

Investigación Original


Do Argentine Universities Incorporate Sustainability in Their Extension Activities?

¿Incluyen las Universidades Argentinas la Sostenibilidad en sus Actividades de Extensión?

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Resumen: Este estudio analiza la integración de la sostenibilidad en las actividades de extensión universitaria en las Instituciones de Educación Superior (IES) de Argentina. Examina cómo tanto las instituciones públicas como privadas han implementado iniciativas de desarrollo sostenible en sus programas de extensión, considerando las limitaciones impuestas por la Ley 27.621, que no incluye la extensión como un pilar de la educación ambiental. Se realizó un análisis descriptivo y correlacional utilizando datos obtenidos de los sitios web de 132 IES mediante un enfoque cuantitativo. Los resultados muestran que solo el 21% de las instituciones han incorporado la sostenibilidad en sus actividades de extensión, con las IES públicas demostrando un mayor compromiso en comparación con las privadas. La inclusión de la sostenibilidad en la misión institucional y la formación de alianzas estratégicas fueron identificadas como factores críticos de éxito para estas iniciativas. Sin embargo, existe una fragmentación en la implementación de estas políticas, lo que limita su impacto sistémico. A pesar de los avances logrados, persisten desafíos significativos, como la falta de recursos y la necesidad de políticas nacionales más coherentes que promuevan una adopción uniforme de prácticas sostenibles en todas las IES. Este estudio propone recomendaciones para fortalecer el papel de la extensión universitaria en la promoción del desarrollo sostenible, destacando la importancia de un liderazgo institucional comprometido y una planificación estratégica alineada con los Objetivos de Desarrollo Sostenible (ODS).

Palabras clave: sostenibilidad, extensión universitaria, instituciones de educación superior, Argentina, gestión.

Abstract: This study examines the integration of sustainability into university extension activities within Argentine Higher Education Institutions (HEIs). It investigates how both public and private institutions have incorporated sustainable development initiatives into their extension programs, particularly in light of the limitations imposed by Law 27.621, which excludes extension as a pillar of environmental education. Using a quantitative approach, a descriptive and correlational analysis was conducted based on data collected from the websites of 132 HEIs. The findings reveal that only 21% of institutions have embedded sustainability into their extension activities, with public HEIs exhibiting a stronger commitment than their private counterparts. Key success factors include the

inclusion of sustainability in institutional missions and the establishment of strategic alliances. However, policy implementation remains fragmented, hindering systemic impact. Despite progress, persistent challenges include resource constraints and the need for more cohesive national policies to ensure uniform adoption of sustainable practices across all HEIs. This study offers recommendations to enhance the role of university extension in advancing sustainable development, emphasizing the importance of dedicated institutional leadership and strategic planning aligned with the Sustainable Development Goals (SDGs).

Keywords: sustainability, university extension, higher education institutions, Argentina, management.

Introduction

Sustainability has emerged as a global priority (Arias-Valle and Coria Augusto, 2024; Goodland, 1995), fundamentally linked to the 2030 Agenda (Lee et al., 2016). This framework calls upon all nations and societal sectors—including Higher Education Institutions (HEIs)—to contribute to poverty eradication, environmental protection, and universal prosperity (Cortese, 2003). Within this context, HEIs must not only fulfill their traditional roles in education and research but also embrace their "third mission," which encompasses university extension as a mechanism for community engagement and sustainable development promotion (Leal Filho et al., 2024; Segalàs Coral and Sánchez Carracedo, 2019).

The 2030 Agenda underscores education as essential for achieving all the Sustainable Development Goals (SDGs), particularly SDG 4, which advocates for inclusive, quality education that fosters sustainability (Ferguson and Roofe, 2020; Holst et al., 2024b). HEIs are uniquely positioned to lead this change, given their capacity to generate knowledge, cultivate informed leaders and citizens, and translate research into practical solutions for global challenges (Albareda-Tiana et al., 2024; Merma-Molina et al., 2022). UNESCO further emphasizes that HEIs should integrate sustainability into all their functions—teaching, research and extension—to amplify societal and environmental impact (Galán-Muros, 2023).

In Latin America, university extension has historically been an essential component of the university mission, particularly in Argentina, where universities have contributed to sociocultural development (Sirvent et al., 2000; Tünnermann, 2000). However, the incorporation of sustainability into extension activities remains inconsistent, often limited to isolated initiatives misaligned with the broader SDG framework (Arias-Valle et al., 2023; Durand et al., 2016).

