Trends in Scientific Publishing on Sustainability in Higher Education

Leal Filho W, Wall T, Salvia AL, Frankenberger F, Hindley A, Mifsud M, Brandli L, Will M

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Abstract

It is widely acknowledged that research and publications in peer reviewed journals offer important metrics in describing the academic outputs of higher education institutions on one hand, and their societal impacts on the other. Peer review is a well-tested method for quality control and has been successfully deployed over many decades in academic journals worldwide. But despite the fact that publications on matters related to sustainable development offer solid evidence of academic activity and excellence, there is a dearth of literature in this field. In order to address this need, the European School of Sustainability Science and Research (ESSSR) and the Inter-University Sustainable Development Research Programme (IUSDRP) have undertaken the World Survey on Sustainability Publishing and Research in Higher Education (WSSSP-HEI). The paper has two main aims. The first is to document and showcase trends in scientific publishing on matters related to sustainable development. The second aim is to contribute to a greater understanding of this rapidly growing field, by describing the latest developments and the role played by some of the journals active in this area. Consistent with these aims, this paper focuses on publications on sustainability in higher education, describes the methods used in the study and some of its results. It can be seen that despite the intrinsic value of research on sustainable development in higher education as a whole, and of publications in this field in particular, such practices are not as widely developed as one could expect. This paper discusses the possible reasons and also outlines some measures via which higher education institutions may be able to take more advantage of the many opportunities that publishing on sustainability offers to them.

Keywords: publications; publish or perish; sustainability articles; sustainability books; higher education

1 Introduction: Scientific publications on Sustainability in Higher Education

The engagement of higher education institutions (HEIs) worldwide in sustainable development (SD) was highlighted for the first time in the 1972 Stockholm Declaration on the Human Environment. Ever since, HEIs have engaged in several global initiatives

and expressed their commitment to SD in a variety of national and international declarations, agreements and conventions (Lozano et al. 2013). The related actions and results have been increasing and reflect the growing number of publications on the topic of sustainability in higher education.

At the outset, it is relevant to outline some of the work definitions to the main terms deployed in the study. The first term to de defined, namely "sustainability in higher education", refers to matters related to sustainable development in a higher education context. In other words, this terms describes sustainability-related components of relevance to tertiary education. The second term which should be defined is "sustainability". Here is it used to describe socio-ecological process

via which a holistic view of nature and a balanced use of natural resouces is advocated, so as to achieve societal gains.

Finally, the term "sustainability publishing" is herewith used, in order to focus on publications whose main subject and focus is on sustainable development. Therefore, the very specific nature of this paper means that the focus is not on publications on general issues or matters of wider interest, but quite focused on sustainable development.

Sustainability in higher education has a potential influence on the exchange of information between various aspects of sustainability (Davin 2015). In this sense, the publications on sustainability in higher education have been deeply involved in themes related to the role of HEIs: education, campus operations, community engagement/outreach, and governance (Kapitulcinová et al. 2017).

Most publications show reports and case studies regarding the initiatives and activities for sustainability. These initiatives take different applications and cover multiple areas. Beringer and Adombent (2008) emphasize that sustainability research in the higher education spectrum is broad, with scientific inquiry taking many different forms and pathways regarding research paradigms, designs, methodology practical goals and aspirations. In another study, Caniglia et al. (2017) analyze the transnational collaboration for sustainability in higher education, identifying the main research activities as virtual research, single projects multiple projects, and visiting scholars projects. The authors' research found a low frequency of these activities, and they argue

that it may be due to the low research rate in international partnerships, or because individual researchers are preferred to institutional partnerships.

An increasing number of studies point out sustainability in higher education in general, including discussions about the barriers and challenges for implementing sustainability in HEIs (Aleixo et al. 2019; Ávila et al. 2017). Some publications cover conceptual descriptions, practical experiences and parallels among the variety of sustainability assessment tools (Shriberg 2002; Caeiro et al. 2013), and other publications address university rankings (Torabian 2019).

There are several specific research areas within sustainability in HEIs which have experienced significant growth in the last few years. Three of these areas include the Living Labs methodology, Climate Change Education, and SDGs implementation.

A growing focus of research in the field of sustainability in higher education is the utilization of 'Living Labs' which aid HEIs in conducting research that has relevance to society and which addresses real-world sustainability issues (Leal Filho et al. 2019a). Research on living labs and sustainability indicates that technological innovation needs to be interwoven with social and cultural aspects over a long time period in order to achieve the required outcomes (Von Geibler 2014). The research work is usually published as case studies. It includes wide-ranging domains in sustainability, such as the implementation of solar-powered schools (REGSA 2016), the formation and evolution of university degrees (Mifsud 2014) and the utilization of open and distance learning (Nicolau et al. 2018).

Research on the role of HEIs and climate change has increased during the last decade due to the scientific, social, environmental and political challenges that the phenomenon has created on the entire biosphere. The most common approach utilized by HEIs in this area appears to be the embedding of climate change education in their curricula and the research framework employed to achieve this (Leal Filho et al. 2019b). A further area of enquiry focuses on students and universities that specialize in climate change adaptation expertise and mitigation tools (Hill et al. 2019).

A relatively new area which is seeing a lot of growth and publications is the study of the relevance, relationships and possible implementation strategies to achieve the UN Sustainable Development Goals (SDGs) within HEIs. (Leal Filho 2019c). HEIs are working to incorporate the ambitious 17 goals into their agendas and policies and to

achieve the SDGs. Due to the multi-stakeholder platform and the participation from numerous institutions, there are multifaceted opportunities for research and publications both in work evaluation and in capacity building (Shiel et al. 2015).

