

Review

Productivity and Impact of Sustainable Development Goals (SDGs)-Related Academic Research: A Bibliometric Analysis

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Abstract: In this paper, we conduct a bibliometric analysis of the global research related to the UN Sustainable Development Goals (SDGs) and the United Nations sustainability agenda. Our analysis builds upon the Elsevier Scopus-indexed scientific outputs since all those are classified for SDG relationships at indexing. We follow the recently published research protocol and use the Elsevier Scopus engine and the SciVal bibliometric reporting and benchmarking tool to analyze the productivity and impact of the global SDG-related research in the 2017–2022 period. We report on the most influential authors and publication outlets for SDG-related research, focusing on the collaboration patterns and their relationship to research productivity and impact. We also use keyword analysis and science mapping to describe the intellectual structure of the SDG research and its implications, which could be interpreted in terms of the “bandwagon effect”.

Keywords: Sustainable Development Goals (SDGs); research productivity; research impact; bibliometric analysis



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1. Introduction

This study aims to analyze the global research output related to the United Nations (UN) sustainability agenda and the resulting Sustainability Development Goals (SDGs) in the 2017–2022 period, using the Elsevier Scopus reference database and the Elsevier bibliometric tools. The relevance of this study is supported by the recent emphasis on the systematic implementation of SDGs at Higher Education Institutions (HEIs), as described by Leal Filho et al. [1] and Alcántara-Rubio [2].

The role of universities and other HEIs could be to serve as “living laboratories” [3], thus showing their commitment by greening the campuses, enabling experimentation and creativity, and involving multiple local stakeholders in sustainable development initiatives. Research is an integral part of a comprehensive HEI orientation toward SDGs, which should address the relevance of local stakeholder knowledge and involve them in knowledge co-production processes [4]. In addition, SDG-related research is, generally, a trans-disciplinary endeavor [5,6], as it sets out to solve “wicked problems” of sustainable development, involving many stakeholders, conflicting interests, inappropriate definitions, and background information, as well as systemic effects [7]. Thus, high levels of international collaboration should appear in this field, along with “non-traditional” authors and institutions being involved in such collaborations. This could be expected due to the need to coordinate the genuine stakeholder interests and address them by a transdisciplinary research agenda to successfully respond to the issues raised by sustainable development and the ambitions set by the SDGs [8]. In addition, a range of new dissemination outlets, especially those devoted to rapid publishing in open access, should start dominating the academic publishing landscape of SDG research since the research results need to be quickly communicated.

The theoretically expected characteristics of the SDG research need to be empirically examined based on a comprehensive overview of the extant body of knowledge, and

this study sets out to address these critical research questions (RQs). This paper aims to provide a clear understanding of the extant SDG research and clarify the characteristics of knowledge production related to sustainable development. In this context, we chose to use the bibliometric approach, which fits well with the characteristics of the rapidly changing and diversifying sustainability science, still in need of mapping and structural description [9].

Therefore, the specific RQs to be covered by this study are formally formulated as follows:

RQ1: What are the empirical patterns of global SDG research compared to the theoretical expectations of trans-disciplinarity, international collaboration, and the selection of publication outlets?

RQ2: What is the intellectual structure of global SDG research, and what are its implications for sustainability science?

2. Theoretical Background

Sustainable development and SDGs have become increasingly important in higher education in recent decades. Since HEIs have a considerable influence on society and the environment, as well as responsibilities to address sustainability challenges and foster a culture of sustainability [10], our theory review focuses on such a dual role for Universities. In this context, we present the teaching and research HEI activities as a form of influencing sustainable socio-economic development. Enacting HEI environmental responsibility in the socio-economic environment is conceptualized using the conventional concept of the “university third mission” [11].

For learners worldwide, HEIs have a crucial role in promoting sustainable development through academic teaching and exposing students to the critical aspects of environmental sustainability [12–14]. Wals and Jickling [15] and Sterling et al. [16] focus on integrating sustainability into the curriculum across all academic fields and advancing sustainability initiatives on campus. They contend that sustainability education can provide students with the expertise and competencies to tackle complex environmental and social challenges.

Beyond traditional teaching and learning, new transformative learning approaches are being implemented. These approaches use interdisciplinary collaboration, action-based learning, and multi-actor involvement, in which universities can act as catalysts for sustainability by fostering trans-disciplinary collaborations and partnerships with industry and governments [17]. Such an approach to innovation in academic teaching and learning extends to various fields of study, including engineering, science, the environment, and business/economics [18,19].

However, the literature shows low HEIs’ involvement in integrating academic teaching and learning into solving actual environmental issues. Leal Filho et al. [20] and Lozano et al. [13] point out that HEIs do not integrate knowledge production and dissemination holistically and that some of the more common obstacles include problems with incorporating the SDGs into courses and lack of support from HEI administrators [21]. Mulà et al. [22] found that universities fail to incorporate environmental sustainability and SDGs into their conventional teaching methods or include them as a significant aspect of their educational priorities.

This paper covers academic research, as the second aspect of the HEIs’ activities, related to increasing the capacity and relevance in developing and promoting the sustainable development concept. Adom̃sent et al. [23] highlighted the role of applied research in academic teaching and learning in developing the overall orientation toward higher education sustainability. They recommend that HEIs focus on the research topics, including measuring sustainability learning outcomes, discussing the different roles of the sociocultural context relevant to sustainable development, and analyzing sustainable organizational change-management strategies.

On the other hand, universities (and other HEIs) can be conceptualized more comprehensively regarding the responsibility to cover the entire set of SDGs by emphasizing the academic community's knowledge production and innovation capabilities [24]. Therefore, the roles and responsibilities of research conducted in the academic community extend well beyond the SDG goal of inclusive, equitable, and quality education (SDG Goal 4) to the widely defined global sustainable development agenda [25].

This paper supports a comprehensive view of the academic research responsibilities and provides a bibliometric overview of the extant literature, covering the entire body of SDG-related knowledge. In this context, we focus on the already discussed role of trans-disciplinarity and the structure of the actual knowledge [26], which should be reflected in high levels of international research collaboration and publication in a range of innovative publication outlets, especially the open-access (OA) academic publications, accessible to a wide range of sustainable development stakeholders. These issues, which have not been well covered by the existing literature, are explored in the empirical part of this paper.

