Strategic alignment of accredited universities and companies in response to environmental sustainability demands in Colombia

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Abstract

This article examines how Colombian universities integrate the Sustainable Development Goals (SDGs) into their strategies, comparing them with the strategies of universities and companies around the world. Using qualitative methodology and content analysis, the article identifies the presence of SDGs in university strategies and related business actions in Colombia and internationally. The results reveal that Colombian universities integrate the SDGs in a manner similar to international universities, demonstrating a strong correlation between business actions in Colombia and abroad with respect to the SDGs. However, the correlation between SDGs integration in university strategies and business actions is moderate globally and weak in Colombia.

Keywords: Sustainable Development Goals (SDGs); strategy; higher education institutions.

1. INTRODUCTION

In 2016, the International Association of Universities (IAU) conducted the Global Survey on Higher Education and Research in Sustainable Development (IAU, 2017), which received responses from 120 individuals around the world holding leadership positions in higher education institutions at the time. The study found that 42% of respondents had some knowledge of the Sustainable Development Goals (SDGs) and 69% identified integral actions related to the SDGs within their institutions. However, when asked about the link between the SDGs and their strategic plan, only 34% said SDGs were part of the plan, while 28% responded negatively and 38% were in the process of including them. In 2020, the IAU conducted a second survey (Mallow *et al.*, 2020), which had a much higher participation rate, with 536 respondents from 428 higher education institutions in 101 countries. 33% of the total said that the SDGs were part of their strategic plan, showing that there had been no significant change since the previous survey in 2016.

The survey shows that, in Latin America, 31% of universities have linked the SDGs to their strategic plans, 24% have not done so, 38% say they are in the process of doing so and 7% do not know whether the SDGs are included in any way. These results rank Latin America as one of the regions with the lowest percentage of universities linking SDGs to strategic plans. Benayas and Blanco-Portela (2019) conducted a systematic review of 73 articles on sustainability in Latin American universities and found that most publications were related to Brazil (47.9%), followed by Mexico (16.5%) and Argentina, Costa Rica and Chile in third place. In contrast, Colombia was at the bottom of the list with only one publication.

Bedoya-Dorado *et al.* (2021) published an analysis of Colombian universities' strategic platform (mission and vision) with respect to sustainability. One of the main findings was that approximately 56% of the Colombian higher education institutions surveyed are aligned with the SDGs, particularly SDG 13 on Climate Action, together with other participants, specifically the public sector and also the private sector. This finding suggests that, although the link between the SDGs and the strategy of Colombian universities is still in its infancy, it is a topic of interest for institutions, serving as a basis for coordination with other sectors and participants.

Considering that Colombia ranks among the countries with the lowest research output with respect to the link between SDGs and university strategy and the interest shown by institutions in this topic from a strategic point of view, and as a basis for developing strategic relationships and coordination processes, it is important to ask: To what extent is there a strategic alignment between the structure of the strategic platform of accredited high-quality universities and the actions undertaken by private companies in Colombia? And, considering the Latin American region lags behind other parts of the world, it is important to establish a comparison with this same phenomenon at the global level.

In this regard, the article begins by presenting the state of the art, which is divided into three parts: *i)* Organizational environment and strategy, *ii)* Academia as a leading participant in sustainable development, *iii)* Strategic management in higher education institutions and sustainable development. Next, the methodology used in the study is presented. Finally, we present the results of the link between the SDGs and the strategic platform in Colombian higher education institutions are presented, along with Colombian universities' responses to the SDGs in the business environment. Finally, we present the discussion and results.

Organizational environment and strategy

Organizations are part of an environment that impacts them and, maintaining proportions, they impact it as well. The classic perspective of organizational analysis understood organizations as closed systems that remained isolated from any external influences. However, the evolution of organizational theory soon led to an understanding of the value of environmental analysis and its impact on the organization. Since the General Systems Theory (Bertalanffy, 1989), the notion of the organization as an open system that interacts with its environment has been more widely understood.

The world has experienced periods of both certainty and uncertainty, which have shaped organizational analysis and its relationship with the environment. However, moments of certainty offer concrete frameworks for action that allow organizations to act with certainty in the medium and long-term, under a '"simple" logic of cause and effect (Etkin and Schvarstein, 2005).

