products and services to a company's revenue in proportion to the company's equity interests (BM&Fbovespa, 2018). It is also important to note that the classification is periodically updated in case of changes in the contribution of the products or services to the company's revenue; hence, the classification we have considered in this study may undergo changes in the future (BM&Fbovespa, 2018).

To compare the SED among agribusiness sectors, companies were divided by sectors. Overall, seven agribusiness sectors listed by BM&Fbovespa relate to the CEPEA classification. These sectors together comprise 28 companies, which were distributed as follows: Agriculture (5); Sugar & Alcohol (3); Miscellaneous Food (6); Meat & Meat Products (6); Beer and Soft Drinks (1); Wood (2); and Pulp & Paper (5).

The companies CTC S.A., JOSAPAR and MINUPAR did not disclose information on CSR, so they were removed from the sample. This resulted in a final sample of 25 companies. Another change

made to the sample was grouping the only company in the Beer & Soft Drinks sector, namely AMBEV S.A., with the Miscellaneous Food sector, creating a sector called Miscellaneous Food & Beverages. Based on this classification, the companies that implemented SED, either through specific reports or via websites, were organized according to their respective sectors, as shown in Table 1.

Table 1.
Companies and sectors

CEPEA Activity	BM&Fbovespa Sector	Corporate Name
Agriculture, forestry and fishing	Agriculture	BRASILAGRO – CIA BRAS DE PROP AGRÍCOLAS
		POMIFRUTAS S/A
		SLC AGRÍCOLA S.A.
		TERRA SANTA AGRO S.A.
Sugar / Ethanol	Sugar & Alcohol	BIOSEV S.A.
		RAIZEN ENERGIA S.A.
		SÃO MARTINHO S.A.
Industry of fruits, vegetables and / Processing of vegetable products (rice, wheat, manioc, corn) / Bread, baked goods, beverages	Miscellaneous Food & Beverages	AMBEV S.A.
		CAMIL ALIMENTOS S.A.
		CONSERVAS ODERICH S.A.
		FORNO DE MINAS ALIMENTOS S.A.
		J. MACEDO S.A.
		M.DIAS BRANCO S.A. IND COM DE ALIMENTOS
Livestock and fishing / Butchering and meat processing	Meat & Meat products	BRF S.A.
		EXCELSIOR ALIMENTOS S.A.
		JBS S.A.
		MARFRIG GLOBAL FOODS S.A.
		MINERVA S.A.
Wood products / Pulp & Paper	Wood	DURATEX S.A.
		EUCATEX S.A. INDÚSTRIA E COMÉRCIO
	Pulp & Paper	CELULOSE IRANI S.A.
		FIBRIA CELULOSE S.A.
		KLABIN S.A.
		SANTHER FAB DE PAPEL STA THEREZINHA S.A.
		SUZANO PAPEL E CELULOSE S.A.

The data were collected from sustainability reports, consolidated reports, social reports, and the websites of the companies selected for the period of September 2018 to November 2018. The first data sources of choice were sustainability reports, consolidated reports, and social reports available for download on corporate websites. If no reports were found, we searched the website for pages containing social and environmental information. Only the most updated information on the company websites,

either from the most recent reports published or the latest information on the websites, was taken into account during the collection period.

The indicators proposed by Branco and Rodrigues (2008) were employed to measure the companies' SED levels. This is a set of 30 indicators divided into four categories, namely, Environmental (11), Human Resources (9), Products and Consumers (5), and Community Engagement (5). We followed Branco and Rodrigues (2008) because it is best suited for the needs of our research and widely cited by other related studies (Radhouane, Nekhili, Nagati & Paché, 2018).

Indicators were measured on a 5-level scale ranging from 0 to 4, where the value of 0 was assigned to the companies that did not provide any relevant information; 1 was assigned when information was disclosed without an appropriate description and only mentioned which practice was implemented (e.g., a company that claims to have environmental policies but does not provide any specific details); 2 was assigned to the companies that provide detailed information but without any in-depth description (e.g., a company that claims to have environmental policies and provides details of objects and people involved in the project); 3 was assigned to the companies that provide detailed information on the indicator (e.g., a company that detailed their environmental policy projects and provided their results and impacts); and 4 was assigned to companies that dedicated a part of its reports to a particular indicator, covering all the characteristics of the previous scores.