Enacting the HEI capabilities and activities in the socio-economic environment could be considered an integral part of the university's third mission, which has already been discussed by Purcel et al. [27], who highlighted the role of universities as engines of societal transformation in advancing sustainability. Such a conceptualization is compatible with the conventional role of the university's "third mission," based on increasingly adapting the HEI activities to contribute to the local communities' socio-economic development and addressing the external stakeholders' expectations [11]. This could become an increasingly complex task due to the different expectations and interpretations of different stakeholders and the need for HEIs to accept new activities (such as adult education, fundraising, introducing flexible organizational forms, etc.), which have not been traditionally considered a part of the university mission [28].

Environmental sustainability could include campus sustainability initiatives [29,30] to establish leadership by example in the local community and society [31]. They can also extend toward local and regional interventions and initiatives, aiming toward a higher level of environmental sustainability [32,33]. In addition, international and global network-building involving HEIs and other international stakeholders contribute significantly to the UN sustainability agenda 2030 [34].

HEIs also need to provide public support and advocacy for pro-environmental attitudes, behaviors, and policies, which could be achieved with extensive reporting on their development activities [35]. However, sustainability reporting and increased quality have yet to become a widely accepted practice among HEIs [36]. Public accessibility of HEI information related to sustainable development and SDG should not be interpreted as public relations stunts or even a "greenwashing" agenda but rather as a path toward positioning HEIs as catalysts of sustainability social actions [37].

Agenda 2030 and the focus on SDGs require HEIs to adopt the multi-stakeholder approach in their community and social outreach to address the "wicked problems" of sustainability [38]. Simultaneously, sustainable development demands academic teaching, learning, and research to focus on multiple stakeholders' needs and respect education and innovation policies [39]. Such a systemic inter-connectedness also calls for increased attention to factors hindering stakeholder understanding and cooperation. Those include cultural sensitivity [40], a high level of practical and trans-disciplinary orientation in knowledge production [41], skills in project management and vision-setting, capacity- and network-building, etc. [42].

3. Methods

We selected the Elsevier Scopus reference database as our primary source of bibliometric information since it better covers the social science research outputs than its closest competitor [43] and serves as a bibliometric database of choice for mapping the research outputs to SDGs. An ongoing SDG mapping initiative of the Scopus-indexed research outputs, based on relevant bibliometric queries and further refined by the machine

learning computer algorithms [44], enables bibliometric analysis users to associate most of the Scopus-indexed research outputs to relevant SDGs. In addition, the Elsevier SciVal bibliometric reporting and the benchmarking tool have been used to calculate and report on more complex metrics. Although it is usually framed as a tool, informing the academic and science policy-decision makers for critical decision-making [45], it was recently used by Cucari et al. [46] to provide a bibliometric overview and science mapping of the Corporate Social Responsibility (CSR) global research field.

The stages of bibliometric research closely follow recommendations by Zupic and Čater [47], who specify the following stages of bibliometric research:

- Definition of research question(s) and relevant methods/metrics;
- Compilation of bibliometric data;
- Bibliometric analysis;
- Interpretation and discussion of research results (including optional visualizations).

Figure 1 illustrates this conventional methodology of bibliometric research.



Figure 1. Methodology of bibliometric research. Source: Adapted from Zupic and Čater [47] (p. 433). The research questions were specified in the introduction section, while the conceptual arguments for selecting bibliometric data sources and tools were addressed previously in this section.

The identification of SDG-related research and compilation of bibliometric data follow the research protocol developed by Cucari et al. [46], who argue that the SciVal topics and topic clusters, based upon citation analysis, provide a comprehensive understanding of field structure and trends. Since our research interest relates to a specialized topic of SDG research, we did not choose a SciVal Topic Cluster, which was already completed in a study by Cucari et al. [46] for the entire global CSR research field. We instead opted for a single SciVal Topic T.33271, which belongs to a more comprehensive field TC.1107 (Poverty, Inequality, and Development). All analyzed publications are listed in the Supplementary Materials to this manuscript. Since our RQs do not cover the bibliometric analysis of the entire sustainable development body of knowledge, future research should address this type of research. The selection of bibliometric indicators related to research productivity and impact is based on Cucari et al. [46] and the previously published studies of public business schools' research performance [48]. All metric values were calculated by Elsevier SciVal, based on the underlying Elsevier Scopus data, as of 1 March 2023, when the data were retrieved and analyzed.

4. Results

This section provides the results of the bibliometric analysis performed on the Elsevier Scopus-indexed body of literature produced in the 2017–2022 period.

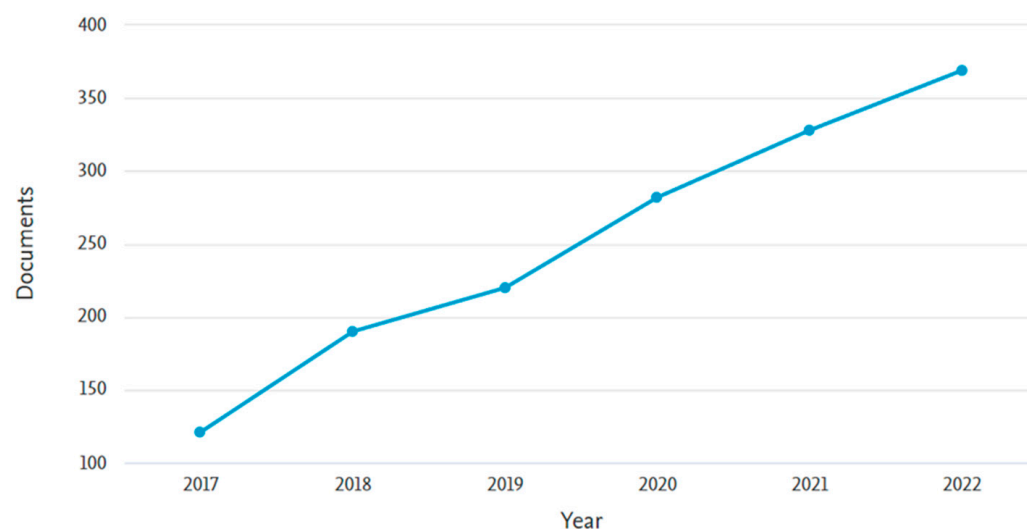
4.1. Descriptive Analysis of the Research Corpus

During 2017–2022, 1511 scientific outputs were produced in the trans-disciplinary SDG research field, with 15,588 citations. As seen from Table 1 and Figure 2, the number of documents has steadily increased over the last six years, with the number in 2022 being more than three times higher than in 2017.