Several HEIs have developed a wide range of initiatives in order to embed sustainability within their organization. These can be broadly categorized under education, outreach, research, operations, and governance (Lozano et al. 2015). All these possibilities are the reasons why publications on sustainability in higher education in the databases have increased, both in terms of the scope of the subject and their geographical range during the last decade.

The analysis of publications shows that the journals which most commonly published on this subject are the *International Journal of Sustainability in Higher Education*, the *Journal of Cleaner Production*, *Sustainability*, *Environmental Education Research and Quality Management in Higher Education*. Besides those, more than 98 other journals include publications on the subject.

The selection of journals for publication is linked to many factors. Authors are increasingly publishing in open access journals and are responsive to library funding initiatives. However, the prestigious closed access journals still range high on the wish-list of the authors. Another aspect is the Impact Factor of the journal, which indicates the most extensive exposure and reach of the peer community (Nariani and Fernandez 2012).

Even though publications on issues related to sustainable development offer substantial evidence of academic activity and excellence, there is a dearth of literature related to this topic and a lack of studies which give a broad view of worldwide publications over time. In order to address this need, the European School of Sustainability Science and Research (ESSSR) and the Inter-University Sustainable Development Research Program (IUSDRP) have undertaken the World Survey on Sustainability Publishing in Higher Education (WSSSP-HEI). The objective of this study was to shed some light on the nature of publications on sustainability, with information which may enhance both the current and future potentials in this field.

There are three main factors which outline the relevance of this research. The first, is that the complexity of sustainability publishing makes it sometimes difficult to understand its true nature and usefulness. Secondly, sustainability publishing entails

environmental, social and economic elements which are broad and difficult to precisely define. Finally, it encompasses various fields of academic research that aim to address various issues, from the natural environment and ecosystems, to human behaviour, financial elements and technical issues, among others.

This paper takes all these items into account. It has two main aims. The first is to document and showcase trends in scientific publishing on matters related to sustainable development. The second aim is to contribute to a greater understanding of this rapidly growing field, by describing the latest developments and the role played by some of the journals active in this area. Apart from showcasing some of the trends in scientific publishing on sustainability in higher education, this paper also presents an overview of measures via which higher education institutions may be able to take more advantage of the many opportunities that publishing on sustainability offers to them.

2 The role of peer review in quality assurance in higher education and its links with sustainable development

Peer review requires a collegiate approach between editors, reviewers and authors that, in the advancement of disciplines and professions, necessitates due courtesy, empathy and diligence from all (Desselle et al. 2019). The importance of publishing for tenure, promotion and entry-level positions is recognized by authors (Teele and Thelen 2017), and they regard the contribution of peer reviewers beneficial for developmental feedback (Atjonen 2019), constructive comments (Roll 2019), and improvements to manuscript quality, readability and accuracy (Rowley and Sbaffi 2018). Editors across disciplines agree that the peer review process should critically assess manuscripts for clarity of thought, objectivity and knowledge (Pollock 2019), quality and methodological rigor (Roll 2019), novelty and significance (Alexandratos et al. 2017), and it should demonstrate clear links to the aims and scope of the journal (Pollock 2019; Alexandratos et al. 2017; Roll 2019). Furthermore, as a measure of performance, editors see the "publication of peer-reviewed evaluations as the gold standard in reporting impact" (Font et al. 2019 p. 7).

However, authors, reviewers and editors are part of a system that protects opinions, methods and innovations by promoting an 'in-crowd' (Frijters and Torgler 2019 p. 1286). Authors have been accused of assessing publication value by impact factors or prestige, rather than the rigor and quality of each peer reviewed submission (Schimanski and Alperin 2018). Reviewer expertise and experience are also open to criticism, being blamed for the exercise of power, gatekeeping, paradigm contradiction

and insufficient expertise (Atjonen 2019), as well as for providing descriptive praise or criticism, instead of practical guidance for improvement of manuscripts (del Fierro et al. 2018). Even though peer reviewers are impartial experts (Roll 2019), there is recognition by editors that the peer review process is not without bias (Pollock 2019). With single-blind, double-blind, triple-blind, quadruple-blind and open peer review approaches in use, there is a need for improvement in transparency, accountability, quality and further research on the peer review process (Haffar et al. 2019).

Editors rely on reviewer efficacy and effectiveness, but with peer reviewed scientific outputs continuing to increase, this impacts experienced reviewers (Curtain et al. 2019). Increasingly multi-tasking, these reviewers are becoming time-challenged, which leads to delays (Sonne and Alstrup 2019), demotivated, due to repeated rejection of the same paper (Drvenica et al. 2019), and concerned that quality cannot be guaranteed as the process is not functioning well (Curtain et al. 2018). Editors are clear as to the reasons for rejection under peer review, these being factors of poor journal fit, lack of insight, fatal flaws, or lack of development (Pollock 2019), or factors of error, language, or lack of explanation or mechanisms (Alexandratos 2017). However, with the pressure for authors to publish and the high levels of rejection from legitimate scholarly journals, there is motivation to publish in predatory journals (Alrawadieh 2018), cite rejected papers (Sonne and Alstrup 2019), trade authorship and fake peer review (FPR) (Rivera 2019).