The first step toward achieving the objective of the study was to describe the characteristics of the SED of agribusiness companies. The next step was to conduct a multiple correspondence analysis to observe if there are any differences in the SED of companies across agribusiness sectors, which also allows for the identification of the categories of indicators that are more relevant to the agribusiness sector under analysis. Futhermore, the Lorenz curve and the Gini index were used to observe the distribution of data within each sector.

Presentation and Discussion of the Results

Description of Social and Environmental Disclosure

For greater reliability of the data analysis, three researchers analyzed a sample of five reports each to calculate the interobserver correlation and check the level of overlapping in the analysis. The

interobserver correlation was calculated through the intraclass correlation coefficient (ICC) method (Fleiss & Cohen, 1973). For the purposes of interpreting ICC values, we consider the average values from 0.80 to 1.00 to be perfect, 0.60 to 0.80 to be substantial, 0.40 to 0.60 to be moderate, 0.20 to 0.40 to be regular, 0 to 0.20 to be discreet, and -1.00 to 0 to be poor (Landis & Koch, 1977).

The test results proved that out of the total number of variables observed, seventeen achieved the perfect score, eight were substantial, one was moderate, one was regular, and two were considered poor. The two poor variables were those with fewer observations in the test sample. In one variable, no observer found any related information in the test sample, such that it was not possible to apply the test to this variable. The overall results are satisfactory, showing a high degree of alignment between observers.

As shown in Table 2, 16 out of 25 companies publish a structured and dedicated report on CSR disclosures. There are some differences in the names of the reports; most of them are called the "Sustainability Report." Other commonly used names are "Annual Report," "Annual Report and Sustainability," "Consolidated Annual Report," and "Report," followed by the year of publication. The nine companies that do not have any SED-specific document publish such information on their websites in the pages dedicated to SED.

The most recent reports were published from 2016 to 2018. BRF S.A. and MARFRIG S.A. published their last reports in 2016; the other companies published them in 2017. BIOSEV S.A. and RAIZEN S.A. even included some measures that were undertaken in the early months of 2018 in their reports, as they covered information for two different years. Considering the reporting template, companies were unanimous in choosing to use the guidelines and indicators proposed by GRI, the most widespread reporting template in the world (Brown, de Jong & Levy, 2009; GRI, 2015; Jain, A.; Islam, Keneley & Kansal, 2021; Machado, Dias & Fonseca,, 2021). Although the companies did not provide all the indicators proposed by GRI, they followed its main guidelines, which helped them to standardize the way in which the corporate responsibility measures undertaken on economic, environmental, social, and labor practices and human rights issues were disclosed (Laksmi & Kamila, 2018).

Another observation was made on the frequency with which the companies disclose reports. Collecting information on this variable was difficult because some companies do not make all the

previously published reports available on their websites. Therefore, it was necessary to collect their relevant data from a sustainability report repository known as the *Corporate Register: Global CSR Resources*. Companies with the lowest number of published reports are SLC AGRÍCOLA and M.DIASBRANCO, with only 2 reports published until the date of collection. It is important to note that SLC AGRÍCOLA informed only the number of reports that had been published via a news article on their corporate website. DURATEX, SUZANO, CELULOSE IRANI, and MARFRIG have published 13, 12, 11, and 10 reports, respectively, over a period of 10 years.

