

Trends in Scientific Publishing on Sustainability in Higher Education

Walter Leal Filho^{a,b}, Amanda Lange Salvia^{a,c*}, Fernanda Frankenberger^d, Tony Wall^e, Ann Hindley^f, Mark Mifsud^g, Luciana Brandli^h, Markus Willⁱ

- a) European School of Sustainability Science and Research, Hamburg University of Applied Sciences, Ulmenliet 20, D-21033 Hamburg, Germany
- b) Department of Natural Sciences, Manchester Metropolitan University, Chester Street, Manchester, M1 5GD UK E-mail: w.leal@mmu.ac.uk
- c) Graduate Program in Civil and Environment Engineering, University of Passo Fundo, Campus I - BR 285, São José, 99052-900, Passo Fundo, RS, Brazil. Email: amandasalvia@gmail.com *corresponding author
- d) Business School PUCPR, Pontifical Catholic University of Paraná, 1155 Curitiba, and Brazil Business School, Positivo University, 5300 Curitiba, Brazil. E-mail: ferfrank1@hotmail.com
- e) International Centre for Thriving, University of Chester, Chester, CH1 4BJ, United Kingdom. E-mail: t.wall@chester.ac.uk
- f) International Centre for Thriving, University of Chester, Chester, CH1 4BJ, United Kingdom. E-mail: ann.hindley@chester.ac.uk
- g) Centre for Environmental Education & Research, University of Malta, Msida MSD 2080, Malta. E-mail: mark.c.mifsud@um.edu.mt
- h) Graduate Program in Civil and Environment Engineering, University of Passo Fundo, Campus I - BR 285, São José, 99052-900, Passo Fundo, RS, Brazil. Email: brandli@upf.br
- i) University of Applied Sciences Zittau/Görlitz, Theodor-Körner-Allee 16, 02763 Zittau. E-Mail: m.will@hszg.de

Wordcount: 7756

Trends in Scientific Publishing on Sustainability in Higher Education

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 be defined, namely "sustainability in higher education", refers to matters related to sustainable development in a higher

1 education context. In other words, this term describes sustainability-related
2 components of relevance to tertiary education. The second term which should be
3 defined is "sustainability". Here it is used to describe socio-ecological process via which
4 a holistic view of nature and a balanced use of natural resources is advocated, so as to
5 achieve societal gains.
6
7

8
9
10 Finally, the term "sustainability publishing" is herewith used, in order to focus on
11 publications whose main subject and focus is on sustainable development. Therefore,
12 the very specific nature of this paper means that the focus is not on publications on
13 general issues or matters of wider interest, but quite focused on sustainable
14 development.
15
16

17
18
19 Sustainability in higher education has a potential influence on the exchange of
20 information between various aspects of sustainability (Davin 2015). In this sense, the
21 publications on sustainability in higher education have been deeply involved in themes
22 related to the role of HEIs: education, campus operations, community
23 engagement/outreach, and governance (Kapitulcinová et al. 2017).
24
25

26
27
28 Most publications show reports and case studies regarding the initiatives and
29 activities for sustainability. These initiatives take different applications and cover
30 multiple areas. Beringer and Adomant (2008) emphasize that sustainability research in
31 the higher education spectrum is broad, with scientific inquiry taking many different
32 forms and pathways regarding research paradigms, designs, methodology practical
33 goals and aspirations. In another study, Caniglia et al. (2017) analyze the transnational
34 collaboration for sustainability in higher education, identifying the main research
35 activities as virtual research, single projects multiple projects, and visiting scholars
36 projects. The authors' research found a low frequency of these activities, and they argue
37 that it may be due to the low research rate in international partnerships, or because
38 individual researchers are preferred to institutional partnerships.
39
40

41
42
43 An increasing number of studies point out sustainability in higher education in
44 general, including discussions about the barriers and challenges for implementing
45 sustainability in HEIs (Aleixo et al. 2019; Ávila et al. 2017). Some publications cover
46 conceptual descriptions, practical experiences and parallels among the variety of
47 sustainability assessment tools (Shriberg 2002; Caeiro et al. 2013), and other
48 publications address university rankings (Torabian 2019).
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

1 There are several specific research areas within sustainability in HEIs which have
2 experienced significant growth in the last few years. Three of these areas include the
3 Living Labs methodology, Climate Change Education, and SDGs implementation.
4

5 A growing focus of research in the field of sustainability in higher education is the
6 utilization of ‘Living Labs’ which aid HEIs in conducting research that has relevance to
7 society and which addresses real-world sustainability issues (Leal Filho et al. 2019a).
8 Research on living labs and sustainability indicates that technological innovation needs
9 to be interwoven with social and cultural aspects over a long time period in order to
10 achieve the required outcomes (Von Geibler 2014). The research work is usually
11 published as case studies. It includes wide-ranging domains in sustainability, such as the
12 implementation of solar-powered schools (REGSA 2016), the formation and evolution
13 of university degrees (Mifsud 2014) and the utilization of open and distance learning
14 (Nicolau et al. 2018).
15

