Understanding the relationship between academic quality of universities and its contribution to the sustainable development goals.

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ABSTRACT

The objective of this research is to find out whether the position of universities in the Times Higher Education Impact Rankings (THE IR) is related to the different dimensions of academic quality of universities according to the Times Higher Education World Universities Ranking (THE WUR). We base our work on the combination of several theories such as stakeholder, legitimacy and institutional theories to explain the relationship between the quality of universities and their contribution to Sustainable Development Goals (SDG). Based on universities ranked in the top 100 of THE IR, we use a regression model obtained by the panel data method, using the fixed effects approach, in order to identify the relationship of academic quality dimensions with that ranking. The results show an increase in the dissemination of information on Sustainable Development Goals by universities. In addition, it is shown that research, number of citations and international outlook is positively associated with a higher score obtained by universities in THE IR, which implies a higher impact on the Sustainable Development Goals by these universities.

Key words:

Sustainable Development Goals, universities, performance, ranking, academic quality.

1. INTRODUCTION

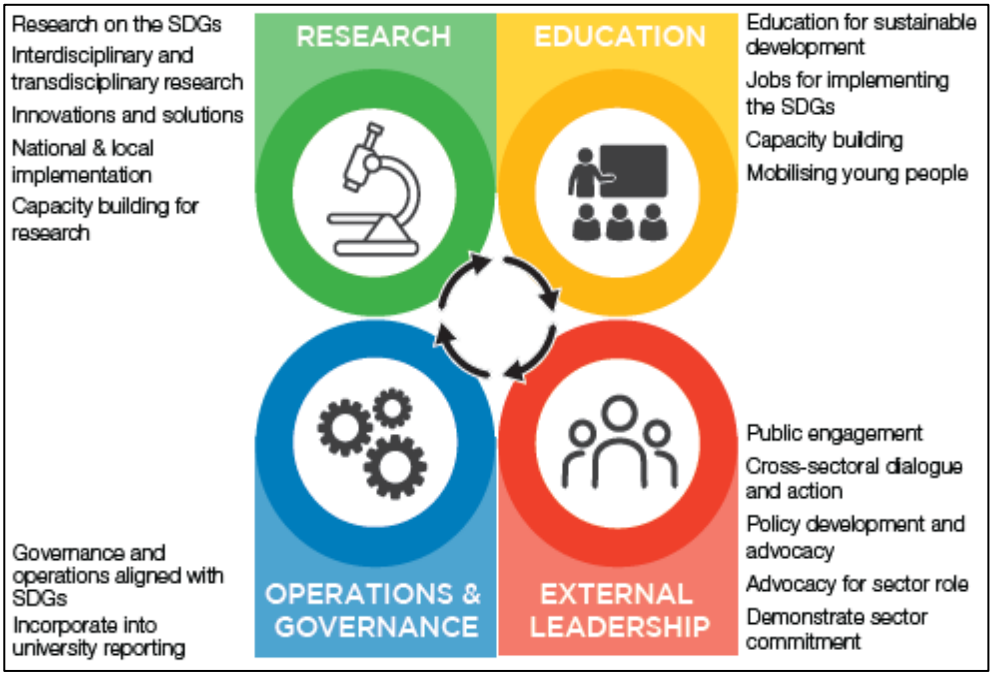
This paper aims to find out whether the academic quality of universities in the top 100 THE IR is related to their commitment to impact on the Sustainable Development Goals (SDGs). To this end, this study aims to find out to what extent the top-ranked universities are aligning each of the dimensions of academic quality with the SDGs of the 2030 Agenda, which are designed to achieve a better world, focused on the so-called 5 Ps (people, planet, prosperity, peace and partnerships).

In 2015, the United Nations approved the 2030 Agenda for Sustainable Development (UN, 2015), which includes 17 Sustainable Development Goals that seek to strengthen socio-economic, environmental and technological development. In that sense, this initiative presented by legislators to promote sustainability is embodied in 17 goals and 169 targets. The path to sustainable development will require a global shift in thinking and action to create a more sustainable world to address the sustainability issues outlined in each of the SDGs.

Much has been written in recent years about the contribution of countries, organisations, businesses and stakeholders to achieving the SDGs. However, despite the publication of a document with a direct impact on education (UNESCO, 2015), little effort has been devoted and little literature exists concerning the role that universities can play in contributing to the SDGs.

Whenever the universities-SDGs binomial is addressed, the important contribution of universities to SDG 4-Quality Education comes to the fore. This SDG aims to "ensure inclusive, equitable and quality education and promote lifelong learning opportunities for all". Logically, education is crucial to achieve this goal. However, the role of universities is not only focused on SDG 4, their contribution to the SDGs is much broader. In fact, the contribution of universities to these goals can be categorised into four groups: contributions in research, in teaching, in management and governance, and in social leadership, as can be seen in Figure 1. Through each of these categories, universities contribute to all the 17 SDGs.

Figure 1. Universities' contribution to SDGs



Source: Spanish Sustainable Development Network (2017)

The literature published in recent years on how universities are engaging with the SDGs is still very scarce. So much that it is not yet clear how universities are coping with their implementation. In recent years, several literature reviews have been published that provide a comprehensive picture of universities' motivations for engaging with the SDGs, as well as the initiatives undertaken to implement them (Findler et al., 2019; Omazic & Zunk, 2021). There are also studies that assess the level of SDG implementation in a specific country or at a specific university (Saha et al., 2021; Blasco et al., 2021; Chaleta et al., 2021; Ruiz-Mallén & Heras, 2020). In the last year, a couple of studies have been published that focus on assessing the impact of the SDGs on universities through rankings (De la Poza et al., 2021; De Iorio et al., 2022). The need for more research on this issue seems clear (Hueske et al., 2022).

In this paper, we will contribute to the existing literature by focusing on their implementation. Based on the legitimacy theory and the stakeholder theory, our analysis focuses on the universities that are best positioned in the THE IR in relation to their contribution to the SDGs. To achieve this purpose, we analyse the top 100 universities positioned in this ranking from 2019 (first year of dissemination of this ranking) to 2022 (last year available). We will also analyse the relationship between the performance indicators of academic quality dimensions

grouped into five areas by THE WUR (Teaching; Research; Citations; International Outlook; and Knowledge Transfer) and the SDG impact index of universities worldwide, represented by the overall THE IR. Our research is complemented by the study of internal and external factors affecting the SDG impact of universities. Our sample covers universities on five continents: 40% in Europe, 23% in America, 19% in Oceania, 17% belong to Asia and only 1% to Africa.

