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Sustainability, social inclusion, and governance: analyzing ESG practices at an urban public university in São Paulo, Brazil

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ABSTRACT

The growing global emphasis on environmental, social and governance (ESG) principles has driven higher education institutions to adopt more sustainable and socially inclusive practices. However, a lack of metrics and regular reporting often limits the ability to assess the true impact of these initiatives. This study critically examined ESG practices at a public urban university in São Paulo, focusing on the Department of Agricultural Sciences (DAS). Using a case study approach, the research employed a systematic literature review, document analysis and on-site observations to assess how ESG principles are implemented. Correspondence Factor Analysis (CFA) and Discursive Textual Analysis (DTA) were used to identify patterns and insights. The findings highlight the University's commitment to sustainability and social inclusion, particularly through initiatives such as the Accessibility Assurance Plan (PGA) and environmental conservation efforts. However, the study also identified the need for structured evaluation metrics and more transparent reporting to better monitor the impact of these initiatives. The research concludes by suggesting that future studies should explore how ESG practices influence students' perceptions of educational quality and examine the financial costs and benefits of these initiatives to guide more strategic implementation in higher education institutions.

Keywords: environment, equity, policies, social inclusion.

Sustentabilidade, inclusão social e governança: analisando as práticas ESG em uma universidade pública municipal em São Paulo, Brasil

RESUMO

A crescente ênfase global nos princípios ambientais, sociais e de governação (ESG) levou as instituições de ensino superior a adotarem práticas mais sustentáveis e socialmente inclusivas. No entanto, a falta de métricas e de relatórios regulares muitas vezes limita a

capacidade de avaliar o verdadeiro impacto dessas iniciativas. Este estudo analisou criticamente as práticas ESG numa universidade pública municipal de São Paulo, centrando-se no Departamento de Ciências Agrárias (DAS). Usando uma abordagem de estudo de caso, a pesquisa empregou uma revisão sistemática da literatura, análise de documentos e observações no local para avaliar como os princípios ESG são implementados. A Análise Fatorial de Correspondência (CFA) e a Análise Textual Discursiva (DTA) foram utilizadas para identificar padrões e percepções. Os resultados destacam o compromisso da Universidade com a sustentabilidade e a inclusão social, particularmente por meio de iniciativas como o Plano de Garantia de Acessibilidade (PGA) e os esforços de conservação ambiental. No entanto, o estudo também identificou a necessidade de métricas de avaliação estruturadas e de relatórios mais transparentes para monitorizar melhor o impacto destas iniciativas. A investigação conclui sugerindo que estudos futuros devem explorar a forma como as práticas ESG influenciam as percepções dos estudantes sobre a qualidade do ensino e examinar os custos e benefícios financeiros destas iniciativas para orientar uma implementação mais estratégica nas instituições de ensino superior.

Palavras-chave: equidade, inclusão, meio ambiente, políticas.

1. INTRODUCTION

The increasing global focus on environmental, social, and governance (ESG) issues has catalyzed the adoption of sustainable practices in various sectors, including higher education (Barros *et al.*, 2020). Universities, as influential institutions in knowledge production and social engagement, hold a significant position in advancing sustainability. By incorporating ESG principles into their operations, educational programs, and research activities, these institutions prepare students to address contemporary socio-environmental challenges while fostering a broader culture of sustainability (Arocena and Sutz, 2021).

ESG principles, as outlined by Yadav and Saini (2023), encompass three interrelated dimensions: environmental, social, and governance. In the university context, these principles guide efforts to minimize environmental impacts, promote diversity and inclusion, and ensure that governance practices are transparent and ethical. While universities are not traditionally viewed as industrial entities, their significant environmental footprint and the complexity of their operations necessitate responsible resource management (Alshuwaikhat *et al.*, 2017). As noted by Lozano (2011), the pursuit of sustainability in higher education is not a recent development; universities worldwide have been gradually incorporating sustainable principles and practices over the past few decades, engaging both students and staff in these efforts.

In addition, ESG practices at universities are closely aligned with the United Nations Sustainable Development Goals (SDGs), a global framework that aims to address critical social, economic, and environmental challenges by 2030 (UN, 2023). ESG initiatives contribute to several SDGs, including SDG 7 (affordable and clean energy), SDG 13 (climate action), and SDG 4 (quality education), demonstrating the alignment between university sustainability efforts and global goals. However, despite the recognized importance of ESG in higher education, there remains a gap in empirical studies focused on how Brazilian universities integrate these principles into their operations and curricula.

In Brazil, studying the implementation of ESG principles in universities is essential for the country's socioeconomic and environmental progress, as emphasized by Viega *et al.* (2023). While there have been initiatives to incorporate sustainable practices, the extent and impact of these efforts across institutions remains understudied. This is particularly relevant given the unique challenges faced by Brazilian universities, including limited resources, complex governance, and regional socio-environmental issues that require context-specific approaches.

This study aims to address this gap by focusing on a public university in the state of São Paulo and examining how ESG principles are integrated into its operations, educational programs, and interactions with the broader community. The relevance of the university as a case study lies in its significant role in the region, both as a driver of academic knowledge and as an institution with the potential to influence local socio-environmental policies. By analyzing the initiatives already in place and assessing their environmental, social and governance impacts, this research provides insights into how these practices contribute to sustainability within higher education in Brazil.

The methodology used is a case study approach, supported by a qualitative analysis of existing ESG initiatives at the university, including document analysis and on-site observations. This approach allows for a comprehensive understanding of the university's alignment with global sustainability goals, while considering the specific challenges and opportunities in the Brazilian context. In doing so, the research contributes to the broader discourse on ESG in higher education and provides relevant information for researchers and university administrators interested in promoting sustainability through strategic ESG initiatives.

2. MATERIAL AND METHODS

2.1. Site Description

The study was conducted at the Department of Agricultural Sciences (DAS) of a municipal higher education institution established as a special educational entity by Law No. 1.498/1974, located in Taubaté, São Paulo. The University offers a wide range of undergraduate and postgraduate courses in various disciplines, and in its 50 years of existence has become one of the most important higher education institutions in the region.

