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Models, Guidelines and Frameworks for Sustainable Management: A Bibliometric Analysis From the Perspective of Interdisciplinarity

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ABSTRACT

The ongoing challenges of climate change, ecosystem degradation and demand for natural resources make sustainability a global priority. Models, guidelines and frameworks are particularly valuable in the field of management as they help to solve problems. This study aims to explore them from an interdisciplinary perspective, including a concern with the SDGs. The study involved a bibliometric analysis using the SALSA method on 352 documents published between 2015 and 2023. Additional data sources supported the analysis. The content analysis assessed the interdisciplinarity and alignment with the 2030 Agenda and the SDGs. The study highlighted the level of interdisciplinarity in the research that is being pursued. Furthermore, it demonstrated the uptake of the SDGs in the field of management. The study gives researchers and editors a valuable view on interdisciplinarity and suggests fruitful opportunities for future research in the context of emerging sustainability concerns.

1 | Introduction

The ongoing challenges posed by climate change, ecosystem degradation and the increasing demand for natural resources due to human activities have resulted in a scarcity of essential resources for human life (UNESCO 2021). In this context, sustainability has gained significant attention and became a global priority. One initiative to address this issue is the adoption of the 17 Sustainable Development Goals (SDGs) by all United Nations member states in 2015. These goals represent a collective commitment among the member states to pursue sustainability as a way to combat climate change and preserve oceans and forests (ONU 2023).

In the light of the contemporary global challenges, the sustainability theme has a paramount importance. It is imperative to consider the role of institutions in promoting more sustainable

processes and production systems (Dhanda and Shrotryia 2021). A survey in the Scopus database using the keyword ‘sustainability’ from the establishment of the SDGs from 2015 to 2022 has found 75,306 articles and conference papers in several areas. Sustainability, under the SDGs, is addressed by multiple disciplines, reflecting its inherently interdisciplinary nature. While there is no agreement on the concept of interdisciplinarity, it can be argued that it emerges from a social context and represents a continuum of integration between disciplines aimed at responding to immediate problems (Philippi et al. 2017).

In sustainability researches, bibliometric analysis has been used to identify patterns, gaps and points of view in the existing literature. Pasko et al. (2021), using the Scopus and Web of Science databases, conducted a bibliometric analysis using CiteSpace to examine sustainability reports, considering the period from 1981 to 2020. Leopizzi et al. (2023) carried out

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a bibliometric analysis using Bibliometrix and VosViewer to examine the adoption of sustainability reports by electric utilities, considering the period from 1974 to 2022. Lazar and Chithra (2021) conducted a bibliometric analysis to reveal the publication trends on the theme sustainability assessment of buildings, and, for this purpose, he used Bibliometrix, considering the period from 2003 to 2018, and used the Scopus and Web of Science databases. Fatima et al. (2023) conducted a bibliometric analysis using the R studio Biblioshiny package and the VosViewer software to investigate emerging trends and research areas at the intersection of finance, innovation and sustainability, considering the period from 2012 to 2022 and using the Scopus and Web of Science databases. Ellili (2022) performed a bibliometric analysis using the softwares CiteSpace, VosViewer and WordStat to examine the latest trends in the literature on the relationship between Fintech and sustainability, considering the period from 2012 to 2022 and the Scopus database. Ellili (2023) conducted a bibliometric analysis using the softwares CiteSpace, VosViewer and WordStat to examine the latest trends in the literature on sustainability in the *Journal of Environment, Development and Sustainability*, examining the period from 1999 to 2022 and also using the Scopus database. Even bibliometric studies considering the context of COVID-19 were published as Hossain et al. (2022) aimed at examining the growth and collaboration of countries in media research during the COVID-19 pandemic. Sustainability and risk management were the focus of Nobanee et al. (2021), a study analysing 1233 documents published in the Scopus database, from 1990 to 2020, using the VosViewer software.