University extension is defined as the set of activities through which HEIs disseminate knowledge and resources to advance societal well-being and comprehensive community development (Freire, 1973; Johnson et al., 2019). This concept has evolved from a unidirectional, assistentialist model—where HEIs simply transfer knowledge—to a participatory approach that integrates community voices into educational and research processes (Borsatto et al., 2024). Today, extension is widely recognized as a pillar of the "third mission," alongside teaching and research (Etzkowitz and Zhou, 2018; Oliveira et al., 2024). It encompasses not only knowledge exchange but also the promotion of sociocultural and environmental values, often through partnerships with industry (Berbegal-Mirabent et al., 2015) with a strong emphasis on sustainability (Etzkowitz and Zhou, 2018; Shyiramunda and van den Bersselaar, 2024). Yet, the

lack of a systemic approach to extension has limited its potential impact, particularly in sustainability (Acaali, 2024; Holst, 2023).

Despite increasing global attention to sustainability in higher education, Latin American literature on this topic remains limited, particularly regarding systematic analyses of its inclusion in university extension activities. While studies have examined sustainability in teaching and research, extension policies and practices have been largely overlooked—especially in Argentina. This gap becomes particularly relevant considering that, in Latin America, extension has traditionally served as a privileged channel for societal engagement. This study aims to address this disparity by providing empirical evidence on how Argentine HEIs incorporate (or neglect) sustainability in their extension activities, identifying both progress and structural barriers to systemic adoption.

In Argentina, Law 27.621(2021) mandates environmental education across all educational levels but notably omits university extension as a key avenue for sustainability promotion. This legislative gap raises critical questions about policy efficacy and the need for greater integration of sustainability in all higher education dimensions. In light of these considerations, this study investigates the following research question: How have Argentine HEIs integrated sustainability into their university extension policies, and what challenges and opportunities arise from this legislative omission?

This paper contributes by delineating disparities between national policy and institutional practice, while proposing recommendations to enhance the role of university extension in sustainable development promotion. Such analysis is particularly relevant in the current context, as HEIs are called upon to be active agents of societal transformation toward equitable and sustainable futures (Fuchs et al., 2023; Seth, 2023).

Literature Review

The integration of sustainability into university extension represents a dynamic and evolving field, marked by a paradigm shift from knowledge transfer toward active, sustained community engagement (Ertzkowitz et al., 2000; Shyiramunda and van den Bersselaar, 2024). This section synthesizes key concepts, challenges, and advancements, with a particular focus on Argentine HEIs.

Historically, university extension has been understood as a unidirectional process wherein HEIs transfer knowledge and resources to society to promote socio-cultural well-being (Freire, 1973). Contemporary perspectives, however, emphasize participatory models that position extension as the "third mission" of HEIs, complementing teaching and research. In Latin America, this role has been instrumental in democratizing knowledge and advancing social justice (Arond et al., 2011; Zamorano Figueroa and Galán-Muros, 2023).

The 1918 University Reform in Argentina redefined HEIs as public-service institutions, embedding extension as a mechanism for addressing societal needs (Guarga, 2018; Tünnermann, 1998). While, this legacy strengthened community- university linkages (Pastore, 2023; Tünnermann, 2000), the explicit. Incorporation of sustainability into extension frameworks emerged only recently, paralleling global environmental concerns (Leal Filho et al., 2021; Fuchs et al., 2023).

The Brundtland Commission (1987) defined sustainability as meeting present needs without compromising future generations—a principle now central to HEIs mission under the 2030 Agenda and SDGs (Acaali, 2024; Cortese, 2003). These international frameworks urge universities to rethink their traditional roles and integrate sustainability into all their functions, including extension (Leal Filho et al., 2015; Tilbury, 2011).

Tilbury (2011) asserts that higher education must lead sustainability transitions, not only through teaching and research but also through university extension. This approach allows academic knowledge to be applied in real-world contexts and promotes tangible social change (López, 2023; Tomasella et al., 2023). UNESCO similarly advocates for holistic institutional commitments to sustainability in a comprehensive manner, recognizing extension as a key component to take action beyond the campus and create an impact on the community (United Nations Educational, Scientific and Cultural Organization, UNESCO, 2020).

Despite theoretical advancements and international recommendations, integrating sustainability into university extension faces numerous challenges (Omotosho et al., 2023; Puertas et al., 2023). In many cases, sustainability-oriented extension activities have been fragmented and lack a coordinated approach (Loorbach and Wittmayer, 2024; Maury et al., 2024). Terán-Bustamante (2021) y Velasco-Muñoz (2018) note that extension initiatives are often limited to isolated projects that, while valuable, fail to generate a systemic impact. This situation is partly due to the absence of clear policies and dedicated funding, which limits the ability of HEIs to institutionalize sustainability in their extension activities (Blanco-Portela et al., 2020; Shrestha, 2024).