The legitimacy and credibility of scientific knowledge is dependent on the quality process of peer review. If the speed of spurious news delivery via mass and digital communications impacts negatively on societal knowledge, then this will influence public health, environmental and medical science (Sonne and Alstrup 2019). A key strategy of climate science denialism is the creation of fake controversies (Hansson 2017). Therefore, a healthy peer reviewed debate is required not only to advance knowledge but to highlight errors, inaccuracies and misinformation (Hall et al. 2015a). This is clearly demonstrated in a debate over several papers on climate change scepticism: “Climate change and tourism: Time for environmental scepticism” (Shani and Arad 2014); “No time for smokescreen scepticism: A rejoinder to Shani and Arad” (Hall et al. 2015a); “There is always time for rational scepticism: Reply to Hall et al” (Shani and Arad 2015); and “Denying bogus scepticism in climate change and tourism

research" (Hall et al. 2015b). The final response suggests that the "obfuscation of scientific research" can have long-term negative consequences for policy and action in relation to climate change (Hall et al. 2015b p. 352). This has a direct impact on the achievement of the Sustainable Development Goals.

In consideration of the impact of Higher Education Institutions (HEIs) on sustainable development, there was a noted increase in publishing between 2005-2017 (Findler et al. 2018). Over half of the 113 peer reviewed journal articles representing the 'state of knowledge' were submitted in the final four years (Findler et al. 2018). Furthermore, a fragmented discourse was identified across a wide journal base, although the 'Journal of Cleaner Production' and 'International Journal of Sustainability in HE' had the highest contributions (Findler et al. 2018). Special issues might account for some of the fragmented discourse: "Evidence for upscaling existing SDGs policies and programmes in African countries" (Okonofua 2016); "Work-based and vocational education as catalysts for sustainable development" (Wall and Hindley 2018). However, movement beyond peer reviewed special issues is needed. The Journal of Sustainable Tourism's editorial team reflected on how their publication could help authors achieve more impact with their research, resulting in a decision to "ask all authors to frame their submitted articles against the Sustainable Development Goals" (Font et al. 2019 p. 9). Nevetheless, there is overall a lack of strategies that promote international research (Caniglia et al. 2017) and publication. This paper seeks to contribute to this discussion.

3 Methodology

In order to assess the trends of scientific publishing on sustainability in Higher Education, the World Survey on Sustainability Publishing in Higher Education (WSSSP-HEI) was undertaken. It was divided into two parts: research (I) and publishing (II). The part on research will be the subject of another paper. Regarding part (II), the methodological steps included the survey development (definition of questions, pre-test and preparation of final version), survey dissemination, and data analysis. Each step is detailed as follows.

The questionnaire had an initial section on demographic details, enquiring respondents for details of their universities (name, department, and country) and their

age group, gender and background (Education, Social Sciences, Natural Sciences, Engineering & Technology and Other). In the sequence, the questions related to the:

a) Number of book chapters on matters related to sustainable development (SD) in higher education (HE) published by the respondent over the past five years;
b) Number of books on matters related to SD in HE edited or co-edited and published by the respondent over the past five years;
c) Number of articles on matters related to SD in HE published by the respondent in journals which are peer-reviewed and have an impact factor over the past five years;
d) Journals in which the respondents usually publish their research (e.g. Journal of Cleaner Production; Int. J. of Sustainability in Higher Education; Int. J. of Sustainable Development and World Ecology, among other options);
e) Areas on SD in HE the papers usually focus on (i.e. Sustainability in higher education in general, campus greening, teaching issues, research issues);
f) Main reasons for choosing a journal/book to publish their research.

The questions were inititially prepared by the authors and pre-tested by researchers and professors working the social and environmental sciences, and with expertise in sustainability in higher education, hence catering for a wide range of perspectives.. The final survey (Appendix A) was then disseminated online (through Google Forms) to all members of the Inter-University Sustainable Development Research Programme (IUSDRP, https://www.haw-hamburg.de/en/ftz-nk/programmes/iusdrp.html), a network of universities committed to sustainability. The Programme has over 140 member universities, and the participants who receive the communications are members of administrative sectors or researchers/professors actively involved in matters related to SD in their organizations, thereby ensuring the reliability and validity of this methodological approach.

The online survey remained active from June to October, 2019 and collected 103 responses from 43 different countries. Simple descriptive statistics to summarize and discuss the collected data was used for the analysis. The results will be presented following each survey section.