DAS is located in the rural area of Taubaté, specifically in the municipality of Itaim (23º02'34" S, 45º31'02" W, elevation 577 meters), approximately 140 km from São Paulo. Originally founded in 1952 as the Taubaté Institute of Agriculture, the department has provided a comprehensive infrastructure for teaching and research since the inauguration of its current facilities in 1979. With a focus on agronomy and veterinary medicine, it provides an environment conducive to academic and scientific development, including laboratories, classrooms and experimental areas for agricultural practices. In 2024, the department will have a total of 435 students enrolled in agronomy and veterinary programs, supported by 15 permanent staff members, in addition to external collaborators who provide occasional services. Spread over 65 hectares, DAS cultivates a variety of crops and medicinal plants, providing students and researchers with valuable opportunities to apply their knowledge in practical, field-based settings.

2.2. Study design and data collection

This study adopted a case study approach to examine the implementation of ESG practices at DAS. The case study method was selected due to its capacity to provide an in-depth understanding of institutional contexts and specific practices. To ensure a comprehensive assessment of ESG principles, the research employed data triangulation from three primary sources: (i) a systematic literature review, (ii) document analysis, and (iii) on-site observations.

a) Systematic literature review: A systematic review of the literature was conducted to contextualize the observed ESG practices within broader trends in higher education. This review served to establish the theoretical framework of the study, providing insights into global and Brazilian ESG practices in universities. Although the review did not directly contribute to the study’s results, it was instrumental in identifying thematic categories relevant to the integration of ESG principles in higher education institutions.

b) Document analysis: Key documents, including the Institutional Development Plan (PDI) and official reports from DAS, were analyzed to identify existing ESG initiatives and evaluate their alignment with the institution's strategic goals. This analysis was further supported by a review of policies, sustainability guidelines, and administrative records that demonstrate the department's commitment to ESG principles.

c) On-site observations: On-site observations were conducted between February and March 2024 to evaluate the implementation of ESG practices within the department's operations. These visits, carried out in the role of a visiting observer, allowed for the documentation of key practices such as waste management, water conservation, and community engagement programs. Additionally, the evaluation included an assessment of the physical infrastructure and facilities to determine their contribution to environmental sustainability and social inclusion.

2.3. Data analysis and interpretation

To analyze the data collected from document analysis, on-site observations, and the systematic literature review, a qualitative meta-analysis was conducted. This approach allowed for the synthesis of diverse data into key themes related to environmental, social, and governance (ESG) practices. The themes were derived based on the central research question: *What is the impact of integrating ESG principles in Brazilian universities on promoting sustainability in higher education?*

The data were organized into categories reflecting the major ESG components. To explore the relationships between these categories, a Correspondence Factor Analysis (CFA) was performed using IRaMuTeQ (*Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires*), an open-source software designed for multidimensional textual analysis. The CFA provided a systematic explanation of how ESG principles have been implemented in universities globally, helping to identify patterns and trends that reflect broader processes of ESG adoption in higher education. This analysis generated graphical representations, enabling a clearer understanding of the proximity between themes and categories, and revealed common areas as well as specific distinctions within the practices observed.

The first step in CFA involved constructing a contingency table summarizing the frequency of occurrence of categorical variables within the text corpora. Using chi-squared distance, CFA calculated the dissimilarity between rows and columns in the table. The matrix of standardized frequencies was then decomposed via singular value decomposition (SVD), resulting in principal components that represented the primary axes of variation in the data. These components were plotted in a two-dimensional space, making it easier to visualize the relationships and trends in the ESG practices at DAS, providing a model for understanding the systematic integration of ESG principles.

In addition to CFA, a Discursive Textual Analysis (DTA) was applied to interpret the qualitative data at a deeper level. This method, following the approach proposed by Medeiros and Amorim (2017), was used to analyze the content and structure of institutional discourse surrounding ESG practices. DTA provided insights into how the university frames its commitment to sustainability and governance, identifying key narratives and rhetorical strategies that influence the institutional approach to ESG principles.

The results of these analyses are specific to the context of DAS; however, they also offer points of comparison and applicability to other universities seeking to integrate ESG principles into their operations. The findings allow for the establishment of a benchmarking framework, where the practices observed at DAS can be contrasted with those of other institutions, thereby contributing to broader discussions of ESG implementation in higher education.

By combining CFA and DTA, the study achieved a multidimensional interpretation of the

data. CFA provided a structural analysis of the relationships between ESG components, while DTA allowed for a more nuanced understanding of the institutional discourse. This integration of quantitative and qualitative approaches ensured a comprehensive evaluation of how ESG principles are embedded in the university's operations, both in practice and in narrative.

2.4. Evaluation and triangulation of data

To ensure the validity of the findings, data triangulation was employed. This involved cross-referencing information obtained from the three main sources—documents, observations, and literature—to establish consistency and reliability. The combination of qualitative data from different sources allowed for a comprehensive evaluation of the university's ESG practices. Furthermore, this triangulation process was essential in identifying any discrepancies and validating the integration of ESG principles into DAS's operations and educational activities.

3. RESULTS AND DISCUSSION

3.1. Systematic literature review

After matching the key descriptors in the database, 45 publications were initially identified. After applying exclusion criteria, 24 articles were selected. After full reading, three articles were excluded because they did not directly address the objectives of this study, resulting in the selection of 21 articles for in-depth analysis. Table 1 presents these 21 publications, including details such as author, year of publication, journal, and main topic.

An examination of the research corpus based on the articles in Table 1 revealed the prominence of terms such as "implementation," "initiatives," and "campus," highlighting the practical focus of these ESG initiatives in the university setting. In addition, words like "approach," "programs," and "analysis" underscore the importance of critically designing and evaluating these initiatives. The frequent appearance of terms such as "evaluation," "need," and "practices" suggests an emphasis on continuous assessment and improvement. In addition, terms such as "institutions" and "leadership" point to the role of higher education institutions as key drivers of sustainable development. The co-occurrence of these terms reinforces the growing relevance of sustainability in the context of higher education.