16 Research on the role of HEIs and climate change has increased during the last
17 decade due to the scientific, social, environmental and political challenges that the
18 phenomenon has created on the entire biosphere. The most common approach utilized
19 by HEIs in this area appears to be the embedding of climate change education in their
20 curricula and the research framework employed to achieve this (Leal Filho et al. 2019b).
21 A further area of enquiry focuses on students and universities that specialize in climate
22 change adaptation expertise and mitigation tools (Hill et al. 2019).
23

24 A relatively new area which is seeing a lot of growth and publications is the study
25 of the relevance, relationships and possible implementation strategies to achieve the UN
26 Sustainable Development Goals (SDGs) within HEIs. (Leal Filho 2019c). HEIs are
27 working to incorporate the ambitious 17 goals into their agendas and policies and to
28 achieve the SDGs. Due to the multi-stakeholder platform and the participation from
29 numerous institutions, there are multifaceted opportunities for research and publications
30 both in work evaluation and in capacity building (Shiel et al. 2015).
31

32 Several HEIs have developed a wide range of initiatives in order to embed
33 sustainability within their organization. These can be broadly categorized under
34 education, outreach, research, operations, and governance (Lozano et al. 2015). All
35 these possibilities are the reasons why publications on sustainability in higher education
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

1 in the databases have increased, both in terms of the scope of the subject and their
2 geographical range during the last decade.

3
4 The analysis of publications shows that the journals which most commonly
5 published on this subject are the *International Journal of Sustainability in Higher*
6 *Education*, the *Journal of Cleaner Production*, *Sustainability*, *Environmental Education*
7 *Research and Quality Management in Higher Education*. Besides those, more than 98
8 other journals include publications on the subject.

9
10 The selection of journals for publication is linked to many factors. Authors are
11 increasingly publishing in open access journals and are responsive to library funding
12 initiatives. However, the prestigious closed access journals still range high on the wish-
13 list of the authors. Another aspect is the Impact Factor of the journal, which indicates
14 the most extensive exposure and reach of the peer community (Nariani and Fernandez
15 2012).

16
17 Even though publications on issues related to sustainable development offer
18 substantial evidence of academic activity and excellence, there is a dearth of literature
19 related to this topic and a lack of studies which give a broad view of worldwide
20 publications over time. In order to address this need, the European School of
21 Sustainability Science and Research (ESSSR) and the Inter-University Sustainable
22 Development Research Program (IUSDRP) have undertaken the World Survey on
23 Sustainability Publishing in Higher Education (WSSSP-HEI). The objective of this
24 study was to shed some light on the nature of publications on sustainability, with
25 information which may enhance both the current and future potentials in this field.

26
27 There are three main factors which outline the relevance of this research. The first,
28 is that the complexity of sustainability publishing makes it sometimes difficult to
29 understand its true nature and usefulness. Secondly, sustainability publishing entails
30 environmental, social and economic elements which are broad and difficult to precisely
31 define. Finally, it encompasses various fields of academic research that aim to address
32 various issues, from the natural environment and ecosystems, to human behaviour,
33 financial elements and technical issues, among others.

34
35 This paper takes all these items into account. It has two main aims. The first is to
36 document and showcase trends in scientific publishing on matters related to sustainable
37 development. The second aim is to contribute to a greater understanding of this rapidly
38

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).

1 With single-blind, double-blind, triple-blind, quadruple-blind and open peer review
2 approaches in use, there is a need for improvement in transparency, accountability,
3 quality and further research on the peer review process (Haffar et al. 2019).
4

5
6 Editors rely on reviewer efficacy and effectiveness, but with peer reviewed
7 scientific outputs continuing to increase, this impacts experienced reviewers (Curtain et
8 al. 2019). Increasingly multi-tasking, these reviewers are becoming time-challenged,
9 which leads to delays (Sonne and Alstrup 2019), demotivated, due to repeated rejection
10 of the same paper (Drvenica et al. 2019), and concerned that quality cannot be
11 guaranteed as the process is not functioning well (Curtain et al. 2018). Editors are clear
12 as to the reasons for rejection under peer review, these being factors of poor journal fit,
13 lack of insight, fatal flaws, or lack of development (Pollock 2019), or factors of error,
14 language, or lack of explanation or mechanisms (Alexandratos 2017). However, with
15 the pressure for authors to publish and the high levels of rejection from legitimate
16 scholarly journals, there is motivation to publish in predatory journals (Alrawadieh
17 2018), cite rejected papers (Sonne and Alstrup 2019), trade authorship and fake peer
18 review (FPR) (Rivera 2019).
19
20

21
22 The legitimacy and credibility of scientific knowledge is dependent on the quality
23 process of peer review. If the speed of spurious news delivery via mass and digital
24 communications impacts negatively on societal knowledge, then this will influence
25 public health, environmental and medical science (Sonne and Alstrup 2019). A key
26 strategy of climate science denialism is the creation of fake controversies (Hansson
27 2017). Therefore, a healthy peer reviewed debate is required not only to advance
28 knowledge but to highlight errors, inaccuracies and misinformation (Hall et al. 2015a).
29 This is clearly demonstrated in a debate over several papers on climate change
30 scepticism: “Climate change and tourism: Time for environmental scepticism” (Shani
31 and Arad 2014); “No time for smokescreen scepticism: A rejoinder to Shani and Arad”
32 (Hall et al. 2015a); “There is always time for rational scepticism: Reply to Hall et al”
33 (Shani and Arad 2015); and “Denying bogus scepticism in climate change and tourism
34 research” (Hall et al. 2015b). The final response suggests that the “obfuscation of
35 scientific research” can have long-term negative consequences for policy and action in
36 relation to climate change (Hall et al. 2015b p. 352). This has a direct impact on the
37 achievement of the Sustainable Development Goals.
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

