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Identifying and overcoming obstacles to the implementation of sustainable development at universities

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ABSTRACT

Although there have been proven and successful developments in the field of Higher Education for Sustainable Development over the past 15 years or so, there are still numerous challenges to be overcome. Among these challenges is the need for Higher Education Institutions to improve the integration of sustainability in the curriculum and in research, and most importantly, to integrate it holistically in their systems. This paper presents an analysis of the fundamental obstacles to the incorporation of sustainable development in universities. It reports on an empirical study performed with universities across the world, where some of the main barriers are identified. It is recommended that these barriers are viewed as obstacles and entrepreneurial opportunities, and addressed accordingly.

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Universities; sustainability; campus; education; curriculum

1. Introduction and literature review: sustainability at universities

Due to the nature of their activities and their mission, universities have an important responsibility in transforming societies, and in particular, in contributing to the development of a more sustainable humanity (Barth and Rieckmann 2012).

HEIs can implement sustainability concepts and translate them to practices in different domains: e.g. education and curricula, research, facilities/campus operations, community outreach, organisational change management/institutional framework, and assessment and reporting (UNESCO 2012; Lozano et al. 2015a). They can achieve this either by applying just one or more of these domains or by adopting a whole-institution approach (UNESCO 2012).

Indeed, diverse efforts are being made by universities worldwide to make sustainable development (SD) part of their institutional frameworks by proposing new teaching and

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pedagogical approaches and curricula, collaborating with other HEIs, encouraging campus sustainability life experiences and running 'educating-the-educators' programmes (Lozano et al. 2013; Ramos et al. 2015). Across the world, but particularly in Europe, some universities have become leaders in the field with very good practices. But unfortunately, many of those efforts address only one or two of the sustainability domains at HEIs, which continue to foster compartmentalisation, instead of a holistic approach (e.g. an approach which is inclusive and takes into account inputs and knowledge from different subjects) and a systems thinking approach (Ramos et al. 2015). Lozano et al. (2015a), developed an exploratory literature review to identify the different practices and domains among HEIs within sustainability, and the results revealed that most are focused on education (including curricula, pedagogies, competences and 'educating the educators'), followed by campus operations, institutional framework, outreach, and assessment and reporting. The least applied area seems to be research. Curriculum practices can vary from simple coverage of some environmental issues and material in existing courses to modules or new courses within a programme, at both the undergraduate and postgraduate levels.

Although there have been proven and successful developments in the field of Higher Education for Sustainable Development over the past 15 years or so, there are still numerous challenges that need to be overcome (Leal Filho et al. 2015). According to Lozano et al. (2013), despite a number of ESD initiatives and universities being engaged in this process, these institutions continue to be traditional and to rely upon reductionist and mechanistic paradigms. Among these challenges, is the need for HEIs to improve the integration of ESD into curricula and research, and most importantly, to include it holistically into their systems. Also, HEIs' stakeholders sometimes face difficulties in incorporating sustainability in practice and in theory. On the other hand, HEIs have a high potential to make rapid progress in implementing SD into their operations (e.g. Cantalapiedra et al. 2006; Ferrer-Balas et al. 2009; Lozano and Lozano 2014; Verhulst and Lambrechts 2015; Wu and Shen 2016), curricula (e.g. Watson et al. 2013; Aktas et al. 2015; Alonso-Almeida et al. 2015; Azeiteiro et al. 2015; von Blottnitz et al. 2015; Dlouhá and Burandt 2015; Lozano et al. 2015b; Rose et al. 2015; Verhulst and Lambrechts 2015), and research (e.g. Cantalapiedra et al. 2006; Ferrer-Balas et al. 2009; Lozano and Lozano 2014).

Although the Sustainable Development Goals (SDGs) include targets in a variety of areas, and recognise the vital link between good governance and SD at the institutional level, a number of obstacles still prevent sustainability from being included in the operations of HEIs in a holistic way, as highlighted earlier. The Global Action Programme (GAP) on Education for Sustainable Development, the follow-up programme to the Decade of ESD (2005–2014), seeks to generate and scale up education for SD, and to accelerate progress towards sustainability.