The evolution of university extension in Argentine HEIs has been deeply influenced by the nation's socio-political history. Since the 1918 University Reform, Argentine universities embraced an active role in society, seeking not only academic training but also social transformation (Guarga, 2018; Tünnermann, 1998). However, the incorporation of sustainability as a core element of university extension activities is a more recent development (Tünnermann, 2000).

Law 27.621 marks significant progress by mandating environmental education across all educational levels, which

represents a significant step towards integrating sustainability into formal education. Yet its failure to explicitly include university extension creates an implementation gap that may hinder the application of sustainability principles beyond the classroom. This lack of formal mention may be contributing to the lag in the incorporation of sustainability in Argentine HEIs (Arias-Valle et al., 2023; Arias-Valle and Marimon, 2024). This legislative omission persists despite extension's demonstrated potential as a key tool for promoting genuine social commitment to sustainability (Cembranel et al., 2024; Popowska and Sady, 2024).

Internationally, various HEIs have demonstrated how extension can be an effective platform for promoting sustainability (Berchin *et al.*, 2021; Findler *et al.*, 2019). Harvard University, for instance, has developed extension programs that integrate sustainability into community projects, involving students, faculty, and community members in solving local environmental issues. Similarly, UNESCO's global networks of SDGs-committed HEIs emphasize systematic impact measurement and monitoring in extension activities (UNESCO, 2020; Tilbury, 2011).

These cases highlight the necessity for Argentine HEIs to develop more structured and coordinated approaches to extension that responds to the immediate demands of the community and aligns with global sustainability goals (Leal Filho et al., 2023; Yarime et al., 2012). Achieving this dual alignment requires not only clearer policies and adequate resources but also evaluation mechanisms that ensure the effectiveness of sustainability-oriented extension initiatives (Borsatto *et al.*, 2024; D'Adamo and Gastaldi, 2023).

The effective integration of sustainability into university extension requires a comprehensive strategic approach that goes beyond isolated initiatives (Adebayo et al., 2023; Holst, 2023). To achieve significant and lasting impact, HEIs must implement systematic tools and practices that embed sustainability as a core component of their institutional mission (Martínez-Rodríguez, 2019; Oliveira et al., 2024). The following are some of the most effective strategic tools supported by the relevant literature:

Institutional Leadership Commitment: Leadership is fundamental in advancing sustainability within extension programs (Lozano et al., 2013; Štrukelj et al., 2023). University leaders must promote an organizational culture that values sustainability, enabling its integration across all institutional activities (Hernandez-Díaz et al., 2024; Vallaeys and Álvarez, 2019). As Leal Filho *et al.* (2018) demonstrate, strong leadership commitment is crucial for incorporating sustainability into institutional mission and vision statements and securing the allocation of resources and support for sustainable development initiatives.

Strategic Planning Framework: The development of a strategic plan with sustainability as a central objective is another crucial tool (

Ahmed et al., 2024; Salmi *and* D'Addio, 2021). Such plan should outline clear goals, implementation strategies, and specific actions to incorporate sustainability through extension activities (Alvarenga et al., 2024; Velazquez et al., 2006). Cortese (2003) states that a well-articulated strategic plan enables HEIs to align their extension programs with SDGs, while incorporating Key Performance Indicators (KPIs) facilitates progress monitoring and evaluation (Christou *et al.*, 2024; Holst *et al.*, 2024a).

Mission and Vision Integration: For sustainability to be a cornerstone of university extension, it is essential that it is explicitly included in the university's mission and vision (Rotondo and Giovanelli, 2024; Viera Trevisan *et al.*, 2024). This ensures that sustainability is not seen as an additional effort but as an integral part of the institutional identity. Tilbury (2011) and UNESCO (2020) emphasize how mission-level commitments can inspire the entire university community to actively participate in sustainable initiatives.

Sustainability Reporting Systems: Regular publication of sustainability reports is essential for transparency and accountability (Adebayo *et al.*, 2023; Amoako, 2023). These documents should comprehensively report institutional sustainability achievements, including extension activities. Shriberg (2002) notes that sustainability reports allow HEIs to assess their performance, identify improvement areas, and communicate achievements to stakeholders - potentially enhancing institutional reputation and attracting external support.