Nevertheless, the interaction between organizations and their environment is not necessarily characterized by certainty, but rather by the complexity of the environment itself and its interaction with the organization. According to Morin's theory of complexity (2001), this relationship is based on organizational recursion, whereby the organization and the environment influence each other, in contrast to the logic of balance and stability pursuant to which organizations were studied for some time (Navarro, 2000, Ferrandon, 2004).

According to Lemaire (2013), the environment is a source of influences, pressures and constraints that will impact management decisions and the evolution of the organization. He categorizes an organization's macro environment based on "three forces of the environment": political-regulatory, socioeconomic and technological. These forces are highly dynamic and characterized by uncertainty, understanding the environment as a fundamental element of the organization and its analysis as the heart of strategic management. The environment influences decision-making processes in organizations, as well as the definition of their structure and strategies by configuring demands from the "forces of the environment" and the uncertainty that surrounds them (Elenkov, 1997; Baum and Wally, 2003; McCarthy *et al.*, 2010; Meinhardt *et al.*, 2018).

Academia as a leading player in Sustainable Development

A characteristic feature of the environment is the interaction and presence of a wide variety of participants who continually work together to meet society's demands. One of the best-known coordination mechanisms has been the "triple helix" model, which brings together academia, business and the public sector to work together to meet society's needs, according to the model proposed by Etkowitz and Leydesdorff (2000) and Leydesdorff and Etzkowitz (2003), which states that innovation arises from the collaboration of these three players, each with distinct yet complementary roles. As the participants interact, their functions become intertwined, generating new forms of organization and knowledge, with this dynamic being adaptive to the context.

In this respect, the triple helix model has been gaining ground in academic discourse and has also begun to gain visibility in the business and public spheres. According to the seminal authors of the model, these are the areas that work together to impact society. This model integrates the generation of new knowledge and innovation processes resulting from the public, private and

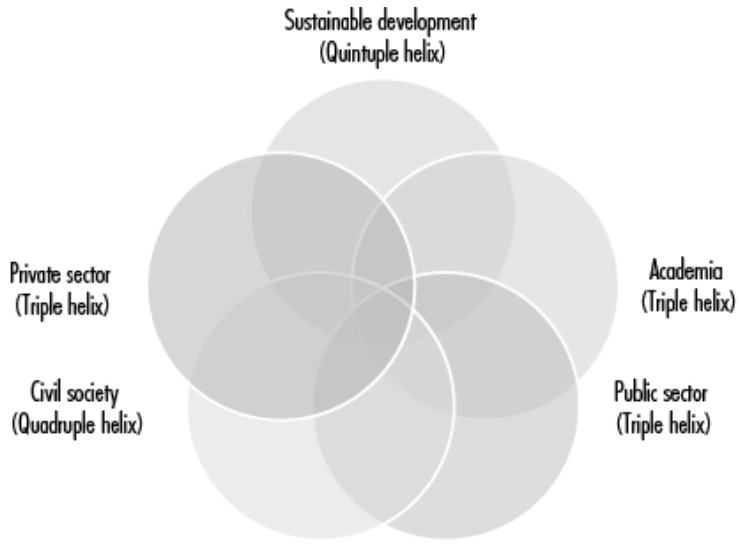
academic sectors, through networks of relationships, connections and (re)configurations. This results in a complex system that responds to the needs of the environment, with synergy being the key element that strengthens collaboration between universities, businesses and the public sector because this interaction allows participants to share functions and generate hybrid spaces, driving innovation. Synergy transforms traditional relationships into strategic dynamics that favor knowledge-based development (Etzkowitz and Leydesdorff, 1997).

Etkowitz and Leydesdorff (2000) established that this model transcends the generation of new knowledge from a traditional perspective and brings together sectors not previously involved in this process. However, knowledge production models have also evolved and, in this respect, Hemlin *et al.* (2004) and Carayannis *et al.* (2021) propose integrating, connecting and combining various participants and knowledge production scenarios to generate new knowledge in creative knowledge environments.

To achieve this, even more participants need to be involved in the process. This is how the “quadruple helix" emerged, including civil society as a key player in generating new knowledge and innovation processes (Carayannis and Campbell, 2016 and 2017). However, the evolution of the model must take into account not only the key players involved in the processes, but also the social demands that arise. The "quintuple helix" model emerged as a response to this need, incorporating an additional component with respect to the possibility of generating new knowledge and innovative processes with sustainability criteria (Carayannis *et al.*, 2018).