Given the paucity of research on the topic of this paper, namely, sustainability in higher education with a focus on the obstacles towards implementing it, the research discussed in this paper was performed. The aim of the paper is to analyse and describe some of the fundamental obstacles that hinder efforts to implement sustainability at universities. The method used is an international questionnaire-based survey sent to experts in universities across the world to investigate the difficulties encountered in overcoming these obstacles. On the basis of these findings, recommendations to address the obstacles identified are given.

2. New opportunities created by the Sustainable Development Goals (SDGs)

HEIs should be able to 'catalyze and/or accelerate a societal transition toward sustainability' (Stephens et al. 2008, p. 320). Progress has been noticeable specifically regarding participation processes (Disterheft et al. 2015a, 2015b, 2016), and barriers to this intervention and to sustainability practices implementation are being addressed by HEIs (e.g. Aleixo et al. 2016, 2017a, 2017b, *in press*; Ávila et al. 2017).

Verhulst and Lambrechts (2015) provided extensive information and discussion about these barriers, and more recently, Aleixo et al. (*in press*, 2017b) have provided an overview of these barriers. The United Nations Sustainable Development Goals (UN SDGs) are an opportunity for overcoming these barriers to achieving sustainability implementation in HEIs (Leal Filho et al. 2017).

The Global South and the Least Developed Countries (LCD countries) share multilevel and multidimensional sustainability challenges (for climate change, see Boko et al. 2007; and Patt et al. 2010) that HEIs should address in their missions and strategies. These challenges impose a new agenda and require the redefinition of HEIs' strategies and missions to cope with the targets established in 'Transforming our world: the 2030 Agenda for Sustainable Development'.

Strategies and drivers for sustainability in HEIs implicate the local, regional and global engagement of HEIs in meeting the SDGs by promoting local and regional intervention, internationalisation and networking (international cooperation, students mobility and knowledge exchange), and acting always with high societal relevance and sustainability purposes (from pedagogy, research and knowledge transfer).

The opportunities offered by the SDGs to strengthen SD at universities and the relevance of this topic and its international dimension require that HEIs be prepared to play this relevant role actively. Moreover, the SDGs offer universities a unique opportunity to reflect on the ways they operate and may encourage them to make further efforts to become more sustainable not only in respect of their operations, but also in the field of research and teaching (Leal Filho et al. 2017).

Sibbel's (2009, p. 75) claim that it is

important to consider the practicality of developing programs of study which can actually prepare graduates with the necessary knowledge and values, a capacity for critical thinking and the motivation to deal with the multitude of diverse problems associated with non-sustainable states

is now more pertinent than ever. In the context of SDGs, HEIs must be able to create knowledge and effectively transfer it to society (Leal Filho et al. 2017; Stough et al. 2017) and, at the same time, prepare students for their role in society (Disterheft et al. 2013).

3. Obstacles at the institutional level

The introduction of the principles and practices of SD at the higher education level is characterised by a number of formal and practical challenges that had already been identified at least one decade ago (see, for example, Lozano 2006). The need to recognise existing tensions and contradictions through reflexive practice and genuine dialogue as well as developing flexible structures and moving towards 'double loop' learning is one of the main and initial barriers to organisational change for sustainability in higher education (Hoover and Harder 2015). There is also a set of obstacles that make the process of innovation and SD in higher education very difficult to achieve.

Dahle and Neumayer (2001) conducted a study that showed that many HIEs had taken initial steps regarding sustainability and campus greening, but their general environmental quality was relatively poor, particularly when related to recycling. The findings of the interviews conducted by Dahle and Neumayer (2001) showed that the most significant barrier was budget restrictions in part due to a lack of knowledge about how green initiatives can minimise costs, followed by institutional reluctance to change the barriers.