Table 2.
Disclosure characteristics

BM&FBovespa Sectors	Company	Type of Report	Most Recent Report	Report Template	Number of Previous Reports
Agriculture	BRASILAGRO	Sustainability Report	2017	GRI	4
	POMIFRUTAS	*Website*	.	.	.
	SLC AGRÍCOLA	Sustainability Report	2017	GRI	2
	TERRA SANTA	*Website*	.	.	.
Sugar & Alcohol	BIOSEV	Sustainability Report	2017/18	GRI	6
	RAIZEN ENERGIA	Annual Report	2017/18	GRI	7
	SÃO MARTINHO	Annual Report and Sustainability	2016/17	GRI	6
Miscellaneous Food & Beverages	AMBEV	Sustainability Report	2016/17	GRI	9
	CAMIL	*Website*	.	.	.
	ODERICH	*Website*	.	.	.
	FORNODEMINAS	*Website*	.	.	.
	J. MACEDO	*Website*	.	.	.
	M.DIASBRANCO	Consolidated Annual Report	2017	GRI	2
Meat & Meat Products	BRF	Annual Report	2016	GRI	8
	EXCELSIOR	*Website*	.	.	.
	JBS	Sustainability Report	2017	GRI	7
	MARFRIG	Sustainability Report	2016	GRI	10
	MINERVA	Sustainability Report	2017	GRI	6
Wood	DURATEX	Annual Report	2017	GRI	13
	EUCATEX	*Website*	.	.	.
Pulp & Paper	CELULOSE IRANI	Sustainability Report	2017	GRI	11
	FIBRIA	2017 Report	2017	GRI	9
	KLABIN	Sustainability Report	2017	GRI	9
	SANTHER	Website	.	.	.
	SUZANO PAPEL	Sustainability Report	2017	GRI	12

The amount of information disclosed for each indicator analyzed can be found in Table 3, which shows the mean, minimum, maximum, standard deviation, and variance of each indicator pertaining to every SED category analyzed. In the Environment category, "Environmental policies or corporate environmental responsibility" was the indicator most widely disclosed by companies; this implies that the vast majority of companies published how they were concerned with assessing their impact on the environment and the practices they were implementing to reduce or mitigate this impact in their reports or on websites (Jenkins & Yakovleva, 2006). The least disclosed indicators in the Environment category were "Pollution from product use" and "Energy efficiency of products," implying a low level of concern among the companies about the impact of using their products. This is because most companies focus on creating an image of low-impact production, rather than actually taking responsibility (Patten & Zhao, 2014). Only companies whose production processes generated energy provided information on energy efficiency under the "Energy efficiency of products" indicator.

In Human Resources, "Employees' health and safety" was the most evident indicator, with health insurance plans, well-being in the workplace, and safety measures as the most frequent information on this indicator; this shows that companies are seeking greater legitimation from their stakeholders, namely, their employees (Suchman, 1995). The least disclosed indicator was the "Employee stock purchase plans." The indicator covers profit sharing agreements, and only a few companies disclosed such information. In all the cases, such policies were restricted to senior management positions.

In the category of Products & Consumers, the most prominent indicator was "Product quality." Many companies have product quality certifications, improvement policies, and increase in productivity to improve the final quality of their products. This category includes the only indicator among all categories that was not disclosed by any company, which is the "Provision for consumers with disabilities." None of the companies provided information on their products' accessibility features.

Finally, in the Community Engagement category, the most disclosed indicator was "Education support," which included support for both internal and external stakeholders, and ranged from tuition assistance programs for employees to courses provided to the community. These actions aim to improve legitimacy among stakeholders, as companies with greater social engagement are those that need legitimation the most (Deegan, Rankin & Voght, 2000). The least disclosed indicator was the

"Sponsorship of sports or recreational projects"; few companies stated to support leisure and sports activities in the community.

