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Methodology for Stakeholder Prioritization in the Context of Digital Transformation and Society 5.0

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Abstract: This paper addresses a pragmatic and well-articulated qualitative methodology for the identification, prioritization, and consultation of stakeholder groups for a higher education institution as a key element for the organization in the context of digital transformation and Industry 5.0. First, the identification phase required technological surveillance and competitive intelligence, which allowed for defining the organization's stakeholders and their characteristics. Then, the prioritization phase was performed to determine the stakeholders that potentially will have the greatest impact on achieving the institution's strategic objectives to the targets of the Sustainable Development Goals prioritized by the institution, and those who will be most affected (positively or negatively) by the HEI activities. Finally, different methods and technological tools were used for consulting internal and external stakeholders, according to the type of relationship with each group, which allowed the understanding of the perceptions of different stakeholder groups on issues such as gender equity, mental health, regenerative economy, and diversity training. The results are then presented in terms of organizational context, where the concept of stakeholder group was defined by the dynamics of the selected HEI; the prioritized stakeholders include students, employees, academic and research sector, public sector, business sector, social sector, community, archdiocese and diocese, alumni, donors, and benefactors. This approach enabled the identification of issues that became a priority in the university's actions towards the future. Although the presented methodology is mainly qualitative, which can represent a high degree of subjectivity, the stakeholder prioritization exercise provides organizations with inputs for decision making aligned with their needs and expectations. Using such a methodology can help the organization to experience structural changes reflected in improved strategic alignment, understanding, and satisfaction of stakeholders' expectations and needs, enhancement of reputation, risk and conflict mitigation, and the consolidation of long-term healthy and trustworthy relationships, in the context of Society 5.0, where human-centered solutions are expected.

Keywords: stakeholders prioritization; sustainable corporate governance; corporate strategy; stakeholder responsibility; Industry 5.0; Society 5.0

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1. Introduction

In 2015, all the member states of the United Nations (UN) approved the 2030 Agenda for Sustainable Development [1]. The 2030 Agenda aims to end poverty, protect the planet, and ensure prosperity and peace for all human beings [2,3]. The 2030 Agenda, as a global purpose, has required the construction and modeling of different mechanisms that link scenarios of environmental and social order to be more precise in fulfilling its objectives and set goals. The main backbone of the UN Sustainable Development Program is constituted

by 17 main Sustainable Development Goals (SDGs), which aim to address current global issues in the areas of economic, social, environmental, and political security [4,5]. In these guidelines generated by the UN through the 2030 Agenda for transforming the world, there is a specific call for the education sector, mainly higher education institutions (HEIs), as they play a key role in increasing students' knowledge about sustainability, transforming their attitudes, and motivating them to promote or participate in sustainable behaviors [6].

The accelerated pace of the world's growth due to business models, digital transformation (DT), process innovation, and other deployed forms of social, economic, and environmental dimensions of sustainability, has generated a temporal and functional categorization of each stage. The term "Industry 5.0" has been included in such sustainable development dialogue as a concept complementing the well-known term "Industry 4.0", since this concept has recently emerged to portray the vision of a future that uses modern technologies for the benefit of society [7,8]. Advocates of Industry 5.0 believe that Industry 4.0 is not the appropriate framework for achieving sustainable development [9], and the European Commission has presented a vision for the future of the European industry in its policy report, named Industry 5.0, which has three central concepts: human-centricity, sustainability, and resilience. The purpose of such central concepts is to integrate a complementary vision between the digital industry and society. Hence, the concept of Society 5.0 also emerges, which aims to balance economic advancement with the resolution of social problems [10,11]. The goal of Society 5.0 is to contribute to the development of an intelligent and human-centric society, allowing all citizens to access a high-quality life, full of comfort and vitality, providing the necessary goods and services for people through the fusion of cyberspace and the physical world.

The integration of humanity into different sectoral environments has required transformations that directly impact the conditions of the economy, markets, digital scenarios, and other structures of social development [12–14]. From here, precise needs arise regarding the effective linkage of new transformation pathways, focusing on the benefits and possibilities of improving human and natural environments [15]. To achieve this, it is necessary to transcend the mere adaptation of organizations to present changes and to generate ecosystems based on a culture of promoting innovation, dynamics of leveraging the digitization of things, and disruptive leadership focused on human capital. As Khairy et al. [16] point out, "In today's accelerated and constantly changing business environment, characterized by rapid technological advancements, unpredictable market conditions, and changing customer expectations, organizational agility has become a critical factor for long-term success".

The transformation from the Fourth Industrial Revolution (Industry 4.0) to 5.0 is currently an ongoing process and is characterized by the integration of advanced technologies such as artificial intelligence, virtual and augmented reality, and advanced robotics, among others [17]. Industry 5.0 opens a scenario of inclusion in issues that directly contribute to environmental sustainability, such as efficient waste management, the use of alternative energies, and the optimization of resource use [18]. Furthermore, it focuses on promoting the formulation of industrial systems that directly impact improving human conditions in their individual and collective forms, such as social well-being, the inclusion of governance principles such as transparency and participation, social appropriation of knowledge, and the creation of standards for social and environmental development [19]. Hence, Industry 5.0 represents a historical moment where it is essential to ensure that technology is used for social welfare purposes [20].

Consequently, skills encompassing emotional intelligence, resilience, empathy, creativity, and critical thinking will emerge as crucial competencies to cultivate a productive and skilled workforce, prepared to meet future demands that include human–machine interactions [21]. Humans excel in areas such as interpersonal interactions, intuition, and complex decision making. Nonetheless, although humans and machines can arrive at the same answer, their different thinking processes result in different paths to conclusions. Building on the aforementioned, it is important to identify those stakeholders who have

direct or indirect links to the actions undertaken in line with the integration between industry, its innovations, and developments with the fulfillment of the 2030 Agenda [22]. Therefore, identifying expectations and demands of stakeholders, and integrating them into the strategy of organizations, is a powerful tool for the success of socially responsible positioning [23–25].