The descriptive results show that there is a positive trend in the dissemination of information on the SDGs, from 450 universities in 2019 to 1,406 universities in 2022 according to THE IR information. It is noted that in 2019, SDG 10 (reductions in inequalities), in 2020 SDG 6 (clean water and sanitation) and in the years 2021 and 2022 SDG 5 (gender equality) were the lowest scoring. In contrast, the highest scores in 2019 were for SDG 13 (climate action), however, for the years 2020 to 2022, SDG 9 (industry, innovation and infrastructure) scored the highest. Furthermore, empirical results based on our panel data sample with 386 observations from 2019 to 2022 show that a higher research score, a higher number of citations, and a higher international outlook of universities implies a better overall SDG score in THE IR.

This article is organised as follows. After this brief introduction explaining the importance of the issue and its timeliness, the next section describes the theoretical framework that situates this research. Section 3 develops the literature review and hypotheses. The description of the methodology is presented in Section 4. Section 5 presents the descriptive and empirical results. The main conclusions, limitations and implications of this research are presented in the final section.

2. THEORETICAL FRAMEWORK

Universities play a very important role in sustainable development, as they not only have the responsibility to incorporate sustainability within the university itself, but also have the responsibility to engage with society (Leal Filho et al., 2017). In order to meet these ambitious objectives, universities must design strategic plans to achieve them. University strategies consist of implementing concrete actions, activities and proposals linked to sustainability. Specifically, when universities introduce the need to contribute to the SDGs, they introduce sustainability content in their curricula, coordinate actions to achieve the SDGs and define indicators to be able to assess the results achieved (Albareda-Tiana et al., 2018). All of this represents a tremendous challenge, which universities should not and do not want to avoid. So much so that there is talk that a new mission has been added to universities, such as sustainable

development; a mission that would be incorporated alongside the classic ones of teaching, research and transfer. Therefore, universities have a fundamental role to play in the fulfilment of the SDGs but, at the same time, they can benefit enormously from their commitment to the 2030 Agenda (De Paula, 2017; Storey et al., 2017).

Following Weiß & Barth (2019), the transformation of universities towards the SDGs takes place at two levels. The first, at the micro level, which focuses on classroom activities and teaching and learning processes, and the second level, called the macro level, aims at the organisational culture with stakeholders, i.e., families, local communities, governmental bodies, etc. Thus, the commitment to sustainable development in universities and to the SDGs is a commitment that must have a long-term global focus.

Therefore, this paper adopts a multifaceted theoretical framework as a way of explaining the performance on the SDGs published by universities. Universities have a third mission of knowledge transfer to stakeholders, Secundo et al. (2016) argue that knowledge has been crucial in establishing the third mission of universities in terms of transfer, social engagement and continuous learning. Based on this assumption, the **stakeholder theory** suggests that contributing to the SDGs helps universities meet stakeholder needs and enhances reputation through THE IR. Stakeholders are likely to show greater appreciation for sustainability initiatives that address internal processes than for the financial performance of universities (Lassala et al., 2021). This emerged in the field of strategy and it is based on the idea that the ultimate performance of an organisation should consider all stakeholders (Freeman, 1984). According to Mainardes et al. (2013) "identifying the stakeholders involved with the university is a fundamental step in establishing the competitive advantages of the educational institution, as well as identifying the needs of these stakeholders and offering ways to satisfy them". Lozano (2011) wrote about the state of sustainability reporting in universities where he highlighted that one of the purposes is to communicate a company's efforts and progress in sustainability to its stakeholders.

Legitimacy theory has been used in sustainability studies for a long time and continues to be used to explain why organisations report on their social and environmental performance (Deegan, 2002; 2019). Universities can achieve legitimacy if they operate in a way that is consistent with societal values and can be of great help in addressing societal and stakeholder demand and consequently gain legitimacy (Iorio et al., 2022). In the same vein, legitimacy

theory underlines how universities achieve legitimacy through the disclosure of sustainable information such as their performance and contributions to the SDGs and thus gain prestige and reputation (Aras et al., 2021).

Finally, **institutional theory** could explain why universities might disclose information about their performance and contribution to the SDGs. Institutional theory links university practices, such as SDG compliance, to the norms and values of the society in which these institutions operate. SDG performance may be the result of coercive, memetic and normative pressures (DiMaggio & Powell, 1983). Coercive force arises when mandated by institutions and lead companies to implement different sustainability standards (Roxas & Coetzer, 2012), but in universities context SDG regulations are not mandatory. Memetic force appears when companies emulate others to answer to societal needs and as a result gain legitimacy. This can occur when universities copy others in order to show their contribution to the SDG and legitimise their strategy vis-à-vis their competitors. Within this theory, we believe that this force is the one that best fits our work, as universities can look to or copy others when implementing the SDG. Lastly, normative pressure refers to the level of professionalism. On the one hand, the members of the profession receive a similar education, on the other hand, professions exchange ideas through professional associations (DiMaggio & Powell, 1983). Normative force influences the implementation of the SDGs at universities. Universities are more likely to implement the SDGs in those that are more culturally developed and have a greater commitment to sustainability than those that are at a less developed (Martínez-Ferrero & García-Sánchez, 2017).

Therefore, based on these theories, this paper will analyse SDG performance according to the THE IR with both external and internal academic quality factors affecting them. Universities that score higher will be able to legitimise their sustainability impact. This information will also satisfy the interests of stakeholders, who are parties directly or indirectly involved in the universities' activities. Moreover, institutional theory allows us to identify and the behaviour of universities regarding the implementation of the SDGs what is the social, environmental and economic impact of universities on society in relation to other universities.

3. LITERATURE REVIEW

3.1. Universities and the Sustainable Development Goals

Although the literature has provided some work on sustainability and on the various tools for assessing, measuring and ranking sustainability in higher education teaching, much remains to be done to understand the real contribution of universities to the SDGs.

Most of the published studies either have focused on local, regional or national contexts or are case studies of a single university's attempts to establish and measure sustainability. However, there is relatively little literature on global sustainability rankings in higher education (Lauder et al., 2015).