While the triple helix was spearheaded by the knowledge economy, the quadruple helix focused on a knowledge society that democratizes access to and participation in this process. The quintuple helix goes further, addressing the need to advance these processes with an ecological component and a Sustainable Development perspective. It seeks to generate positive impacts on the environment, turning the process into an engine of innovation and creating an “ecosystem" that flows around Sustainable Development (Carayannis *et al.*, 2021). The components of the model and their involvement can be seen below (see Figure 1).

Figure 1. Components of the quintuple helix model



Source: prepared by the authors based on Carayannis et al. (2021).

Strategic management in higher education institutions and sustainable development

Organizations must adapt to changes in their environment and strategic planning is one element that allows them to do so effectively. In this respect, companies have adopted sustainability as a tool for effectively adapting to the environment, connecting interested parties and generating a sustainability-focused ecosystem (Góes *et al.*, 2023). In turn, universities are organizations whose environment strongly impacts organizational dynamics, so they must respond to social demands at the local, national, regional and global levels, incorporating this into their strategy. One of the most critical issues in recent years is the contribution to sustainable development (Anggalini *et al.*, 2022).

In 2015, the United Nations (UN) established 17 Sustainable Development Goals (SDGs) as part of its 2030 Agenda, which integrate economic, social, and environmental dimensions (United Nations, 2015). The 17 goals and 169 targets, which the UN declared to be integrated and indivisible, imply an integral vision when addressing the fulfillment of the SDGs, with respect for Human Rights and the freedom of countries to implement them based on their needs.

The SDGs originate from the report “Our Common Future" (1987), which introduced the concept of sustainability as the ability to meet the needs of the present without compromising the needs of future generations. Later, in 2000, the Millennium Development Goals (MDGs) were established, focused on reducing poverty and improving health and education, though their scope was limited to developing countries. The need for a more robust agenda subsequently led to the Rio+20 Summit in 2012, where it was agreed to develop the SDGs as an evolution of the MDGs. This materialized in 2015 when the UN General Assembly adopted the 2030 Agenda, the result of a participatory process involving governments, civil society, the private sector and international organizations. This marked a milestone in global cooperation for sustainable development (Mayoral *et al.*, 2020).

Although education is part of one of the SDGs (SDG 4) and one target in particular refers to the need to ensure equitable access to higher education, the role of universities goes beyond this. It is estimated that around 80% of decisions regarding the economy, politics and industry worldwide are made by individuals with university degrees (Tilbury, 2011; Tawil and Locatelli, 2015), which represents a significant commitment for universities. Given their responsibility to educate individuals who will encounter major changes in society, universities must transform themselves and align with the SDGs (Benayas and Blanco-Portela, 2019).

From a strategic point of view, the inclusion of SDGs must transcend training processes, understanding that universities are in a position to support the implementation of SDGs through research and outreach to society (El-Jardali *et al.*, 2018; Mawonde and Togo, 2019). According to El-Jardali *et al.* (2018), integrating universities with other social players in order to implement and fulfill the SDGs will align them strategically with social demands. Internally, the SDGs create universities with greater demand for sustainability-related training processes, the structuring of international standards for responsible universities, the possibility of building a framework to demonstrate impact, diversifying sources of income and greater engagement (Kestin *et al.*, 2017).

Authors such as Owens (2017) propose strengthening alliances between academia, other participants and their environment in order to promote research and innovation in areas critical to Sustainable Development. Harris *et al.* (2017) found that the incorporation of sustainability into university strategy is influenced by the areas of greatest interest in the geographical regions where each institution operates. In this respect, the way this is linked varies between Europe, the United States and Africa, providing evidence of a direct relationship between the strategic approach adopted and the regional environment in which each university operates.

In this respect, the following research question should be considered: To what extent have SDGs been linked to the strategy of accredited companies and universities and how are SDGs deployed strategically in assimilated companies and universities in order to identify whether there is alignment between different parties belonging to a “quintuple helix ecosystem" around sustainable development?