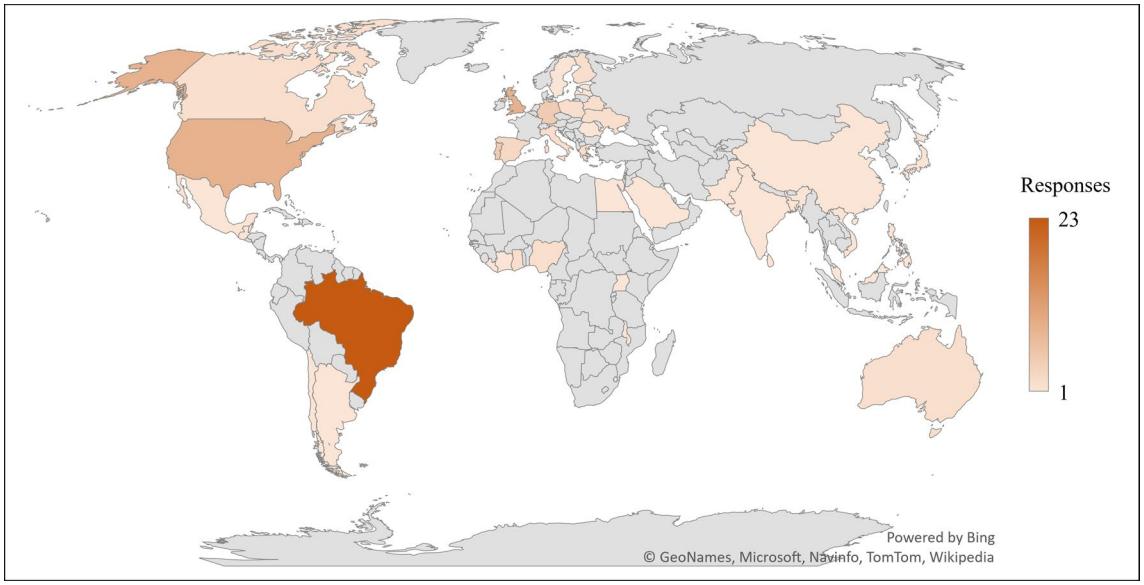
4 Results and Discussion

This section starts by describing the trends in scientific publishing on sustainability in higher education collected from the worldwide survey. By the end, it presents an overview of measures that universities and researchers can adopt to improve their publishing opportunities.

4.1 Demographic details

Figure 1 shows the 43 countries represented in the study, and the intensity in the number of responses. From the Americas, the participant countries were Argentina, Bahamas, Belize, Brazil, Canada, Chile, Guatemala, Mexico and USA; from Africa: Cote d'Ivoire, Egypt, Ghana, Liberia, Malawi, Nigeria and Uganda; from Asia/Oceania: Australia, Bangladesh, China, Hong Kong, India, Japan, Malaysia, Pakistan, Philippines, Saudi Arabia, Sri Lanka and Vietnam; and from Europe the participant countries were Belarus, Estonia, Finland, Germany, Greece, Italy, Latvia, Malta, Poland, Portugal, Romania, Spain, Sweden, Ukraine and the UK.

Figure 1. Countries which participated in the survey (and intensity of the number of responses)

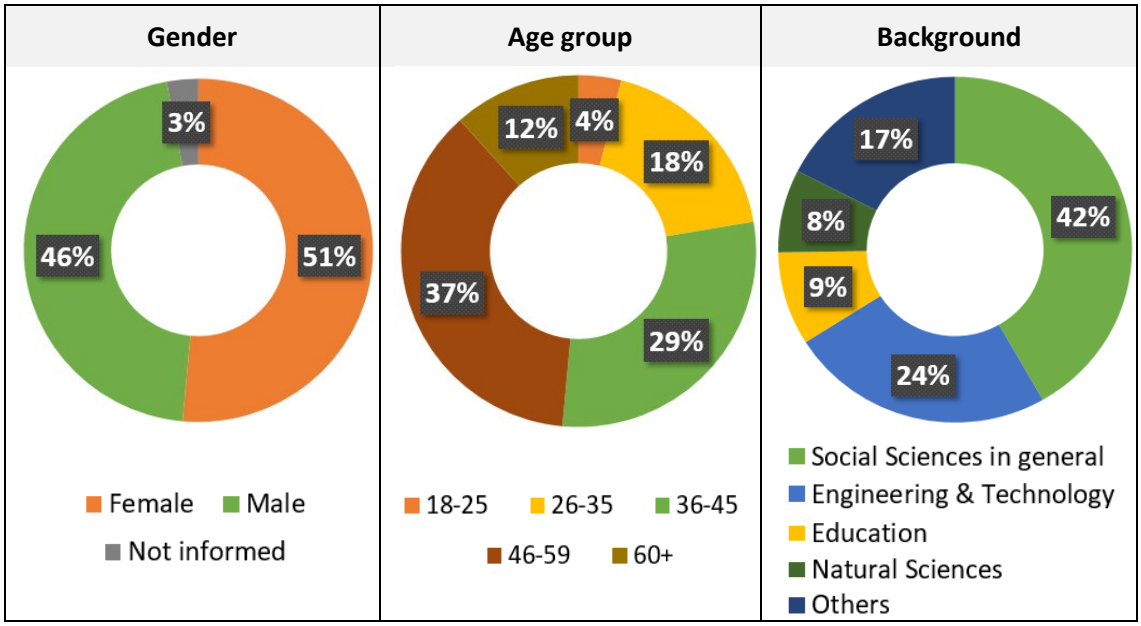


Source: Prepared by the Authors

Figure 2 summarizes the sample demographic details: when it comes to gender, 51% of the respondents are female, 46% are male, and 3% preferred not to state. Regarding the age group, the survey received responses from all levels: 4% in the age

group of 18-25, 18% between 26-35 years of age, 29% between 36-45 years of age. The majority of the sample, 37%, is between 46-59 years of age; only 12% are 60 years of age or more. Regarding background, more than 40% are from the social sciences, and more than 20% from engineering and technology. Other areas, such as education and natural sciences, are represented by a lesser proportion.