Table 1. Annual Scopus-indexed scientific output in the global SDG research field.

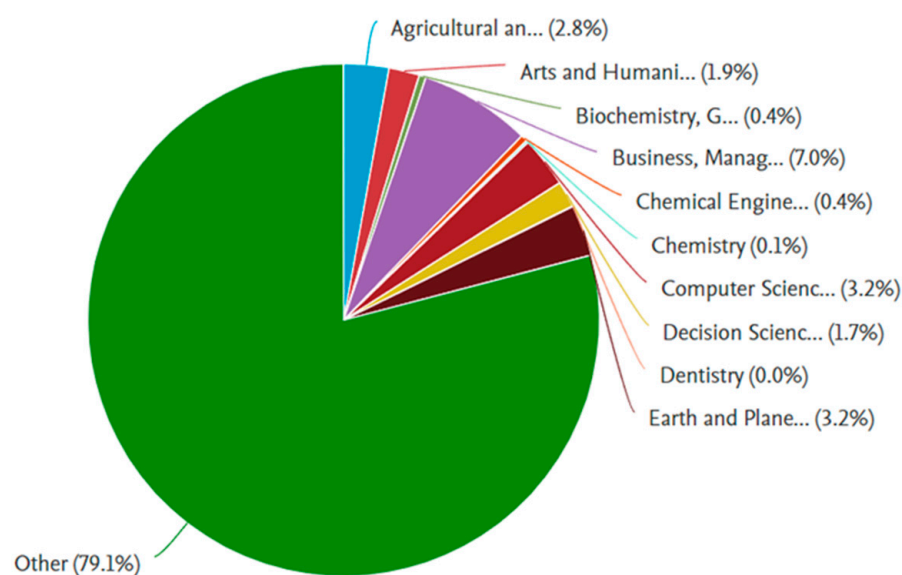
Year	Scientific Output	Year	Scientific Output
2017	121	2020	282
2018	190	2021	328
2019	220	2022	370
		Total	1511

Source: Elsevier Scopus (data collected 1 March 2023).

**Figure 2.** Scientific outputs in the SDG research field per year. Source: Elsevier Scopus (data collected 1 March 2023). Note: References to all reviewed papers are available in the Supporting Information.

A large majority of these documents refer to articles (57.7%), followed by book chapters (15.4%), reviews (7.0%), conference papers (6.8%), and editorials (5.0%). Other types of documents represent less than 10% of all documents.

Next, we looked at the subject areas the mentioned documents pertain. Figure 3 favors trans-disciplinarity as a fundamental feature of SDG research.

**Figure 3.** Scientific outputs according to the subject area. Source: Elsevier Scopus (data collected 1 March 2023). Note: All the categories could not be presented in the figure. Some minor categories were omitted.

Looking at the geographic distribution of the documents (Figure 4), the US is the most productive country, with 275 documents. Scientific productivity is also high in the UK, with more than 230 documents. They are followed by India, Germany, Australia, China, and Spain, whose researchers have published between 75 and 100 documents in this field over the analyzed period.

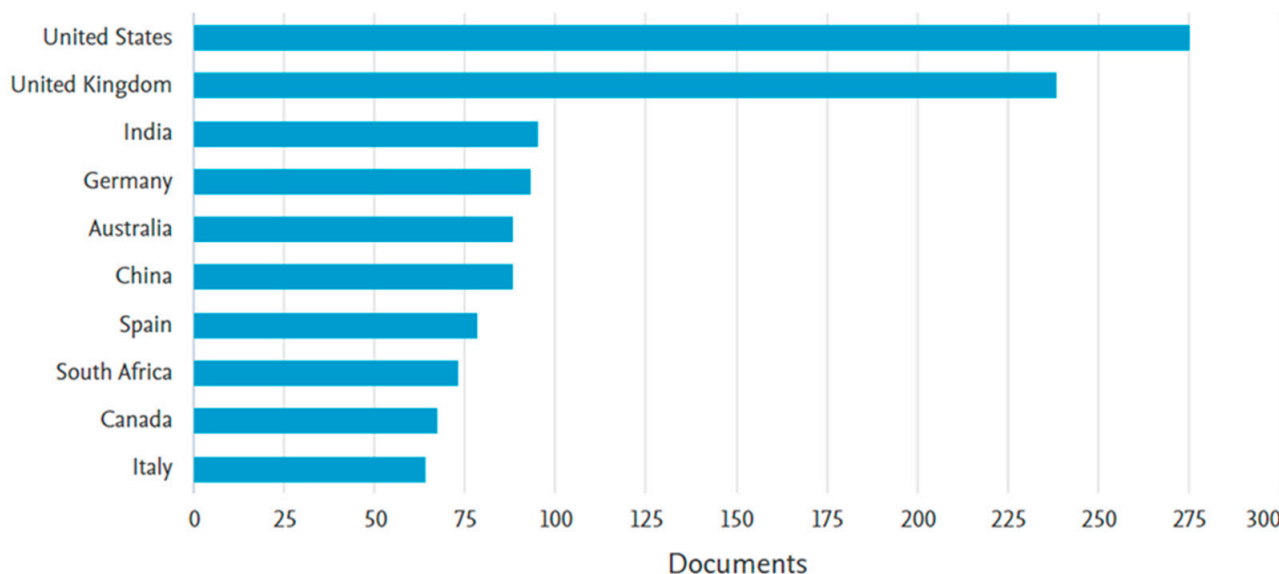


Figure 4. Scientific outputs by country and territory. Source: Elsevier Scopus (data collected 1 March 2023).

Focusing on scholarly output by institutions, Figure 5 gives an overview of the number of documents by affiliation. The top three affiliations are the Chinese Academy of Sciences, Organisation Mondiale de la Sante, and University College, London. These three institutions have more than 20 indexed scientific outputs in the SDG research field.