2. METHODS AND MATERIALS

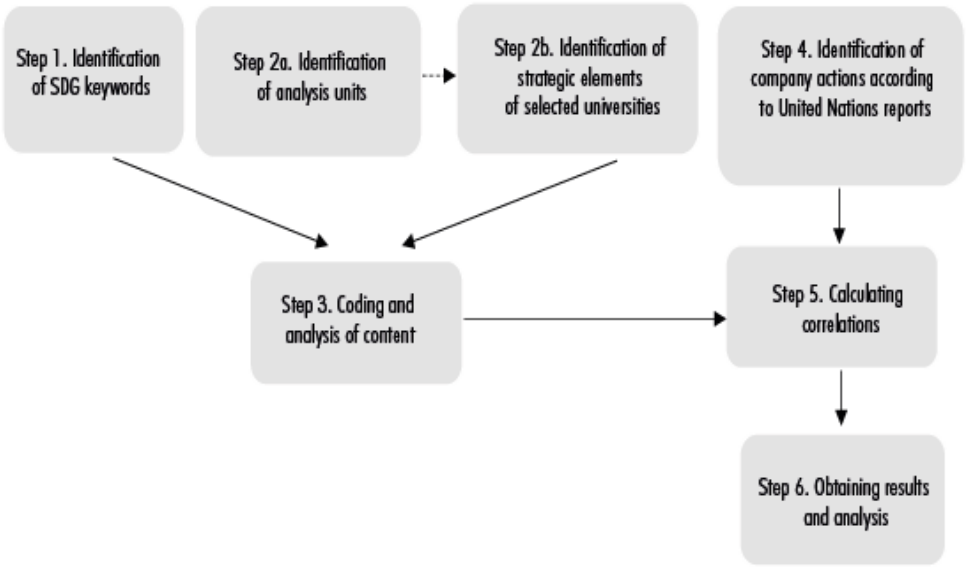
This research uses a qualitative methodology with content analysis. According to Noguero (2002), content analysis does not aim to analyze the style of the text, but rather the ideas expressed in order to identify meaning. The aim of this method is to replace the subjective and interpretive study of texts with standardized procedures that seek to objectify and convert the content found in specific documents or texts into data for analysis by researchers (Sánchez-Riofrío *et al.*, 2017). A fundamental feature of content analysis is its degree of flexibility, given that coding can be derived from theory or from categories established based on the material obtained and the context of the research (Kuckartz, 2019). Similar works (Furrer *et al.*, 2008; Sánchez-Riofrío *et al.*, 2015) have referred to the steps followed for structuring this research (see Figure 2).

Step 1. Identification of keywords for each SDG

For 2020, “Elsevier's data science teams created enhanced search queries for 16 of the 17 SDGs and augmented them with a machine learning (ML) model to improve the integrity of the documents assigned to each SDG" (SciVal, 2022, p. 3), which has been

used by the Times Higher Education (THE) ranking as part of its impact rankings. Elsevier allows users to consult a keyword analysis for each of the 16 selected SDGs through the construction of word clouds. Using this tool, the most representative keywords for each SDG were selected, with four to six keywords established for each goal (see Table 1).

Figure 2. Research steps



Source: prepared by the authors.

Table 1. Keywords identified by SDG

Sustainable Development Goals	*Keywords*
1. No poverty	Poverty, Inequality, Well-being, Social Inclusion.
2. Zero hunger	Nutrition, Agriculture, Climate Change, Food Security.
3. Good health and well-being	Health, Social Security, Diseases, Quality of Life.
4. Quality education	Training, Learning, Quality, Excellence, Teaching.
5. Gender equality	Gender, Gender Equality, Empowerment, Diversity.
6. Clean water and sanitation	Water, Waste, Water Resources, Sanitation.
7. Affordable and clean energy	Energy, Sustainable Energy, Renewable Energy, Emissions.
8. Decent work and economic growth	Economic Growth, Sustainable Development, Human Capital, Labor, Entrepreneurship.
9. Industry, Innovation, and Infrastructure	Industry, Technology, Innovation, Business, Productive Sector.
10. Reduced Inequalities	Poverty, Vulnerable Groups, Income, Inequality, Equity.
11. Sustainable Cities and Communities	Smart Cities, Air Quality, Waste, Cultural Heritage.
12. Responsible Consumption and Production	Social Responsibility, Sustainability, Circular Economy, Consumption.
13. Climate Action	Emissions, Renewable Energy, Climate, Environment.
14. Life Below Water	Oceans, Microplastics, Marine, Maritime.
15. Life on Land	Terrestrial Ecosystems, Environmental Protection, Biodiversity, Agriculture, Farming.
16. Peace, justice, solid institutions	Rights, Peace, Democracy, Conflict, Justice.

Source: prepared by the authors based on SciVal (2022).