There is a clear interest in exploring the contribution of higher education institutions to sustainability through ESG initiatives. By embedding such initiatives in both their operational structures and academic activities, these institutions are promoting environmental awareness both in the classroom and through the practical application of knowledge. Incorporating sustainability programs on campus encourages systematic evaluation of these initiatives, enabling institutions to identify emerging challenges, improve existing strategies, and position themselves as leaders in sustainable development.

Figure 1 shows the graphical results of the CFA based on the articles in Table 1. The axes represent factors extracted from the analysis, where "Dimension 1" reflects primary associations between terms and "Dimension 2" reflects secondary associations. The percentage values for each factor indicate its contribution to explaining the variance in the data. Different colors in the figure highlight patterns and relationships among the analyzed terms, with larger fonts indicating the most relevant articles according to the search criteria.

The CFA results (Figure 1) were interpreted based on the proximity and alignment of categories in the graph, facilitating the identification of clusters with thematic, methodological, or theoretical similarities. Eleven articles showed significant relationships and provided relevant insights into ESG practices in universities. These articles were grouped into classes: Class 1 (red), Class 2 (gray), Class 3 (green), Class 4 (cyan), Class 5 (blue), and Class 6 (purple). If an article did not meet the criteria for size or color assignment, it was categorized as 'None'. Each class represents key themes and contributions from the most relevant articles.

Table 1. Publications selected for inclusion in the set analyzed in this study.

n	CFA Class	Researchers	Journal or Periodical	Theme
1	Green (3)	Freire *et al.* (2023)	International Sci. Journal	"Global strategies and collaborative initiatives to address environmental challenges"
2	Cyan (4)	Pascu (2015)	Academic Journal of Manufacturing Engineering	"Integrated sustainable management systems for universities"
3	Blue (3)	Safarkhani and Örnek (2022)	Journal of the Faculty of Architecture	"The importance of the 'green campus' concept from the perspective of the UI GreenMetric University Rankings"
4	None	Gallardo-Vázquez and Folgado-Fernández (2020)	Land	"The role of universities in the context of regional economic sustainability"
5	Green (3)	Castro and Delgado (2016)	Sustainable Ecological Eng. Design for Society	"The design and implementation of sustainability initiatives in institutional contexts"
6	Red (1)	Williams (2008)	Quarterly Journal of Research and Planning in Higher Education	"The role of university leadership in promoting sustainability"
7	Green (3)	Fassin (2015)	Journal of the International Association for Business and Society	"Evaluation of the state of Social Responsibility reports"
8	Purple (6)	Al-Alwani (2018)	Mesopotamia Environmental Journal	"Development of a sustainability assessment model for universities"
9	Red (1)	Khoshbakht *et al.* (2020)	Anzasca	"Content analysis of sustainability statements in universities"
10	Red (1)	Viegas *et al.* (2015)	Journal of Cleaner Production	"The role of universities in initiatives to institutionalize sustainability."
11	Grey (2)	Rotondo *et al.* (2023)	Journal of Cleaner Production	"Review of the role of universities in initiatives to institutionalize sustainability."
12	Blue (3)	Akyol Özcan (2023)	Sustainability	"Classification of university sustainability using different weighting approaches."
13	Green (3)	Lampropoulos *et al.* (2024)	Journal of human resource and sustainability studies	"Contribution of education to perceptions of sustainable development."
14	Cyan (4)	Malinen (2013)	Journal of Cleaner Production	"Possibility of a cooperation network between universities promoting the adoption of an environmental management system."
15	Purple (6)	Macharis and Kerret (2019)	Sustainability	"Sustainability changes in higher education through positive psychology."
16	Grey (2)	Cernicova-Buca *et al.* (2023)	Sustainability	"Student awareness of environmental protection in university campus life."
17	Cyan (4)	Shobe (2015)	Environmental Sustainability	"Perspectives on environmental sustainability."
18	Blue (3)	Waheed (2011)	Qualitative & Quantitative Methods in Libraries	"Quantitative evaluation of sustainability using frameworks."
19	None	Nsanbayeva (2019)	Technical Transactions	"A systemic approach to sustainability in higher education."
20	Cyan (4)	Nejati (2011)	Malaysian Perspective	"Fostering the 'intellect of sustainability' in higher education."
21	None	Butt (2022)	Journal of nonprofit education and leadership	“Key factors affecting the management of sustainability programs in universities”

The percentages associated with "Dimension 1" and "Dimension 2" in the CFA are essential to understanding the variability of the data. "Dimension 1 explains 36.4% of the variance, while Dimension 2 explains 30.5%, for a total of 66.9%. This substantial amount of variance in the data explained by the two axes ensures the reliability of the positions and

distances between the points and reveals the underlying relationships.