Dedicated Organizational Structures: Establishing specialized sustainability offices within HEIs is another effective strategy (Leal Filho *et al.*, 2019). These units coordinate sustainability initiatives across the institution, including extension activities. Lozano *et al.* (2013) suggest that a centralized sustainability office can serve as a contact point for community projects, facilitating collaboration between HEIs and external stakeholders. These offices can also lead the implementation of sustainable practices on campus and ensure that extension initiatives align with sustainability objectives. In addition to annual reports, HEIs can develop specific sustainability reports that focus on extension activities. These reports can include case studies, statistics, and examples of how HEI are contributing to sustainable development through its community engagement. Koehn and Uitto (2014) emphasize that extension-specific sustainability reports can highlight the social impact of HEIs and strengthen their role as leaders in sustainability.

Digital Engagement Platforms Finally, the creation of websites and digital platforms for sustainability the visibility and reach of extension activities (Amoako, 2023; Monteiro *et al.*, 2024). These platforms function as repositories of resources, share best practices, and facilitate collaboration among students, faculty, and the community. UNESCO (2020) y Borsatto et al. (2024) underscore

the importance of using digital technologies to amplify engagement and participation in sustainability-focused extension programs.

The successful integration of sustainability into university extension requires a strategic approach that involves leadership, planning, and specific management tools (Budihardjo *et al.*, 2021; Holst, 2023). Through these practices, HEIs can ensure that their extension activities simultaneously advance social welfare and sustainable development, aligning with the SDGs and strengthening their impact on society (Castillo and Roberts, 2024; Zaidan *et al.*, 2023).

Methodology

Research Design

This study follows a quantitative research approach with a non-experimental descriptive-correlational design. It systematically examines how Argentine HEIs have integrated sustainability principles into their university extension activities through comprehensive analysis of institutional website data.

Population and Data Collection Instruments

The research population comprises all 132 Argentine HEIs that conduct university extension activities.

Variables and Operationalization

The study operationalizes key variables as follows:

HEI: Identification of each HEI (nominal categorical variable).

Ownership: Whether the HEI is public or private (nominal categorical variable).

Extension programs: Number of sustainability-focused extension programs (continuous quantitative variable).

Volunteer initiatives: Number of sustainability-related volunteer programs (continuous quantitative variable).

Strategic partnerships: Number of collaborative sustainability projects (continuous quantitative variable).

Social Work: Evaluation of social contribution (Likert scale or number of projects) (ordinal or continuous quantitative variable).

Environmental programs: Number of environmental protection initiatives (continuous quantitative variable).

Events: Number of sustainability-related events organized by the HEI (continuous quantitative variable).

Strategic Axes: Number of HEI's strategic priorities addressing sustainability (continuous quantitative variable).

Sustainability Mission: Whether sustainability is included in the HEI's mission (binary variable: 0 = No, 1 = Yes).

Conferences: Number of sustainability-related conferences organized by the HEI (continuous quantitative variable).

Data Analysis

Descriptive Analysis

The first step involves conducting a descriptive analysis to summarize the characteristics of the variables. Frequency tables, measures of central tendency (mean, median), and dispersion metrics (standard deviation) are used to describe the distribution of quantitative variables.

Correlational Analysis

Next, relationships between the quantitative variables are examined using Pearson or Spearman correlation coefficients. This analysis allows the identification of significant patterns and relationships, for example, between the number of extension programs and the number of sustainability-related events.

Regression Analysis

To evaluate how different factors (such as the ownership of the HEI, the number of strategic partnerships, or the inclusion of sustainability in the mission) predict the level of sustainability integration in extension activities, multiple regression models were applied.

Group Comparisons

The analysis compares how public and private HEIs integrate sustainability into their extension practices by conducting independent sample t-tests.

Procedure

Data Cleaning: Identification and treatment of missing values.

Coding: Categorical variables are coded.

Statistical Analysis: Descriptive analysis followed by correlation, regression, and group comparison analyses as needed.

Conceptual Framework

This study is grounded in the conceptual framework of institutional sustainability, which serves as the analytical lens to understand the integration of sustainable development within university extension activities (Leal Filho et al., 2023). This perspective assumes that HEIs must not only promote sustainability through their core functions—teaching and research—but also embed it within institutional governance and community engagement efforts (Cortese, 2003).

Institutional sustainability is understood here as the capacity of universities to integrate sustainable development principles across their organizational culture, management policies, and extension practices, generating tangible impacts on their social and environmental surroundings (Holst, 2023). As such, this framework enables an assessment of whether extension activities reflect a genuine and strategic commitment to sustainability, rather than isolated or fragmented initiatives lacking continuity and institutional grounding (Acaali, 2024).