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). Nevertheless, 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 initially 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)

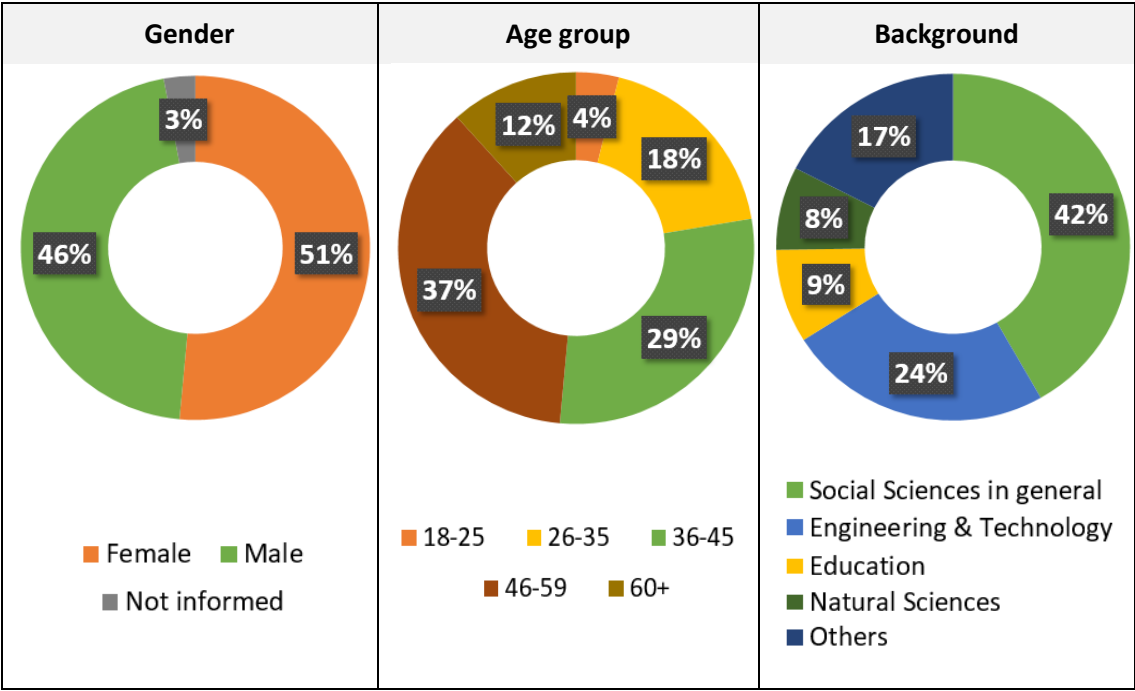


Source: Prepared by the Authors

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)



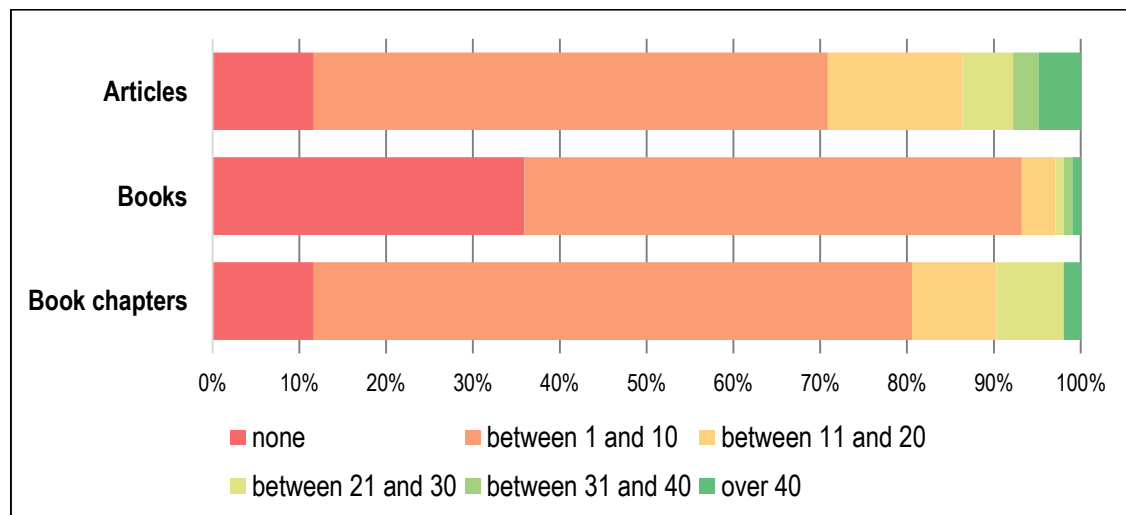
4.2 Number of publications

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.