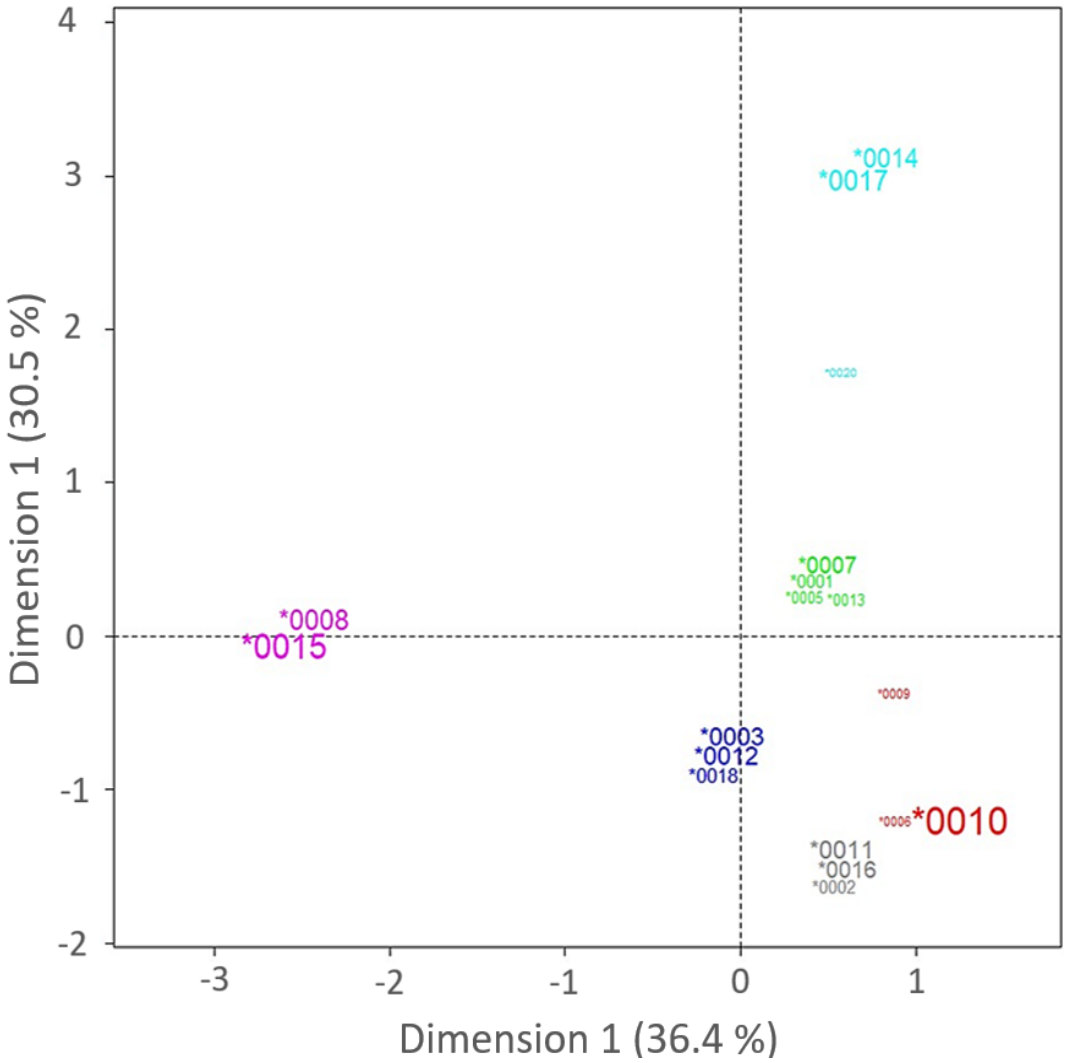

Figure 1. Correspondence Factorial Analysis (CFA) obtained from the global corpus. The different colors and sizes show the patterns and relationships between the articles.

Class 1, shown in red, highlights the growing importance of sustainability initiatives on university campuses and emphasizes the integration of these practices into teaching, research, and operational activities. Articles in this class also discuss the importance of leadership in advancing sustainability and identify both challenges and opportunities in implementing these initiatives. While Khoshbakht *et al.* (2020) analyze sustainability statements from Australian universities and highlight gaps in implementation strategies, Williams (2008) and Viegas *et al.* (2015) explore the role of universities in regional sustainability initiatives and the importance of leadership in advancing sustainability education.

Articles in Class 2 (Rotondo *et al.*, 2023; Cernicova-Buca *et al.*, 2023), represented by the color gray, focus on sustainability in the university context, but from different perspectives. Rotondo *et al.* (2023) analyze the processes, tools, and challenges of implementing sustainable innovations in Italian state universities, emphasizing the institutional perspective and sustainable business models. Cernicova-Buca *et al.* (2023) investigate environmental awareness and willingness to act among university students in Romania, exploring their willingness to promote sustainability on campus.

Class 3, represented by Freire *et al.* (2023) and Fassin (2015), addresses the status of sustainability initiatives. Freire *et al.* (2023) review international research on sustainability in

universities through 2021, highlighting gaps and future research needs, particularly in developing countries. Fassin (2015) examines corporate social responsibility (CSR) and sustainability activities in European universities, focusing on management practices and sustainability reporting. This exploratory study included an analysis of 20 university websites and a questionnaire response from 73 universities on CSR and sustainability practices.

Class 4 (Malinen, 2013; Shobe, 2015) focuses on environmental management in universities. Malinen (2013) investigates the potential of a collaborative network among Finnish universities to promote the Green Office environmental management system. The study, based on thematic interviews, highlights the benefits and challenges of network collaboration. Shobe (2015), on the other hand, examines the barriers to implementing environmental sustainability at the University of Kentucky and identifies obstacles such as lack of funding and communication issues.

Class 5 (Safarkhani and Örnek, 2022; Akyol Özcan, 2023; Waheed, 2011) focuses on evaluating sustainability in universities through rankings, multicriteria decision-making techniques, and quantitative evaluation models. The articles highlight the necessity of an integrated approach to sustainability, considering multiple dimensions and performance metrics. Additionally, the authors recognize the limitations inherent in their methodologies and propose directions for future research.

Class 6 examines innovative strategies to promote sustainability in universities. It explores the development of sustainability assessment models and the use of psychological principles to encourage environmentally sustainable behaviors and enhance the well-being of the academic community. These studies present tools and models that can help assess and promote sustainable practices in universities. Looking at all the classes together (Figure 1), it is clear that classes 1, 2, 3 and 5 share common themes despite their different approaches. Each of these articles contributes to a broader understanding of sustainability in higher education by offering new perspectives, evaluation models and recommendations for future research. Despite their methodological differences, these articles converge in advancing knowledge about the integration of sustainable practices in universities. In contrast, Class 4 and Class 6 take different approaches. Class 4 articles emphasize collaboration between institutions to enhance sustainability efforts, while Class 6 focuses on specific strategies to influence behavior and promote sustainable change.

The diversity of these approaches illustrates the complexity of sustainability research in universities, which requires adaptive methods that consider institutional differences, available resources, and educational priorities. Only by considering these factors can sustainability initiatives be effectively tailored to different academic environments.