In the course of those studies, sustainability has emerged as a central theme, focusing on various specific aspects that are critical to understanding its implications. However, it is worth noticing that the research did not include an examination of existing models, guidelines or structured frameworks that could facilitate the practical application of sustainability principles. This absence highlights a gap in the current literature, as there is a clear need for comprehensive tools and strategies that can translate theoretical discussions into actionable practices in relevant fields. Sustainability in these works encompasses a wide range of management-related issues. Key aspects include the preparation and analysis of sustainability reports, which provide a transparent insight into the environmental and social impacts of the organisation. Corporate social responsibility initiatives are also an important component, reflecting companies' commitment to ethical practices and the well-being of communities. In addition, innovation plays a crucial role in driving sustainable practices, encouraging organisations to develop new solutions that minimise their environmental footprint. Finally, effective risk management strategies are essential to identify and mitigate the potential challenges associated with sustainability efforts, ensuring long-term viability and resilience.

The models, guidelines or frameworks are particularly useful in the field of management, as they contribute to the achievement of the desired results. A wide variety of models, guidelines and frameworks are used by different organisations, each tailored to achieving operational or strategic goals and objectives. There is a vast body of standards designed to support the management of organisations in achieving the results related to specific topics,

such as quality (ISO 9001), information security (ISO 27001) and occupational health and safety (ISO 45001). In recent years, some sustainable management models for specific niches have been proposed in the literature, indicating gaps in more holistic models that can be applied in different sectors and contexts (Nawaz and Koç 2018). These gaps can be addressed through interdisciplinary research (IDR), a concept that has been defended by many authors and positioned as a form of problem-solving, as indicated by Yegros-Yegros et al. (2015).

According to Nobre (2017), the challenges for humanity, in the present time, rely in the interfaces among the disciplines, in the areas of contact little explored by the formations and strictly disciplinary research. In this sense, for innovation and the development of new discoveries in the scientific field, interdisciplinarity and transdisciplinarity play a pivotal role. Interdisciplinary projects have the potential to solve complex problems and help restore a broad and integrative view of the object of study, contributing to identify aspects hidden in the boundaries of knowledge of each discipline that end up escaping their focus (Philippi et al. 2017; Porter et al. 2006). As asserted by Braun and Schubert (2003), the phenomenon of interdisciplinarity emerges when different disciplines intersect, integrate and collaborate with one another.

Socio-environmental problems have a high level of complexity and require the integration of several areas of knowledge for their understanding and for the development of solutions (de Oliveira and Amaral 2017). This standpoint is consistent with the perspective articulated by Porter et al. (2006) that the purpose of interdisciplinary research (IDR) is 'to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single field of research practice'. In this sense, it is argued that, in addition to identifying the models for sustainable management, it is essential to investigate the extent to which the models, guidelines and frameworks for sustainable management are built from an interdisciplinary perspective.

The objective of this study is twofold: first, to map existing research on the management subject concerning models, guidelines and frameworks for sustainability and second, to analyse its interdisciplinarity. Furthermore, the paper seeks models, guidelines and frameworks for sustainability that take into account the 2030 Agenda. This paper aims to answer the following research questions: (1) What has it been the distribution of publications on models, guidelines and frameworks for sustainability since the adoption of the 2030 Agenda? (2) Which are the core sources of publications on models, guidelines and frameworks for sustainability since the adoption of the 2030 Agenda? (3) Who are most cited authors on models, guidelines and frameworks for sustainability since the adoption of the 2030 Agenda? (4) What are the countries' role in publications on models, guidelines and frameworks for sustainability since the adoption of the 2030 Agenda? (5) How much of interdisciplinarity lies on researches on models, guidelines and frameworks for sustainability since the adoption of the 2030 Agenda? (6) How does the research on models, guidelines and frameworks for sustainability since the adoption of the 2030 Agenda link to the SDGs?

This work is original because it analyses the results using an interdisciplinary approach. In addition, this study provides

interesting insights for researchers and editors concerning interdisciplinarity.

2 | Research Methodology

This study is characterised by presenting an exploratory approach, which seeks to analyse what is being discussed in the field of management in terms of sustainability (Gray 2012). Interdisciplinarity is also a strong point to be explored in this work, as well as the researchers' adherence to the SDGs.