As mentioned by Colle [26], stakeholders are all those identifiable groups or individuals on whom an organization depends for its survival, sometimes referred to as primary stakeholders: shareholders, employees, customers, suppliers, and key government agencies. However, on a broader level, a stakeholder is any identifiable group or individual who can affect or be affected by the organization's performance in terms of products, policies, and work [27]. Colle [26] argues that stakeholder marketing is slowly merging with the broader thinking that has emerged in stakeholder management and ethics literature over the past quarter century. However, the prevailing view of stakeholders advocated by many marketing specialists remains primarily pragmatic and company-centered. The position advocated here is that stronger forms of stakeholder marketing are needed to reflect more normative, macro/social, and network-centered orientations [28].

The process of stakeholder prioritization holds pivotal importance in sustainable development, particularly within the context of digital transformation and the advent of Society 5.0. Some recent works show how this prioritization process has been conducted within different contexts, including environmental management [29], circular bioeconomy [30], textile industry [31], electric vehicle industry, [32], and research and innovation projects [33], among others. To understand the needs and expectations of stakeholders in institutions, it is necessary to establish, according to the dynamics of each organization, the concept of stakeholder groups and to compile a list of those who are impacted directly or indirectly by the institution. In the case of HEIs, universities have several stakeholders, and it is impossible to manage them all in the same way, making stakeholder management a complex issue to apply in practice [34,35]. After identifying the stakeholder groups, they should be classified to define consultation strategies and actions.

In this way, this work presents a methodology to show the direct relationship that exists between Industry 5.0 and the strategies of identification, prioritization, consultation, and dynamism of stakeholder groups to contribute to the fulfillment of the objectives and goals proposed in the 2030 Agenda. The proposed methodology has the following contributions: (i) it allows organizations to prioritize their stakeholders about the fulfillment of the 2030 Agenda for Sustainable Development, (ii) it recognizes organizational strategic goals according to their stakeholders, (iii) it is adaptable and flexible to various needs and expectations in different spatial and temporal contexts, and (iv) it is a consultative methodology that is easy to adopt for stakeholders, incorporating Industry 5.0 into decision making. The hypothesis of this work is that organizations that prioritize stakeholder groups using a pragmatic and well-articulated methodology experience structural changes reflected in improved strategic alignment, understanding, and satisfaction of stakeholders' expectations and needs, enhancement of reputation, risk and conflict mitigation, and the consolidation of long-term healthy and trustworthy relationships, in the context of Society 5.0, where human-centered solutions are expected. The organization of the paper is as follows: Section 2 contains the process for identifying, prioritizing, and consulting stakeholders. Section 3 shows the results for a higher education institution. Then, Section 4 contains the discussion, and finally, conclusions are presented in Section 6.

2. Materials and Methods

The process of identifying, prioritizing, and consulting stakeholders of an institution involves a series of steps that can be consolidated into three phases.

2.1. Phase I. Identification

The identification phase comprises three main components, which are described as follows.

- Technological Surveillance and Competitive Intelligence Study. The aim of this study is to analyze quantitative and qualitative valorization methodologies and identify the best models for stakeholder identification [36]. Databases, scientific articles, and company experiences serve as inputs for the first phase.
- Definition of Stakeholders. Based on the results of the technological surveillance and competitive intelligence study, the institution defines the concept of stakeholders and describes their characteristics and purpose. The study provides tools and context for the institution, but the institution formulates the actual concept to describe its stakeholder relationships [37].
- Stakeholder List. The final outcome of this phase is to create the preliminary stakeholder list. This list should contain stakeholders impacted by the institution [37]. It is important that this list includes the institution's mission and strategic plan, especially the strategic lines, programs, and plans.

2.2. Phase II. Prioritization

The prioritization of stakeholders is performed by identifying those who potentially will have the greatest impact on achieving the institution's strategic objectives and those who will be most affected—positively or negatively—by its activities.

Understanding stakeholders as counterparts with whom there must be assertive relationships in favor of a dynamic exchange of ideas and issues to address at the institution, an analysis exercise must be carried out for each of the prioritized stakeholder groups, based on two key variables for the identification and validation of their participation in the institution: contribution and impact. Contribution is the criterion that allows for measuring how much a stakeholder group influences the strategic lines [38], the relationship, and the contribution to achieving the prioritized Sustainable Development Goals' (SDGs) targets [39]; on the other hand, the second variable, impact, allows for identifying the benefit or the impact that stakeholders obtain in the same proposed scope [40].

The stakeholder groups described in the first phase are evaluated based on the variables: contribution and impact, applied to the strategic lines, the relationship, and the prioritization of SDGs and their targets. The rating will range from 0 to 1, with 0 being the value assigned when the criteria have no relationship with the evaluated variables, and the number 1 is assigned to the stakeholder groups that do have some relationship with these variables.

The scoring that allows for obtaining the final result of the stakeholder analysis is defined based on the following percentages:

- Contribution 50%: this percentage corresponds to 20% in strategic lines, 15% in effectiveness in strategic communication, and 15% in contributions to the targets of the prioritized SDGs.
- Impact 50%: this percentage corresponds to 20% in strategic lines, 15% in consultation and relationship, and 15% in incidence of the goals of the prioritized SDGs on stakeholder groups.

The results of the prioritization of stakeholder groups are visualized through a scatter plot, which allows for identifying the degree of contribution and the impact of each one by quadrant. Those groups located in the upper-right quadrant will be selected.

2.3. Phase III. Consultation

To promote the participation of stakeholders, different strategies for internal and external consultation must be designed. Such strategies include workshops, surveys, focus groups, meetings, among others; the use of social networks as a communication channel needs to be promoted to achieve a broader interaction where people can express their ideas and contributions more dynamically [41].