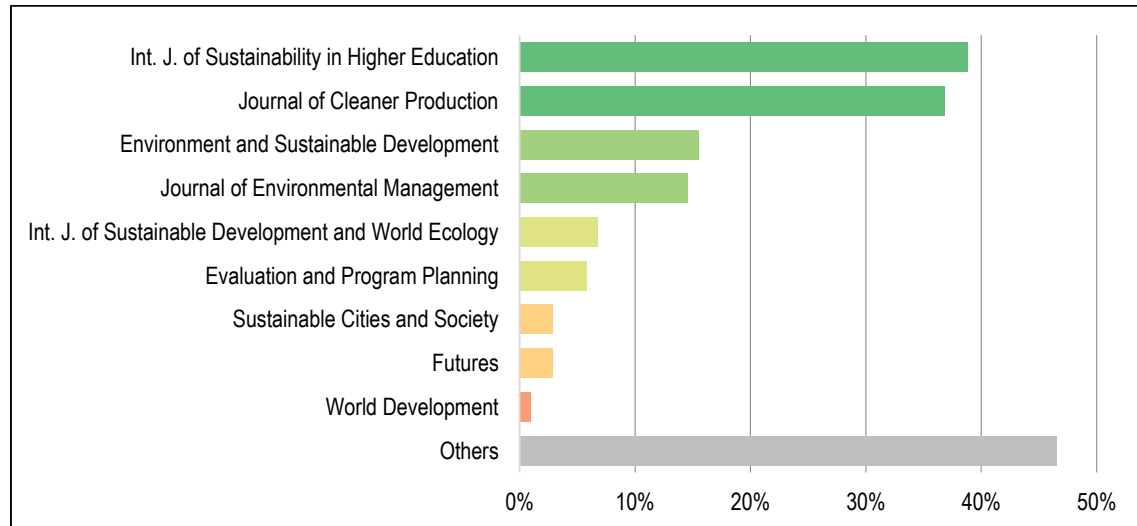
Looking into the journals which address environmental management performance issues at HEIs, Guenther and Ross (2020) corroborate these results by indicating that

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



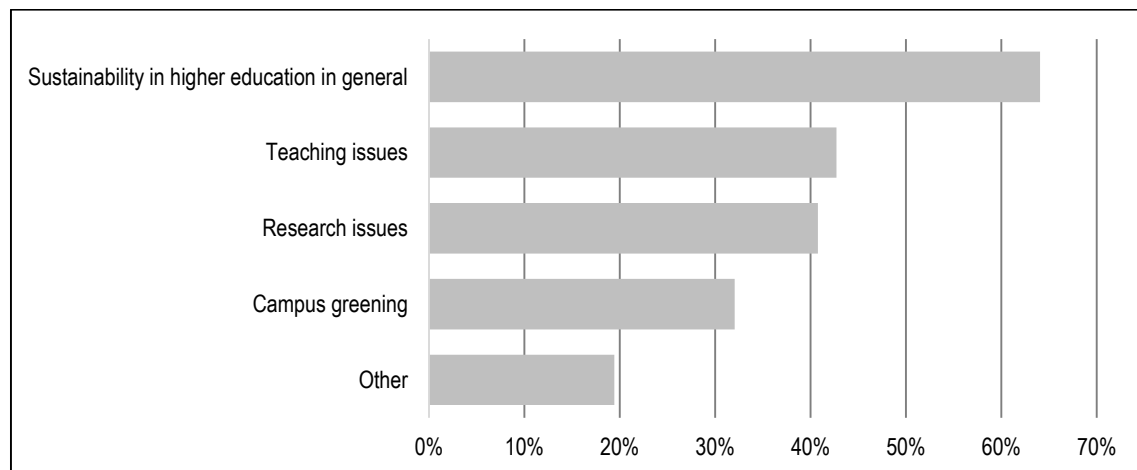
4.4 Areas and reasons

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).

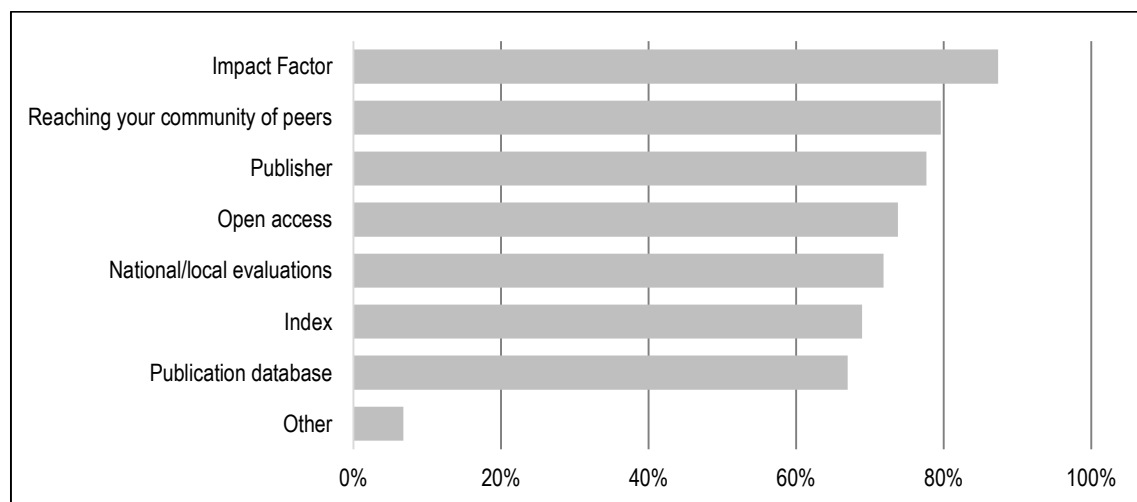
Figure 5. Areas of SD in HE the papers usually focus on



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 innumerable.