3.2. Document analysis at DAS

An in-depth review of the Institutional Development Plan (PDI) and other key documents at the Department of Agricultural Sciences (DAS) reveals a growing commitment to sustainability. This analysis highlights both the current initiatives and areas for potential improvement in the implementation of ESG principles. The review identified the three pillars of ESG—environmental, social, and governance—with the social aspect emerging as particularly prominent in the PDI. The institution emphasizes inclusion and equity, positioning itself as a hub for disseminating academic knowledge and fostering social values.

One of the standout initiatives in the PDI is the Accessibility Assurance Plan (PGA), aimed at creating an inclusive environment that guarantees equitable access, retention, and academic success for all students. This initiative seeks to eliminate pedagogical barriers and enhance access to academic content in both physical and virtual environments. Special attention is given to the adaptation of spaces and equipment to ensure accessibility for individuals with limited mobility. In addition, the University promotes social initiatives through its legal clinic and

distance education program, addressing contemporary issues and reinforcing its commitment to social inclusion. These initiatives underscore the University's role in cultivating socially responsible citizens.

The University's communication strategy plays a key role in disseminating its actions to both internal and external audiences, using various media to promote transparency and engagement. Through services provided by the Extension Pro-Rectory (PREX), the institution extends its reach to the broader community by offering a range of programs, from socio-economic research to health services, including physical therapy, nutrition, and dentistry. These initiatives are complemented by scholarship programs and food security projects, such as the "Agro Bag," which provides fresh produce to the academic community.

From an environmental perspective, the establishment of the University Center for Sustainability (CEUS) marks a significant milestone. This center, established under CONSUNI Resolution No. 174/2021, aims to advance sustainability by aligning the University's activities with the United Nations Sustainable Development Goals (SDGs). The CEUS focuses on areas such as gender equality, working conditions, and environmental impact mitigation. Its responsibilities include conducting sustainability studies, raising awareness of the SDGs, fostering research partnerships, and training staff on SDG-related activities. The CEUS also coordinates with various university departments and external institutions to promote sustainability initiatives.

Governance at DAS is overseen by various councils, including the University Council (CONSUNI), Teaching and Research Council (CONSEP), Administrative Council (CONSAD), and Department Council (CONDEP). Among these, the CONDEP plays a central role in departmental decision-making, addressing issues such as curriculum development, teaching plans, and course evaluations. This council also promotes scientific research, interdisciplinary collaboration, and extension activities, further reinforcing the institution's commitment to advancing sustainability in education and management.

3.3. On-site observations at DAS

Between February and March 2024, a series of on-site observations were conducted at the DAS to evaluate the implementation of various ESG practices, as outlined in the PDI. These observations provided insight into how the institution integrates sustainability principles into its operations, reflecting its ongoing commitment to these values across both environmental and social dimensions.

The environmental initiatives observed underscore DAS's efforts to reduce its ecological impact. Selective waste collection bins (Figure 2a) are strategically placed across the campus, promoting proper disposal and recycling practices among the academic community. This system encourages responsible waste management, contributing to an environmentally conscious campus culture.

In addition, water conservation awareness signs (Figure 2b) have been installed in key areas, reminding the community to use water responsibly. Complementing this effort is the installation of a rainwater collection system (Figure 2c), which collects rainwater for use in non-potable applications, such as irrigation. This system helps reduce the department's reliance on external water sources and supports broader conservation goals.

Safety is another priority, as indicated by warning signs regarding the presence of poisonous animals (Figure 2d) in areas where such risks exist. These measures help ensure that staff and students remain informed and safe within the campus environment.

Other notable initiatives include the vegetable garden (Figure 2e), which supports the "Agro Bag" project. This project provides the academic community with fresh, locally grown produce. The garden also serves as a hands-on learning space for students and researchers, linking sustainable agricultural practices with academic research and practical application.