Although various measures have been shown to decrease the consumption of energy and improve solid waste management, such initiatives were not employed in all campuses, and the priority was the practices involving a rapid return on the capital expended to implement them (Dahle and Neumayer 2001). A lack of resources or of available financing for sustainability projects was also found in the research of Brandli et al. (2015). Other issues listed by these authors were cultural change, degree of importance attached to sustainability, lack of network cooperation between universities; government policies to encourage the implementation of education for sustainability and sustainable practices on campus, especially the Ministry of Education; and the lack of staff and any more experienced officers to implement and monitor the efforts towards remedying the lack of sustainability projects uniting companies and universities and research projects and development.

For Elliott and Wright (2013), efforts to integrate education for SD have increased, although this has not occurred quickly enough to affect the imbalance caused by the way the human race is interacting with the planet. The authors realised that the students' point of view was missing from academic studies, so they decided to interview 27 Canadian students and student union leaders to investigate their view of the concepts of SD and sustainability at universities.

The results of the work of Elliott and Wright (2013) showed that, from the perspective of presidents of student associations, barriers will continue to hinder the work of advocating sustainability, but these are not insurmountable obstacles if all stakeholders in the university are involved to energise and carry forward the process or share the drive on campus towards sustainability. The students surveyed acknowledged their responsibility to be part of the changes.

Leal Filho (2000) wrote a paper resulting in the Conference on Environmental Management Systems at Universities (Environmental Management Systems at Universities – EMSU 99, held in Lund, Sweden, in May of 1999). The aim was to discuss some of the misconceptions about the perceived sustainability at universities and suggest some desired measures to make progress in this field. The countries that participated with the corresponding number of universities are as follows: Austria – 2; Denmark – 1; France – 3; Germany – 15; Italy – 4; Netherlands – 1; Portugal – 2; Spain – 3; Sweden – 1; and the United Kingdom – 7 universities.

What items can be considered as an obstacle to sustainability at a university? That was the question Leal Filho (2000) posed to the respondents of the survey. The opinions obtained revolved around five main fronts, ranging from claiming that the question is (a) very abstract, (b), (c) that there are no employees to deal with this, (d) universities do not have or cannot justify the substantial resources required and (e) for this a scientific basis. Such conceptions have shown that there are many misconceptions about what is involved in the process of sustainable development and what sustainability represents to an institution. Misconceptions such as these and their associated contradictory interpretations are usually translated into a negative view. Such a negative vision, in general, reflects the willingness, or otherwise, to gather efforts to make a university's activities to more environmentally friendly and to make the university's method of conducting business more sustainable.

Leal Filho et al. (2015) wrote about the integrative approach to the development of sustainability at university level. They concluded that, regarding the research agenda, it is clear that academics are engaged in research on the environment and on sustainability in the universe, but not necessarily in a coordinated manner. Indeed, there are very few examples of interdisciplinary work (something that is vital to find solutions to the problems of unsustainable development). On the one hand, there are challenges to implementing the interdisciplinary approach, for both educators and researchers, at universities, and on the other hand, there is a lack of policies and operational readiness. The obstacles to be overcome include a lack of resources to support the interdisciplinary approach and of any system of rewards and academic support, a contrasting culture between each discipline, and procedures and departmental policies and strategies of decentralised budget are traced (Leal Filho et al. 2015).

Reid and Schwab (2006) investigated the issues of planning and focus. Their findings, which resulted from 10 years of collaboration in a project between the University of Arkansas, US, and the Yarmouk University in Jordan, were that the institutional barriers are not being addressed, and existing cultural barriers are not being recognised. The authors pointed to the importance of the implementation of the strategy devised by the university with the support of the regional or local government. For the authors, it was clear that partnerships between universities are excellent vehicles to generate long-term commitments and achieve complex political goals.

4. Methods

To describe the fundamental obstacles that hinder efforts to implement sustainability at universities, the research method was developed in two stages. The first phase involved a qualitative approach and identified the main obstacles pointed out by the universities. With these results, the second phase, using the qualitative approach, evaluated the importance of the barriers.