The method proposed to achieve the objective of the research was bibliometry. Bibliometric tools have been used to enhance research productivity and facilitate knowledge synthesis in diverse academic works (Farrukh et al. 2020; Rao and Shukla 2023; Troian and Gomes 2020; Goyal et al. 2024; Razia and Binti Abu Bakar Ah 2022; Güngör et al. 2025; Nobanee et al. 2021; Araujo Galvão et al. 2018). In an environment with several publications, bibliometrics can be very useful to explore this large number of publications in a scientific way, supported by the use of a bibliographic database, in order to offer a way for future studies (Costa and Oliveira 2020).

These previous searches were made in the Scopus, Web of Science and SciELO databases. All these references were gathered in the reference manager 'Mendeley', and the duplicated documents were deleted. Initial screening of the literature was undertaken at the title and abstract fields, and a set of these documents was being used to justify the relevance of this work.

SALSA is an analytical framework with four sequential steps, namely Search, Appraisal, Synthesis and Analysis, used by different scholars Razia and Binti Abu Bakar Ah (2022). This analytical framework has been applied in this work, and Table 1 shows its application.

2.1 | Research

According to Martín-Martín et al. (2021) and Martín-Martín et al. (2018), the choice of the basis depends on the objectives of the work and the area of knowledge. In this sense, for this work, the Web of Science (WoS) was selected, which is the basis with the highest data quality (Aria and Cuccurullo 2017; Razia

and Binti Abu Bakar Ah 2022; Troian and Gomes 2020). On 22 November 2023, the search was conducted in the WoS.

Database searches can be performed based on keywords contained in the titles, abstracts or full text. Careful elaboration of title and abstract and the selection of keywords are fundamental for the texts to be retrieved by search engines and finally reach their potential readers (Garcia et al. 2019). The title field was chosen because it contains the key concepts chosen by the authors to translate what the work is about. According to Booth et al. (2005) 'the title should introduce the key concepts'. Furthermore, in bibliometrics, the use of the title reduces the chance of finding works outside the main interest of the study, which are the models, guidelines and frameworks applied to sustainability. Moreover, in many cases, the title is the only information the reader has during his literature search on a particular subject, which, if poorly presented, may fail to engage interest or even alienate the readers (Garcia et al. 2019). The title draws from the other sections of the paper and becomes the face of the paper—the descriptor, the advertisement and the pitch (Annesley 2010). The first step in the SALSA framework is the search, in which the string used to search for titles was (sustainability OR 'sustainable development') AND (framework OR guidelines OR model). This resulted in a set of 6071 documents as shown in Table 1.

2.2 | Appraisal

The second step in the SALSA framework is the appraisal. The appraisal is the phase in which the selected articles were evaluated based on the review work objective (Mengist et al. 2020). In this step, the management category in the Web of Science database was selected, aiming at results directed to the work objectives. This criterion excludes works related to frameworks and models or guidelines related to other subject categories, such as anthropology or architecture, and focuses on works related to management. This resulted in a set of 506 documents as shown in Table 1.

2.3 | Synthesis

The third step in the SALSA framework is the synthesis. The period from 2015 onwards helps to synthesise the results around the concept of sustainability in relation to the SDGs. This is due

TABLE 1 | Application of the SALSA method.

Steps of the SALSA method		
Step 1: Research	(sustainability OR 'sustainable development') AND (framework OR guidelines OR model) (title)	6071 documents
Step 2: Appraisal	(Management) Web of Science category	506 documents
Step 3: Synthesis	(Years 2015–2023) and (language: English) AND (file type: Article, Proceeding Paper, Early Access and Review Article)	352 documents
Step 4: Analysis	Bibliometric analysis (identify to what extent these productions are characterised as interdisciplinary and in dialogue with the 2030 Agenda)	352 documents

to the fact that in 2015, the 2030 Agenda was adopted by all United Nations member states, with the 17 SDGs (ONU 2023). The importance of this mark is reinforced in the work of Tsalis et al. (2020), when they note that several international organisations have suggested various ways to assist firms in incorporating SDGs into strategic management and sustainability reporting. Bebbington and Unerman (2018) pointed to the achievement of the United Nations SDGs as an enabling role for accounting research. The use of the SDGs has the potential to be extended and applied to other subject categories, including management, which is the aim of this work.