From this perspective, the assessment of sustainability in university extension is not evaluated solely based on the number of activities. Instead, it considers the degrees to which such activities align with

institutional strategic plans, explicitly incorporate sustainability into the university's mission, foster cross-sectoral partnerships, and employ systematic practices for monitoring, reporting, and continuous improvement. This comprehensive approach moves beyond a purely quantitative assessment to explore the structural factors that enable—or constrain—the systemic adoption of sustainability within extension function.

This approach is particularly relevant in the Argentine context, where university extension has traditionally served been a privileged channel for university–society engagement. However, the nexus between extension and sustainability has not been sufficiently examined from a comprehensive institutional standpoint.

Results

Descriptive Analysis

The descriptive analysis provides an overview of how Argentine HEIs have integrated sustainability into their extension activities. Data were collected from 132 HEIs; the following key trends were observed.

Distribution of HEIs Integrating Sustainability (Figure 1)

Among the 132 HEIs analyzed, only 28 institutions (21%) reported the implementation of sustainability-related extension programs. Of these, 16 are public institutions (15%) and 12 are private (11%). This distribution indicates a relatively balanced adoption between public and private HEIs. Nonetheless, the low overall adoption rate suggests that sustainability integration within university extension remains limited across the Argentine higher education sector.

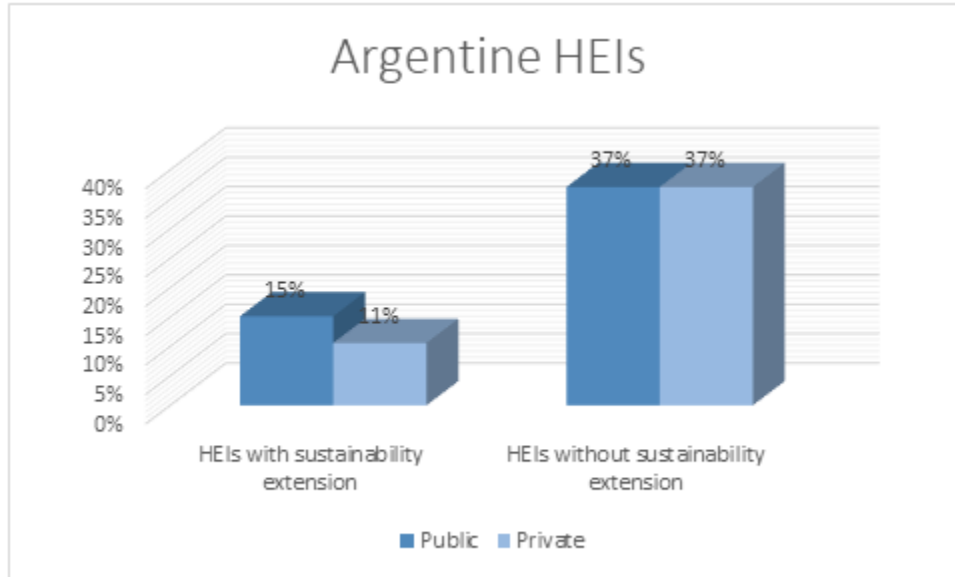


Figure 1

Distribution of Sustainability Integration in Extension Activities by Argentine HIEs

Source: Compiled by authors

Areas of Sustainability Integration in Argentine HEIs ([Figure 2](#))

Analysis of the areas in which sustainability is incorporated shows that:

Strategic Axes: A total of 20 HEIs (71%) have incorporated sustainability as part of their strategic axes, indicating a formal institutional commitment to this approach.

Social Work and Strategic Partnerships: Nineteen HEIs (68%) have established strategic partnerships for sustainability projects and have developed social work activities, reflecting strong community interaction.

Environmental Care: Seventeen HEIs (61%) carry out programs focused on environmental protection, demonstrating the relevance of this theme in the extension agenda of Argentine universities.

Volunteerism and Events: Sustainability is also manifested through volunteer programs (9 HEIs, 32%) and the organization of events (17 HEIs, 61%). These activities highlight the active participation of students and faculty in promoting sustainability within their communities.

These data suggest that while HEIs have made progress in aligning extension with strategic planning and partnership development, there are still opportunities to expand the focus on other sustainability areas, such as volunteerism.