The definition of stakeholders is a joint construction, in which it is important to establish a common definition route, where different areas of the institution participate in all stages of prioritization, from identification and consultation tools to appropriate

mechanisms for collecting and analyzing results [37]. In line with this, a consultation exercise needs to be conducted with units that lead relationship matters and that have a direct impact on stakeholders. In the case of an HEI, for instance, these internal stakeholders can include Alumni, Institutional Welfare, Extension, Planning, Teaching, Communications, Marketing, Advanced Training, Research, and Internationalization, among others [42,43]; their opinion on existing stakeholder groups and the consultation methods should be consulted in this process.

3. Results

The methodology for the identification, prioritization, and consultation of stakeholder groups was applied by conducting a case study for the Universidad Pontificia Bolivariana (UPB), which is a private non-profit multicampus HEI, with headquarters located at Medellín, Colombia [44]. Such institution has been promoting the sustainability culture, by creating the Sustainability Office in 2017, and became the first carbon-neutral university in Latin America by 2018 [45].

3.1. Phase I. Identification

3.1.1. Technological Surveillance and Competitive Intelligence Study

The surveillance study carried out by the UPB's Analytics and Context Studies Office was developed in two stages: in the first one, the methods and criteria for prioritizing stakeholder groups were addressed, including the qualitative and quantitative assessment of the criteria and some general guidelines for the analysis of the resulting matrices. The second stage focused on the identification of processes for prioritizing stakeholder groups in national and international HEIs in the context of sustainability strategy; the methodologies of four HEIs were consulted: University of Antioquia [46] (local context), Simón Bolívar University [47] and EAN University [48] (national context), and Royal Melbourne Institute of Technology University [49] (international context).

The identification study yielded the following points for the first stage:

(i) Five sets of criteria for prioritizing stakeholder groups were identified: Power/Interest, Opportunity/Interest, Affectation/Influence, Power/Legitimacy/Urgency (Prominence Matrix), and a criterion integration method.
(ii) The Affectation/Influence matrix was implemented as in [50].
(iii) The criterion integration methodology was applied to the prioritization of stakeholder groups for environmental management in Sharpe's study [29], considering 10 criteria: Level of Interest, Level of Influence, Magnitude of Impact, Probability of Impact, Urgency/Temporal Immediacy, Proximity, Economic Interest, Rights, Equity, and Underrepresented/Underserved Populations.
(iv) The quantitative assessment of prioritization factors/criteria varies depending on the source.
(v) The resulting classification from the assessment process will indicate the level of appropriate treatment for the stakeholder or stakeholder group, and in general, the points of their treatment are addressed in this report.

These results represent an outcome aligned with the central proposal of Industry 5.0, where the inclusion of the human component is prioritized through the identification and prioritization of stakeholder groups, contributing to the theme of human centrality, which is one of the three main concepts of Industry 5.0. The human focus, a central value of Industry 5.0, places humans at the center of production, leading to the prioritization of human needs, ranging from health and safety to self-realization and personal growth [51].

The second stage of the identification phase yielded the following:

(i) The University of Antioquia [46] applies the Affectation/Influence matrix in its stakeholder group prioritization process in the sustainability strategy in the way reported in [50].

(ii) Simón Bolívar University [47], with the support of ARCO Consultores (a consulting company), carried out the identification and prioritization of the university's stakeholder groups in the context of materiality analysis. The work methodology included the following steps: (a) identification of university stakeholder groups, (b) validation of stakeholder groups, and (c) stakeholder group prioritization process.
(iii) The matrix proposed by EAN University [48] considers five criteria: decision making, income generation, business operation, organizational strategy, and reputation.
(iv) The Royal Melbourne Institute of Technology [49] includes the following criteria in its annual sustainability report: representation, dependency, responsibility, and influence.

The attributes related to the effect and influence of stakeholder groups are drivers of an inclusion strategy that takes into account all the components identified in the environment. In this way, resilience patterns were identified, one of the three central concepts of Industry 5.0, thus integrating the human component and the impacts of the industry and the various economic sectors. The main argument of the stakeholder theory is that an organization has relationships with various constituent groups (both internal and external) and can generate and maintain their support by considering and balancing their relevant interests [52].

3.1.2. Sectoral Analysis

An analysis of management and sustainability reports was conducted on various companies and universities to identify the most representative stakeholder groups and the most used prioritization methodologies, supplementing the results of the technological surveillance study. The selected companies are recognized for their sustainability reputation and their national leadership in stakeholders' engagement. The chosen universities were the top 5 of the QS "Universities for Environmental and Social Sustainability" ranking for 2023 [53]. The analyzed organizations and universities include Argos, Bavaria, Enka, AES, Cerrejón, Nutresa, ISA, Postobón, XM, and Uniban, University of California, University of Toronto, University of British Columbia, University of Edinburgh, and University of New South Wales (UNSW). The details of this review and analysis exercise are presented as follows.

The analysis of companies allows for the identification of various strategies they apply to characterize their stakeholder groups. These strategies include the incorporation of Environmental, Social, and Governance (ESG) criteria; the establishment of internal committees; and the creation of strategic maps from sustainable value perspectives, including shareholder value, social and environmental impact, and corporate validity. These companies periodically produce sustainability reports and validate the stakeholder groups every 3 years through materiality analysis.

- Argos: it uses specialized software to monitor external risks and opportunities related to ESG issues across different industries and peers in the construction sector. Through this process, priority stakeholder groups were identified [54].
- AES Colombia: in 2013, AES Colombia identified the most relevant stakeholder groups for the organization through a strategic work session with the AES Colombia Management Committee. During this session, each stakeholder was analyzed, focusing on the impact of the company's operations on them and their impact on the company's operations. This prioritization of stakeholder groups is validated every 3 years by conducting a materiality analysis, during which it is assessed whether there is a need to add or remove any specific group due to the impact of the company's operations and the impact these groups have on the operations [55].
- Cerrejón: it does not specify how stakeholder groups are prioritized. They have identified the following groups: employees and contractors, union members, suppliers, shareholders, customers, governmental and regulatory entities, communities, traditional authorities, non-governmental organizations, trade associations, opinion leaders, civil society, and the media. Annually, they conduct a corporate reputation study [56].