Figure 2. Sample demographic details (gender, age group and background)



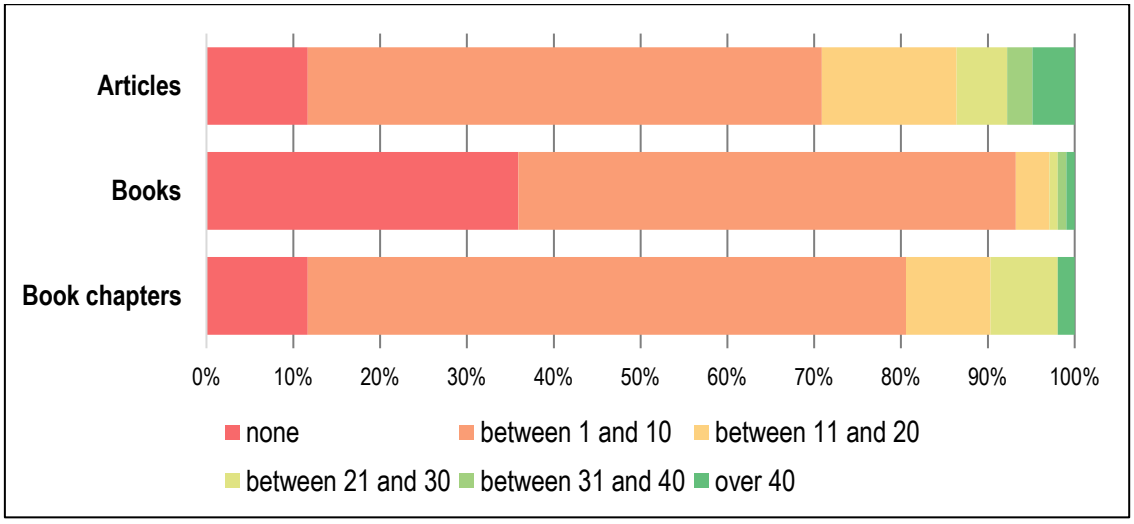
4.2 Number of publications

Publications are relevant for researchers in order to share their studies and get recognition from their peers. From a practical point of view, they are often used when decisions on promotion or tenure are to be taken. The primary modalities include publishing books, book chapters or journal articles. The survey started by asking the respondents to indicate the number of books and book chapters on matters related to sustainable development in higher education that were published by them over the past

five years, as well as the number of articles published in peer reviewed journals in the same period. Figure 3 summarizes the responses for the three types of publication, including the percentage of responses according to the number of publications in the last years.

Interestingly, the majority of the respondents in the sample stated to have published less than ten publications or none, regardless of the type of publication, during the last years. For books, however, the percentage of respondents which indicated "none" is higher than the other groups (>35%). For book chapters and articles, this percentage was approximately 10%. On average, among all types of publications, journal articles are more commonly published, reaching almost 10% of responses in the categories "between 31 and 40" and "over 40," while the same categories resulted in only 2% for books and book chapters. Although the peer review process for books and book chapters might be slightly less complicated, authors may prefer publishing journal articles for reasons associated with the evaluation of scholarship in general (Arnăutu and Panc 2015; Schimanski and Alperin 2018), curriculum scores and demands from graduate programs (Dyke 2019; Harris 2015; Rawat and Meena 2014). Additionally, books demand coordinated efforts and support from the publisher (Cortada 2017).

Figure 3. Results on the number of book chapters, books and articles published by the respondents



4.3 Main journals

The survey also intended to find out in which journals the respondents usually or frequently publish their research. Among the given options, two were the most indicated: *International Journal of Sustainability in Higher Education* (indicated by 39% of the respondents) and *Journal of Cleaner Production* (indicated by 37% of the respondents). This is one of the key results from this analysis. It indicates that these options as the most preferred ones to publish studies related to sustainability in higher education, and virtually dominate the sustainability in higher education conversation.

Looking into the journals which address environmental management performance issues at HEIs, Guenther and Ross (2020) corroborate these results by indicating that the majority of publications are published in the *International Journal of Sustainability in Higher Education* (IJSHE) (45%) and *Journal of Cleaner Production* (JCP) (41%), with only around 14% of literature being published in various other journals (Guenther and Ross, 2020).

These include journals such as "Environment and Sustainable Development" (16%) and "Journal of Environmental Management" (15%).

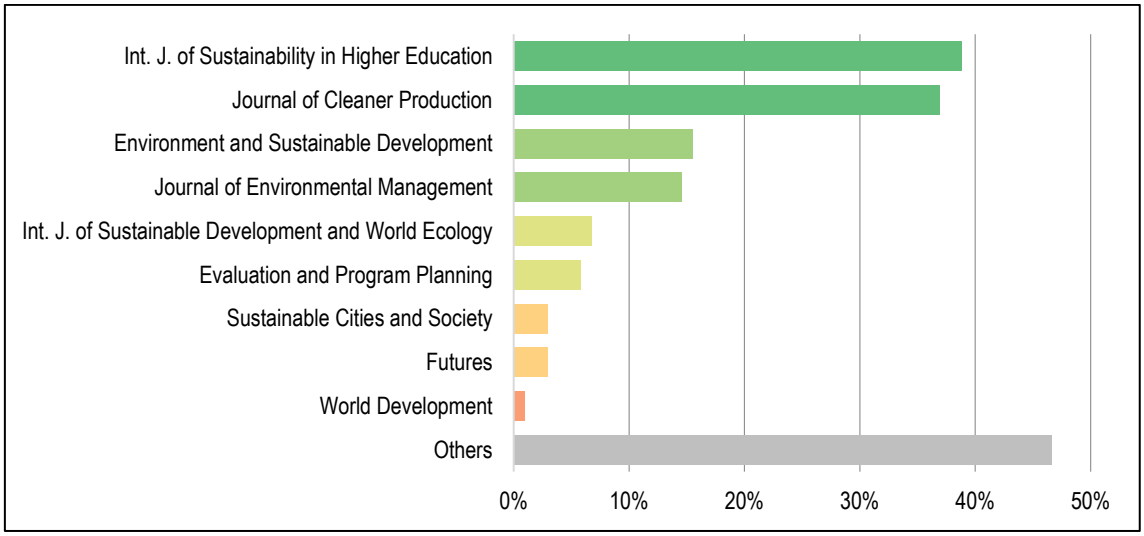
An additional 48 responses were received in the option “Others,” where respondents could mention journal titles not presented

in the offered options. Of these, the most recurring journal was "Sustainability", with eight mentions. This is also a

key result, since these periodicals account for about a third of the journals mentioned sample.