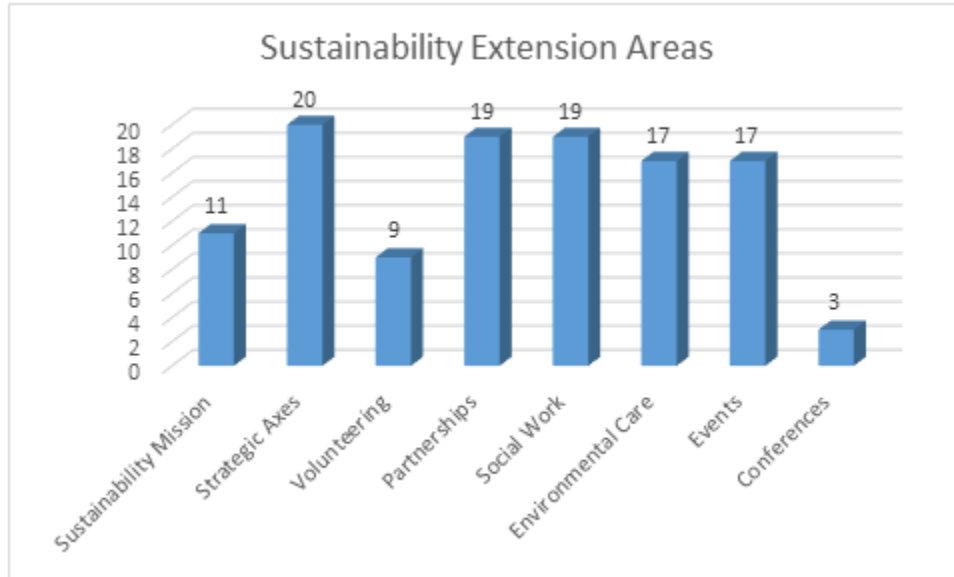


Figure 2

Areas of Sustainability Addressed in Extension Activities by Argentine HEIs

Source: Compiled by authors

Sustainability Programs by HEI (Figure 3)

On average, HEIs that have incorporated sustainability into their extension activities report between 5 and 7 dedicated programs. Public HEIs tend to implement more sustainability programs compared to private institutions. In terms of volunteer activities and strategic partnerships, public HEIs report an average of 1 volunteer program and 1 partnership per institution, whereas private HEIs display slightly lower but still significant participation.

Similarly, in environmental care, public HEIs lead in organizing environmental initiatives, averaging 1 program and 1 related event per year. Such figures surpass private those of private HEIs. Figure 3 illustrates these findings.

The descriptive analysis suggests that Argentine HEIs are gradually incorporating sustainability into their extension activities, although the overall adoption is still limited. Public HEIs seem to be at the forefront, particularly in the areas of strategic alignment, partnerships, and environmental action. However, there is fragmentation in implementation, indicating that many HEIs have not yet adopted a systemic and coordinated approach to integrating sustainability into their university extension activities.

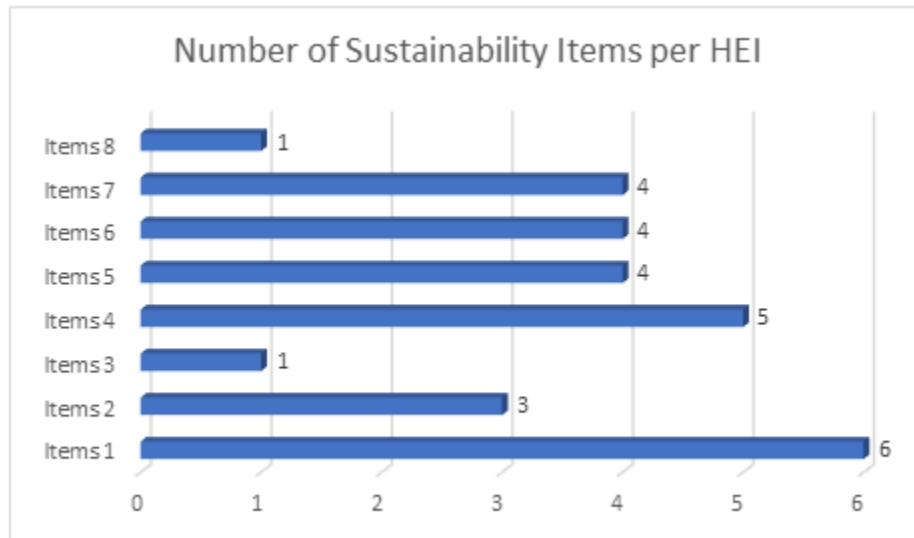


Figure 3

Average Number of Sustainability Programs and Initiatives per HEI

Source: Compiled by authors

Correlation Analysis

The correlation analysis among the sustainability variables in university extension activities revealed several statistically significant relationships. A moderate positive correlation ($r = 0.50$) between the number of sustainability-related extension programs and the number of volunteer activities organized. This suggests that HEIs with more extension programs also tend to promote greater engagement through volunteerism.