Table 3.
Statistics of indicators

SED Category	Indicators	Statistics by indicator				
		MEAN	MIN	MAX	STD.D	VAR
Environmental	Environmental policies or corporate responsibility toward the environment	3.12	0	4	1.56	2.44
	Environmental systems, audit, and management	2.96	0	4	1.46	2.12
	Pollution from commercial transactions	2.60	0	4	1.87	3.50
	Pollution from product use	0.68	0	4	1.25	1.56
	Discussion about specific environmental laws and regulations	2.76	0	4	1.67	2.77
	Prevention or compensation for environmental damages	2.68	0	4	1.70	2.89
	Conservation of natural resources and recycling activities	2.72	0	4	1.65	2.71
	Sustainability	2.72	0	4	1.70	2.88
	Environmental Aesthetics	2.16	0	4	1.62	2.64
	Energy conservation in commercial transactions	1.96	0	4	1.86	3.46
	Product energy efficiency	0.56	0	4	1.36	1.84
Human Resources	Employees' health and safety	2.80	0	4	1.71	2.92
	Equal employment opportunities	2.16	0	4	1.99	3.97
	Staff training	2.36	0	4	1.91	3.66
	Support and benefits for employees	2.32	0	4	1.91	3.64
	Employees compensation	1.60	0	4	1.83	3.33
	Employee profiles	2.12	0	4	1.88	3.53
	Employee stock purchase plan	0.32	0	2	0.69	0.48
	Employee motivation	1.44	0	4	1.78	3.17
	Trade relations	2.16	0	4	1.99	3.97
Products and Consumers	Product safety	1.64	0	4	1.85	3.41
	Product quality	2.20	0	4	1.76	3.08
	Safety information for consumers	0.92	0	4	1.68	2.83
	Consumer complaints or satisfaction	1.60	0	4	1.85	3.42
	Accessibility	0.00	0	0	0.00	0.00
Community Engagement	Donations and charity works	1.40	0	4	1.63	2.67
	Support to education	2.52	0	4	1.53	2.34
	Support to arts and culture	2.28	0	4	1.62	2.63
	Support to public health	1.44	0	4	1.39	1.92
	Sponsorship of sports and recreational projects	1.12	0	4	1.48	2.19

Figure 1 aims to offer a visual description of the association between sectors and categories, generating a two-dimensional correspondence graph. Tests were performed using the statistical software

Stata 15, using the multiple correspondence analysis command (MCA); and to generate the graphs, the command mcaplot, overlay origin was used.

Dimensions are represented by the smallest number required to represent the data in their entirety; the two most representative dimensions are used to build the correspondence graph. The test also generates the dimensions' inertia, which is the measure of association between two categorical variables. The division of a dimension's inertia by the total inertia generates the percentage that represents the dimension.

To perform this test, the variables must be categorical, such that the SED levels are rounded off to their nearest whole number. Sectors (SEC) were transformed into nominal variables ranging from 1 to 6, where Agriculture was coded as sector 1, Sugar & Alcohol as sector 2, Miscellaneous Food & Beverages as sector 3, Meat & Meat Products as sector 4, Wood as sector 5, and Pulp & Paper as sector 6. Finally, the categories were abbreviated to Environmental (ENV), Human Resources (HR), Products and Consumers (PRC), and Community Engagement (CEG).

By conducting the correspondence analysis between the 6 sectors and 4 categories, it is possible to see in general how the sectors behave with respect to SED levels. Dimension 1 can explain more than half of the data (53.74%), while the two dimensions together represent 87.56% of the data, as shown in Table 4.

Table 4.
Correspondence analysis between categories and sectors

Dimension	Inertia	%	Accrued %
Dim 1	0,5907098	53.74	53.74
Dim 2	0,716882	33.82	87.56
Total	0,9623980	87.56	

In Figure 1, it is possible to distinguish three data groups: initially, sector six relates to levels four of HR and ENV, and levels three of PRC and CEG, showing that, in general, the Pulp & Paper sector has the highest level of SED. In contrast, the Agriculture (1) and Miscellaneous Food & Beverages (3) sectors have the lowest levels of SED in all categories, showing that the companies in these sectors should pay more attention to their SED practices, along the lines of the other sectors of the

Brazilian agribusiness. The remaining sectors constituted a large group with average SED levels in all categories, showing that half of the sectors only disclose the necessary information and do not allocate resources to SED practices.