4.1. First phase: qualitative approach

The first phase of the study was developed from July to August of 2016. The initial point involved the collection of qualitative data from 51 experts, which included rectors and office managers of universities participating in the Green Sustainability Metrics (2016); 20 researchers with a significant number of publications on the subject in the Web of Science database; and professors/lecturers and researchers with peer-reviewed impact publications on the subject of sustainability at universities. Participants were from the following countries: Australia, Colombia, Ghana, South Africa, Austria, Cote d'Ivoire, Guatemala, Spain, Ecuador, Japan, Sweden, Brazil, England, Nigeria, Uganda, Chile, Finland, Philippines, United States, China, Germany, Portugal and the Philippines.

The data were collected through the Survey Monkey software, asking the following question: *What are the main barriers encountered in the innovation related to sustainability practices in universities?*

The answers were analysed using content analysis. This procedure, as defined by Bardin (2011), is a technique which assists the researcher to read and interpret the contents of any material from verbal analysis. It is developed by a progressive and systematic process which

is similar to an inductive constructive approach (Moraes 1999). This then led to the categorisation of data. In accordance with Vergara (2005), the categories used were rearranged during the course of the study. The operationalisation of the review process took place with the support of NVivo software, which is used for qualitative studies and is very suitable for documentary studies. As Mozzato and Grzybovski (2001, p. 743) stated,

The NVIVO, in addition to its basic purpose to streamline the analysis, has as its function to validate, generate confidence, and optimize the usefulness of the materials collected. Software of this type provide a degree of transparency to qualitative studies, and allow a transparency in respect of methodical features.

4.2. Second phase: quantitative approach

The second phase of the study was developed from September to October of 2016. The sample was enlarged to 269 experts. Participants were from the following countries: Australia, Austria, Belarus, Belgium, Brazil, China, Cote d'Ivoire, Croatia, Czech Republic, Denmark, Ecuador, Finland, France, Germany, Ghana, Guatemala, Hong Kong PRC, India, Iran, Ireland, Italy, Japan, Latvia, Lithuania, Malta, Mauritius, México, Mongolia, Nigeria, Philippines, Poland, Portugal, Qatar, Scotland, Serbia, Singapore, South Africa, Spain, Syrian Arab Republic, Tanzania, Thailand, The Netherlands, The Republic of Belarus, Turkey, Uganda, the United Kingdom and the United States.

The data were collected using a questionnaire available online (via the internet), which was created using standard forms available at Google Docs®. It was sent via email to the participants of the World Symposium on Sustainable Development at Universities, held at the University of Massachusetts Institute Technology, in the United States of America, on 14 to 16 September 2016.

The questionnaire contained 25 questions constructed based on the results of first phase, and it used a five-point Likert scale (Likert 1932) to measure the level to which respondents evaluate the importance of obstacles. For that, the respondents were asked to express the degree of relevance for the 25 obstacles, from 1 to 5. The full questionnaire is presented in the Appendix 1.

The data analysis was processed using the Software 9.1® statistical package. The associations between the obstacles to sustainability were analysed using multivariate data analysis techniques, following previous experiences from Hair et al. (2014), Montgomery (2001), Morrison (1984), and Pereira (1999).

5. Results and discussion: institutional obstacles and possible means to overcome them

The qualitative analysis identified 25 obstacles to sustainability in HEIs. These categories of obstacles are listed below and were obtained from the experts' answers. The answers were analysed using content analysis to identify the key terms/expressions. Then, the 'frequency test' was used to identify the frequency of the key terms. The terms were grouped according to categories of obstacles (Table 1).

Figure 1 presents the average values obtained in the evaluation of the 25 obstacles from 269 respondents. The qualitative analysis shows that the most of obstacles are considered

in the same scale of importance. This may be indicating that the implementation of SD into HEI challenges to face the combination of different obstacles with similar magnitude.