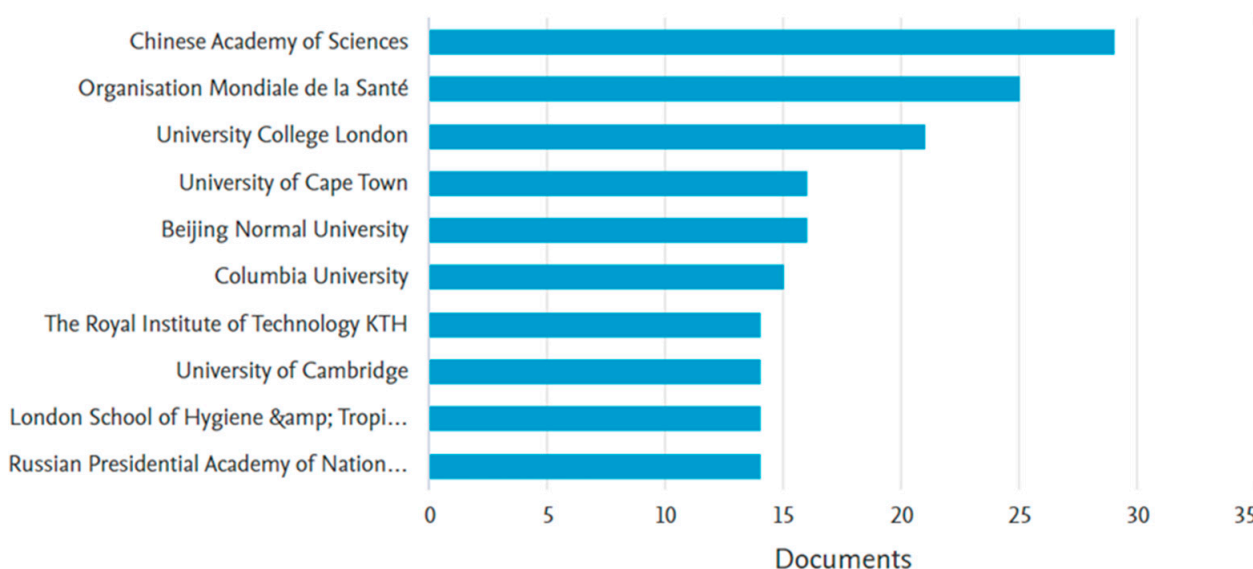


Figure 5. Scientific outputs by institutional affiliation. Source: Elsevier Scopus (data collected 1 March 2023).

4.2. Productivity and Impact Analysis of the Research Corpus

A wide array of performance measures could be used in the analysis, and here we focus on the most used ones, as identified by Cucari et al. [46]. These include scholarly

output, field-weighted citation impact, citations per publication, publications in top journal percentiles, and international collaboration, with self-citations included. Limitations of the bibliometric tool used do not provide an option to exclude self-citations when analyzing the literature cluster (although the option is available when analyzing other entities). Table 2 provides the values of selected research productivity and impact indicators over the 2017–2022 period.

Table 2. The selected bibliometric performance metric for the global SDG research (2017–2022).

	Overall	2017	2018	2019	2020	2021	2022
International Collaboration (%)	27.5	28.9	26.9	25.8	26.1	23.9	32.9
Scholarly Output	1511	121	190	220	282	328	370
Citations	15,588	2955	4238	3476	2584	1674	661
Citations per Publication	10.3	24.4	22.3	15.8	9.2	5.1	1.8
Field-Weighted Citation Impact	1.76	2.04	2.31	2.14	1.43	1.56	1.6
Authors	3966	275	477	561	820	994	1211

Source: Elsevier SciVal (data collected 1 March 2023). Note: Self-citations included.

International Collaboration (%) refers to the percentage of research output (publications) that researchers from different countries have co-authored. The data in Table 2 indicate that this number was, on average, 27.5%, suggesting a significant level of collaboration between researchers from different nations in this research area. This percentage increased to almost 33% in 2022, indicating increased international collaboration. Scholarly Output represents the total number of research publications (articles, reviews, conference papers, etc.) produced. This indicator has been steadily increasing over the period under investigation, with more than 1500 documents published overall. The number of citations and citations per publication has been steadily declining over time, which will be further discussed in the next section. However, the Field-Weighted Citation Impact is above the value of 1.0 each year, with an average of 1.76. This is a relevant measure, as it considers the number of citations a publication receives and the field in which the publication is published, thus adjusting for the different citation patterns and publication norms across different research fields. The overall impact of 1.76 suggests that publications used in our sample have a higher citation impact than the average in the field. Finally, the number of authors publishing in this field has constantly been increasing through the years.

4.3. Analysis of the Top Research Outputs According to Impact

Figure 6 presents the number of documents by five top Scopus sources (publication outlets) over the years. *MDPI Sustainability* experienced unprecedented growth in scientific outputs during the observed period: from two or three documents in 2017 to more than 20 in 2022. *Sustainability Science* and *Sustainable Development* also increased the number of documents, albeit at a smaller scale. The *World Development Journal* experienced ups and downs in the number of documents over the years, with the number of documents in 2022 below five. A similar conclusion can be drawn for the *Global Policy*, with even more variability over the years. While the increasing scientific output might be interpreted as a sign of research interest and relevance, it could also be associated with lowering peer review and publication quality standards. This issue will be further addressed in the discussion section.

Table 3 provides a more comprehensive analysis of the twenty top publication outlets for the global SDG research, listed in descending order according to the inter-disciplinary impact achieved, measured by the Field-Weighted Citation Impact (FWCI) metric. The FWCI metric sets out an alternative view to the top five journals, according to impact (*Sustainability Science*, *MDPI Sustainability*, *Sustainable Development*, *World Development*, and *Nature Sustainability*), as presented in Figure 6.