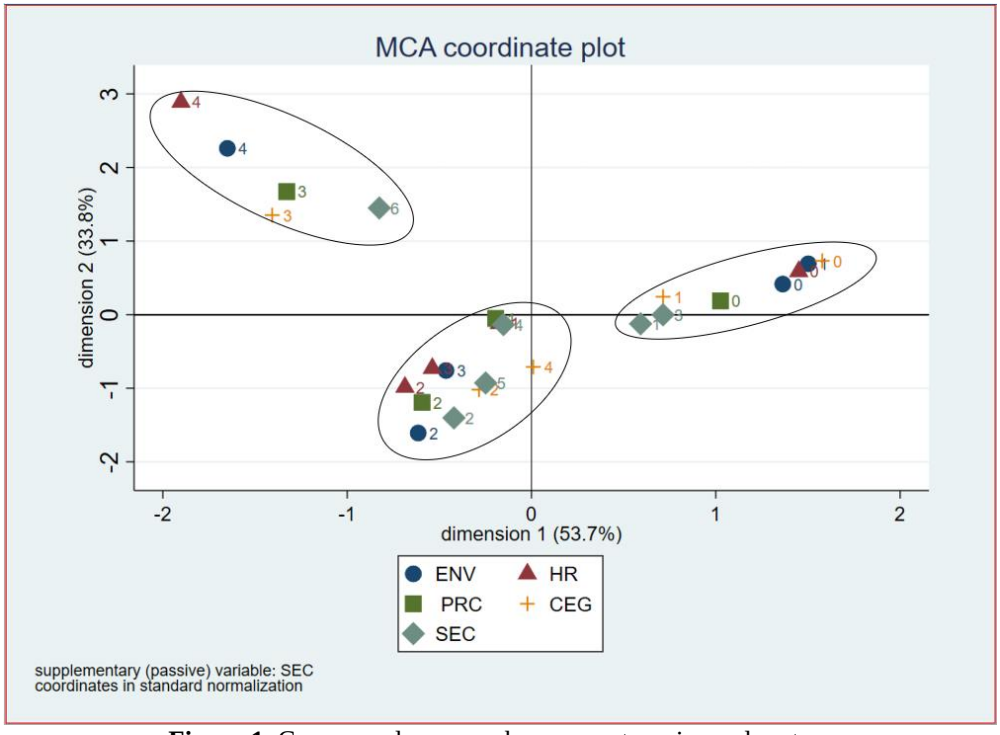

Figure 1. Correspondence graph across categories and sectors

The results of the correspondence analysis corroborate the fact that sector six (Pulp & Paper) has the highest level of SED, as it is associated with the highest SED levels within the categories in most tests. This result may be related to the sensitive environmental issues inherent to this sector. It was also observed that the ENV x HR test results form a cluster that represents a similar higher frequency of disclosure for the both categories simultaneously, which together have the highest average SED levels.

Sector Analysis

To ascertain the variations within the sectors under analysis, the Gini index of each sector was calculated, which allows assessing the interference of companies with low SED levels in companies with

high SED level and vice versa. The Gini coefficient is analyzed considering a scale ranging from 0 to 1; the closer the observed value to 0, the smaller the variation of SED levels within the sector (Hoffmann, 2011). Tests were performed, and graphs were constructed using Microsoft Excel; the results are presented in Table 5.

Table 5.
Gini index and Lorenz curve

Sector	β Area	α Area	Gini
Agriculture	35.51	14.49	0.290
Sugar & Alcohol	48.75	1.25	0.025
Miscellaneous Food & Beverages	26.2	23.8	0.476
Meat & Meat Products	38.36	11.64	0.233
Wood	45.26	4.74	0.095
Pulp & Paper	38.23	11.77	0.235

The Gini index for the agriculture sector is 0.290, which is low. This sector comprises four companies, two of which implement SED practices via websites and two other have specific reports. The lowest SED levels were assigned to the companies that use their websites to disclose information. As for the Sugar & Alcohol sector, it has the lowest Gini index among all sectors; all the three companies in this sector released reports and had very similar SED levels, which resulted in a Gini index of 0.025.