As the research has been conducted with universities worldwide, in different places and contexts, this may also be lowering the average and relativising the evaluation values. Once each respondent has evaluated in the light of their context, the highest obstacles can also differ from one university to another. However, it can be said that all the obstacles are considered serious since they pose a serious threat to the implementation of the SD and it would be a mistake to ignore them.

Figure 2 presents the 6 obstacles with highest relevance among those 25, which are discussed following.

The administration and management departments are the greatest obstacles to the integration of SD into HEI, which is congruous with the results of Velazquez et al. (2005). Administrative and systemic sluggishness form the obstacle that hampers the implementation of the programme (Velazquez et al. 2005). Moreover, since the rights of the teachers must be respected, the administration has no authority to compel teachers to incorporate

	Evaluation Scale				
	1	2	3	4	5
Lack of support from management					3,9411765
Lack of appropriate technology					2,7941176
Lack of awareness and concern					2,6470588
Lack of Environmental Committee					2,6176471
Lack of buildings with sustainable performance					2,6176471
Government Barriers					2,5000000
Lack of research and development					2,4705882
In the introduction of control systems					2,4117647
Lack of legislation and guidelines					2,3823529
Social barriers					2,3823529
Lack of knowledge and education on the topic					2,3235294
Lack of training and collaboration					2,2941176
Lack of defined practices and policies					2,2941176
Lack of support from the academic community					2,2941176
Institutional Barriers					2,2941176
Lack of incentives for innovations					2,2352941
Many restrictions and bureaucracy					2,2058824
Strong culture and conservatism					2,1764706
Lack of planning and focus					2,1764706
Lack of entrepreneurship and public private partnerships					2,0882353
Lack of dialogue					2,0588235
Lack of capacity and decision					1,9705882
Lack of commitment and discipline					1,9705882
Lack of integration in teaching, research and extension					1,9117647
Lack of applicability and continuity of the actions					1,8235294

Figure 1. Relevance of obstacles – results of quantitative approach.

**Table 1.** Content analysis and results of qualitative approach.

	Terms obtained from content analysis	Categories of obstacles
1	Lack of long-term planning; lack of plans for sustainable development; plans with no focus on sustainability; lack of institutional agenda for sustainability	Planning and focus
2	Lack of an efficient environmental committee; lack of a dynamic environmental official campus organisation; lack of environmental management policies adopted at the institution	Environmental committee
3	More general resistance to change ('but that's how we've always done it'); people do not like change and do not understand the term 'sustainability'	Resistance to changes in behaviour
4	They may agree in adopting changes, but continuity is needed; applicability in our setting; 'my assumption is, potential donors seem to be on a different footing with our situation [...] we seem to find studying issues as dictated by potential donors abroad irrelevant to our setting'	Applicability and continuity
5	Lack of policies and lack of institutional commitments; most people are not aware of the need of having practices of sustainability-related innovation in universities	Commitment towards innovation and sustainability
6	Lack of training among professors, staff and students; persuading traditional workers and planners to consider sustainable practices when it is not part of their background or training	Training and collaboration
7	The wrong focus on more innovative/sustainable technology, while neglecting the bigger picture of 'behavioural change' and promoting the 'culture' of sustainable living; the segmentation of the university is another aspect which makes it difficult to pursue a whole institution approach in the field of sustainability, as members of different departments tend to be focused on their particular area and consequently are not receptive to holistic approaches	Culture and conservatism
8	Policy and institutional orientation in the linear logic of basic research and innovation lacking coherence for transformative research and education	Research and development
9	Lack of policies and lack of commitment from administrations; lack of awareness and concern; lack of consciousness of the issues and risks involved	Levels of awareness and concern
10	Better environmental impact; lack of sustainable buildings; financial constraints and ignorance about sustainability matters that, for example, prevent motion sensor lights from being installed in new and old buildings; 'sometimes lack of financial resources to develop a research centred on sustainability in Galapagos'	Building
11	Lack of support and support from the administration; lack of support from administration and senior management teams; lack of technology resources	Administration
12	Need for techno economic analysis; lack of systems for innovative technologies that can be implemented in communities and make a difference on the ground; this requires integrating research with entrepreneurship with local realities	Technology
13	In research, the main barrier is the need for inter- and transdisciplinary research platforms and their financing. Funding agencies tend to support more focused, single-topic research approaches. In education, here I find some reluctance to include explicitly sustainability-relevant contents in courses.	Integration of teaching, research and extension
14	The differences between academic and administrative staff are particularly visible in regard to the academic freedom of researchers and the university administration, which tends to be more regulated and thus can lead to specific and complex steering problems; communication between the different areas.	Dialogue
15	The second one characterised by faculty members that are more worried about salary, job stability and graduate programme ranking than educate/research; students that are more worried about titles than learning; owners more worried about profit than education. Therefore, the whole system is more worried about the ends than the means.	Institutional barriers