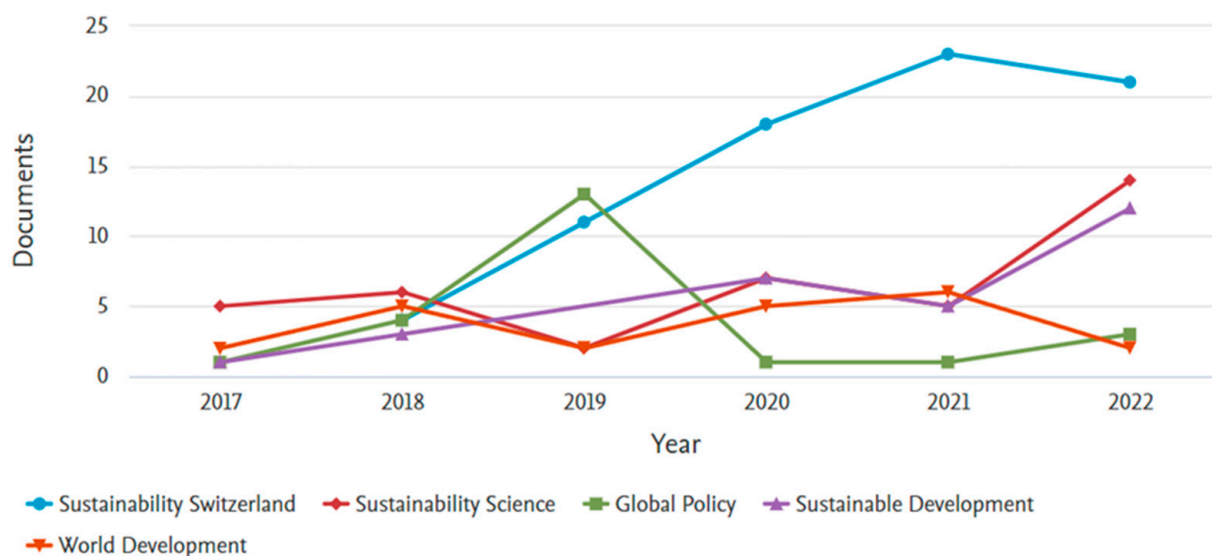


Figure 6. Documents per year by Scopus source (publication outlet). Source: Elsevier Scopus (data collected 1 March 2023).

Table 3. Top twenty Scopus sources (publication outlets) according to FWCI.

Scopus Source	Scholarly Output	Field-Weighted Citation Impact	Citation Count
Higher Education	4	15.78	98
Nature Sustainability	12	8.42	537
Nature Energy	3	7.75	488
Marine Policy	4	6.38	249
Politics and Governance	3	6.07	25
Geography and Sustainability	5	5.41	86
Sustainability Science	39	5.35	2002
Journal of Public Affairs	4	4.96	36
Dialogues in Human Geography	5	4.55	146
World Development	22	4.3	579
Environmental Science and Policy	4	4.2	71
Smart Innovation, Systems and Technologies	4	4.08	4
Governing Through Goals: Sustainable Development Goals as Governance Innovation	3	4.02	29
Bulletin of the World Health Organization	7	4	246
Ecological Economics	4	3.74	121
International Journal of Human Rights	11	3.71	170
The Lancet Planetary Health	3	3.51	24
Social Indicators Research	4	3.43	27
International Journal of Sustainable Development and World Ecology	10	3.24	339
Journal of Cleaner Production	10	2.72	226

Source: Elsevier SciVal (data collected 1 March 2023).

However, the trans-disciplinary nature of the SDG research requires that the field-normalized citation metric is used, due to the differences in citation patterns in different fields, leading to differences in the expected number of total citations across scientific fields [49]. The normalized FWCI metric, with a value of 1.0 representing the expected global citation average [50,51], enables the easy comparison of impact, regardless of the field and the classification scheme. Thus, it is essential to consider the FWCI-based ranking of SDG publication outlets, which leads to identifying the following five journals regarding the SDG research impact: *Higher Education*, *Nature Sustainability*, *Nature Energy*, *Marine Policy*, and *Politics and Governance*. They all have an FWCI value above six, with *Higher Education* FWCI metric value above 15.

Table 4 presents the number and percentage of publications published in the top 1%, 5%, and 10% of Scopus sources, considering their CiteScore percentile values. There were 51 research outputs (4.3% of the analyzed body of literature) in the top 1% Scopus sources. Looking at the distribution over the years, an increasing trend can be observed, whereby the overall number of publications in this category increased from three in 2017 to fifteen in 2022. Research outputs in the top 5% include 230 publications (19.5% of the analyzed corpus), while 299 publications (i.e., 25.4% of the analyzed corpus) appeared in the top 10% of Scopus-indexed sources. It could be concluded that a segment of high-quality and impactful SDG research exists. The year 2021 stands out as an outlier in this sense, as all the categories experienced a drop in the number of research outputs in each category. This could be due to the specificities of the COVID-19 period, as all analyzed metrics return to the increasing trend in 2022. The list of high-quality and high-impact publications (top 10% of Scopus sources) from the analyzed corpus is also available in the Supplementary Materials to this manuscript.

Table 4. Publications in the top (Scopus-indexed) publication percentiles.

	Overall	2017	2018	2019	2020	2021	2022
Publications in the top 1% of Scopus Sources	51	3	6	7	17	3	15
Publications in the top 1% Scopus Sources (%)	4.3	3.7	4.9	4.4	7.6	1.1	4.7
Publications in the top 5% of Scopus Sources	230	13	30	26	42	45	74
Publications in the top 5% Scopus Sources (%)	19.5	15.9	24.6	16.5	18.7	16.5	23.1
Publications in the top 10% of Scopus Sources	299	16	36	29	57	64	97
Publications in the top 10% of Scopus Sources (%)	25.4	19.5	29.5	18.4	25.3	23.5	30.3

Source: Elsevier SciVal (data collected 1 March 2023). Note: References to all papers published in the top 10% of Scopus sources are available in the Supporting Information.

4.4. Positioning the Analyzed Literature within the Sustainability Research Corpus

In further analysis, we address the RQ2 by positioning the analyzed literature within the broader body of sustainability knowledge and uncovering its intellectual structure. The first step in positioning the analyzed part of sustainability literature is the analysis of key phrases. Tables 5 and 6 present the top five key phrases identified by the Elsevier SciVal tool.

Table 5. Key phrases occurrence in the literature by year.