The Miscellaneous Food & Beverages sector has the highest Gini index, that is, 0.476. The large variation e because only two out of the six companies observed had high SED levels. It is also related to the way the data are disclosed; higher SED levels are linked to specific disclosure reports, while lower SED levels are associated with the disclosure of information via websites. The Gini index for the Meat & Meat Products sector is 0.233, which is considered to be low. Most companies have published dedicated reports to disclosure practices, causing a slight variation in SED levels.

The Wood sector presents a very small variation in SED levels, recording the second lowest Gini index (0.095). The sector is composed of only two companies; both of them had specific reports to disclose information. The Pulp & Paper sector has a low Gini index (0.235), which is similar to the Meat & Meat Products sector (0.233). In this sector, SED practices were mostly carried out through specific reports; only one company disclosed information through its website.

Figure 2 provides a graphical representation of the Gini index for all sectors. The area between the equity line and the Lorenz curve is called the α area, which represents data variation. In the case of the Agriculture sector, the α area is 14.49. It should also be noted that there is a very small variation between companies in the Sugar & Alcohol sector, with an α area of 1.25.

It is possible to observe a significant variation within the Food & Beverages sector, with an α area of 23.8. The α area for the Meat & Meat Products sector is 11.64, which shows a larger variation between the two companies with lower SED levels.

The Wood sector, with an α area of 4.74, presents only a small curve, resulting from the small difference in SED levels between the two companies in this sector. Finally, it is possible to observe an α area of 11.77 for the Pulp & Paper sector, showing a greater variation between the two companies with lower SED levels to then stabilize with a low variation between the companies with higher SED levels.

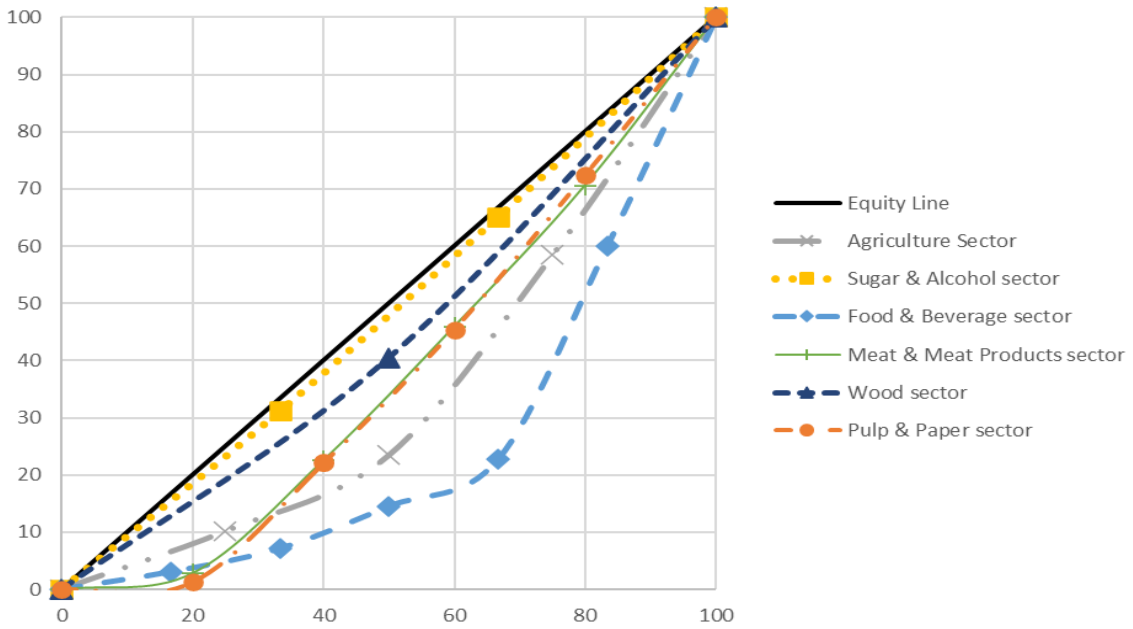

Figure 2. Lorenz curves for the sectors

Considering the results obtained by employing the Gini index and the Lorenz curve, a moderate to low variation is noticed in most sectors, except for the Miscellaneous Food & Beverages sector, which showed a higher Gini index than that shown by the others; this implies that the average SED

levels of the companies in this sector vary widely and one cannot consider the average as a way of ranking all the companies that constitute this sector.