16	Lack of funding/investment in new programmes; lack of niches for innovative – weak recognition of transdisciplinarity; lack of financial resources and a mentality oriented to innovation	Incentives for innovation
17	To combine research and practice: 'provide our campus as a living laboratory for sustainability'	Practice and policies
18	Inter-departmental arguments over control of existing resources; operations staff face stiff pressure to keep all systems running all the time, meaning that new technology or processes are viewed sceptically	Support for the introduction of control systems
19	Bureaucracy and working for the wrong reasons. is characterised by the large amount of paper work and middleman's necessary to have the job done	Restrictions and bureaucracy
20	Perception that sustainability is just recycling or turning off the lights; lack of understanding of the larger imperative; the main barriers are the questions the inclusion of environmental education and sustainable democracy	Knowledge and education
21	Lack of capacity for decision; lack of focus and decisions about environmental policies	Capacity and decision-making
22	In my case, the absence of public-private collaboration; the viabilisation of the integration between the company and the university, in activities of applied research of professional and scientific technical character	Entrepreneurship and public-private partnerships
23	Lack of relationship between universities; lack of social projects with the external community; Lack of relationship with the city; not real existent of collaboration and partnerships with others universities from develop countries.	Social barriers
24	Funding from the government; lack of government incentives and support; administrative and governance barriers; lack of relationship between leaders and staff; the main barriers encountered are lack of funds and government support for the practice of sustainability-related innovation in universities	Government barriers
25	A dynamic environmental officer at my campus; no adopted environmental management policy at the institution; lack of norms and habits	Legislation and guidelines