- ISA: for ISA companies, stakeholder groups consist of individuals, organizations, and institutions with whom they build and share common interests and who could be affected by the company's services or activities. The relationship between these groups and the companies is clear, visible, and legitimate [57].
- XM: their direction is based on the company's strategic map, which outlines the organization's objectives from the perspectives of sustainable value: shareholder value, social and environmental impact, and corporate validity. This is achieved through the pillars of its VIDA strategy, which stands (in Spanish) for Green, Innovation, Development, and Articulation. The impacted stakeholder groups include customers, employees, the state, suppliers, and society [58].
- Bavaria: in 2020, the parent company AB InBev conducted a materiality analysis in which they identified key social, environmental, and economic themes prioritized by their stakeholder groups. These were classified in a materiality matrix according to the degree of interest and the potential impact on the business. Civil organizations, non-governmental organizations (NGOs), buyers (retailers), and consumers, regulators, suppliers, investors, and partners are among the external actors considered in the global-level analysis. Bavaria recognizes the importance of working hand in hand with its internal and external stakeholder groups to create high-impact and sustainable projects over time. Currently, they are developing a specific materiality analysis for the operation in Colombia, which will precisely understand the interests and expectations of the stakeholder groups [59].
- Enka: the last update of the Materiality Matrix was carried out in 2021, when the most important issues for our stakeholder groups and the company were defined, which remain valid. It will be reviewed again in 2023, with the aim of including not only the issues that impact the company in its current environment but also those that could affect its future financial performance, in accordance with the new requirements of the Financial Superintendence of Colombia [60].
- Nutresa: the Corporate Governance, Risk Management, and Compliance models of Grupo Nutresa are constantly challenged by the social, political, and economic dynamics of the countries where the organization operates. Therefore, it is fundamental to have an appropriate definition and implementation of controls for the identified risks that, given the environment, could materialize and result in ethical breaches or inappropriate behaviors by third parties and the organization's personnel. This can impact the reputation, the relationship with stakeholder groups, market loss, and legal sanctions [61].
- Postobón: it understands stakeholder groups as representative sets of individuals, groups, or organizations with whom it maintains relationships of trust and credibility, in addition to commitments, in order to achieve its strategic goal of being a sustainable company [62].
- Uniban: for the consultation process, they took a sample of 509 contacts from different stakeholders and received 445 responses, representing an overall participation rate of 87%. Twenty-four percent of the surveys were conducted via email, and 76% by telephone. In these latter cases, some stakeholder groups, such as the community and banana workers, appreciated that Uniban included them in these processes [63].

The analysis of the universities reveals the positioning of the sustainability offices and the integrated work with teaching and research, and highlights the real need to produce reports using international methodologies or, alternatively, prioritize goals with a short- and medium-term scope, in line with global objectives.

- The University of California, Berkeley (UCB), has a sustainability office. The report is available on the website (it is not GRI standard) and does not present a methodology for the identification, consultation, and prioritization of stakeholder groups [64].
- The University of Toronto has a sustainability office and a 10-year strategic plan. It does not produce sustainability reports and lacks a methodology for prioritizing stakeholder groups [65].

- The University of British Columbia has a sustainability strategy based on academic offerings and research. There is a dedicated sustainability team, but they do not produce reports [66].
- The University of Edinburgh has a strategy up to 2030 and a plan that includes 32 commitments to impact the surrounding communities. They do not have a sustainability report or a differentiated strategy for stakeholder groups [67].
- The University of New South Wales (UNSW) has an environmental plan for the period 2022–2024 focused on climate change, physical infrastructure, and efficient use of resources. They have prioritized 9 of the 17 Sustainable Development Goals (SDGs). There is no information related to stakeholder groups provided [68].

3.1.3. Definition of Stakeholders

In accordance with the results of the technological surveillance and sector analysis study, the UPB consolidated the definition of its stakeholder groups; such definition was provided by the Sustainability Office, as follows: "For the University, stakeholders are the actors in the ecosystem of which the UPB is part, with whom it must relate and attend in a strategic and differentiated way through the development and transfer of its value offer, aiming to contribute to transformation, sustainability, and the achievement of everyone's purposes". This redefinition allows for considering individuals and organizations with which the UPB has a direct relationship, in accordance with its mission axes and macroprocesses outlined in the Institutional Development Plan.

3.1.4. Stakeholder´s List

The university has been developing for 87 years with the work of those who have made their contributions from different and relevant roles. For this reason, the identification of UPB's stakeholders has been an exercise valued from the methodology and recognized by its role in the university. Stakeholders have been categorized as internal or external (Figure 1). In this way, a bidirectional relationship of participation has been generated, and different alternatives of communication and consultation methods have been used to allow a continuous, effective, and close dialogue.