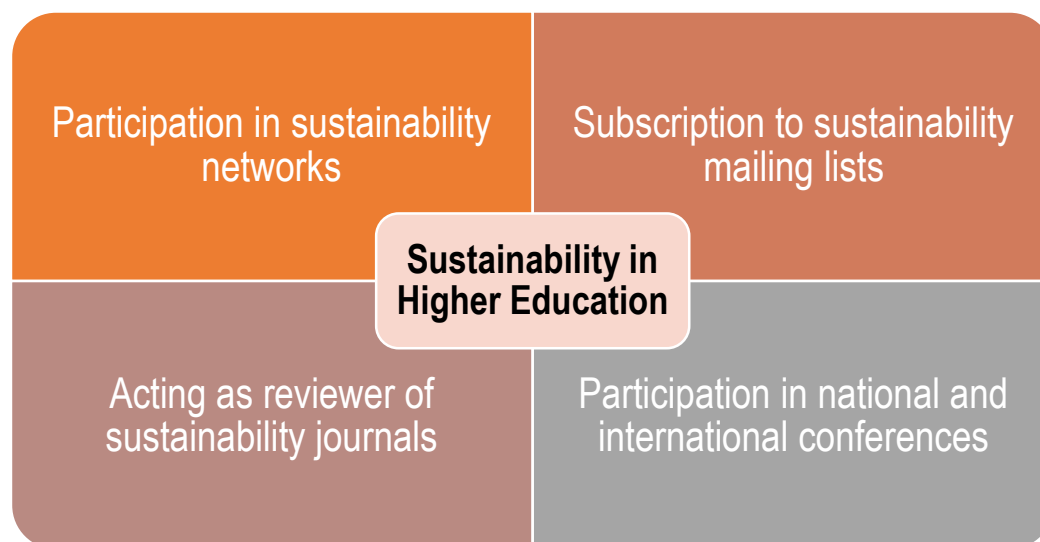
1 All these elements reiterate the advantages academics may have, by being aware
2 of the publishing opportunities in the topic of sustainability in higher education. The list
3 below presents some insights on how to take more advantage of these opportunities,
4 based on the authors' experience:
5
6
7

- 8 a) Participate in national and international sustainability networks: these networks
9 work as complex and integrated spaces for universities and researchers who
10 share a common goal to support each other. Partnerships for publications and
11 projects are among their advantages and purposes (Bixler et al. 2019; Keeler et
12 al. 2016). The IUSDRP, for example, has among its aims to “catalyse and
13 facilitate the production of high-quality joint publications in indexed journals, as
14 well as in ground-breaking books and book chapters, in cooperation with well-
15 established publishers” (IUSDRP n.d.).
16
17
18
19
20
21
22
- 23 b) Subscribe to mailing lists on the topics of interest: through these lists,
24 researchers can invite other colleagues to work on project proposals,
25 publications and even partnerships for events, for example. Calls for authors for
26 diverse publishing opportunities are common and frequent;
27
28
29
- 30 c) Contact editors and editorial teams of journals informing them of one's interest
31 to act as a reviewer: being available to act as a reviewer (given the topic reflects
32 the researcher expertise area) may increase one's chances to publish more – not
33 solely for gaining experience on the topic, but also for getting recognition in the
34 area (Verbeke et al. 2017);
35
36
37
38
- 39 d) Participate in conferences which lead to publications in journals/books: there are
40 other various reasons to choose conferences to attend and present research
41 results, but whenever appropriate and suitable, researchers may consider those
42 that promote high-impact publications.
43
44
45
46

47 These recommendations will assist authors in recognizing diverse publishing
48 possibilities and choosing the ones that respond to their main reasons for publishing.
49 These findings corroborate with Caniglia et al. (2017), specifically focusing on
50 communication strengthening and the collaborative process, which can contribute to
51 increasing the low research rate in international partnership.
52
53
54
55

56 Based on these contributions, the following framework is suggested to increase
57 the publication rate in sustainability in higher education (Figure 7).
58
59
60
61
62
63
64
65

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, albeit 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 reiterated 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

1 fact that these indicators are used in decisions related to the tenure and promotion of
2 academics. Authors may benefit from accessing networks and mailing lists, and by
3 attending events and venues for accessing journals.
4

5
6 The research has some limitations. Firstly, the sample is too small to allow for a
7 broad extrapolation of the results. Secondly, its wide dissemination via various networks
8 is not a guarantee that it mobilized all concerned sustainability researchers. Nonetheless,
9 the data obtained offers a rough profile of how academic publishing on sustainable
10 development is perceived and practiced. Since the paper was not meant to cluster
11 responses among specific countries but to build a general profile instead, the purpose has
12 been achieved. It contains no specific geographical focus; rather, it needs to be
13 considered as a global study.
14
15