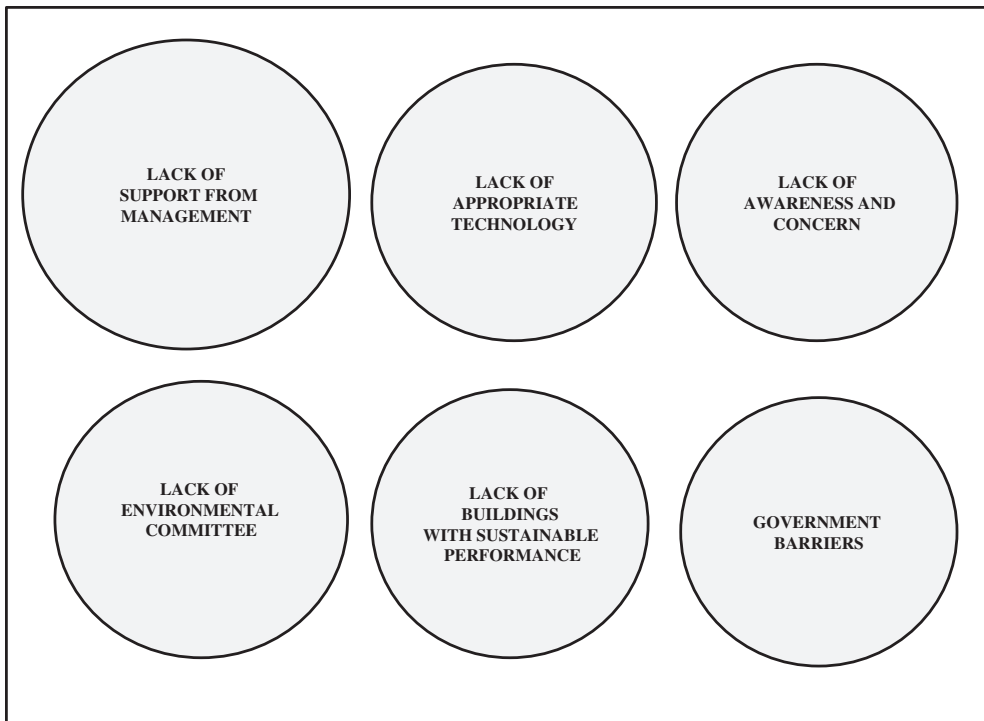


Figure 2. Obstacles more representative – results of quantitative approach.

the concept of sustainability into the curriculum (Moore 2005). These findings suggest that students, educators and the administration need to arrive at a consensus on sustainable education through dialogue. Collective efforts are underway to improve the outdated curriculum, policies and standards, which will sustainably transform higher education. Research by Disterheft et al. (2015a and 2016) identified the participatory issues in addressing sustainability in HEIs, and suggested the methodologies to put them into practice.

Technology is ranked as the second greatest stumbling block to sustainable development. Technological change is one of the most significant reforms that would contribute to identifying the origins and potential solutions for the main challenges of SD that confront society (Stephens et al. 2008). Colleges are places to create and access scientific and technological knowledge; however, knowledge is seldom successfully applied to operating activities (Garvin 1993). Combining academic and campus operations to promote and demonstrate the principles and technologies of SD provides a very valuable learning opportunity for SD (Wright and Wilton 2012). This is a very relevant issue in the context of HEIs contributing to the implementation of SDGs and their alignment with the scope and aims of sustainability science (Disterheft et al. 2013).

For SD to be promoted, it must be rooted in social culture and conscience (Segovia and Galang 2002). Colleges cannot claim with certainty that their students, teachers and administrations have ideal sets of virtues and values (Shephard 2010). Matters of *conscience and concern* are seldom taken into account when practical implementation and application of SD is applied to HEIs. Therefore, *conscience and concern* also constitute important obstacles, as demonstrated in our research results. In the process of practicing sustainability, the shared

assumptions and beliefs of internal stakeholders in HEIs will be influenced, and their self-awareness and environmental consciousness must therefore be enhanced (Ferreira et al. 2006). The issues concerning stakeholders (leaders, faculty, staff, students and external stakeholders) were addressed by Aleixo et al. (2017b), thus reinforcing their role and contribution for overcoming the barriers, challenges and obstacles to implementing sustainable initiatives in HEIs.

The environmental committee, structured and responsible to put in practice the policies adopted by the Institution is an obstacle important. The common response from universities to pressure and calls from stakeholders has been to establish environmental committees to develop a series of action plans, and to appoint one individual to implement and control the chosen solutions (Sharp 2002).

Green building design, retrofitting, or construction have higher up-front costs (Richardson and Lynes 2007). However, in recent years, HEIs have continually invested in green buildings. In contrast to single project success, Sharp (2002) proposed the concept of institutional transformation with an emphasis on establishing university-wide commitments, thereby making all future constructions are planned as green buildings, rather than this being limited to single projects.

Government barriers also are important obstacles. Government regulation of business activities plays an important role in environmental protection. Compliance with government regulations and laws are seemingly the key drivers of SD; however, they are widely accepted as the end point rather than the bottom line. If governments fail to regulate environmental sustainability more strictly, commercial or higher education institutions may not accept SD on a large scale (Pinkse and Domisse 2009). However, this may be addressed via legislation and guidelines, and supplemented with incentives to attract the participation of HEIs.