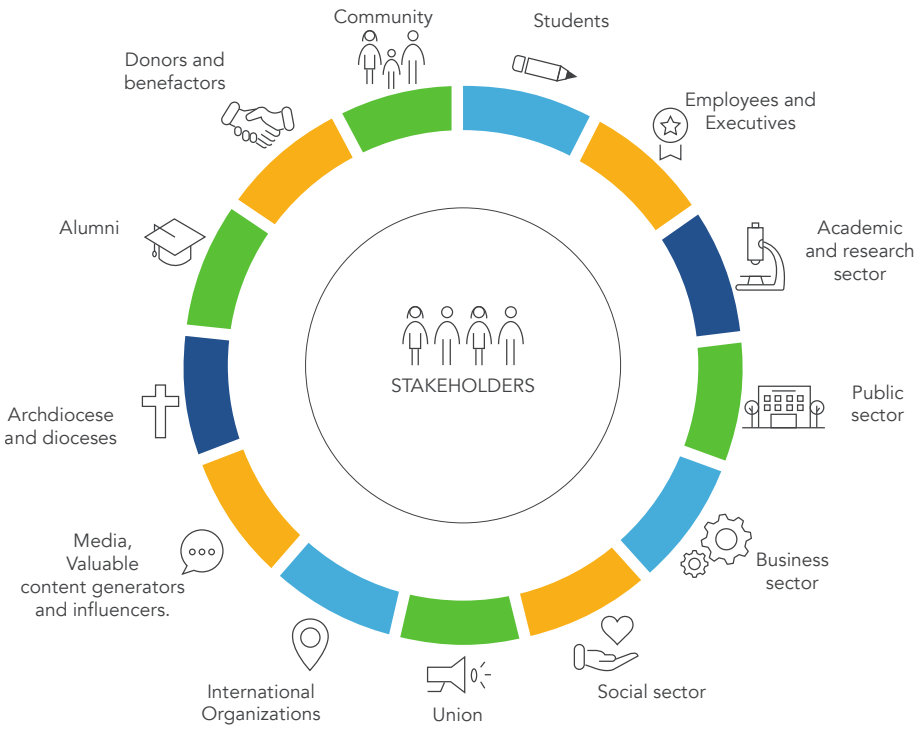

Figure 1. University stakeholders.

3.2. Phase II. Prioritization

As mentioned in the previous chapter, to prioritize stakeholder groups, evaluation criteria were specified. First, the concept of contribution and impact was defined. Following this, the university's four strategic lines were identified, and finally, the goals contributing to the sustainable SDGs prioritized by the UPB were established.

3.2.1. Contribution and Impact

Contribution is the criterion that allows for measuring how much a stakeholder group influences the strategic lines, the relationship, and the contribution to achieving the goals of the prioritized Sustainable Development Goals. On the other hand, the second variable, impact, identifies the benefit or detriment that stakeholder groups receive within the same proposed scopes.

The concept of sustainable development has been adopted by governments worldwide and has deeply rooted itself in the public psyche since its introduction in the report "Our Common Future", proposed by the United Nations World Commission on Environment and Development, often referred to as the Brundtland Commission, over 30 years ago [69].

The incorporation of criteria for achieving the SDGs' targets, based on the identification of stakeholder impacts and contributions, is a strategic mechanism that boosts sustainability as one of the central concepts of Industry 5.0. This is achieved through the actual analysis of contexts in the development of innovation and technological growth, pillars of human centrality and resilience. Although sustainable development is a global cause and society is becoming increasingly sensitive to it, there are many complex challenges, such as the need to align the expectations of various stakeholders, the growing need for innovations in sustainability, implementing social responsibility strategies, and defining and assessing sustainability performance. Furthermore, sustainable development requires collaboration in the form of integrative thinking and action [70,71].

3.2.2. Strategic Lines

The UPB has four strategic lines that were evaluated to identify how they impact and are impacted by different stakeholder groups. First, Institutional Identity strengthens the identity by developing human capabilities and competencies that inspire and guide its actions towards its purpose of social and human transformation. Second, Integral Formation achieves human development based on the values and principles of Christian humanism, covering life's dimensions, ethics, and aesthetics; it promotes scientific training with autonomous, reflective, and critical thinking for integrating care with the world. Third, Creation of Value and Social Impact generates, applies, transfers, and appropriates scientific and social knowledge in a co-creative manner with various actors to effectively contribute to solving contextual problems from local to global levels. Lastly, Sustainability ensures institutional performance based on governance and the value expectations of stakeholder groups in economic, social, and environmental fields, securing the institution's permanence through management founded on the principles of an intelligent and original organization.

3.2.3. SDG Prioritization

As it has been defined by the United Nations [72], "the Sustainable Development Goals (SDGs) represent the universally agreed roadmap to overcome economic and geopolitical divisions, restore trust, and rebuild solidarity. Many proposals are aimed at facilitating the achievement of these goals, such as reforming the international architecture, developing parameters different from Gross Domestic Product (GDP), strengthening digital cooperation, encouraging youth participation in decision-making, transforming education, creating an emergency platform, and promoting a new peace agenda".

To fulfill this roadmap, the UPB carried out a prioritization exercise in 2019 that precisely identified which of the 17 Sustainable Development Goals it impacts directly, in line with its status as a HEI (Figure 2). In this exercise, SDGs 3, 4, 6, 7, 9, 13, 16, and 17 were prioritized. For each SDG prioritized by the university, an exhaustive evaluation of the goals to which it directly contributes was carried out. For example, it was identified that, for SDG 3, the university directly contributes to 6 out of the 13 targets declared in the 2030 Agenda, contributing 46 % towards its fulfillment. Following this prioritization, in 2022, an approach was made to the targets of the prioritized SDGs to determine the institution's contributions to the fulfillment of the 2030 Agenda for Sustainable Development.