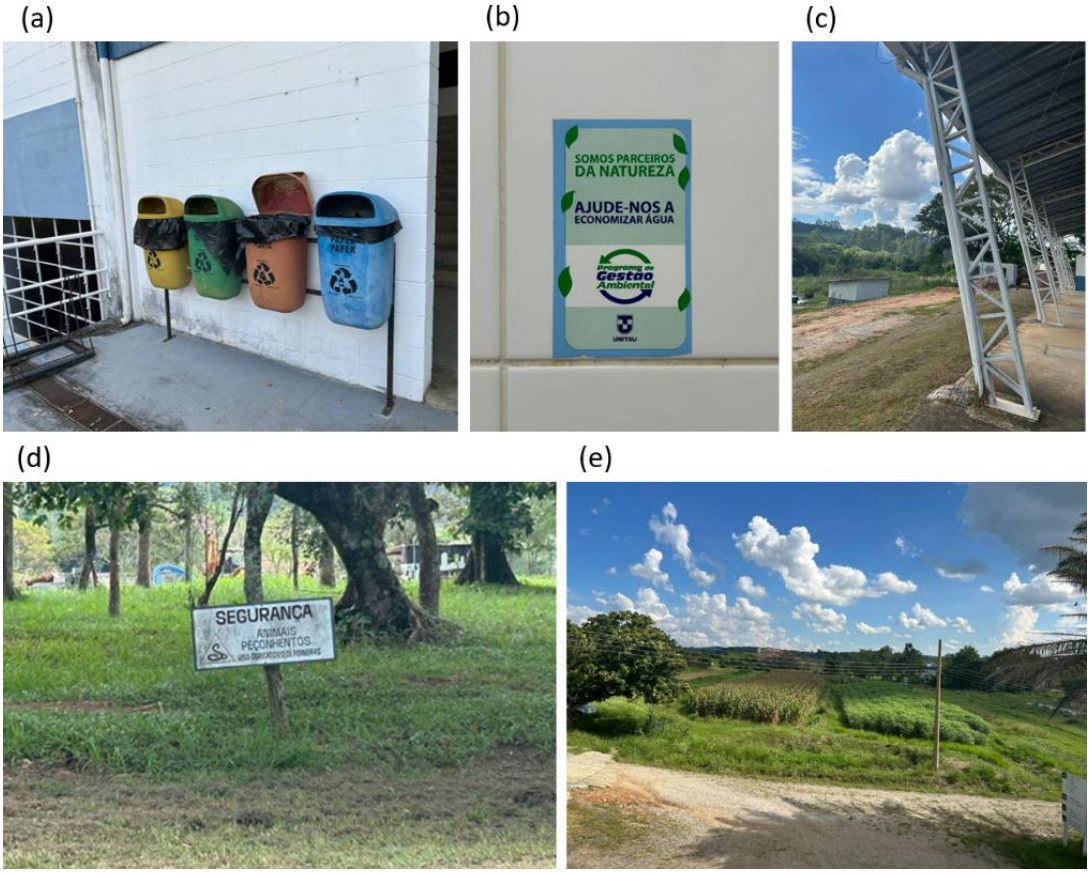

Figure 2. Environmental practices at DAS: (a) selective waste collection bins, (b) water conservation awareness signs in bathrooms, (c) rainwater harvesting for reuse, (d) warning signs about the presence of poisonous animals, (e) responsible vegetable garden.

From a social perspective, DAS has implemented several initiatives that reflect its commitment to inclusion and community engagement. Accessibility measures (Figures 3a, 3b, and 3c) were observed across campus, ensuring that individuals with disabilities have equal access to university facilities and services. This includes modifications to physical infrastructure, such as ramps and elevators, along with other necessary accommodations.

Moreover, the department offers resources like the "Agro Bag" for staff (Figure 3d), which forms part of the broader initiative to support sustainable living within the university community. This initiative enhances the well-being of staff by providing access to fresh, healthy produce, reinforcing the institution's focus on sustainability and social responsibility.

DAS also plays an active role in engaging with the broader community through its laboratories, which offer services such as soil analysis, studies on beekeeping, and research on medicinal plants. These laboratories—such as the Soil and Plant Mineral Nutrition Laboratory, the Apiculture Study Center, and the Medicinal Plants Study Center—extend their expertise to local farmers and agricultural professionals, contributing to sustainable agricultural practices in the region. The provision of technical support for farmers, alongside family farming projects, further strengthens the connection between the university and the surrounding community, promoting regional development.

These observations indicate that DAS has made meaningful progress in aligning its operations with ESG principles. The department's initiatives address both environmental concerns, such as resource conservation and sustainable agriculture, and social responsibilities, including inclusivity and community support. This integrated approach serves as a model for how higher education institutions can lead by example in fostering sustainability.

Figure 3. Social practices at DAS: Accessibility measures to ensure the inclusion of all persons (3a, 3b and 3c) and "agro-bag" provided to staff (3d).

3.4. Recommendations for strengthening ESG practices

Although DAS has made meaningful progress in integrating ESG principles, there remain opportunities for improvement. A key recommendation is the development of a systematic evaluation and reporting framework that would allow the institution to consistently monitor the impacts of its ESG initiatives across the environmental, social, and governance pillars. This system could rely on established metrics for assessing sustainability outcomes, facilitating more strategic, evidence-based decisions. Such metrics should be informed by CFA results, which highlight patterns in how ESG principles are being applied globally in universities. The CFA results from this study (Figure 1) emphasize the need for enhanced communication and transparency, particularly in the governance aspect, aligning DAS's practices with global standards (Alshuwaikhat *et al.*, 2017).

Improving the institution's communication strategies regarding ESG practices is another priority. Publicly accessible reports that detail ESG-related achievements, challenges, and future objectives would help foster transparency and encourage broader engagement from the academic community and external stakeholders (Yadav and Saini, 2023). CFA results further emphasize the role of leadership and governance in advancing sustainability practices (Williams, 2008; Viegas *et al.*, 2015), making it essential to include governance-related metrics in these reports. Additionally, triangulated data from document analysis and on-site observations reveal that there is room for increased student involvement in ESG initiatives. As other studies on university sustainability (Rotondo *et al.*, 2023; Freire *et al.*, 2023) suggest, engaging students in the design and implementation of ESG programs not only promotes innovation but also strengthens their sense of social and environmental responsibility.

Incorporating sustainability, social responsibility, and governance topics into the academic curriculum through dedicated lectures, workshops, and events is crucial for cultivating a culture

of awareness and commitment across the institution (Arocena and Sutz, 2021). Triangulation of data from the systematic literature review and document analysis indicates that similar strategies adopted in other universities, particularly through curriculum integration, have shown promising results. This would further enhance the institution's capacity to promote sustainability throughout all areas of its operation. Additionally, organizing specific training programs for faculty, staff, and students on ESG principles could deepen institutional commitment to these practices, as suggested by CFA results, which highlight the importance of institutional leadership in fostering a culture of sustainability (Fassin, 2015; Khoshbakht *et al.*, 2020).

The establishment of an evaluation system and periodic reporting is vital for ensuring that ESG practices remain dynamic and responsive to emerging challenges. As previous research has shown, systematic evaluation of sustainability practices, informed by reliable data, is key to continuous improvement and strategic planning (Akyol Özcan, 2023; Waheed, 2011). The triangulation of data sources—document analysis, on-site observations, and the systematic literature review—reinforces the need for such a system, enabling the university to evaluate its progress and identify areas for improvement more effectively. By adopting a model for continuous feedback and evaluation, DAS could ensure that its ESG initiatives align with both national and global sustainability standards, including the United Nations SDGs (United Nations, 2023).

Additionally, the university could strengthen initiatives that promote student engagement, not just as beneficiaries but as active participants in driving ESG projects. As CFA results and triangulated data show, universities that actively involve students in sustainability efforts tend to foster a stronger culture of responsibility and innovation (Freire *et al.*, 2023; Rotondo *et al.*, 2023). Expanding outreach programs to engage both the academic community and the broader local community would amplify DAS's positive impact in the region, as demonstrated by similar initiatives observed in other universities globally (Malinen, 2013; Shobe, 2015).