Step 2a. Identification of units of analysis

The central focus of the research is on accredited universities in Colombia (68 institutions) and also uses the top 50 universities from the Times Higher Education (THE) ranking, located in the United States, England, Scotland, Australia, Switzerland, Sweden, Belgium, China, France, Germany, Hong Kong, Japan and Singapore, to provide a global benchmark for comparing the situation in the two analyzed countries.

Step 2b. Identification of fundamental aspects of the strategic platform

The inclusion criteria for selecting elements for analysis are that they relate to mission, vision, values and strategic objectives, taken directly from information provided by the institutions analyzed.

Step 3. Coding and analysis of selected content

Two researchers analyzed the selected content using the criteria mentioned in Step 2b. The coding must correspond to the previously selected categories, for which the keywords identified in Step 1 are used. These keywords were cross-referenced with the strategic elements of the selected universities (Steps 2a and 2b), assigning a value of 0 (absence) or 1 (presence) to identify the link between each SDG and the institutional strategy of the selected universities. This process identified which objectives are represented in each higher education institution analyzed. A manual review was subsequently carried out for each element analyzed because finding synonyms or similar expressions containing the desired meaning represented an opportunity to include more elements in the analysis.

Step 4. Identification of company actions according to reports to the United Nations

As part of its monitoring of compliance with the objectives set out in the Global Compact, the United Nations receives reports from companies in the countries involved, detailing their actions in relation to the SDGs (United Nations, 2022). Based on this, information is extracted that allows the prioritization of Colombian and global companies in relation to the objectives to be identified, based on the actions taken in relation to each of them.

Step 5. Calculating correlations

After obtaining the percentages for each objective to determine their presence in the universities' strategy (Step 3), the correlation between these figures and the figures obtained for companies in each of the three analyzed zones (Step 4) are calculated.

Step 6. Obtaining and analyzing results

The percentages obtained are the result of the analysis carried out in Step 3. Once the results indicating how each analyzed institution does or does not link to any element related to the objectives are available, a global sum is calculated for each goal and for Colombia. The involvement of the objectives for each of the zones listed in the analysis is then identified in a grouped form.

3. RESULTS

SDGs in the strategy of Colombian universities

When reviewing the missions, visions, values, institutional policies and strategic objectives of all the analyzed universities, it was found that 100% of the institutions analyzed include SDG 4 on Quality Education in their strategies, in line with the missions of higher education institutions. The figures below show the percentage of universities that link elements of the SDGs to their strategy, broken down by each goal (see Table 2).

Table 2. Results by group

SDG	Top 50 universities according to the THE Ranking(%)	Colombia Universities (%)
1	20.00	45.60
2	8.00	0.00
3	48.00	30.90
4	**100.00**	**100.00**
5	**74.00**	36.80
6	14.00	1.50
7	12.00	1.50
8	**52.00**	**55.90**
9	**82.00**	**64.70**
10	40.00	36.80
11	4.00	2.90
12	40.00	45.60
13	22.00	27.90
14	2.00	4.40
15	6.00	5.90
16	18.00	**76.50**

Source: prepared by the authors.

As shown in Table 2, for the group of universities in the THE Top 50 ranking, there is a commitment to SDG 9 on Industry, Innovation and Infrastructure, present in 82% of the institutions studied, demonstrating efforts to position educational institutions as a driving force in society. SDG 5 on Gender Equality is second with 74%, which is a highly relevant issue in today's educational institutions. Academic progress is evidenced by the increased participation of women as researchers and in management positions, as well as in the development of gender-related research projects. Finally, SDG 8, Decent Work and Economic Growth, is present in 52% of institutions, recognizing the importance of universities that train students for the jobs of the future.

For the 67 accredited Colombian universities analyzed in this study, 100% of institutions link SDG 4 to their strategy and it is worth noting that the SDGs that make up the Top 3 are: SDG 8 (Decent work and economic growth), SDG 9 (Industry, Innovation, and Infrastructure) and SDG 16 (Peace, Justice and Strong Institutions). Regarding the latter, there is a wider gap, with a greater presence of this goal in Colombian universities (76.5%) than in the THE Top 50 group (18%). This is mainly due to the response of Colombian universities to a context of peacebuilding, which has dominated public debate in the country over the last decade, demonstrating the connection between Colombian universities and their environment. This analysis is based on the 2022 THE Impact Ranking (2022), which measures the performance of universities with respect to the SDGs, by taking into account contributions in research, governance, outreach and teaching.