Other journals refer to climate change and educational issues, in addition to energy and sustainability challenges in general. It can also be highlighted the presence of local/national journals, which publish papers in other languages (such as Spanish and Portuguese). Figure 4 presents these results.

Figure 4. Journals preferred by the respondents for publishing



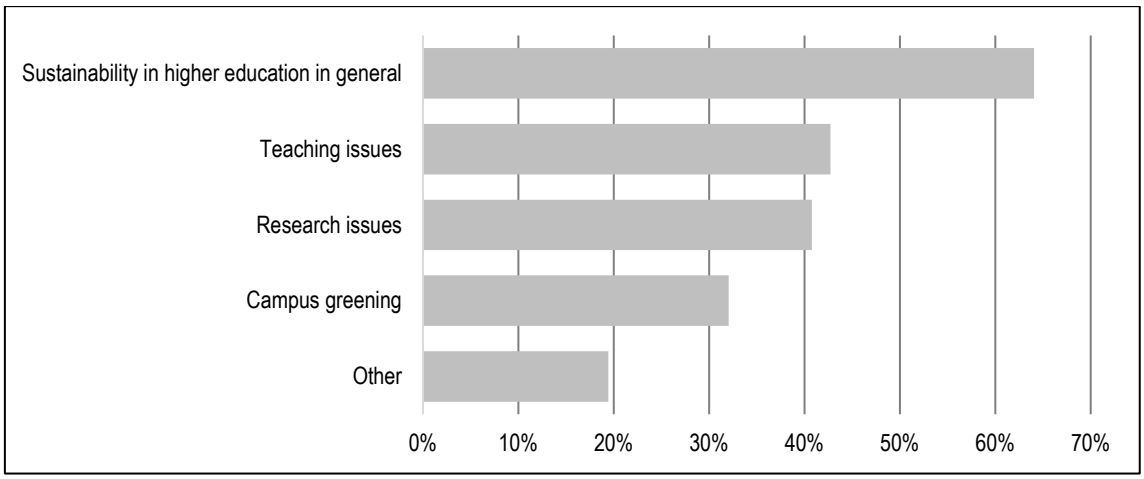
4.4 Areas and reasons

When asked about the areas of sustainable development in higher education that the published papers usually focus on (Figure 5), the respondents indicate Sustainability in general as the most common topic (>60% of responses). This was already expected at a certain point, since several studies may not fall under a specific approach on teaching, research or campus operations. With around 40% of the responses, the following most common areas are: **teaching and research issues**, which include teaching techniques and innovative approaches for teaching education for sustainable development (Hermann and Bossle 2020; Lozano and Young 2013) and **challenges and opportunities** for researching sustainability (Barbosa-Póvoa et al. 2018; Salvia et al. 2019; Turnheim et al. 2020), among others. Campus greening was indicated by 32% of the sample. However, its contribution towards publications on the topic might increase, mainly due to recent publications which support this matter [e.g. "Books Universities as Living Labs for Sustainable Development - Supporting the Implementation of the Sustainable Development Goals" (Leal Filho et al. 2020) and "Towards Green Campus Operations - Energy, Climate and Sustainable Development Initiatives at Universities" (Leal Filho et al. 2018)].

The option "Other" contained further interesting results. The respondents included topics such as the Sustainable Development Goals, climate change efforts, sustainable procurement at universities, sustainable consumer behaviour, in addition to others that may represent connections with society in general and local communities (capacity

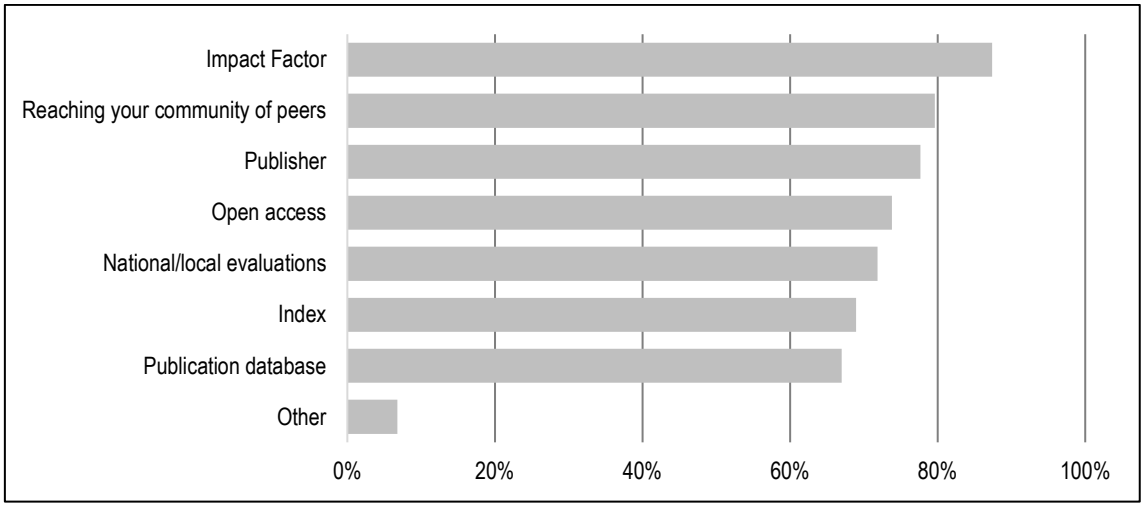
building, social innovation, global citizenship, urban mobility and poverty, religions and sustainability, psychological aspects and sustainable construction projects).