Key Phrase	2017	2018	2019	2020	2021	2022
Sustainable Development Goal	2727	3951	2658	2126	1435	581
Sustainable Development	1902	2667	2099	1571	1007	347
Agenda	1677	2393	1630	1009	802	292
United Nations	1260	1999	1488	1114	594	268
Millennium Development Goals	691	471	263	93	46	14

Source: Elsevier SciVal (data collected 1 March 2023).

Table 6. Key phrases for Sustainable Development Goals.

Key Phrase	Relevance (Max Value = 1.00)	Scholarly Output (Growth%, over the Period 2017–2021)
Sustainable Development Goal	1	228.6
Sustainable Development	0.2	264.1
Agenda	0.2	192.9
United Nations	0.15	325.9
Millennium Development Goals	0.09	−51.5

Source: Elsevier SciVal (data collected 1 March 2023).

As evidenced by Table 5, the occurrence of the first four key phrases followed an inverted U-shape pattern. Namely, there was an increase in the occurrence of these key

phrases in the literature between 2017 and 2018, followed by a decrease in each of the following years. The occurrence in the final year under analysis (2022) was lower than in the first year (2017). The slight loss of interest in these topics might be due to the COVID-19 crisis; long-term sustainability concerns are often overlooked during economic crises. The United Nations has recognized various financial crises as a threat to sustainable development [52] since governments in these situations tend to prioritize balancing their budgets over social and environmental aims, environmental legislation, or policy enforcement [53]. This seems to be followed by a decrease in research interest in these topics later in the analyzed period, which could also be caused by the “bandwagon effect,” discussed in the next section. The Millennium Development Goals (MDG) key phrase experienced a steady decline throughout the observed period, which is logical due to their expiration in 2015.

Results in Table 6 indicate that the most relevant key phrase is Sustainable Development Goal (SDG). At the same time, the other four are much less relevant (their relevance being 20% and less compared to Sustainable Development Goal). Regarding scholarly output, all key phrases apart from Millennium Development Goals experienced a tremendous increase in published papers. More precisely, the number of papers that contain the key phrase United Nations, experienced an increase of 326%, those mentioning Sustainable Development Goal and Sustainable Development 228% and 264%, respectively; and those that used Agenda as a keyword increased by 192% between 2017 and 2022. As mentioned, the only key phrase being less used is Millennium Development Goals (MDGs). This is expected as MDGs were a set of time-bound goals intended to be achieved by 2015 and, therefore, may be perceived as having been superseded by the SDGs. Conversely, the SDGs have a broader scope and are intended to be achieved by 2030, which may make them more relevant and appealing to researchers and practitioners.

4.5. Intellectual Structure of the Analyzed Sustainability Body of Knowledge

Analysis of the most relevant key phrases provides insight into the topics covered by the extant body of SDG-related knowledge. However, it does not reveal the intellectual structure of the analyzed literature. To uncover the underlying literature clusters, we transferred the literature items, identified using the Elsevier SciVal tool, back to the Elsevier Scopus and downloaded the complete bibliographic information, including references. We used the full Scopus records for mapping with the VOS Viewer tool, designed for the visualization of bibliometric networks [54], by the researchers affiliated with CWTS (Center for Science and Technology Studies) at the University of Leiden.

Figure 7 provides a visualization of the intellectual structure of the analyzed body of SDG knowledge in the 2017–2022 period, using the keyword co-occurrence map produced with the author-supplied keywords. It suggests the existence of seven research clusters:

- The red cluster covers socio-economic development’s broad topic(s) in the sustainability context, including the SDGs and the UN 2030 Agenda, their assessment and implementation, and related topics. The yellow sub-cluster indicates research interest in human rights, poverty, and development issues, with some emphasis on the countries from the “global South”.
- The light blue cluster is concerned with researching human health and well-being and related topics in economic development.
- The blue cluster indicates moderate research interest in climate change, food security, and their links to global health.
- The green cluster, with the coverage of public health issues, including healthcare planning, delivery, and financing. The purple sub-cluster concerns research on female, maternal, and infant health.

We have intended to compare the author-proclaimed keywords with those “actually” occurring in the literature analyzed. For such a purpose, we performed text mining of the extant literature’s titles, abstracts, and keywords using the VOS Viewer functionalities for text analysis [55]. Figure 8 shows the intellectual structure of the SDG research (2017–2022), according to the text mining results.