Finally, improved communication regarding ESG actions and outcomes is critical. Developing publicly accessible reports that present detailed progress on sustainability efforts would enhance the institution's transparency and strengthen its reputation as a leader in sustainability (Alshuwaikhat *et al.*, 2017; Yadav and Saini, 2023). Proactive communication through multiple channels would ensure that stakeholders—both internal and external—remain informed about the university's ESG initiatives, encouraging further collaboration and support. CFA analysis indicates that governance practices significantly influence sustainability outcomes, reinforcing the importance of transparency in institutional actions (Khoshbakht *et al.*, 2020; Williams, 2008).

In summary, the findings of this study highlight the importance of integrating ESG principles as a fundamental component of sustainability in Brazilian universities. The practices observed at DAS align with the broader goals of sustainability, particularly the SDGs related to clean energy, decent work, economic growth, and climate action (United Nations, 2023). These initiatives not only strengthen social cohesion within the institution but also contribute to the socio-economic development of the surrounding communities. Moreover, they reflect a clear commitment to the well-being of all stakeholders. The triangulated analysis of ESG practices underscores the value of these initiatives in building institutional credibility and fostering a culture of responsibility, essential for advancing sustainability across all sectors of society.

4. CONCLUSION

The objective of this study was to assess how the principles of environmental, social, and governance (ESG) are integrated into the operations and academic activities of the Department of Agricultural Sciences (DAS). By conducting a comprehensive analysis that included key

documents, on-site observations, and a systematic literature review, this research evaluated the influence of these principles on fostering sustainability within the institution.

The primary finding confirms that DAS has made considerable progress in incorporating ESG practices into its daily operations. Environmental initiatives, such as waste management and rainwater harvesting, and social programs, which ensure accessibility and promote community engagement, demonstrate the institution's alignment with global sustainability objectives, including the United Nations Sustainable Development Goals (SDGs). The establishment of the CEUS further illustrates the University's ongoing commitment to sustainability and its proactive stance in addressing socio-environmental challenges.

This research contributes both theoretically and practically to the discourse on sustainability in higher education. From a theoretical standpoint, the study offers a detailed examination of ESG implementation in a Brazilian public university, providing a framework that can be adapted by other institutions. Practically, the study identifies successful ESG strategies, such as improved waste management systems and community outreach initiatives, which can serve as models for other universities seeking to enhance their sustainability efforts. Moreover, the study underscores the potential of universities to serve as catalysts for social responsibility and environmental consciousness through their engagement with local communities.

However, this study has certain limitations. The scope was restricted to a single department, which may limit the broader applicability of the findings to other departments or institutions. Additionally, the reliance on qualitative methods, such as document analysis and observations, could introduce interpretive biases, given the subjective nature of these data collection techniques. While the Correspondence Factor Analysis (CFA) provided insights into thematic patterns, its effectiveness was contingent upon the data and literature available at the time of the research.

Future research could expand this analysis by comparing ESG adoption across different departments or universities in Brazil, thereby offering a more comprehensive view of how these principles are being embraced within diverse institutional contexts. Another area of exploration could involve examining how ESG initiatives influence students' perceptions of academic quality, their engagement, and overall satisfaction, which could offer important feedback for institutional development. In addition, a financial analysis of the costs and benefits associated with ESG implementation in higher education would provide data to support more sustainable and efficient financial planning.

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6. REFERENCES

AKYOL ÖZCAN, K. Sustainability Ranking of Turkish Universities with Different Weighting Approaches and the TOPSIS Method. **Sustainability**, v. 15, n. 16, 2023. https://doi.org/10.3390/su151612234

AL-ALWANI, M. K. A model for assessing sustainability of universities in Iraq. **Mesopotamia Environmental Journal**, v. 4, n. 2, p. 66-78, 2018.

ALSHUWAIKHAT, H. M.; ABUBAKAR, I. R.; AINA, Y. A.; ADENLE, Y. A.; UMAIR, M. The development of a GIS-based model for campus environmental sustainability assessment. **Sustainability**, v. 9, n. 3, p. 439, 2017. https://doi.org/10.3390/su9030439

AROCENA, R.; SUTZ, J. Universities and social innovation for global sustainable development as seen from the south. **Technological forecasting and social change**, v. 162, p. 120399, 2021. https://doi.org/10.1016/j.techfore.2020.120399

BARROS, M. V.; PUGLIERI, F. N.; TESSER, D. P.; KUCZYNSKI, O.; PIEKARSKI, C. M. Sustainability at a Brazilian university: developing environmentally sustainable practices and a life cycle assessment case study. **International journal of sustainability in higher education**, v. 21, n. 5, p. 841-859, 2020. https://doi.org/10.1108/IJSHE-10-2019-0309

BUTT, L. **Failing the future: key factors affecting the management of sustainability programs in universities in the Sydney Basin and region**. 2022. Thesis (PhD) - Macquarie University, Macquarie Graduate School of Management, Sydney, 2022. http://hdl.handle.net/1959.14/1060009

CASTRO, P. P. C.; DELGADO, C. C. Design and implementation of a sustainability initiative from the "institutional middle": reflection on the organizational conditions for it to thrive/or fail. *In:* INTERNATIONAL SUSTAINABLE ECOLOGICAL ENGINEERING DESIGN FOR SOCIETY CONFERENCE, 14-16 Sep. 2016, Leeds. **Proceedings[…]** Leeds Beckett University, 2016. http://eprints.leedsbeckett.ac.uk/id/eprint/3525/

CERNICOVA-BUCA, M.; DRAGOMIR, G. M.; GHERHEȘ, V.; PALEA, A. Students' Awareness Regarding Environment Protection in Campus Life: Evidence from Romania. **Sustainability**, v. 15, n. 23, p. 16444, 2023. https://doi.org/10.3390/su152316444

FASSIN, Y. The Status of CSR and Sustainability Reporting at Universities in Europe: a Survey. **Proceedings of the International Association for Business and Society**, v. 26, n. 1, p. 179-191, 2015.