Figure 5. Areas of SD in HE the papers usually focus on



As already touched upon, one may wonder about the reasons for choosing a certain journal/book to publish a study. In this regard, Figure 6 shows the main reasons indicated by the respondents for choosing a publication. Impact factor should be highlighted as the most mentioned reason (indicated by 87% of the respondents). Reaching the community of peers (80%) and the publisher (78%) were the next most indicated reasons, followed closely by the Open Access availability (74%). **This is also a key result**. The least indicated reasons (but still indicated by 67-72% of the sample) are national/local evaluations, Indexes and publication databases. An additional seven comments (7%) were included in the space for "Other" responses, and they are related to the adherence of the paper subject to the scope of the journal/book, the ease in handling the publication (probably meant by the respondent as the steps of submission and peer review until getting the study finally published) and the case of being invited by peers to submit studies to a publication.

Figure 6. Main reasons for choosing a journal/book to publish research



4.5 Discussion

The results indicate that the reasons behind the choice of where to publish may vary, and they depend on the relevance that authors give to specific factors. Although the publishing process used to take a rather long time in the past (depending on the publisher, type of publication, and peer review process, among others), this is not so today. Many publishers are able to make an accepted paper available with a DOI and ensure they can be cited a few weeks after being accepted. The advantages of this new trend are innumerous.

All these elements reiterate the advantages academics may have, by being aware of the publishing opportunities in the topic of sustainability in higher education. The list below presents some insights on how to take more advantage of these opportunities, based on the authors' experience:

a) Participate in national and international sustainability networks: these networks work as complex and integrated spaces for universities and researchers who share a common goal to support each other. Partnerships for publications and projects are among their advantages and purposes (Bixler et al. 2019; Keeler et al. 2016). The IUSDRP, for example, has among its aims to "catalyse and facilitate the production of high-quality joint publications in indexed journals, as well as in ground-breaking books and book chapters, in cooperation with well-established publishers" (IUSDRP n.d.).
b) Subscribe to mailing lists on the topics of interest: through these lists, researchers can invite other colleagues to work on project proposals,

publications and even partnerships for events, for example. Calls for authors for diverse publishing opportunities are common and frequent;

c) Contact editors and editorial teams of journals informing them of one's interest to act as a reviewer: being available to act as a reviewer (given the topic reflects the researcher expertise area) may increase one's chances to publish more – not solely for gaining experience on the topic, but also for getting recognition in the area (Verbeke et al. 2017);

d) Participate in conferences which lead to publications in journals/books: there are other various reasons to choose conferences to attend and present research results, but whenever appropriate and suitable, researchers may consider those that promote high-impact publications.

These recommendations will assist authors in recognizing diverse publishing possibilities and choosing the ones that respond to their main reasons for publishing. These findings corroborate with Caniglia et al. (2017), specifically focusing on communication strengthening and the collaborative process, which can contribute to increasing the low research rate in international partnership.

Based on these contributions, the following framework is suggested to increase the publication rate in sustainability in higher education (Figure 7).

Figure 7 - Framework to increase publications on Sustainability in Higher Education

From the framework, it can be seen that academics have many disadvantages when they work alone. By taking part on sustainability network and being kept informed about progresses in mailing lists, they can be kept abreast of the latest development, and access information they would not normally not become aware of. An example is the IUSDRP mailing list which can be accessed for free at: https://www.jiscmail.ac.uk/cgi-bin/webadmin?A0=IUSDRP. It contains information on events, publishing opportunities and project calls, which academic staff may find very useful.

Also, academic staff may wish to act as reviewers in sustainability journals, being able to obtain information on recent research. Moreover, participation in international events, albei costly, often proves to be a good investment since many are in fact in-service training and offer the opportunity to meet individuals who are otherwise known from the literature. The current restrictions posed by the COVID-19 pandemic do not need to adversely affect communication or networking among academics: even though physical events cannot at present be easily organised or held, on-line events offer a good complement. This is not to say that on-line events could ever replace presence ones. But they do offer an alternative, until it is safe again to organised normal Symposia, Workshops or Congresses.

5 Conclusions

As this paper has shown, publications on matters related to sustainable development are good indicators of academic activity and excellence. They provide valuable venues for discussing issues pertaining to sustainable development, showing the plurality of viewpoints and perspectives and documenting experiences.

Before dwelling on the conclusions, it should be reiteirated that female participants, (with 51%) had a slightly higher engagement in the study than their male counterparts. Senior researchers, between 36 and 59 years of age, accounted for 65% of the respondents, in the context of which the social sciences were twice as highly represented in the study as engineering and technology.

The survey undertaken has identified a number of trends. The first one is that over half of the 113 peer reviewed journal articles published and representing the 'state of knowledge' were submitted in the last four years. This suggests an intensification of research efforts, coupled with an increased in the willingness to submit this work to peer reviewed journals. Secondly, there is a trend towards a fragmented discourse, i.e. a discourse focusing on specific issues, thanks to the production of special issues. These, however, present one advantage: they may address the concerted coverage of some topics (e.g. sustainability governance, sustainability reporting), which may not otherwise be well covered elsewhere. In addition, articles in journals are seen to be more popular than book chapters. Furthermore, it is clear that two journals seem to dominate the conversation of sustainability in higher education, with over 3/4 of all papers published on this subject matter, namely the *International Journal of Sustainability in Higher Education* and the *Journal of Cleaner Production*.