In recent years, several reviews have been conducted that aim to provide a comprehensive snapshot of the state of knowledge on the implementation of SDG initiatives and commitments and universities' motivations for engaging with these goals (Omazic & Zunk, 2021; Findler et al., 2019). Findler et al. (2019) conducted a literature review on the impact of the SDGs on universities. This exploration focuses largely on case studies on specific implementation issues in these universities and their impact on society, the economy or the environment, again highlighting a lack of studies that analyse impacts from a more global perspective. Relatedly, Omazic & Zunk (2021) based their review on key issues that have been investigated such as the implementation of the SDGs through the institutional structure or governance of campus operations or activities, education and learning (introduction of sustainability issues in curricula), and research (Ruiz-Mallén & Heras, 2020). Similarly, the Spanish Sustainable Development Network developed the guide "How to get started with Sustainable Development Goals in universities", which facilitates the transition of universities towards sustainability from the SDGs (SDSN Australia/Pacific, 2017). This guide is complemented by the Global University Network for Innovation (GUNi) which reflects on the challenges, obstacles and opportunities faced by universities in implementing the SDGs**.**

In our literature review, we will first focus on those studies that pursue the implementation of the SDGs in university institutions by looking at the activities carried out on university campuses. In this sense, the literature refers to a diversity of sustainable practices observed on campuses, such as environmental management planning for the implementation of sustainable buildings and the sharing of information from sustainability reports with indicators on the use

of water, energy, emissions, waste, transport, etc. (Hooey et al., 2017; Leal Filho et al., 2017). Franco et al. (2019) conducted research involving a combination of a range of qualitative methods and techniques, such as individual interviews, literature reviews, focus groups, field observations and policy analysis, the results of which suggest that a more effective collaborative governance approach within universities is essential for sustainable development. In the study conducted by Atici et al. (2021), they concluded the importance of environmental sustainability policies implemented by management in universities. The results reveal that being green is reflected in university rankings, and environmental sustainability can serve as a competitive advantage for universities. Some studies highlight that the key to university engagement with the SDGs is the strategic alignment of the academic mission with sustainable development in its broadest definition, such as that of Purcell et al. (2019), which used a multiple case study approach, with examples from the UK, Bulgaria and the US. University partnerships can help accelerate the achievement of the SDGs, enabling higher education to make a fuller contribution to sustaining the economic, environmental, cultural and intellectual well-being of our global communities. All of these studies suggest that further exploration of the interrelationships between the SDGs in universities and rigorous research into the gaps and factors that impede their achievement are major research opportunities.

Most of the studies conducted have been carried out in the area of university teaching. The incorporation of the SDGs within and across the curriculum contributes not only to expanding and improving the number of people taking action and aspiring to live sustainably but also to having a significant impact on ensuring the achievement of the goals and a better future (Leal Filho et al., 2018). In this way, academics' engagement in sustainability teaching reinforces their role as educators (Lazzarini et al., 2018). Universities therefore integrate the SDGs with the principles of Education for Sustainable Development (ESD) in undergraduate and postgraduate courses (Bhowmik et al., 2018). Kioupi & Voulvoulis (2020) conducted a study on the SDGs and their integration into the different programmes offered by universities. Specifically, they analysed 40 Masters programmes related to the environment and sustainability (35 offered in the UK and 5 by other European universities), to compare the alignment of the intended learning outcomes of the programmes with 8 attributes (these were constructed by grouping the SDGs into different categories). The results show that, of the top 10 programmes, 8 scored high on all sustainability attributes. With regard to the performance of the learning outcomes with sustainability, these are either related to leadership or focus on environment and management or economics and therefore show integration between different

areas of study. In the same vein, Chaleta et al. (2021) conducted a study reviewing the SDGs in the curricula of undergraduate courses at the University of Évora. The results showed that SDG 4 (Quality Education) was present in all curricula, although only half of them have an SDG marked in addition to SDG 4. Considering all curricula, the most mentioned goals were those related to Gender Equality (SDG 5), Reducing Inequalities (SDG 10), Decent Work and Economic Growth (SDG 8) and Peace, Justice and Strong Institutions (SDG 16).

Other lines of research are based on studying the implementation of certain SDGs in different contexts. Thus, the study developed by Miotto et al. (2019) conducts a content analysis of the sustainability reports of the top 50 business schools worldwide (according to the Financial Times ranking in 2016). The results show that there are differences in the use of gender equality (SDG 5) as a main theme in the sustainability narrative across business schools. In each geographical area, the ratio of female presence in the faculty, MBA classrooms and boards is different. Business schools with a higher percentage of female students in MBA programmes have a better ranking position, a higher number of women on their boards and focus their reporting narrative on gender equality. The results of this research show that, aligning with the priorities defined by the UN 2030 agenda, top business schools make efforts to promote gender equality and most of them mention projects related to this goal in their sustainability reports.

Saha et al. (2021) conducted a study examining the determinants of carbon emissions disclosure in the annual reports of 168 universities. The findings show that government carbon emission targets, environmental audits and current carbon emissions are significant and positively associated with carbon emission disclosure measured by both volume and quality. Furthermore, no significant relationship was found between carbon disclosures and SDG disclosures in university annual reports in 2019. Similarly, Caputo et al. (2021) considering 163 Global Reporting Initiative (GRI) indicators in a more representative sample of European, South American and Asian universities revealed that in terms of SDG disclosure, goals 4 (Quality education, 72%), 10 (Reducing inequalities, 68%) and 9, (Industry, innovation and infrastructure, 55%) are the most important and goal 17 (Partnership to achieve the goals) the least.

3.2. Universities and Rankings

Universities are experiencing a borderless environment that demands innovation and change. In recent years, university rankings, although controversial, have become fully established

within universities. Indeed, the last ten years have seen a significant increase in the number of rankings of higher education institutions. Although the methodology used is not simple and is quite controversial, the reality is that rankings have become something that universities cannot and do not want to avoid. The rankings, in general, propose an evaluation of university activities, through a simplification of their results according to certain pre-established indicators.

The reputation of universities today is strongly influenced by the position that they occupy in the rankings, so that rankings are sometimes used as a marketing tool for universities to show their educational or research excellence. The growing interest of universities in receiving a good evaluation through a good position in the rankings has led to the emergence of several rankings whose results are sometimes quite different in terms of the number of universities analysed and the factors reported. Nevertheless, they all underline the importance of providing increasingly accurate rankings. In terms of ranking higher education institutions, there are three highly recognised global rankings: the QS World University Rankings, the Times Higher Education (THE) World University Rankings and the Academic Ranking World University (ARWU) (known as the Shanghai ranking). Universities use these indicators to grow and to position themselves, so that their internal use ensures mechanisms to provide increasingly better education (Shin & Shin, 2020).