Similarly, the number of strategic partnerships was positively correlated with the number of environmental care initiatives ($r = 0.45$), indicating that HEIs engaged in external collaborations are more likely to implement environmental sustainability programs.

A stronger correlation is observed between the inclusion of sustainability in a university's mission statement and the organization of sustainability-related academic events ($r = 0.55$). This finding highlights the role of institutional discourse and leadership in driving visible actions around sustainability.

Regression Analysis

To identify the key predictors of sustainability integration within university extension, a multiple regression analysis was conducted. The model explained 50% of the variance in the number of sustainability-related extension programs ($R^2 = 0.50$). The results indicate that public HEIs are a significant predictor ($\beta = 0.38$, $p < 0.05$) of a higher number of sustainability-related extension programs.

The establishment of inter-institutional partnerships emerged as a significant predictor ($\beta = 0.34$, $p < 0.05$), suggesting that external collaborations are crucial for the successful implementation of

sustainable programs. The inclusion of sustainability in the institutional mission was also positively associated ($\beta = 0.29$, $p < 0.05$) with the number of sustainability-related extension programs.

Group Comparison

An independent sample t-test was conducted to compare how public and private HEIs integrate sustainability into their extension practices.

Extension and Ownership: The t-test showed significant differences ($t(26) = 2.50$, $p < 0.05$) between public and private HEIs. Public institutions demonstrated a significantly higher level of engagement in sustainability-related extension programs.

Events and Ownership: Although public HEIs organized more sustainability-related events, the difference was not statistically significant ($t(26) = 1.75$, $p = 0.08$). This finding suggests that both public and private HEIs are active in this aspect, albeit to different extents.

Discussion

These findings gain relevance when considering the limited number of empirical studies addressing the integration of sustainability within university extension policies in Latin America. Unlike the abundant research focused on sustainability in teaching or institutional management, extension activities have been largely overlooked in academic debates, despite their key role in fostering university–society engagement. This study, offers empirical evidence that brings visibility to both the scope and current limitations of Argentine HEIs in this area, addressing a significant gap in the regional literature.

The data reveal an uneven landscape in the integration of sustainability within university extension activities in Argentina. Although 21% of the HEIs analyzed have implemented initiatives in this area, the overall low level of incorporation of sustainability-related extension activities suggests that a fragmented and non-systemic approach still prevails within this function. This is a critical issue considering the historical role that extension has played in Latin America as a key channel for university–society engagement (Sirvent et al., 2000; Tünnermann, 2000). These findings underscore a gap between institutional discourse and actual practice, while simultaneously point to an opportunity to rethink the role of university extension through the lens of sustainability.

The results confirm previous findings in the literature suggesting that public HEIs are more likely to embed sustainability in their extension activities compared to private HEIs. This phenomenon may be related to the historical commitment of public HEIs to social responsibility and community service, as noted by authors such as De Sousa Santos (2018) y Tilbury (2011). These institutions, being state-

funded, may also have a more explicit mandate to address sustainability and social development issues (Multan et al., 2023).

However, the fact that a similar percentage of public and private HEIs have adopted sustainability practices in their extension activities suggests that private HEIs are beginning to recognize the importance of sustainability, aligning themselves with global trends driven by frameworks such as the 2030 Agenda and the SDGs. This shift could be motivated by mounting pressure from students, faculty and stakeholders demanding a genuine commitment to sustainability (Segalàs Coral and Sánchez Carracedo, 2019).

Public HEIs show higher levels of sustainability integration within their extension programs, which may be linked to their historical tradition of social commitment and their reliance on public policies. In contrast, private HEIs demonstrate more limited progress, possibly due to budgetary constraints or lower institutional pressure in this area.

The analysis underscored that institutional leadership and the inclusion of sustainability in the university's mission are critical factors for the success of sustainability initiatives (Acaali, 2024). HEIs that have incorporated sustainability as a strategic axis show a greater number of sustainability-related extension programs; they are also more likely to organize events and form strategic partnerships.