Whereas "sustainability" as a general term appears to be the most popular theme, the study has shown that papers on teaching, research or campus operations are also popular. Also, themes such as the Sustainable Development Goals, climate change and sustainable procurement at universities, along with sustainable consumer behavior, are increasingly popular topics.

The fact that nearly 90% of the authors indicated that the impact factor (followed by Open Access) is the main criteria in the decision to publish in a particular journal shows that these elements will also guide future decisions. This may be explained by the fact that these indicators are used in decisions related to the tenure and promotion of

503 academics. Authors may benefit from accessing networks and mailing lists, and by
504 attending events and venues for accessing journals.
505 The research has some limitations. Firstly, the sample is too small to allow for a
506 broad extrapolation of the results. Secondly, its wide dissemination via various networks
507 is not a guarantee that it mobilized all concerned sustainability researchers. Nonetheless,
508 the data obtained offers a rough profile of how academic publishing on sustainable
509 development is perceived and practiced. Since the paper was not meant to cluster
510 responses among specific countries but to build a general profile instead, the purpose has
511 been achieved. It contains no specific geographical focus; rather, it needs to be
512 considered as a global study.
513 The present paper nevertheless provides a welcome addition to the literature since
514 it addresses the deficiency in studies on published research on matters related to
515 sustainable development. Its implications are two-fold: it offers a detailed overview of
516 the state-of-the-art on publications on sustainability in a higher education context,
517 outlining its main features. Also, it sheds light on the journals most active in the topic and
518 the level of emphasis they attach to various themes.
519 Methodologically, the approach used in this paper can be replicated and used in
520 similar studies, especially in those where a combination of qualitative and quantitative
521 data is important in order to allow a broader understanding of trends.
522 Looking forward, there are various measures via which higher education
523 institutions may be able to take more advantage of the many opportunities that publishing
524 on sustainability offers to them. Some of them are as follows:
525 * the SDGs offer universities good opportunities to document and promote their
526 works, be it in respect of policies or practical activities;
527 * authors should take more advantage of networks, mailing lists and conferences,
528 as a means of better engaging with their peers and accessing publishing opportunities;
529 * the specialist journals available and mentioned in this paper offer a solid basis for
530 scientific publishing, and have many published papers which may be used as reference
531 points.
532
533 As far as future steps are concerned, there is a perceived need for more research on
534 publishing trends wjich are specific to the social and natural sciences, since they adopt

different sustainability philosophies. In addition research is also needed on the extent to which the SDGs are being taken into account in the context of scientific publishing. These research gaps will be addressed in forthcoming studies being undertaken as part of the newly-founded "The SDGs Academic Research and Publications Initiative" (SDG-ARPI), whose details can be seen at: https://www.haw-hamburg.de/en/university/newsroom/news-details/news/news/show/new-research-initiative-on-the-sdgs/.

Overall, academic publications provide a valuable service in that they disseminate case studies, projects and programs and report on the findings of studies and research on sustainable development. As such, they are very important tools in fostering information exchange and serve as a vehicle for the documentation and dissemination of what government bodies, research agencies, international bodies, universities and aid agencies are undertaking in the various pathways leading to a more sustainable world.

Conflict of Interest

The authors declare that they have no conflict of interest.

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720
721

722 **Appendix A.** Summary of the survey questions and response options

	Questions	Responses
Demographics	**Name of your University:**	
	Country:	
	Your age group:	( ) 18-25 ( ) 26-35 ( ) 36-45 ( ) 46-59 ( ) 60+
	Your gender:	( ) Female ( ) Male
	What is your background?	( ) Education ( ) Social Sciences in general (including politics, economics, arts, languages) ( ) Natural Sciences ( ) Engineering & Technology ( ) Other
Number of publications	**How many book chapters on matters related to sustainable development in higher education have been written and published by yourself/your team at your university over the past 5 years?**	( ) none ( ) between 1 and 10 ( ) between 11 and 20 ( ) between 21 and 30 ( ) between 31 and 40 ( ) over 40
	How many books on matters related to sustainable development in higher education have been edited or co-edited and published by yourself/your team at your university over the past 5 years?	( ) none ( ) between 1 and 10 ( ) between 11 and 20 ( ) between 21 and 30 ( ) between 31 and 40 ( ) over 40
	How many articles on matters related to sustainable development in higher education have been published by yourself/your team at your university in journals which are peer-reviewed and have an impact factor, over the past 5 years?	( ) none ( ) between 1 and 10 ( ) between 11 and 20 ( ) between 21 and 30 ( ) between 31 and 40 ( ) over 40

Main journals	**In which journals do you usually publish? (multiple answers possible)**	( ) Journal of Cleaner Production ( ) Int. J. of Sustainability in Higher Education ( ) Futures ( ) Int. J. of Sustainable Development and World Ecology ( ) Environment and Sustainable Development ( ) Evaluation and Program Planning ( ) World Development ( ) Journal of Environmental Management ( ) Sustainable Cities and Society ( ) Other
Areas and reasons	**Which areas have the papers focused on in relation to sustainable development in higher education? (multiple answers possible)**	( ) Sustainability in higher education in general ( ) Campus greening ( ) Teaching issues ( ) Research issues ( ) Other
	Which are the main reasons for choosing a journal/book to publish your research? (multiple answers possible)	( ) Impact Factor ( ) National/local evaluations ( ) Open access ( ) Publisher ( ) Index ( ) Publication database ( ) Reaching your community of peers ( ) Other

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