Despite the praise that the rankings receive, they are also a highly controversial topic, especially because of the criteria used to compile them. An analysis presented by Radojicic & Jeremic (2012) emphasised the potential weaknesses of ranking methods if they are based solely on the number of published articles, as the results show that the qualitative dimension of scientific production is much more important than the quantitative dimension. Similarly, Bougnol & Dulá (2015) presented a list of four obstacles in these rankings: anti-isotonic attributes (a weighting scheme that uses positive weights for the value of an attribute, thus rewarding larger magnitudes); inefficiency; collinearity in the data; and, finally, transparency and consistency. Similarly, Goglio (2016) complements this, as his results show that the search for a single 'best' ranking can be misleading, given the coexistence of different needs, expectations and priorities that characterise individual universities. Along the same lines, the work of Johnes (2018) and Hauptman Komotar (2019) is in line with this, as a composite index does not adequately reflect the information contained in the set of variables analysed. Therefore, the results should not be generalised or understood as a means to improve the quality of higher education.

Mikhaylov & Mikhaylova (2018) conducted a study to provide an overview of 61 national ranking systems applied in the performance evaluation of higher education institutions in 36 countries. The results showed that more than three-quarters of all national rankings ignore unconditional differences between comprehensive, specialised or focused universities, producing unified league tables for all. However, only 30% of the rankings are limited to the institutional level of comparison. Others allow ranking users (students, the academic society, the faculty, policymakers and employers) to compare HEIs by field of science, subject area or even study programme. This makes it possible to capture the strengths and weaknesses of a particular institution and to detect a needle in a haystack. The literature review by Vidal & Ferreira (2020) concludes that international university rankings should not be a relevant source of information to consider the quality of universities because this may have a negative impact on the development of medium and long-term policies in higher education and the universities themselves. Universities should focus on their mission and should provide valid and reliable information to all stakeholders on the level of achievement of their objectives. They should consider whether to accept the idea of university quality in the rankings or to maintain their differential character despite media pressures.

As we have noted, the rankings attract considerable criticism, although they have also revealed many benefits. Among these benefits are that they provide information to prospective students, particularly those from backgrounds where there is little knowledge of higher education, and similarly provide information to policymakers and other stakeholders. Furthermore, these rankings provide benchmarking between universities and are a stimulus for improvement both as a result of such benchmarking information and because of the incentives for improvement provided by competition.

With regard to ranking universities in terms of their contribution to the Sustainable Development Goals, there are two global rankings: the THE IR and the QS World University Rankings. The THE IR rank the impact of universities on society, rather than only assessing research and teaching. This ranking measure the success of universities in achieving the SDGs. It provides comparisons in four areas: research, outreach, administration and teaching. Universities submit data on as many of the SDGs as they can obtain evidence for. Each SDG has a set of metrics that are used to assess the university's performance concerning that SDG. Each university is required to provide data on SDG 17 and at least three other SDGs that are

included in the overall ranking. SDG 17 accounts for 22% of the total score, while the other three SDGs have a weight of 26% each. This means that different universities are ranked according to a different set of SDGs, depending on their focus (THE IR, 2022). The second of the rankings, in 2022, the QS World University Rankings, has chosen to introduce new information to assess each institution's research focus in two SDG categories. Institutions receive a medal (Gold, Silver, Bronze or Candidate) reflecting the impact of their output in a particular area of sustainable development. In this first iteration, they have focused on two areas of interest: inequality and the environment. They have grouped SDGs 5 and 10, Gender Equality and Reducing Inequalities, under the category of "Equal Opportunities". Secondly, they have grouped SDGs 7, 11, 12, 13, 14 and 15 (Affordable and clean energy, Sustainable cities and communities, Responsible production and consumption, Climate action, Life under sea and Life on land) under "Environmental impact" (QS World University Rankings, 2022). The problem with this ranking is that it does not provide an exact numerical value for universities. These sustainability rankings are able to demonstrate strengths and areas for improvement in order to contribute to the legitimisation of universities in the eyes of their stakeholders. Furthermore, the sustainability impact of universities' activities is becoming increasingly imperative for university stakeholders (Findler et al., 2019).

To our knowledge, there are only two articles that analyse the THE IR on SDGs in universities worldwide. The first one, by De la Poza et al. (2021), has the general objective of assessing the impact of SDG disclosure according to the THE IR. The results showed that the number of universities disclosing their SDGs increased by 54% in 2020 compared to the previous year. Likewise, SDG 17, SDG 4, SDG 3, SDG 9 and SDG 5 are the goals that universities disclose the most. Similarly, those universities with more positive actions related to industry, innovation and infrastructure (SDG 9); responsible consumption and production (SDG 12) and climate action (SDG 13), will have a higher position in the overall THE IR. In addition, the presence of a higher number of international students raised the overall ranking score. The second is the article by De Iorio et al. (2022) which aims to analyse the dissemination of the SDGs in the university context from a cross-national perspective. Specifically, they investigate the internal and external factors that affect universities' disclosure choices. They particularly relate the dissemination of the different SDGs to the institutional context, size, age, degree of internationalisation and the presence of women, all of which relate to universities. The results show that these five factors have a positive influence on SDG disclosure.

3.3. THE WUR vs THE IR

The Times Higher Education World University Rankings collects data on the following areas:

- Teaching: This area measures the learning environment at a university, including the quality of teaching, the student-to-staff ratio, and the proportion of graduates who go on to earn doctoral degrees.
- Research: This area measures the volume, income, and reputation of a university's research.
- Citations: This area measures the impact of a university's research, as measured by the number of times its publications are cited by other researchers.
- International outlook: This area measures the extent to which a university is internationalized, including the proportion of international students and staff, and the number of international collaborations.

The Times Higher Education Impact Rankings collects data on the following areas:

- Education: This area measures a university's contribution to quality education, including the proportion of students who graduate with a bachelor's degree within three years, and the proportion of students who are satisfied with their studies.
- Health and well-being: This area measures a university's contribution to good health and well-being, including the proportion of students who are physically and mentally healthy, and the proportion of students who are involved in activities that promote health and well-being.
- Gender equality: This area measures a university's contribution to gender equality, including the proportion of female students and staff, and the proportion of female students who graduate with a bachelor's degree.
- Clean water and sanitation: This area measures a university's contribution to clean water and sanitation, including the proportion of students who have access to clean water and sanitation, and the proportion of students who are aware of the importance of clean water and sanitation.
- Affordable and clean energy: This area measures a university's contribution to affordable and clean energy, including the proportion of students who are aware of the importance of affordable and clean energy, and the proportion of students who are involved in activities that promote affordable and clean energy.
- Decent work and economic growth: This area measures a university's contribution to decent work and economic growth, including the proportion of students who are employed after graduation, and the proportion of students who are involved in activities that promote decent work and economic growth.