6. Conclusions

This paper has reported on an explorative study about the fundamental obstacles to implementing sustainability at universities. The main approach used was an international questionnaire-based survey, and the outcomes identify that various barriers currently preventing universities from engaging in SD efforts. Yet, at a time when the debate on the SDGs is gaining momentum, it is important that universities advance in terms of ways to overcome the obstacles to implementing SD. Also, they should be able to take more advantage of the many opportunities to contribute by means of curricular innovation and research to achieve the SDGs.

This study has two main limitations: firstly, the online survey could engage only a small fraction of professionals working on SD in higher education. Secondly, there were no interviews conducted to gather personal input. Nonetheless, the wide scope of the study and its strong international basis have provided some useful data, which makes it possible to draw of a rough profile of the sustainability challenges seen at universities today.

According to the results of this paper, all the obstacles listed compromise the implementation of SD in universities. The areas of administration and management are where the greatest obstacles to sustainable development in HEIs can be found. This is followed by a lack of interest in or concern with sustainability issues. The lack of structures, such as environment committees, also contributes to the problem. A major recommendation that this paper can make is that universities should establish formal structures to guide the

implementation of SD policies and programmes, with specific personnel, instead of trying to pursue them on an ad hoc basis, as is seen in many cases.

Although most of the obstacles listed by the respondents have also appeared in previous studies in the literature, this paper is very relevant since it has a solid basis of more than 300 respondents from all continents, and reflects the view of all these stakeholders.

Further research is necessary in two main areas: (a) in establishing the individual implications of each obstacle to measure their specific impacts, and (b) in identifying testing of ways to overcome them. Finally, further research is needed in respect of the extent to which different barriers affect public and private universities, so as to identify if there are differences among them.

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Appendix 1

INNOVATION AND SUSTAINABILITY: POTENTIAL AND BARRIERS IN UNIVERSITY

We would like to invite you to participate in a survey on Innovation and sustainability in universities. The study is part of research for a doctoral thesis, which seeks to understand what are the barriers that influence the development process of innovation and sustainability in universities, as well as a glimpse of the potential that innovation and sustainability will contribute to the university.

Thank you for participation.

Best Regards,

The Researchers.

Respondent profile

Name:	E-mail:
Country:	University:

Dear researcher,
 This is the second phase of the study, which aims to analyze what are the barriers that influence the process of innovation and sustainability development in universities.
 Please, select the range that represents larger barriers, taking into account their experience and the activities it carries out in your institution.

The scale 5 expressed a greater degree of relevance and weight 1.

Barriers	Scale	5	4	3	2	1
1 Lack of planning and focus		5	4	3	2	1
2 Institutional Barriers		5	4	3	2	1
3 Lack of Environmental Committee		5	4	3	2	1
4 Resistance to changes in behavior		5	4	3	2	1
5 Lack of support from management		5	4	3	2	1
6 Lack of applicability and continuity of the actions		5	4	3	2	1
7 Lack of support from the academic community		5	4	3	2	1
8 Lack of commitment and discipline		5	4	3	2	1
9 Lack of incentives for innovations		5	5	4	3	2
10 Lack of training and collaboration		5	4	3	2	1
11 Lack of defined practices and policies		5	4	3	2	1
12 In the introduction of control systems		5	4	3	2	1
13 Many restrictions and bureaucracy		5	4	3	2	1
14 Strong culture and conservatism		5	4	3	2	1
15 Lack of knowledge and education on the topic		5	4	3	2	1
16 Lack of research and development		5	4	3	2	1
17 Lack of awareness and concern		5	4	3	2	1
18 Lack of capacity and decision		5	4	3	2	1
19 Lack of buildings with sustainable performance		5	4	3	2	1
20 Lack of appropriate technology		5	4	3	2	1
21 Lack of entrepreneurship and public private partnerships		5	4	3	2	1
22 Social barriers		5	4	3	2	1
22 Government Barriers		5	4	3	2	1
23 Lack of integration in teaching, research and extension		5	4	3	2	1
24 Lack of dialogue		5	4	3	2	1
25 Lack of legislation and guidelines for sustainability and innovation		5	4	3	2	1

Suggestions of barriers that are not included in the study: _____