16
17 The present paper nevertheless provides a welcome addition to the literature since
18 it addresses the deficiency in studies on published research on matters related to
19 sustainable development. Its implications are two-fold: it offers a detailed overview of
20 the state-of-the-art on publications on sustainability in a higher education context,
21 outlining its main features. Also, it sheds light on the journals most active in the topic and
22 the level of emphasis they attach to various themes.
23

24
25 Methodologically, the approach used in this paper can be replicated and used in
26 similar studies, especially in those where a combination of qualitative and quantitative
27 data is important in order to allow a broader understanding of trends.
28

29
30 Looking forward, there are various measures via which higher education
31 institutions may be able to take more advantage of the many opportunities that publishing
32 on sustainability offers to them. Some of them are as follows:
33

34
35 * the SDGs offer universities good opportunities to document and promote their
36 works, be it in respect of policies or practical activities;
37

38
39 * authors should take more advantage of networks, mailing lists and conferences,
40 as a means of better engaging with their peers and accessing publishing opportunities;
41

42
43 * the specialist journals available and mentioned in this paper offer a solid basis for
44 scientific publishing, and have many published papers which may be used as reference
45 points.
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65

As far as future steps are concerned, there is a perceived need for more research on publishing trends which 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.

References

- Alexandratos SD, Biegler LT, Broadbelt LJ, Freeman BD, Lee JY, Li BG, Morbidelli M, ...Xiao FS, et al. (2017) Why Wasn't My Manuscript Sent Out for Review? *Industrial Engineering Chemistry Research* 56(25):7109-7111
- Alrawadieh Z. (2018) Publishing in predatory tourism and hospitality journals: Mapping the academic market and identifying response strategies. *Tourism and Hospitality Research*. <https://doi.org/10.1177/1467358418800121>
- Arnăutu E, Panc I (2015) Evaluation criteria for performance appraisal of faculty members. *Procedia-Social and Behavioral Sciences*, 203:386-392.
- Atjonen P (2019) Peer review in the development of academic articles: Experiences of Finnish authors in the educational sciences. *Learned Publishing* 32(2):137-146
- Avila LV, Leal W, Brandli LL, Macgregor C, Molthan-Hill P, Ozuyar PG, Moreira RM (2017) Barriers to Innovation and Sustainability at Universities Around the World. *Journal of Cleaner Production* 164:1268-1278
- Barbosa-Póvoa AP, da Silva C, Carvalho A (2018) Opportunities and challenges in sustainable supply chain: An operations research perspective. *European Journal of Operational Research* 268(2):399-431

- Beringer A, Adomßent M (2008) Sustainable university research and development: inspecting sustainability in higher education research, *Environmental Education Research* 14(6):607-623
- Bixler RP, Atshan S, Banner JL, Tremaine D, Mace RE (2019) Assessing integrated sustainability research: Use of social network analysis to evaluate scientific integration and transdisciplinarity in research networks. *Current Opinion in Environmental Sustainability* 39:103-113.
- Caeiro S, Leal Filho W, Jabbour C, Azeiteiro, UM (org) (2013) Sustainability Assessment Tools in Higher Education Institutions. Sustainability Assessment Tools in Higher Education Institutions. Mapping Trends and Good Practices Around the World, Springer International Publishing. <https://doi.org/10.1007/978-3-319-02375-5>
- Caniglia G, Luederitz C, Groß M, Muhr M, John B, Keeler LW, ... Lang D (2017) Transnational collaboration for sustainability in higher education: Lessons from a systematic review. *Journal of Cleaner Production* 168:764-779
- Cortada JW (2017) Authors Versus Editors: A Personal View on Dealing with How Long a Book to Write or Publish. *Publishing Research Quarterly* 33(4):392-401
- Curtin PA, Russial J, Tefertiller A (2018) Reviewers' perceptions of the peer review process in journalism and mass communication. *Journalism & Mass Communication Quarterly*, 95(1):278-299
- Davim JP (Ed) (2015) Sustainability in Higher Education. Elsevier Ltd, 144 pp.
- del Fierro P, Meruane, O, Espinoza G, Herrera V (2018) Peering into peer review: Good quality reviews of research articles require neither writing too much nor taking too long. *Transinformacao* 30(2):209-218 <https://doi.org/10.1590/2318-08892018000200006>
- Desselle SP, Chen AM, Amin M, Aslani P, Dawoud D, Miller MJ, Norgaard LS (2019) Generosity, collegiality, and scientific accuracy when writing and reviewing original research. *Research in Social & Administrative Pharmacy: RSAP* 16(2):261-265
- Drvenica I, Bravo G, Vejmelka L, Dekanski A, Nedić O (2019). Peer review of reviewers: the author's perspective. *Publications* 7(1):1.
- Dyke G (2019) Does the early career 'publish or perish' myth represent an opportunity for the publishing industry? *Learned Publishing* 32(1):90-94
- Findler F, Schönherr N, Lozano R, Stacherl B (2019) Assessing the Impacts of Higher Education Institutions on Sustainable Development - An Analysis of Tools and Indicators. *Sustainability* 11(59) doi:10.3390/su11010059
- Findler F, Schönherr N, Lozano R, Reider D, Martinuzzi A (2019) The impacts of higher education institutions on sustainable development: A review and conceptualization. *International Journal of Sustainability in Higher Education* 20(1):23-38
- Font X, Higham J, Miller G, Pourfakhimi S (2019) Research engagement, impact and sustainable tourism. *Journal of Sustainable Tourism* 27(1):1-11
- Frijters P, Torgler B (2019) Improving the peer review process: A proposed market system. *Scientometrics* 119(2):1285-1288
- Guenther E, Roos N (2020) Sustainability Management Control Systems in Higher Education Institutions -From Measurement to Management. *International Journal of Sustainability in Higher Education* (in press).
- Haffar S, Bazerbach F, Murad MH (2019) Peer review bias: A critical review. *Mayo Clinic Proceedings* 94(4):670-676