- Industry, innovation and infrastructure: This area measures a university's contribution to industry, innovation and infrastructure, including the proportion of students who are involved in research and development, and the proportion of students who are involved in activities that promote industry, innovation and infrastructure.
- Reduced inequalities: This area measures a university's contribution to reduced inequalities, including the proportion of students from disadvantaged backgrounds, and the proportion of students who are involved in activities that promote reduced inequalities.
- Sustainable cities and communities: This area measures a university's contribution to sustainable cities and communities, including the proportion of students who are aware of the importance of sustainable cities and communities, and the proportion of students who are involved in activities that promote sustainable cities and communities.
- Peace, justice and strong institutions: This area measures a university's contribution to peace, justice and strong institutions, including the proportion of students who are aware of the importance of peace, justice and strong institutions, and the proportion of students who are involved in activities that promote peace, justice and strong institutions.
- Responsible consumption and production: This area measures a university's contribution to responsible consumption and production, including the proportion of students who are aware of the importance of responsible consumption and production, and the proportion of students who are involved in activities that promote responsible consumption and production.
- Climate action: This area measures a university's contribution to climate action, including the proportion of students who are aware of the importance of climate action, and the proportion of students who are involved in activities that promote climate action.

Times Higher Education Impact Rankings collects data on a much wider range of areas than the Times Higher Education World University Rankings. This is because the Impact Rankings is designed to measure universities' contributions to society, while the World University Rankings is designed to measure universities' overall performance.

3.4 Hypotheses

Based on the literature review provided, we argue that universities have an important role to play in achieving the SDGs, but there is a need to understand the factors that enable or hinder their contribution to the SDGs from a global perspective. Hence, we developed the following

hypotheses regarding the relationship between the different dimensions of academic quality according to THE WUR and the position of universities in THE IR:

H_1: there is a positive relationship between the overall THE WUR and the overall THE IR.
H_2: there is a positive relationship between teaching according to THE WUR and the overall THE IR.
H_3: there is a positive relationship between research according to THE WUR and the overall THE IR.
H_4: there is a positive relationship between citations according to THE WUR and the overall THE IR.
H_5: there is a positive relationship between the international outlook according to THE WUR and the overall THE IR.
H_6: there is a positive relationship between knowledge transfer according to THE WUR and the overall THE IR.

4. METHODOLOGY

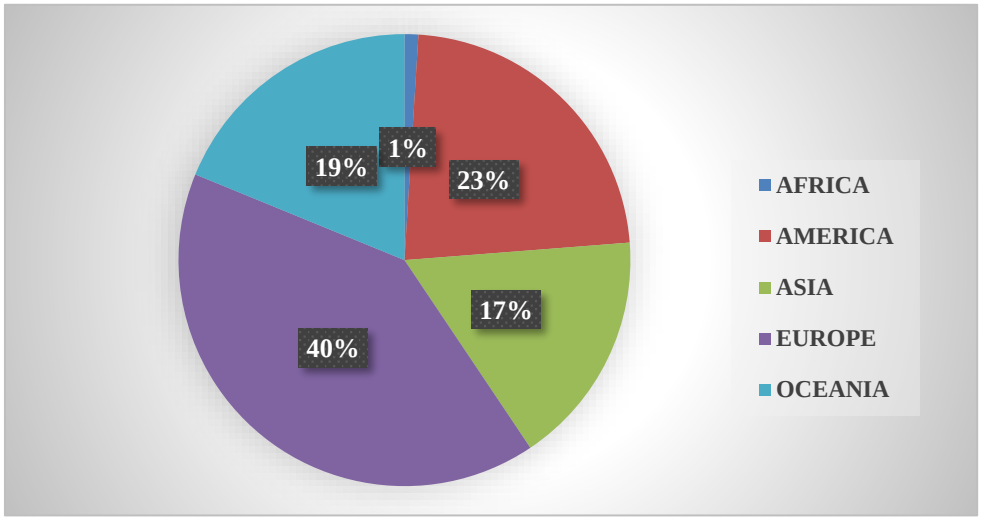
4.1. Data sources and sample selection

Since 2004, the Times Higher Education (THE) has developed the annual World University Rankings. Subsequently, institutions have provided and approved their corporate data for use in the rankings. In 2019, the criteria required by universities to be included in the ranking are: teaching at an undergraduate level, publishing more than 1000 articles (indexed by Scopus) over a period of 5 years with a minimum of 150 per year, and finally, working in a variety of areas. Since 2019, THE develops the THE IR that evaluates universities against the Sustainable Development Goals. In 2019, the first year of publication of this ranking, it uses indicators in three areas: research, outreach and administration. However, in 2020 it expanded to one more area: teaching. Likewise, in 2019 THE ranked the sustainability of universities by calculating only 11 SDGs (SDGs 1, 2, 6, 7, 14 and 15 were excluded). However, in 2020, all 17 SDGs were included, indicating a positive trend in SDG disclosure. In 2019, 450 universities provided information to the THE ranking, 768 in 2020, 1,118 in 2021 and finally 1,406 universities in 2022.

This study aims to understand the relationship between the disclosure of information on SDG impact and certain characteristics of universities. As a reference, the universities ranked in the top 100 in the THE IRTHE IR were considered (we have selected only the top 100, as from that

score onwards, universities are only ranked by clusters). We obtained a total of 100 universities in 2019 (we have eliminated 10 for not having enough information and 2 for belonging to Russia as the data has been deleted). In 2020, there was a total of 101 universities (we have removed 4 due to insufficient information and 3 Russian universities). In 2021, there was a total of 102 universities with 4 removed for not having enough information. Finally, in 2022 we have a total of 100 universities with 1 removed for not having enough information. Therefore, the final sample is 379 observations. They are distributed 39.58% in Europe, 23.48% in America, 19.26% in Oceania, 16.62% in Asia and only 1.055% in Africa (see Figure 2).