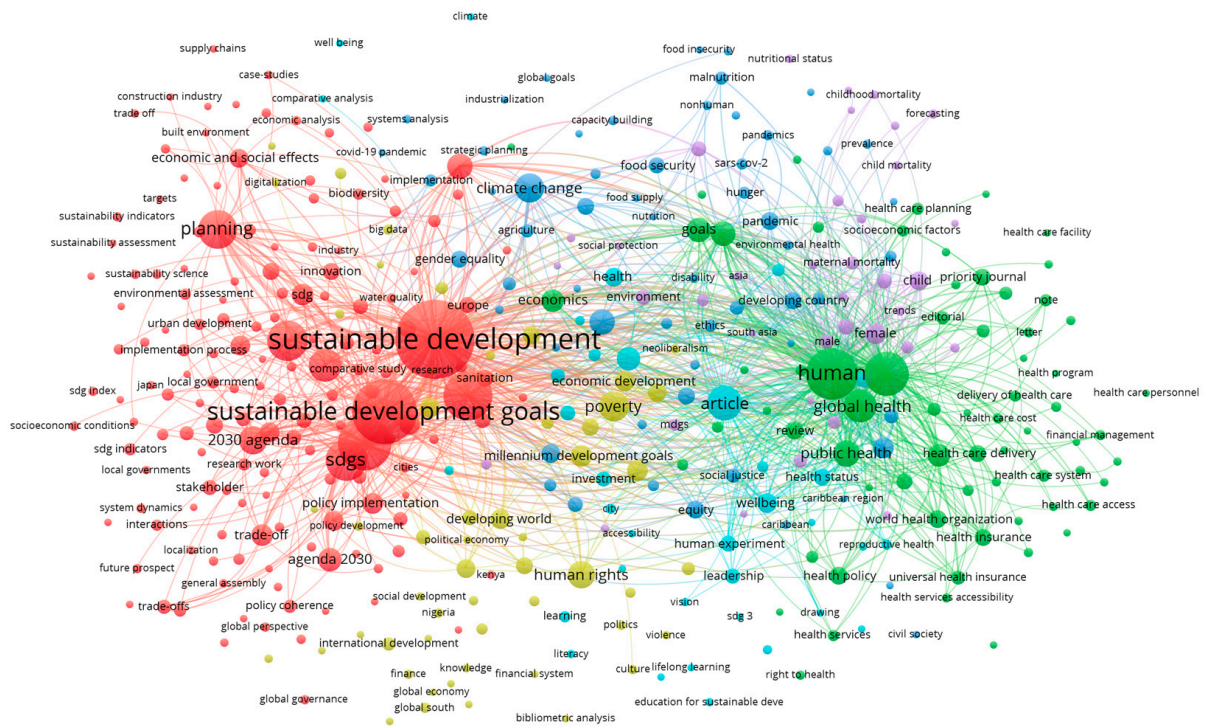


Figure 7. Keyword co-occurrence map (author-supplied keywords). Source: Elsevier Scopus (data collected 1 March 2023).

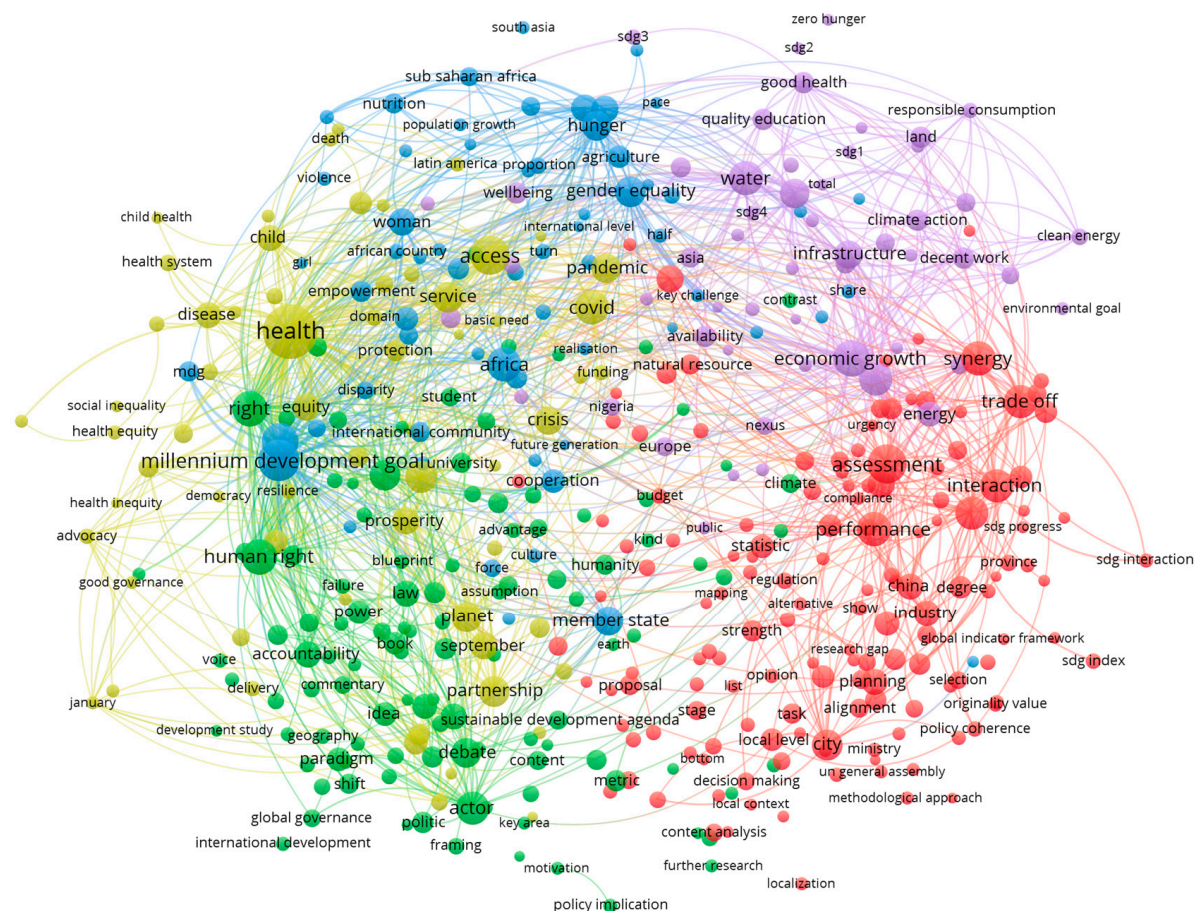


Figure 8. Keyword co-occurrence map (obtained by text mining of the Scopus records). Source: Elsevier Scopus (data collected 1 March 2023).

The data mining of our Scopus data shows a different picture of the recent academic SDG research, which deviates from the analysis of author-proclaimed keywords. The keyword occurrence visualization shows a significant (purple) cluster of papers focusing on individual SDGs and their socio-economic dimensions (zero hunger, good health, quality education, decent work, responsible consumption, clean energy, water, etc.). Another (red) cluster indicates a significant interest in sustainable development assessment and management, including SDG interactions, synergies, and trade-offs, which could not be concluded from the science map based on author-supplied keywords (see Figure 8). The overlapping three clusters, appearing on the left side of the map, represent the research interests for related topics of global health (yellow), food security and gender equity (blue), and human rights and political power in directing sustainable development (green).

5. Discussion

The obtained results address the characteristics of SDG-focused research in the analyzed period (2017–2022). The research interest in the 2030 UN Agenda is confirmed by the continuously increased number of publications and authors, with some interesting patterns in the number and impact of citations. The total and average number of citations are declining over the five years, along with their impact, measured by the normalized FWCI metric (see Table 2 in the Results section). Such a result could be interpreted as the “bandwagon effect,” i.e., topic popularity reaching its height in 2017–2018 (see Table 5).

We have reviewed the literature and have not found mentions of the potential influence of the topics researchers cover due to their popularity and the increased potential for journal acceptance and subsequent citation. However, it is logical that researchers might be looking for such opportunities, with the increasing use of the quantitative measures of research performance [56], and other pressures from research policy [57]. This proposition should be further empirically reviewed in future research, which should be completed across multiple topics in sustainability science.