- Hall CM, Amelung B, Cohen S, Eijgelaar E, Gössling S, Higham J, ... Weaver D (2015a) No time for smokescreen skepticism: A rejoinder to Shani and Arad. *Tourism Management*, 47:341-347
- Hall CM, Amelung B, Cohen S, Eijgelaar E, Gössling S, Higham J., ... Weaver D (2015b) Denying bogus skepticism in climate change and tourism research. *Tourism Management*, 47:352-356
- Hansson SO (2017) Science denial as a form of pseudoscience. *Studies in History and Philosophy of Science Part A* 63:39-47.
- Harris C (2015) Best practices in professional development in graduate education. *Handbook on teaching and learning in political science and international relations*. Edward Elgar Publishing. 512 pp.
- Hermann RR, Bossle MB (2020) Bringing an entrepreneurial focus to sustainability education: A teaching framework based on content analysis. *Journal of Cleaner Production* 246:119038. <https://doi.org/10.1016/j.jclepro.2019.119038>
- Hill P, Worsfold N, Nagy G, Leal Filho W, Mifsud M (2019) Climate change education for universities: A conceptual framework from an international study. *Journal of Cleaner Production*, 226, 1092-1101.
- IUSDRP (n.d.) Inter-University Sustainable Development Research Programme, <https://www.haw-hamburg.de/en/ftz-nk/programmes/iusdrp/aims.html>
- Kapitulcinová D, AtKisson A, Perdue J, Will M (2017) Towards integrated sustainability in higher education e Mapping the use of the Accelerator toolset in all dimensions of university practice. *Journal of Cleaner Production* 172:4367-4382
<http://dx.doi.org/10.1016/j.jclepro.2017.05.050>
- Keeler LW, Wiek A, Lang DJ, Yokohari M, van Breda J, Olsson L, ... Bojórquez-Tapia LA (2016) Utilizing international networks for accelerating research and learning in transformational sustainability science. *Sustainability Science* 11(5):749-762
- Leal Filho W, Frankenberger F, Iglecias P, Mülthar RCK (Eds.) (2018) *Towards Green Campus Operations: Energy, Climate and Sustainable Development Initiatives at Universities*. Springer, Cham. <https://doi.org/10.1007/978-3-319-76885-4>
- Leal Filho W, Salvia AL, Pretorius RW, Brandli LL, Manolas E, Alves F, ... Do Paco A (Eds.) (2019a) *Universities as Living Labs for Sustainable Development. Supporting the Implementation of the Sustainable Development Goals*. Springer, Cham.
<https://doi.org/10.1007/978-3-030-15604-6>
- Leal Filho W, Mifsud M, Molthan-Hill P, Nagy G, Ávila L, Salvia AL (2019b) Climate Change Scepticism at Universities: A global study, *Sustainability* 11:2981.
- Leal Filho W, Shiel C, Paço A, Mifsud M, Veiga Ávila L, Londero Brandli L, Molthan-Hill P, Pace P, Azeiteiro U, Ruiz Vargas V, Caeiro S (2019c) Sustainable Development Goals and Sustainability Teaching at Universities: Falling Behind or Getting Ahead of the Pack? *Journal of Cleaner Production* 226:1092-1101.
- Lozano R, Young W (2013) Assessing sustainability in university curricula: Exploring the influence of student numbers and course credits. *Journal of Cleaner Production* 49:134–141
<https://doi.org/10.1016/j.jclepro.2012.07.032>
- Lozano R, Ceulemans K, Alonso-Almeida M, Huisingh D, Lozano FJ, Waas T, Lambrechts W, Lukman R, Hoge J (2015) A review of commitment and implementation of sustainable development in higher education: results from a worldwide survey. *J. Clean. Prod.* 108A:1-18, <https://doi.org/10.1016/j.jclepro.2014.09.048>