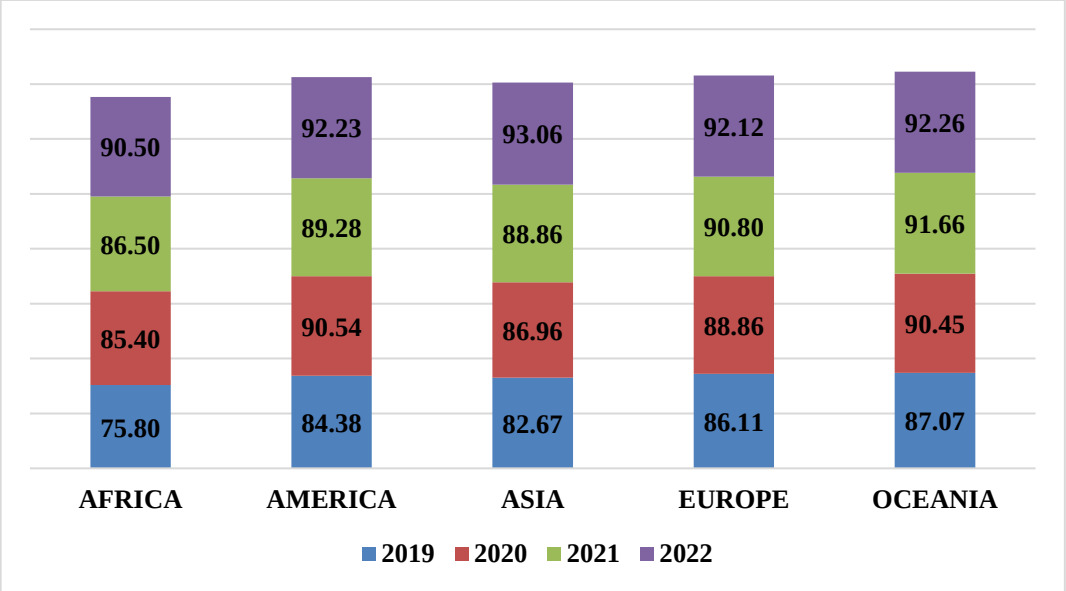
Figure 2: Sample by continent



Source: own elaboration

With regard to the average THE IR by continent and year, we observe that no continent has fallen in the 2022 ranking score. Only American universities have dropped in the overall score in 2021. Likewise, in the last year, Asian universities are the ones that obtained the highest score with 93.06. However, it is African universities that have the lowest score in 2022 (Figure 3).

Figure 3: Average THE IR by continent and year



Source: own elaboration

4.2. Regression model

To test the hypotheses of the study, a regression model obtained by the unbalanced panel data method is proposed. This approach allows us to take into account effects, thus improving the estimation, and to control for the time factor. Several tests are performed to identify the best statistical model for our purpose. First, we choose between pooled OLS and random effects, using the Breusch-Pagan multiplier test; then between pooled OLS and fixed effects, using the restrictive F-test; and finally, between random and fixed effects, using the Hausman test. We conclude that the fixed effects approach is better than the others (not included in the tables). From here, we examine possible problems as the model might be misspecified in other respects. Therefore, we analyse autocorrelation and heteroscedasticity as it makes the results less efficient. In our model, we are given the presence of heteroscedasticity and autocorrelation and we correct it with Panel Corrected Standard Errors (PCSE) estimators:

THE IRTHE IR = β_0 + β_1 overall THE WUR + β_2 control variables + ε *(Model 1)*

THE IRTHE IR = β_0 + β_2 teaching THE WUR + β_3 research_THE WUR + β_4 citation THE WUR + β_5 international outlook THE WUR + β_6 knowledge transfer THE WUR + β_7 control variables + ε *(Model 2)*

4.2. Variables

The dependent variable is the overall THE IR, which considers the impact of universities on all 4 SDGs reported. This ranking is calculated by assigning the following score: SDG 17 is assigned 22% and is mandatory for all universities and the other three SDGs represents 26% each (THE Impact Rankings, 2022).

As independent variables, we use the overall THE WUR that measures the average of the five areas (teaching, research, citations, international outlook and knowledge transfer). This is how we get the total score in the THE WUR. The higher the ranking, the better the position. Furthermore, we take the performance indicators or scores disclosed by the THE WUR which are grouped into five areas: teaching (learning environment), research (volume, income and reputation), citations (research influence), international outlook (staff, students and research), and knowledge transfer (industry income). All of them value between 0 and 100.

As control variables, we include: number of students (we have transformed this into a logarithm since there are universities with less than 500 students and others with more than 175,000 students), proportion of women (percentage of female students), the continent where the university is located to measure the impact of the geographical location (a categorical variable was created with 5 categories America, Asia, Europe and Oceania; Africa being the reference), and age of the university (we have transformed this into a logarithm as there are universities with an age of more than 900 years and others with less than 10 years).

5. RESULTS

5.1. Descriptive

Descriptive of the sample are reported in Table 1. With respect to the continuous variables studied, we observe that the overall SDG THE IR has a minimum value of 75.71 and a maximum of 99.1 and has a mean of 89.381 with a standard deviation of 4.988. Furthermore, the overall THE WUR has a minimum value of 14.35 and a maximum of 94.4 and has a mean of 47.956 with a standard deviation of 14.225. Of the 5 scores published by the THE WUR, the International Outlook is the one with the highest mean with 72.171 and the lowest mean is Education with 34.079, the score value being from 0 to 100. Regarding the control variables, we highlight that the number of students has a maximum of 175,270 students and a minimum of 4,965. The average female ratio tells us that on average there are more men than women in

universities. Finally, the age of the universities varies greatly: the youngest is 9 years old and the oldest is 934 years old.

Table 1: Descriptive statistics. Continuous variables

VARIABLES	Mean	Stand. deviation	Min	Max
***Overall* THE IR**	89.381	4.988	75.71	99.1
***Overall* THE WUR**	47.956	14.225	14.35	94.4
Teaching THE WUR	34.079	13.710	11.8	90.7
Research THE WUR	35.703	16.780	7.4	94.4
Citations THE WUR	67.684	22.750	8.9	100
International outlook THE WUR	72.172	20.836	18.7	99.7
Knowledge transfer THE WUR	50.835	16.851	33.4	100
N. º students	27,946.12	20,396.78	4,965	175,270
Ratio women	1.222	0.330	0.22	2.703
Age	135.401	155.850	9	934

Source: own elaboration

With regard to the average SDGs per year (see Table 2), it should be noted that in 2019, the first year of the THE IR publication, only 11 of the 17 SDGs were evaluated, leaving out SDGs 1, 2, 6, 7, 14 and 15. It can be seen that in 2019, SDG 10 (reducing inequalities) has the lowest value at 61.79 and SDG 13 (climate action) has the highest value at 83.69. In 2020, SDG 6 (clean water and sanitation) has the lowest value at 73.35 and SDG 9 (industry, innovation and infrastructure) has the highest value at 94.61. In 2021 and 2022, SDG 5 (gender equality) has the lowest value with 76.72 and 76.59, respectively, and SDG 9 (industry, innovation and infrastructure) has the highest value with 96.21 and 97.27, respectively.