Colombian HEIs and the business sector's response to the SDGs

As mentioned, coordination with the environment is essential, given that it is important to evaluate how companies in Colombia and companies on a global level are acting in relation to the SDGs, to review their correlation with the participation of elements related to the SDGs in university strategy.

The United Nations receives a report that identifies the number of actions that companies are taking with respect to each SDG, categorized by country, region and globally (United Nations, 2022). Figures for Colombia and the world are presented below, allowing for a comparison between the response of Colombian companies to the challenges posed by the SDGs and the global response of companies to provide a frame of reference for strategic guidance with respect to the issues raised by these goals (see Table 3).

Based on these figures, we calculate the correlation coefficient between the actions that companies globally undertake to contribute to the SDGs and the actions that Colombian companies undertake in the same respect. The result, 0.9459, indicates a strong correlation and suggests that companies have similar responses to the SDGs, which in turn could indicate a sectoral response rather than a contextual one. However, this aspect emerges as a future research opportunity to understand the phenomenology presented in greater depth.

Table 3. Companies reporting actions according to SDGs

SDG	*SDG global companies*	*SDG Colombian companies*
SDG 1	13.110	495
SDG 2	10.820	310
SDG 3	26.735	807
SDG 4	24.039	734
SDG 5	29.386	808
SDG 6	16.753	663
SDG 7	19.263	624
SDG 8	32.688	1 092
SDG 9	20.805	609
SDG 10	16.796	472
SDG 11	16.337	507
SDG 12	26.581	775
SDG 13	27.078	824
SDG 14	9.515	192
SDG 15	15.768	545
SDG 16	17.859	644
Correlation coefficient	0.945911501	

Source: prepared by the authors based on the United Nations (2022).

Next, we calculated the correlation with respect to the percentage of universities that included elements related to the SDGs in the mission, vision, values and strategic objectives of the universities studied for each objective, with two groups: accredited Colombian universities and universities in the THE Top 50 (see Table 4).

Table 4. Comparison of SDGs between global universities and Colombia

	SDGs THE Top 50 Universities	*SDGs Colombian Universities*
SDG 1	10	31
SDG 2	4	0
SDG 3	24	21
SDG 4	50	68
SDG 5	37	25
SDG 6	7	1
SDG 7	6	1
SDG 8	26	38
SDG 9	41	44
SDG 10	20	25
SDG 11	2	2
SDG 12	20	31
SDG 13	11	19
SDG 14	1	3
SDG 15	3	4
SDG 16	9	52
Correlation coefficient	0.764554518	

Source: prepared by the authors based on the United Nations (2022).

The correlation calculation between the SDG link of the top 50 universities in the THE ranking and the SDG link of Colombian universities results in a figure of 0.7645. This may indicate that, in the case of higher education institutions, although there may be trends in the higher education sector, it could be worthwhile exploring the possibility of identifying differential responses in line with the needs of the environment in which each institution operates (see Table 5).

Table 5. Correlation between SDGs of universities and SDGs of companies at the global level

	SDGs Top 50 THE Universities	*SDGs Global Companies*
SDG 1	10	13.110
SDG 2	4	10.820
SDG 3	24	26.735
SDG 4	50	24.039
SDG 5	37	29.386
SDG 6	7	16.753
SDG 7	6	19.263
SDG 8	26	32.688
SDG 9	41	20.805
SDG 10	20	16.796
SDG 11	2	16.337
SDG 12	20	26.581
SDG 13	11	27.078
SDG 14	1	9.515
SDG 15	3	15.768
SDG 16	9	17.859
Correlation coefficient	0.62913718	

Source: prepared by the authors.

When observing the presence of elements related to the SDGs in the strategy of universities with respect to the actions of companies in relation to each global goal, a correlation of 0.629 can be observed, indicating that there is a moderate correlation ($0.5 < r < 0.75$).

When analyzing the presence of elements linked to the SDGs in the strategy of Colombian universities, with respect to the actions of companies in relation to each SDG in Colombia, a correlation of 0.4506 can be observed (see Table 6). Based on the results presented, various conclusions can be drawn, as outlined below.

Table 6. Correlation between SDGs of universities and SDGs of companies in Colombia

	SDG Colombian universities	*SDG Colombian companies*
SDG 1	31	495
SDG 2	0	310
SDG 3	21	807
SDG 4	68	734
SDG 5	25	808
SDG 6	1	663
SDG 7	1	624
SDG 8	38	1 092
SDG 9	44	609
SDG 10	25	472
SDG 11	2	507
SDG 12	31	775
SDG 13	19	824
SDG 14	3	192
SDG 15	4	545
SDG 16	52	644
Correlation coefficient	0.450674008	

Source: prepared by the authors.