These findings reinforce the importance of universities adopting a comprehensive approach to sustainability management, as proposed by Albareda-Tiana et al. (2024) and Holst (2023). The results show that committed leadership and a clear mission may enable sustainability to transcend rhetorical commitments and become effective practice that positively impacts society (Lozano *et al.*, 2013).

Despite noteworthy progress, the results also indicate a fragmentation in the implementation of sustainability in university extension activities. While some HEIs have made significant strides, others show a more limited and inconsistent adoption of sustainable practices. These findings align with the works of Arias-Valle *et al.* (2023) and Durand *et al.* (2016).

This observation suggests the need to develop more coherent and standardized national policies that promote the integration of sustainability across all Argentine HEIs. The observed variability could be a consequence of the lack of resources (Huepe, 2024) and a regulatory framework that drives all HEIs, regardless of their ownership, to uniformly adopt sustainable practices (Javed and Alenezi, 2023). Although Law 27.621 represents a step forward in environmental education, its omission of university extension as a strategic pillar reveals a regulatory disconnect that may partially explain the low level of adoption. Addressing this oversight is essential to enable the cross-cutting integration of sustainability throughout higher education institutions.

The results of this research have important implications for the development of university policies. Foremost, it is crucial that HEIs integrate sustainability more explicitly into their mission and vision statements (Acaali, 2024). Doing so not only improves internal cohesion around sustainability initiatives but also strengthens the HEI's positioning in an increasingly competitive global environment (Javed and Alenezi, 2023; Merma-Molina, 2022). The results suggest that the explicit inclusion of sustainability in the institutional mission and the establishment of strategic partnerships are key factors. Consequently, university governance must prioritize the cultivation of an organizational culture oriented toward sustainable development.

In operational terms, HEIs should consider creating dedicated sustainability offices that can coordinate and oversee extension initiatives, ensuring that they are aligned with institutional objectives and the SDGs (Leal Filho *et al.*, 2019). These offices can play a key role in forming strategic partnerships, a factor identified in this study as crucial for the success of sustainability activities.

Although the correlation analysis yielded only moderate associations among key variables, it nonetheless offered valuable initial insights into potential patterns of institutional behavior. The limited strength of correlations reflects the fragmented and unstructured nature of sustainability practices in Argentine HEIs. However, the multiple regression analysis offered more robust explanatory power, indicating that factors such as public ownership, sustainability inclusion in the institutional mission, and the formation of strategic partnerships significantly predict the presence of sustainability in extension programs. Therefore, while correlations were moderate, they served as a valuable exploratory tool, complemented by more conclusive multivariate analysis.

This study has several limitations that should be considered when interpreting the results. First, the sample was restricted to HEIs that have adopted sustainability practices in their extension activities, which may not represent all Argentine HEIs. Moreover, the reliance on data obtained from HEI websites may introduce biases in data collection.

Another limitation is the absence of qualitative data that could have provided a deeper understanding of the motivations and challenges faced by HEIs in integrating sustainability into their extension activities. Future research could benefit from a mixed-methods approach that combines quantitative analysis with interviews and case studies.

Despite these limitations, this study demonstrates that while Argentine HEIs have made progress in embedding sustainability into their extension activities, significant challenges remain to ensure that these initiatives are coherent, effective, and accessible to all institutions. The adoption of clear policies, adequate resource

allocation, and institutional commitment are essential to ensure that HEIs can fulfill their role as leaders in promoting sustainable development.

These insights contribute to the growing body of knowledge on sustainability in higher education by shedding light on a largely unexplored dimension—university extension—and by offering evidence-based recommendations for institutional reform and public policy development in Argentina and similar contexts.

Conclusion

This study examined the integration of sustainability into university extension activities in Argentine HEIs, identifying areas of progress alongside significant challenges. Public HEIs show a greater commitment to sustainability, demonstrated through a higher number of extension programs, volunteer initiatives, and strategic partnerships compared to private institutions. A key finding is that leadership and the explicit incorporation of sustainability into the institutional mission are crucial to successful implementation.

However, there is still fragmentation in the adoption of sustainable practices across HEIs. To enhance sustainability within university extension, it is essential to strengthen leadership, develop coherent national policies, and establish dedicated sustainability offices that coordinate and oversee these initiatives. Furthermore, fostering strategic partnerships and enhancing transparency through sustainability reporting will be vital for aligning HEIs' efforts with the SDGs and the 2030 Agenda.

Although progress has been made, the need for a systemic, coordinated approach to ensure that all HEIs can contribute effectively to sustainable development. With strong institutional commitment and strategic planning, Argentine HEIs can play a pivotal role in advancing sustainability at both the national and regional levels.

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