Table 2: Average of SDGs per year

1 NO POVERTY	2019	-	10 REDUCE INEQUALITIES	2019	61.79
	2020	80.87		2020	81.94
	2021	82.58		2021	84.41
	2022	85.77		2022	85.73
2 ZERO HUNGER	2019	-	11 SUSTAINABLE CITIES AND COMMUNITIES	2019	77.97
	2020	82.89		2020	87.27
	2021	80.47		2021	86.00
	2022	85.36		2022	87.96
3 GOOD HEALTH AND WEEL-BEING	2019	77.48	12 RESPONSIBLE CONSUMPTION AND PRODUCTION	2019	77.92
	2020	80.86		2020	85.14
	2021	84.58		2021	85.11
	2022	86.39		2022	86.86
4 QUALITY EDUCATION	2019	71.41	13 CLIMATE ACTION	2019	83.69
	2020	84.36		2020	77.37
	2021	84.24		2021	81.70
	2022	85.90		2022	82.52
5 GENDER EQUALITY	2019	71.25	14 LIFE BELOW WATER	2019	-
	2020	73.20		2020	89.09
	2021	76.72		2021	86.39
	2022	76.59		2022	90.26
6 CLEAN WATER AND SANITATION	2019	-	15 LIFE ON LAND	2019	-
	2020	73.35		2020	88.52
	2021	81.00		2021	86.76
	2022	83.50		2022	91.26
7 AFFORDABLE AND CLEAN ENERGY	2019	-	16 PEACE, JUSTICE AND STRONG INSTITUTIONS	2019	75.79
	2020	74.57		2020	81.20
	2021	76.85		2021	81.35
	2022	83.35		2022	86.77
8 DECENT WORK AND ECONOMIC GROWTH	2019	72.33	17 PARTNERSHIPS FOR THE GOLAS	2019	76.51
	2020	75.54		2020	84.77
	2021	76.70		2021	88.51
	2022	79.14		2022	92.11
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE	2019	83.57	SUSTAINABLE DEVELOPMENT GOALS		
	2020	94.61			
	2021	96.21			
	2022	97.27			

Source: own elaboration

5.2. Empirical Analysis

5.2.1. Correlation analysis

The results in Table 3 show the Pearson correlation that measures the strength of the linear relationship between two variables. A weak correlation between the dependent, independent and control variables, suggesting that multicollinearity has not been an issue in the proposed analysis. These values indicate that there is an acceptable relationship between the variables.

Table 3: Pearson Correlations

	A	B	C	D	E	F	G	H	I	J
A. Overall THE IR	1									
B. Overall THE WUR	0.3957*	1								
C. Teaching	0.2689*	-	1							
D. Research	0.3475*	-	0.6872*	1						
E. Citations	0.3373*	-	0.3374*	0.4749*	1					
F. International outlook	0.2827*	-	0.0840	0.2923*	0.5883*	1				
G. Knowledge transfer	0.1054*	-	0.3502*	0.3220*	-0.0941	-0.1059*	1			
H. N. º students	0.1954*	0.2446*	0.3685*	0.3355*	0.0585	-0.1293*	0.1662*	1		
I. Ratio women	-0.0117	-0.0418	-0.1478*	-0.1678*	0.0917	0.1767*	-0.2321*	-0.050	1	
J. Age	0.1481*	0.3606*	0.4199*	0.3511*	0.2239*	0.0751	0.0682	0.2716*	-0.009	1

Significance: *99%; **95%; ***90%

5.2.2. Pairwise comparison of means

To test the existence of a mimetic pressures within universities, in Table 4 we calculate the pairwise comparison of means of THE IR for THE WUR participants according to their levels (according to THE WUE ranking): Level 1: 1-100, Level 2: 101-200, Level 3: 201-300, Level 4: 301-400, Level 5: 401-500, Level 6: 501-600, Level 7: 601-800, Level 8: 801-1000, Level 9: 1001+. The results show that until level 2 the higher the university is ranked in THE WUR the higher it is ranked in THE IR. This provides evidence of mimetic pressure in top universities according to THE WUR to rank high in THE IR.

Table 4: Pairwise comparison of THE IR means

Level THE WUR	Overall THE IR Mean	Std. Err.	SNK Groups*
1	91.798	0.618	C
2	91.084	0.570	C
3	90.093	0.500	BC
4	89.630	0.812	ABC
7	87.545	0.719	AB
9	87.067	1.346	AB
6	87.052	0.972	A
8	86.678	0.897	A
5	86.461	0.837	A

*Means sharing a letter in the group label are not significantly different at the 5% level

5.2.3. Regression results

In Table 5, model 1 indicates that there is a positive relationship between the overall THE IR (coef. .12459, z<0.000) and the **THE WUR** and therefore hypothesis one is accepted. These results indicate that top-ranked universities in the world are more likely to show high scores in the THE IR. Moreover, universities with a higher number of students show a higher THE IR

(coef. 1.20144, z<0.026). However, the presence of women, the age of the university and the geographic context do not influence the THE IR.

Regarding the model 2a, where we have taken into account all the independent variables, **research** is positively associated with THE IR (coef. .09461, z<0.043). Therefore, H_3 is accepted, implying that research has a positive relationship with the THE IR. Regarding the third hypothesis, those universities with higher number of **citations** are positively related to a higher THE IR, therefore H_4 is accepted (coef. .03161, z<0.049). With respect to hypothesis five, **international outlook** is positively related to THE IR (coef. .04896, z<0.007). That is, those universities with a higher international outlook score higher on THE IR. The H_2 and the H_6 are not accepted, therefore teaching and knowledge transfer are not related to the overall SDG ranking. With respect to the control variables, the number of students is related to a higher SDG ranking (Coef. 1.69688, z<0.003) and Asian universities (Coef. 6.1023, z<0.072) are positively associated when compared to African universities in relation to a higher university position in the SDG ranking.

In the subsequent models (Models b-f) we have studied the influence of each of the independent variables on the THE IR and we have obtained the following results. The five independent variables separately are positive related to the THE IR. Furthermore, regarding control variables, the number of students is related to a higher SDG ranking.