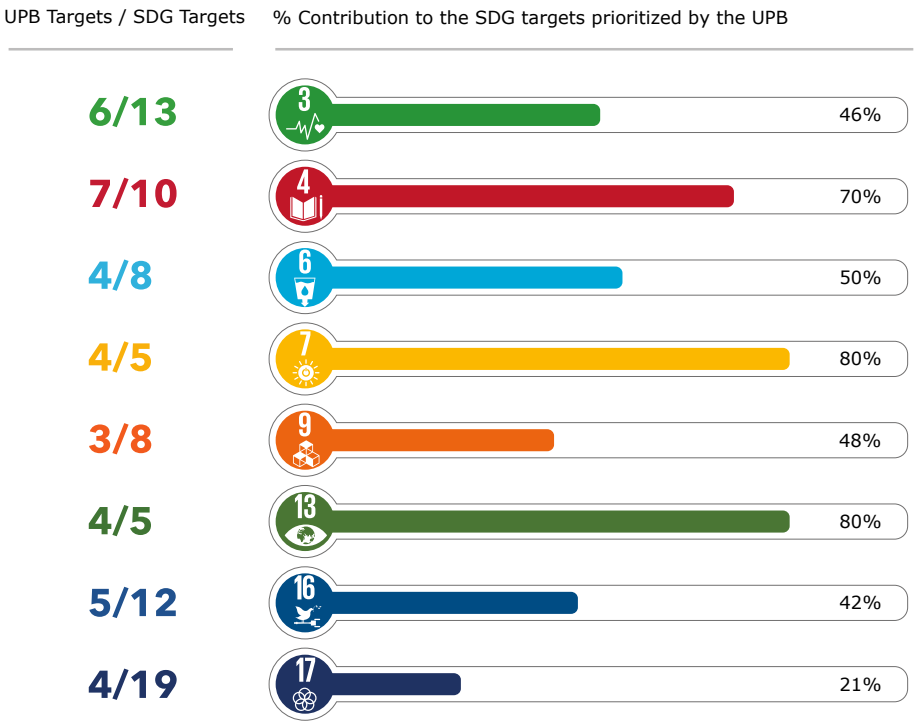

Figure 2. SDG targets prioritized by the UPB.

3.2.4. Internal Consultation

The definition of stakeholder groups is a joint construction in which it is important to establish a common route of definition, where different areas of the university participate in all the prioritization stages, from identification, through consultation tools, to the appropriate mechanisms for the collection and analysis of results. In line with this, a consultation exercise was conducted with the leading units in relationship matters and with a direct impact on stakeholder groups, such as Alumni, Institutional Well-Being, Extension, Planning, Teaching, Communications, Marketing, Advanced Training, Center for the Development of Research and Innovation (CIDI), and Internationalization Office, with the goal of knowing their opinion about the existing stakeholder groups and the consultation methods implemented with them. From this consultation exercise, six responses were obtained to the question, would you add any other stakeholder group? The consulted leaders unanimously responded no. For the other two questions about removing any stakeholder group, responses are shown in Figure 3, and responses on proposals for consultation methods to implement are shown in Figure 4. This last figure shows that the most appropriate consultation mechanisms for the stakeholders are consultation surveys and workshops, followed by a relevance validation exercise, with digital media and focus groups being the last option.

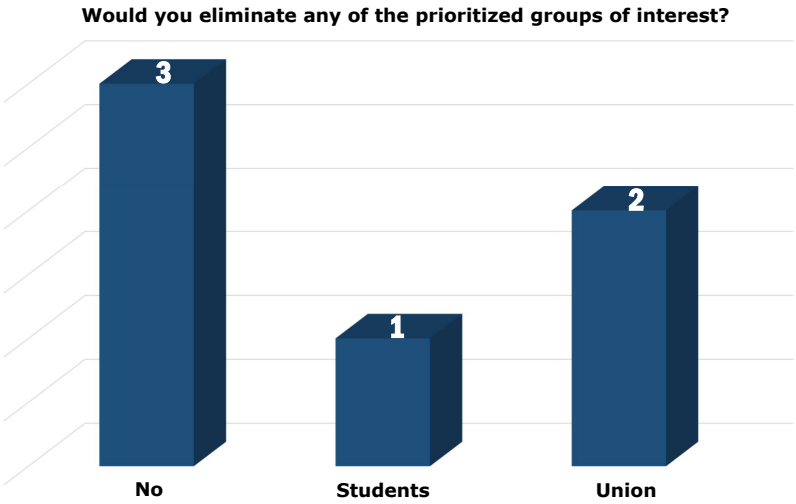

Figure 3. Results of proposal to eliminate interest groups.

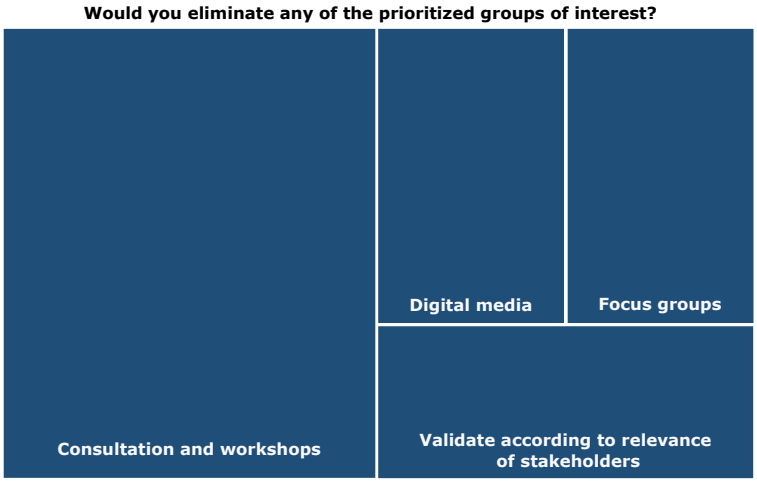

Figure 4. Results with different consultation mechanisms.

3.2.5. Scatter Chart and Interest Groups

With the results obtained from the contribution and impact analysis, using the percentages defined in the methodology, and the questions asked to the units described in the previous section, a scatter plot was generated (Figure 5). The stakeholder groups that were positioned in the upper-right quadrant were selected as priorities. Likewise, a final grouping process was carried out, resulting in the definitive list of stakeholder groups for the UPB.

- Students (undergraduate, graduate, initial education, basic and secondary education, continuing education, and technical and technological training);
- Employees (faculty, administrative staff, and associations);
- Academic and research sector (HEIs, universities, international institutes and academies, research centers and agencies, academic and scientific associations, innovation centers, and public sector);
- Public sector (international governments, national government, and departmental and local governments);
- Business sector (business groups and associations, multilatinas, business groups, companies and international companies, clusters, suppliers, and concessionaires);
- Social sector (NGOs, community organizations, charitable organizations, and media);
- Community (parents of students and applicants, professionals, and professional associations);
- Archdiocese and diocese;

- Alumni;
- Donors and benefactors.