Final Considerations

This paper analyzed the SED of agribusiness companies listed on the BM&FBovespa through the comparison of the different companies from the same sector, and Brazilian agribusiness sectors. All the companies that disclosed social and environmental information in their reports and websites were included in the sample.

The analysis of Brazilian agribusiness companies with respect to SED highlighted the widespread use of GRI guidelines in the preparation of reports, as 16 out of the 25 companies in the sample used this template. The remainder of the companies implemented the SED only through their websites and did not follow any preset structure or standard, which caused variations in both the quantity and quality of the information disclosed.

It was also observed that companies in some sectors disclose information specific to the sector, as evidenced by Poetz, Haas and Balzarova (2012). Agribusiness is composed of many sectors, and each sector has distinct characteristics. The Meat & Meat Products sector, for example, stands out for publishing information on animal welfare, which is relevant to this sector alone and is an important social and environmental concern. Cultural and religious issues are also relevant to this sector. Special care needs to be taken in the raising and slaughtering of animals to serve markets with specific requirements.

The multiple correspondence analysis identified a high association between the Pulp & Paper sector and the highest SED levels of all categories. A high level of association was also observed between this sector and the Environment and Human Resources categories of SED. These SED levels may be caused by the industry's strong link to environmental impact issues that generate a higher demand for communication from its stakeholders.

Considering the low variation in the Gini index (0.025) of the Sugar & Alcohol sector, it can be inferred that this sector is serious about the adoption of SED practices. All the companies in this sector publish detailed sustainability reports focusing on their actions toward the mitigation of greenhouse gas

emissions, environmental preservation, and solid waste management. The SED has become an institutionalized practice for the sector, and it is mandatory for a publicly traded company to implement it.

In contrast, the Miscellaneous Food & Beverages sector attained the highest Gini index (0.476), a large variation caused by the fact that many companies in this sector only posted the relevant information on their websites, resulting in very low SED levels. At the same time, the sector had companies that issued specific reports with high levels of SED. There has been an increasing demand for this sector to incorporate changes in order to meet sustainability challenges (Forsman-Hugg et al., 2013). That is, it needs to implement CSR practices as well as disclose them in the form of SED to achieve legitimacy and improve its relationship with the stakeholders. In addition to the disclosure of positive actions, the dissemination of information on the social and environmental impact caused and decisions undertaken to mitigate any related problems is also required (Deegan, Rankin & Voght, 2000; Poetz, Haas & Balzarova, 2013).

Results herein showed that some agribusiness companies disclose information, either through reports or via websites. Companies allocate resources to develop SED content for their stakeholders. This behavior is heterogeneous across sectors and within sectors. The information presented in this report is useful for the managers of agribusiness companies because it allows them to know the SED of other companies, which in turn, facilitates their decision-making process regarding CSR. For policymakers, these results help to understand which agribusiness sectors need to be encouraged to develop their CSR. Finally, future research can benefit from the descriptive and exploratory data considered in this study.

This study only covered the companies listed on the BM&FBovespa. These companies have a significant market exposure. This factor may have influenced the amount of disclosures found. Therefore, this study needs to be replicated to other samples of agribusiness companies to understand the differences in the results. Another limiting factor of the study is the number of companies in the sample; it does not allow us to make more sophisticated statistical inferences or generalize the results to different samples of companies.

Future studies can conduct case studies on agribusiness companies extensively analyze a particular sector. Other similar surveys can also be conducted on non-publicly traded companies to compare SED levels by seeking an association between the companies' exposure and the amount of information disclosed.

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