- Lozano R, Lukman R, Lozano FJ, Huisingh D, Lambrechts W (2013) Declarations for Sustainability in Higher Education: Becoming Better Leaders, through Addressing the University System. *J. Clean. Prod.* 48, 10–19.
- Mifsud M (2014) Students perceptions on the first Masters in Education for Sustainable Development in Malta. *Transformative Approaches to Sustainable Development at Universities*, Springer, Switzerland. ISBN 978-3-319-08836-5
- Nariani R, Fernandez L (2012) Open Access Publishing: What Authors Want, *College & Research Libraries* 73(2):182-195
- Nicolau MD, Pretorius RW, De Jager AE, Lombard A (2018) Empowerment for sustainability in a community context: Lifelong learning and story of the Big 5 Community Tourism Forum, Koffiekraal/Brakkuil (South Africa). In: *Handbook of Lifelong Learning for Sustainable Development*. Cham: Springer. 29–44
- Okonofua F (2016) Special edition on the implications of the Sustainable Development Goals for Africa's development: editor's choice. *African Journal of Reproductive Health* 20(3): 10-12
- Pollock NW (2019) Rejection Under Peer Review. *Wilderness & Environmental Medicine* 30(1):1
- Rawat S, Meena S (2014) Publish or perish: Where are we heading?. *Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences* 19(2):87
- REGSA (2016) Promoting Renewable Electricity Generation in South America, www.regsa-project.eu/
- Rivera H (2019) Fake peer review and inappropriate authorship are real evils. *Journal of Korean Medical Science* 34(2):e6, doi:10.3346/jkms.2019.34.e6
- Roll SC (2019) The Value and Process of High-Quality Peer Review in Scientific Professional Journals. *Journal of Diagnostic Medical Sonography*, <https://doi.org/10.1177/8756479319853800>
- Rowley J, Sbaffi L (2018) Academics' attitudes towards peer review in scholarly journals and the effect of role and discipline. *Journal of Information Science* 44(5):644-657
- Salvia AL, Leal Filho W, Brandli LL, Griebeler JS (2019) Assessing research trends related to Sustainable Development Goals: Local and global issues. *Journal of Cleaner Production* 208:841-849
- Schimanski LA, Alperin JP (2018) The evaluation of scholarship in academic promotion and tenure processes: Past, present, and future. *F1000research*, 7:1605 <https://doi.org/10.12688/f1000research.16493.1>
- Shani A, Arad B (2014) Climate change and tourism: Time for environmental skepticism. *Tourism Management* 44:82-85
- Shani A, Arad B (2015) There is always time for rational skepticism: Reply to Hall et al. *Tourism Management* 47:348-351
- Shiel C, Leal Filho W, Paco A, Brandli L (2015) Evaluating the engagement of universities in capacity building for sustainable development in local communities. *Eval. Program Plann.* 54, 1237134
- Shriberg M (2002) Institutional Assessment Tools for Sustainability in Higher Education. *Int. J. Sustain. High. Educ.* 3:254–270
- Sonne C, Alstrup AK (2019) Discussion: Peer-review under siege. *Science of the Total Environment* 651:1180-1181

- Teele DL, Thelen K (2017) Gender in the journals: Publication patterns in political science. *PS: Political Science & Politics* 50(2):433-447
- Torabian J (2019) Revisiting Global University Rankings and Their Indicators in the Age of Sustainable Development. *Sustainability* 12(3):167-172
- Turnheim B, Asquith M, Geels FW (2020) Making sustainability transitions research policy-relevant: Challenges at the science-policy interface. *Environmental Innovation and Societal Transitions* 34:116-120
- Verbeke A, Von Glinow MA, Luo Y (2017) Becoming a great reviewer: Four actionable guidelines. *Journal of International Business Studies* 48:1–9
<https://doi.org/10.1057/s41267-016-0049-5>
- Von Geibler J, Erdmann L, Liedtke C, Rohn H, Stabe M, Berner S, Leismann K, Schnalzer K, Kennedy K (2014) Exploring the potential of a German Living Lab research infrastructure for the development of low resource products and services. *Resources* 3:575-598.
- Wall T, Hindley A (2018) Work-based and vocational education as catalysts for sustainable development? *Higher Education, Skills and Work-Based Learning* 8(3):226-232

Appendix A. Summary of the survey questions and response options

	Questions	Responses
Demographics	Name of your University:	
	Country:	
	Your age group:	<input type="radio"/> 18-25 <input type="radio"/> 26-35 <input type="radio"/> 36-45 <input type="radio"/> 46-59 <input type="radio"/> 60+
	Your gender:	<input type="radio"/> Female <input type="radio"/> Male
	What is your background?	<input type="radio"/> Education <input type="radio"/> Social Sciences in general (including politics, economics, arts, languages) <input type="radio"/> Natural Sciences <input type="radio"/> Engineering & Technology <input type="radio"/> 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?	<input type="radio"/> none <input type="radio"/> between 1 and 10 <input type="radio"/> between 11 and 20 <input type="radio"/> between 21 and 30 <input type="radio"/> between 31 and 40 <input type="radio"/> 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?	<input type="radio"/> none <input type="radio"/> between 1 and 10 <input type="radio"/> between 11 and 20 <input type="radio"/> between 21 and 30 <input type="radio"/> between 31 and 40 <input type="radio"/> 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?	<input type="radio"/> none <input type="radio"/> between 1 and 10 <input type="radio"/> between 11 and 20 <input type="radio"/> between 21 and 30 <input type="radio"/> between 31 and 40 <input type="radio"/> over 40

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