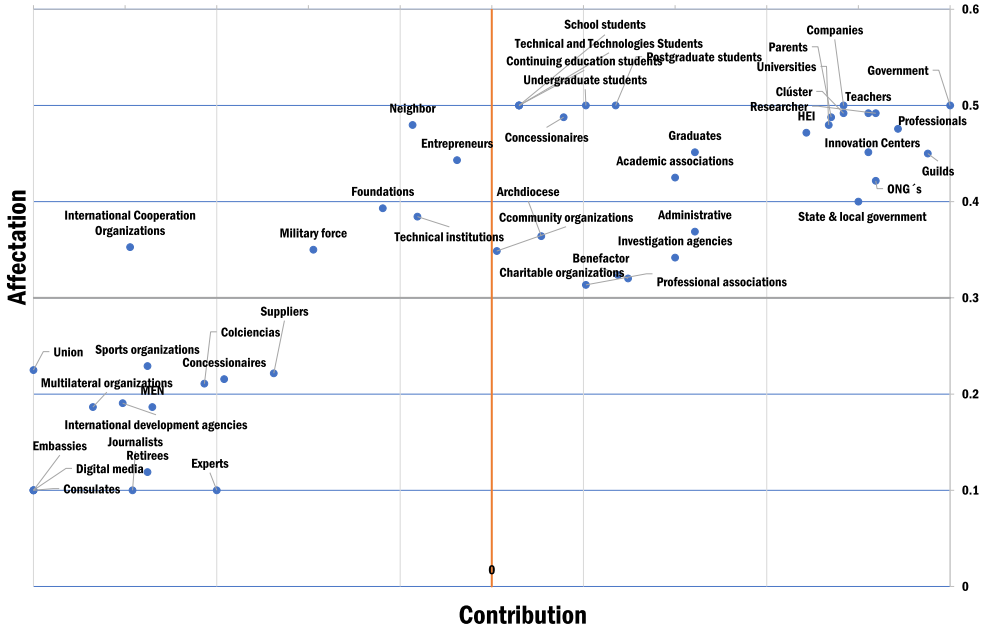

Figure 5. Groups of interest for the UPB.

3.3. Phase III. Consulting

Once the stakeholder groups were identified, different methods and technological tools were defined for consulting them, according to the type of relationship with each group. To establish a bidirectional relationship with the stakeholder groups identified and prioritized by the university, the following roadmap was created:

1. Definition of questions related to the Sustainable Development Goals (SDGs) prioritized by the university;
2. Identification of communication channels, methods, and technological tools for consultation;
3. Systematization of the results.

For the student stakeholder group, the consultation was carried out through the university's banner system during the pre-registration process. For employees, a Microsoft Forms questionnaire was created and distributed through all institutional channels. For the other stakeholder groups, mass emails were sent, and targeted approaches were made using Microsoft Forms questionnaires and QR codes.

The result of the systematization provided a broad overview of issues that impact the dimensions of sustainability and become actions of the university. Issues related to gender equity, mental health, regenerative economy, social impact, infrastructure, and safety are highly relevant for stakeholder groups.

4. Discussion

Regarding the fulfillment of the 2030 Agenda, the results evidenced the key role of educational institutions in achieving the SGD's targets, not only in terms of the global challenges in the utilization, demand, and use of natural resources, but also in the consolidation of a critical mass that reflects on its role in society. This supports the idea reported by Filho [73], who stated that universities have a great opportunity to "support the implementation of the SDGs agenda" through teaching, research, and transfer. In his study, Filho points out that universities have revised their curricula and research topics, among other reasons, due to the "increasing demand from students to research and learn about sustainability", making higher education "a key player in promoting engagement on the

SDGs across different sectors and in training students to practice sustainability in their personal and professional lives" [73].

The results obtained with the methodology for the identification, prioritization, and consultation of stakeholder groups for a higher education institution have impacts on sustainable education toward sustainable community development [14,21] as opening a permanent communication channel not only makes them feel relevant and important for the organization's decision making but also ensures that they demand appropriate training in these topics. This allows their positions and initiatives to be considered, creating a long-term critical mass based on global sustainability challenges. For example, students, who are consulted annually, request training through the United Nations Educational, Scientific and Cultural Organization (UNESCO) Chair of Sustainability to have solid arguments and participate in all conversation scenarios. This allows the methodology to serve as an example of how the adoption of new communication forms ensures the success of its implementation.

We conducted a benchmarking exercise on the most representative universities in sustainability worldwide, as per the QS Sustainability Ranking. However, we noticed that these universities do not have any stakeholder definition methodology in their communication channels. This presents an opportunity for our presented methodology to establish long-term strategies that align with stakeholders' needs and expectations. Our approach aligns with the concept of collective intelligence, as defined by Longoria et al. [74], which emphasizes "collaboration and competition among individuals to gather community insights and stimulate designers' creativity. The combination of collective human brain power and modern information technology can be a useful tool for developing sustainable projects".

The presented work emphasizes the importance of establishing reference models with tactical and strategic criteria that allow for the delimitation and consolidation of the definition of stakeholder groups and their long-term impact on the sustainable development of higher education institutions. As mentioned by Srivastava et al. [75], "to maintain sustainability, organizations need to integrate the efforts of all the stakeholders and drive them towards one direction to ensure effective implementation of practices and policies. Since in academic institutions, teachers are key players, the authorities need to focus on their understanding of brand values and commitment towards organizational sustainability".

Defining and prioritizing stakeholder groups is crucial for the development of the idea of human-centricity, which has become a focus in the transition from Industry 4.0 to Industry/Society 5.0. This concept should take into account the organizational, regional, and strategic contexts, and should promote a model where stakeholder groups are central to decision making. In this way, the concept of Industry 5.0 can be integrated into organizational decisions, enhancing transparency and participation. This approach is in line with Srivastava's statement [75]: "Proper training and leadership opportunities can enable employees to participate in decision-making. This can provide more clarity to employees regarding organizational goals and the background behind decisions. Additionally, it can direct their activities towards a common purpose".