Table 5: Panel Data regression

	Model 1	Model 2a	Model 2b	Model 2c	Model 2d	Model 2e	Model 2f
	Coefficient (P>z)	**Coefficient (P>z)**	**Coefficient (P>z)**	**Coefficient (P>z)**	**Coefficient (P>z)**	**Coefficient (P>z)**	**Coefficient (P>z)**
Overall World Rank	.12459 (0.000)*	-	-	-	-	-	-
Teaching	-	-.06045 (0.255)	.08809 (0.000)*	-	-	-	-
Research	-	.09461 (0.043)**	-	.09350 (0.000)*	-	-	-
Citations	-	.03161 (0.049)**	-	-	.06983 (0.000)*	-	-
International outlook	-	.04896 (0.007)*	-	-	-	.08621 (0.000)*	-
Knowledge transfer	-	.00493 (0.812)	-	-	-	-	.03950 (0.059)***
N. º students	1.20144 (0.026)**	1.69688 (0.003)*	1.16002 (0.050)**	1.11681 (0.048)**	1.5476 (0.003)*	2.23165 (0.000)*	1.58110 (0.005)*
Ratio women	-.23035 (0.803)	-.26717 (0.783)	-.32208 (0.736)	.10313 (0.914)	-.74351 (0.414)	-1.01676 (0.317)	-.38964 (0.696)
Age	-.07213 (0.846)	.00118 (0.997)	.09703 (0.794)	.02414 (0.947)	.24456 (0.487)	.25601 (0.450)	.48458 (0.163)
Continents (Ref.: Africa)							
America	3.40586 (0.314)	4.1408 (0.201)	4.07921 (0.262)	4.12891 (0.209)	3.17719 (0.404)	5.54521 (0.141)	4.91605 (0.234)
Asia	4.21965 (0.219)	6.1023 (0.072)***	3.7154 (0.311)	4.40801 (0.185)	4.48689 (0.243)	7.06233 (0.067)***	4.10839 (0.324)
Europe	4.20668 (0.211)	4.7034 (0.144)	5.21334 (0.150)	5.24976 (0.108)	3.73785 (0.323)	6.04765 (0.105)	6.14309 (0.135)
Oceania	4.96995 (0.140)	4.6378 (0.150)	6.50588 (0.071)***	6.10593 (0.062)***	4.63758 (0.221)	6.04769 (0.105)	6.93323 (0.091)***
R^2 Prob>Chi^2	82.97 0.000*	81.25 0.000*	83.09 0.000*	81.30 0.000*	79.59 0.000*	84.02 0.000*	82.69 0.0001*
N: 379 Significance: *99%; **95%; ***90%							

6. CONCLUSIONS

Universities are at a crossroads where they are contributing in four major areas, each of them constituting a mission to be developed. These areas are teaching, research, transfer and sustainable development. The 2030 Agenda has set a new way of doing things in the world and universities, as drivers of social and economic development, must be at the forefront. For this reason, this study reflects on the true role of universities in achieving the so-called 5Ps (people, prosperity, planet, partnership and peace).

The aim of this research is to carry out a preliminary analysis of the relationship between academic quality according to the THE WUR and the impact universities have on the SDGs according to the THE IR. Our research is based on two pillars: the first one on university rankings and the second one on university engagement with the SDGs.

Drawing on legitimacy and stakeholder theories, our results shed light on the behaviours followed by a group of universities at the top of the THE IR. Our descriptive analysis for the period 2019-2022 clearly shows the growing interest of universities in disclosing their achievements concerning the SDGs. In 2019, 450 universities provided information to the THE IR, rising to 1,406 universities in 2022. In other words, there has been a three-fold increase over the last three years. Specifically, in the last three editions, SDG 9 (industry, innovation and infrastructure) is the most representative. However, in 2021 and 2022, SDG 5 (gender equality) has the lowest value. Furthermore, regarding whether different dimensions of academic quality determine the impact of universities on the SDGs, this study shows that research, a higher number of citations, and international outlook are positively related to the impact universities have on the SDGs.

Based on institutional theory, we can state that those universities that rank higher in THE world ranking show a better score in the THE IR. But, we want to point out that out of the THE WUR TOP 10 universities in 2022, only one (Massachusetts Institute of Technology) is ranked in the top 100 in THE IR. This an interesting debate why the majority of the best Universities regarding the Shanghai ranking or the THE WUR are not included in the THE IR.

Academic performance can impact the contribution of universities to the SDGs in several ways. Higher academic performance leads to greater research output, which can increase a university's contribution to the SDGs. Universities with stronger academic programs may have more resources and more highly skilled researchers who can conduct innovative research that directly addresses the SDGs. Additionally, higher academic performance leads to greater student engagement in SDG-related activities. Students who are exposed to high-quality academic programs may be more likely to take an interest in global issues and engage in activities that contribute to the SDGs, such as volunteering, activism, and research. Finally, higher academic performance leads to greater collaboration with other universities, organizations, and governments, which can enhance a university's capacity to contribute to the SDGs. Universities that are highly regarded for their academic programs may have more opportunities to collaborate with other institutions and stakeholders to address complex social and environmental challenges. Overall, the relationship between academic performance and university contributions to the SDGs is complex and multifaceted. Further research is needed to explore these hypotheses and better understand the factors that influence universities' ability to contribute to the SDGs.

Contribution to theory:

The stakeholder theory suggests that universities have a responsibility to serve and meet the needs of various stakeholders, including students, faculty, staff, local communities, and society at large. From this perspective, academic performance can impact the contribution of universities to the SDGs by affecting the quality of education and research, which in turn can influence the satisfaction of stakeholders and their willingness to support the university's sustainability initiatives.

The legitimacy theory proposes that organizations, including universities, must comply with the expectations and norms of society to maintain their legitimacy and reputation. In the context of SDGs, universities are expected to contribute to the achievement of these goals as part of their social responsibility. Thus, academic performance can impact the contribution of universities to the SDGs by affecting the legitimacy and credibility of the university in the eyes of its stakeholders and the broader society.

The institutional theory suggests that organizations must conform to the prevailing norms, rules, and values of their institutional environment to survive and succeed. In the context of SDGs, universities are part of a global network of organizations that are committed to contributing to sustainable development. Academic performance can impact the contribution of universities to the SDGs by affecting the university's position and reputation within this network, as well as its ability to access funding and collaborations with other organizations working towards the same goals.

In summary, our study provides evidence that:

- International collaboration is relevant to contrbute to the SDGs (International outlook). This gives HEI a global view and understanding of the ESG problems.
- Research intensive HEI contribute more to the SDGs (Research score), mainly research aligned with specific SDGs
- Policy impact research and relevant research contribute more to the SDGs (Number of citations).

The results of this research are of interest primarily to universities and their stakeholders as they can provide a benchmark for improving university academic quality-related practices to have better overall impact on the SDGs. Specifically, they could encourage higher education institutions to increase their commitment to outreach practices on the Sustainable Development Goals to meet societal expectations as well as to attract and retain the best students and

researchers and incorporate them into their strategic plans. For governments and regulators, a framework is provided on sustainable disclosure for universities to integrate into the university's mission. In addition, they could consider the differences between the different regions where universities are located as those that are more disadvantaged may find it more difficult to contribute to the SDG commitment.

Our research has a number of limitations. Firstly, the data have been collected from those published in the THE IR and these are disclosed according to the information provided by each university, which may result in universities with fewer resources not attaining the required information. Secondly, in 2019 the 17 SDGs have not been included as only 11 were analysed and only the first 100 universities have been analysed, so the results cannot be generalised.

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