The correlation result for the relationship between what happens in companies is 0.9459. This indicates that there is an almost perfect alignment between Colombian companies' actions with respect to the SDGs and companies' actions on a global level. This suggests a similar trend in response to the SDGs between both groups of private organizations analyzed.

When calculating the correlation between the group of universities in the Top 50 of the THE ranking, the result is 0.7645. In this specific case, there are variations that can be explained by the interrelationship between the higher education institutions analyzed and their context. In the case of Colombia, society is facing high levels of poverty and various violent processes that have resulted in peace agreements and the structuring of institutions to support those agreements. In this respect, universities have responded to these needs, becoming key players in the social, political, cultural and economic development of the country. Consequently, their behavior differs from that of the THE Top 50 universities with respect to SDG 1 (No Poverty) and SDG 16 (Peace, Justice, and Strong Institutions).

When reviewing the correlation between SDGs in the THE Top 50 universities and the actions companies globally take to address each SDG, a result of 0.6291 was obtained. This means that, although there is alignment between companies' activities related to the SDGs and how these are linked to universities' strategies, substantial differences prevent establishing a correlation that would suggest joint and coordinated action between the two groups of organizations.

The correlation between the SDGs linked to the strategy of Colombian universities and the actions linked to SDGs in Colombian companies yields a result of 0.45067. While there is a link between Colombian companies' actions and the strategic platform of

accredited universities in Colombia, this relationship is weak and is limited to certain aspects, revealing a lack of coordination and the absence of an “ecosystem" that acts in accordance with the SDGs in Colombia.

The following SDGs demonstrate aligned behaviors between companies and universities: SDG 4 Quality Education, SDG 8 Decent Work and Economic Growth, SDG 9 Reduced Inequalities and SDG 16 Peace, Justice and Strong Institutions. The response to these goals reflects coordination with situations that concentrate the greatest demands of Colombian society, which require collaboration among different participants to achieve effective responses and solutions.

Meanwhile, SDGs have been identified in which there is no alignment between accredited universities and companies: SDG 2 Zero Hunger, SDG 6 Clean Water and Sanitation, SDG 7 Affordable and Clean Energy, SDG 11 Sustainable Cities and Communities and SDG 15 Life on Land. These issues, for the most part, require a technical approach to offer solutions, so the participation of universities could enrich the impact through research and social outreach.

4. Conclusions

The objective of this article was to address the extent of strategic alignment between the structuring of high-quality accredited universities’ strategic platforms and private companies’ actions in Colombia. Taking into account the Latin American region's lag behind other parts of the world, the article also established a comparison with this same phenomenon at the global level. The results presented in this article allow us to conclude that there is still no clear alignment between business and academic parties, and that a window of opportunity is opening up. Companies can take advantage of strategic alliances with higher education institutions that support their actions for the development of business activities aligned with the SDGs, guaranteeing access to new markets. In turn, higher education institutions can strengthen their research and outreach capacities through links with the productive sector, generating greater visibility for their research activities and developing inputs that allow them to adjust their academic and research offerings based on relevance criteria. As future lines of research to be addressed, it is recommended that a more detailed analysis of each SDG be carried out in Colombia’s most prominent universities, particularly the accredited ones with the largest number of research groups and researchers. This will help identify how these institutions address sustainability in their academic, research and strategic practices.

In Colombia, coordination can be observed in areas critical for the country's development. These areas could be the starting point for a “five-helix ecosystem" that works effectively to provide assertive, relevant responses. In areas with less coordination, there are technical requirements that could be met through the aforementioned effective coordination. Developing effective public policies that encourage this coordination is essential for consolidating and maintaining it as a system.

Coordinating different participants in a “quintuple helix" ecosystem requires a solid public policy that encourages these partnerships to seek multisectoral solutions to social demands. However, strategic alignment between these participants is key to initiating effective actions that contribute to the country's sustainable development, from a strategic point of view within each participant's sphere of action. In terms of research opportunities, the relationships between the other “helices" could be explored in greater depth. While this study focuses on academia, the private sector and sustainability as the central axis of the model, the role of social organizations and private sector entities must be understood in order to propose more complex and holistic coordination strategies.

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