Finally, the results obtained by using the stakeholder's prioritization methodology are aligned with the findings the reported by Ghobakhloo et al. [7], which stated, "Scholars believe that the newly introduced Industry 5.0 has the potential to move beyond the profit-centered productivity of Industry 4.0 and to promote sustainable development goals such as human-centricity, socioenvironmental sustainability, and resilience. However, little has been done to understand how this ill-defined phenomenon may deliver its indented sustainability values despite these speculative promises".

5. Limitations and Future Research

Among the most relevant limitations presented by the methodology, it is noteworthy that the results are mainly qualitative and the importance rating has a high degree of subjectivity, depending on the evaluator. This represents a challenge that involves conducting

a consultation with hyper-segmented results to a representative sample of the organization, along with a quantitative analysis to facilitate decision making.

The stakeholder prioritization exercise provides organizations with inputs for decision making aligned with their needs and expectations. However, the methodology does not address historical or underlying issues related to information access. To design relevant offers that ensure the closing of gaps, this exercise is consolidated as a starting point for the collection and analysis of information in the digital era.

The methodology has limitations in terms of context and temporality, which requires organizations to update it based on new goals and strategies. Likewise, the prioritization exercise must be accompanied by an analysis of the environment, trends, strengths, and weaknesses, as organizations learn, act, and co-evolve through interaction with their stakeholders.

Although several advantages were identified when prioritizing stakeholders at the UPB, risks must also be considered in future studies, since stakeholders are heterogeneous and changing, which forces the organization to establish expeditious and structured communication routes and to make prioritizations in short periods. Furthermore, it is feasible that, in the long term, value judgments about the importance of one group or another will be involved; hence, quantitative measures are required in future studies. If prioritization does not align with the organization's objectives and strategies, there may be a mismatch between what is prioritized and what is needed to achieve the objectives. Assessing the impact and importance of each stakeholder quantitatively can be complicated, making it difficult to make informed decisions.

6. Conclusions

The prioritization of stakeholders in organizations, and in particular in universities, is a strategic approach that recognizes the importance of identifying and addressing the needs and expectations of the various stakeholders involved in the academic institution. These stakeholders include, but are not limited to, students, faculty, administrative staff, alumni, donors, the local community, governmental bodies, and the industry.

Gathering information and data at universities can be a fundamental task, but it can also present a series of challenges. Some of the most common difficulties organizations face when collecting information and data are related to the lack of access to adequate data sources, as well as the availability and accessibility of the necessary data sources. In many cases, higher education institutions (HEIs) may have difficulty accessing external or internal data, making it challenging to collect verifiable and measurable information. Additionally, the typology of stakeholders determines the difficulty in accessing information, as it is evident that, with some of them, a sensitization and cultural effort is necessary regarding the collection of relevant data and information. For example, efficient consultation mechanisms exist for students, thanks to permanent interaction tools. However, with a stakeholder group like suppliers, the mechanisms are specific and inefficient, often limited to a commercial relationship in some cases.

The relationship between stakeholders and the 2030 Agenda mainly concerns how various interested parties, such as governments, companies, non-governmental organizations (NGOs), civil society, and individual citizens, contribute to the implementation of the Sustainable Development Goals (SDGs) set out in the 2030 Agenda. In this regard, there are several ways in which stakeholders are linked to this agenda, such as participation and collaboration in defining those material issues relevant to HEIs. Stakeholders play a fundamental role in the implementation of the 2030 Agenda by collaborating in the formulation of policies, programs, and projects that promote sustainable development. Governments, for example, can involve businesses, NGOs, and other actors in the planning and execution of initiatives related to the SDGs.

With the exercise of prioritizing and consulting stakeholders, a direct contribution is made to SDG 17 "Partnerships to achieve the SDG", recognizing the importance of collaborative work, dialogue, and participation; the consolidation of partnerships; shared

responsibility; joint learning; and the fulfillment of the central and transformative promise of the 2030 Agenda: "Leave No One Behind" (LNOB).

The humanization of stakeholders, in the context of Industry 5.0, refers to the trend of treating the interested parties in the business and technological environment in a more people-centered manner, taking into account not only economic and technical aspects but also social, ethical, and human ones. Industry 5.0, as an evolution of Industry 4.0, is characterized by the integration of cutting-edge technologies such as artificial intelligence, advanced robotics, the Internet of Things, and cybersecurity into industrial processes. The humanization of stakeholders in Industry 5.0 involves aspects such as ethics and social responsibility, from which organizations and companies strive to adopt ethical and socially responsible practices in their decision making and operations. They consider not only the economic benefit but also the social and environmental impact of their actions.

The commitments that must be undertaken with stakeholders are related to open and transparent communication, providing relevant information regularly, and ensuring that the interested parties are informed about important decisions and developments. The most relevant aspects of the relationship between the institution and stakeholders, in light of what is proposed by Industry 5.0, are related to listening to and understanding needs, including them in decision making, fulfilling the commitments made, and being very precise in accountability and transparency in the material matters presented to the interest groups.

Prioritizing interest groups within organizations can lead to significant long-term advantages. This involves focusing efforts on building strong relationships, practicing assertive communication, and allocating resources more effectively. Moreover, understanding the influence or dependence of these groups enables us to anticipate and proactively manage potential risks associated with them. This can help mitigate potential conflicts, address concerns promptly, and gain valuable insights into market trends, customer needs, and innovation opportunities.

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Abbreviations

The following abbreviations are used in this manuscript:

DT	digital transformation
ESG	Environmental, Social, and Governance
HEIs	higher education institutions
IoT	Internet of Things (IoT)
NGOs	non-governmental organizations
SDGs	Sustainable Development Goals
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization

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