As previously suggested, the influence of the COVID-19 crisis in the 2020–2021 period and the new global security crisis as of 2022 could represent the new “bandwagons” for researchers looking for impactful topics which could find their way into highly cited journals.

Nevertheless, there is a core of high-quality and high-impact SDG research, represented by the number and a relative number of publications in the 1%, 5%, and 10% Scopus sources. Since this metric is constantly increasing (see Table 4), it could be hinted that, as the “bandwagon effect” wears off, the core of high-quality and high-impact SDG research does not. The list of such papers and authors, available in the Supporting Information, should assist the readers in further evaluating this research topic.

As related to our first RQ, we see that trans-disciplinarity (see Figure 3) and a high level of international collaboration, which has been increasing throughout the analyzed period (see Table 2), characterize the SDG-focused research corpus. The selection of publication outlets (see Table 3) reflects the dominance of traditional publishers and publishing corporations. At the same time, the new open-access publishers, such as MDPI, have recorded the highest growth with the *Sustainability* journal. This could hint at the need to rapidly communicate research results and ensure their free availability to various stakeholders. This aligns with the multi-stakeholder approach to solving environmental and sustainable development problems.

On the other hand, the growth of SDG-related literature in open-access publications could be interpreted as a sign of lowered peer review and publication standards. Those labels might sometimes be applied to the entire community of open-access journals, publishers, and authors, as the traditional publishing route may be seen as being committed to higher quality and impact. Nevertheless, traditional publishing still relies on editors as “gatekeepers” [58], managing the peer review process and journal resources in terms of “desk rejecting” manuscripts with low quality or potential. Although empirical evidence shows editors are generally effective within such a role [59], a high demand for

publishing in indexed journals implies that editors seek “impactful” topics with a high citation potential. In their “gate-keeping” role, editors of conventional journals might be introducing limitations to scientific innovation by counting with a “conservative” tendency and avoiding risk by rejecting unconventional work or one with surprising results [60].

In addition, the increased pressure to publish in indexed journals, coupled with the limited editorial and peer review resources, leads to progressively long waiting times, especially in social science journals [61]. With many desk rejections and peer review delays, the traditional publication process becomes frustrating [62], especially for authors from somewhat peripheral regions, such as Central and Eastern Europe, who increasingly rely on non-traditional publication outlets [63].

In many cases, the frustration is addressed by publishing opportunities offered by the open-access “mega-journals” (OAMJs), evaluating the manuscripts on scientific rigor only, and leaving the scientific community to decide on the novelty and impact of the published research. With the massive number of manuscripts published [64], there is an increased probability that OAMJs could serve as a “dumping ground” for all sorts of research manuscripts and limited practical opportunities for post-publication evaluation of impact [65]. However, in many cases, they represent a realistic publication opportunity for authors from more peripheral scientific fields and geographical regions. They will further benefit from relatively high levels of author satisfaction [66]. On the other hand, the current level of the Article Processing Charges (APC fees) represents a significant challenge to authors without relevant funding [67].

Therefore, it could be suggested that the current negative sentiment toward OAMJs is not especially helpful if not followed by a much-needed reform of the scientific communication and evaluation processes. This is especially relevant for fields such as sustainable development, which could benefit most from the increased agility of journal editors and reviewers.

6. Conclusions

In this paper, we analyzed the research productivity, impact, and intellectual structure of global SDG research using Elsevier Scopus and SciVal bibliometric tools. Over 2017–2022, 1511 scientific outputs were produced in this trans-disciplinary field, with 15,588 citations. These outputs mainly refer to articles and book chapters. Regarding geographic distribution, the US and the UK are the most productive countries. The normalized Field-Weighted Citation Impact (FWCI) metric shows that the top five journals in this field have an index value above six, with the *Higher Education* FWCI metric value above 15. This finding favors the high number of citations achieved by SDG-related research. Our analysis showed that this field’s total and average number of citations had steadily declined, even with the self-citations being included in the analysis. The current limitation of this analysis is related to the inclusion of self-citations, which a future study should address.

In addition, the occurrence of the four key phrases (Sustainable Development Goal, Sustainable Development, Agenda, and United Nations) dropped after 2018. We interpret these as a “bandwagon effect,” whereby SDG-related research seems to have peaked in 2018. However, taken jointly with the constantly increasing number of publications in the top 1%, 5%, and 10% Scopus sources, we take this to mean that as the “bandwagon effect” wears off, the production of high-quality research with high-impact, in the realm of Sustainable Development, remains unwavering. Overall, our results highlight the importance of international collaboration and trans-disciplinarity as the main characteristics of SDG-focused research. Building on the premise that the roles and responsibilities of university research transcend SDG goal 4, which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all, we argue that the “third mission” is a vital component of a university’s role in society.

The intellectual structure of the analyzed body of SDG research also shows that authors concerned with this field might not declare their research’s actual topic(s), as there are differences between science maps constructed according to the author-supplied and text-

mined keyword co-occurrences. If focusing on a single most significant finding, from comparing the two science maps, a much-needed focus on the interactions, synergies, and trade-offs among the individual goals can be mentioned. It is difficult to recognize this topic in the science map based on the author-supplied keywords. However, when using data mining on the Scopus publication records, it is pretty obvious. It is up to further discussion if authors are unaware of the SDG topics' relevance and why they may not be declaring them. On the other hand, the "bandwagon effect" could be at play in this case, as well, since authors might be assigning keywords based on their perception of the topics' popularity and relevance to address the editors' evaluation of the potential impact and avoid desk rejections of their manuscripts.

Consecutively, we believe that open-access publications have a unique role to play in serving diverse SDG stakeholders since they might provide a more rapid scientific communication and help develop solutions to what is usually considered a "wicked problem," which requires multi-stakeholder cooperation [7]. However, the current controversies related to the discussion of the open-access publications' quality, impact, and indexing, as mentioned in the Discussion section, should not be viewed from simplistic, unilateral viewpoints. This especially applies to sustainability research, which needs to be widely available to assist the complex and urgent nature of solving related environmental problems and to frame those issues appropriately [68].

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