FREIRE, H. V. L.; ALBANESES JUNIOR, N. P.; ABREU, T. M. B. de; TROCCOLI, I. R.; MENDONÇA MOTTA, P. R. International sustainability initiatives in universities: a bibliometric study. **InterSciencePlace**, v. 18, n. 1, 2023.

GALLARDO-VÁZQUEZ, D.; FOLGADO-FERNÁNDEZ, J. A. Regional economic sustainability: Universities' role in their territories. **Land**, v. 9, n. 4, p. 102, 2020. https://doi.org/10.3390/land9040102

KHOSHBAKHT, M.; ZOMORODIAN, M.; TAHCILDOOS, M. A content analysis of sustainability declaration in Australian universities. *In* INTERNATIONAL CONFERENCE OF THE ARCHITECTURAL SCIENCE ASSOCIATION, 54., 2020, Auckland. **Proceedings[…]** Auckland: University of Technology, 2020. p. 41-50.

LAMPROPOULOS, I.; ASTARA, O. E.; SKORDOULIS, M.; PANAGIOTAKOPOULOU, K.; PAPAGRIGORIOU, A. The Contribution of Education and ICT Knowledge in Sustainable Development Perceptions: The Case of Higher Education Students in Greece. **Journal of Human Resource and Sustainability Studies**, v. 12, n. 1, p. 15-31, 2024. https://doi.org/10.4236/jhrss.2024.121002

LOZANO, R. The state of sustainability reporting in universities. **International Journal of Sustainability in Higher Education**, v. 12, n. 1, p. 67-78, 2011. https://doi.org/10.1108/14676371111098311

MACHARIS, C.; KERRET, D. The 5E model of environmental engagement: bringing sustainability change to higher education through positive psychology. **Sustainability**, v. 11, n. 1, p. 241, 2019. https://doi.org/10.3390/su11010241

MALINEN, L. M. **Could a cooperation network between Finnish universities advance adoption and success of Green Office environmental management system?** 2013. 61p. Master's thesis. School of Business and Economics, University of Jyväskylä, Finland, 2013. https://jyx.jyu.fi/handle/123456789/42646

MEDEIROS, E. A.; AMORIM, G. C. C. Análise textual discursiva: dispositivo analítico de dados qualitativos para a pesquisa em educação. **Laplage em revista**, v. 3, n. 3, p. 247-260, 2017. https://doi.org/10.24115/S2446-6220201733385p.247-260

NEJATI, M.; SHAHBUDIN, A. S. M.; AMRAN, A.; CLAYTON, G. J.; HELMI, M. H. M. Cultivating the "Sustainability Intellect" in Higher Education: a Malaysian perspective. **Academia.edu**, 2011. Available at: https://www.academia.edu/download/34631415/Cultivating_the_Sustainability_Intellect_in_Higher_Education.pdf Access: Jun. 2023.

NSANBAYEVA, N. **A systems approach to sustainability in higher education: Analysis of undergraduate architectural education in Kazakh Leading Academy of Architecture and Civil Engineering in Kazakhstan**. 2019. 94p. Master's Thesis (Master of Arts in Creative Sustainability) - Department of Design, School of Arts, Design and Architecture, Aalto University, Espoo, 2019. https://core.ac.uk/reader/196268680

PASCU, R. V. Modelling a sustainable integrated management system for universities. **Academic Journal of Manufacturing Engineering**, v. 13, n. 2, p. 118-23, 2015.

ROTONDO, F.; GIOVANELLI, L.; EZZA, A. Implementing sustainable innovation in state universities: Process and tools. **Journal of Cleaner Production**, v. 391, p. 136163, 2023. https://doi.org/10.1016/j.jclepro.2023.136163

SAFARKHANI, M.; ÖRNEK, M. A. The meaning of green campus in UI GreenMetric World University Rankings perspective. **A|Z ITU Journal of the Faculty of Architecture**, v. 19, n. 2, p. 315-334, 2022. https://doi.org/10.5505/itujfa.2022.22566

SHOBE, A. R. **Insights into Perspectives on Environmental Sustainability**. 2015. 52p. Master's Thesis (Master of Science in Community and Leadership Development) - University of Kentucky, Lexington, 2015. http://dx.doi.org/10.13023/ETD.2016.006

UNITED NATIONS. Department of Economic and Social Affairs. Sustainable Development. **The 17goals**. Available: https://sdgs.un.org/goals. Access: June 2023.

VIEGA, G. L. L.; LORENZI JUNIOR, D.; GLASENAPP, S. Princípios ESG: universidades como instituições condutoras ao desenvolvimento sustentável e para a sustentabilidade. **Observatório de la Economía Latinoamericana**, v. 21, n. 11, p. 19907-19928, 2023. https://doi.org/10.55905/oelv21n11-071

VIEGAS, C. V.; FRÖHLICH, C.; DA SILVA, L. P. A review on the roles of universities in regional initiatives of sustainability institutionalization. *In:* ANNUAL WORLD FORUM OF THE INTERNATIONAL ASSOCIATION OF JESUIT BUSINESS SCHOOLS, 21., 2015, Montevideo, Uruguay. **Conference Paper[…]** IAJBS, 2015.

WAHEED, B. **Quantitative assessment of sustainability using linkage-based frameworks: a case study of universities**. 2011. Doctoral (PhD Thesis) - Memorial University of Newfoundland, St. John's, 2011. http://research.library.mun.ca/id/eprint/9872

WILLIAMS, P. M. **University leadership for sustainability: An active dendritic framework for enabling connection and collaboration**. 2008. 307p. Doctoral (Thesis) - Victoria University of Wellington, Wellington, 2008.

YADAV, M.; SAINI, M. Environmental, social and governance literature: a bibliometric analysis. **International Journal of Managerial and Financial Accounting**, v. 15, n. 2, p. 231-254, 2023. http://dx.doi.org/10.1504/IJMFA.2023.10049404