Regarding the types of work, articles were considered because they are more rigorous and reliable scientific sources, given the peer-review process and the congress works because they are sources that reveal themes of more current works that are being developed and may not have yet been published in article form (Gray 2012).

Regarding the language, the English-language works, whose accessibility and dissemination are global, were considered. In addition, the number of papers in other languages, in the search performed on the Web of Science database, was not significant compared to English-language publications. This resulted in a set of 352 documents as shown in Table 1.

2.4 | Analysis

The fourth step in the SALSA framework is the analysis. Data from the bibliographic survey were exported in BibTeX format in stages because of the restriction of the Web of Science database. For bibliometry, the data were processed in the R software, using the 'Bibliometrix', especially the 'Biblioshiny' (Aria and Cuccurullo 2017). In addition to the R package, electronic spreadsheets were used to treat the data and elaborate the graphs applied in the analysis.

The analysis was carried out from a quantitative perspective, using bibliometrics, and from a qualitative perspective, using content analysis. The first one was used to identify the patterns and perspectives of scientific production on the subject (the main sources on the subject, the main authors and the main relationships between countries), a descriptive analysis (Aria and Cuccurullo 2017). The content analysis was employed to assess the extent to which the set of documents could be characterised as interdisciplinary and in dialogue with the 2030 Agenda. Thus, the data available at the electronic addresses of the sources in relation to the editorial board will be analysed in this paper.

The interdisciplinary perspective was considered as a reference for the analysis of the bibliometric results. Filho and Gargioni (2017) define that to configure a strong interdisciplinarity, it is necessary to rely on a specific, complex problem, with various dimensions and the action of distant areas or disciplines. A weak interdisciplinarity would be characterised by a specific, complex problem with multiple dimensions and close areas or disciplines. The disciplinary approach would be characterised by a specific problem, delimited and one dimension, while the multidisciplinary approach would be characterised by a specific problem, with multiple disciplinary dimensions. Thus,

according to the authors, multidisciplinary, interdisciplinarity and transdisciplinarity differ in their degrees of complexity.

As indicators for the analysis of interdisciplinarity, Filho and Gargioni (2017) suggest the involvement of at least two areas or disciplines (the farther, the greater the potential for interdisciplinarity), the diversity/variety/disparity of the areas involved and the integration of areas in the knowledge process. For the authors, the published scientific articles are important elements of interdisciplinarity and present indicators of the degree of integration of the team. In the published articles, we can evaluate the number of participants and diversity of team members, the involvement of funding institutions, the involvement of government research institutions, co-authored publications and the participation of the private sector when applicable. According to Braun and Schubert (2003), the degree of interdisciplinary integration is characterised in accordance with the four criteria: the number of disciplines that are involved; the degree of similarity between them (e.g., mathematics and physics are similar and molecular genetics and electronics are less similar); the novelty and creativity involved in the combination; and the degree of integration.

As Filho and Gargioni (2017) argue, this diversity is fundamental to an interdisciplinary examination of themes involving management and sustainability. A substantial editorial board comprising numerous individuals from the same nation, geographical area and affiliations is less likely to exhibit an interdisciplinary character. A purely disciplinary approach to the papers submitted for review may compromise the acceptance of interdisciplinary works.

Finally, from an interdisciplinary perspective and in line with the SDGs, the five most frequently cited documents are examined. Yegros-Yegros et al. (2015) argue that the appropriate unit of social analysis may be research groups or projects, rather than publications. However, this work identifies interdisciplinary papers and sources related to sustainability models, guidelines and frameworks in publications.

3 | Results

3.1 | Bibliographic Descriptive Analysis, Interdisciplinarity and SDGs

The data extractions were done on 22 November 2023 as described in Section 2 (Research Methodology). Table 2 presents the main information about the bibliometric analysis data frame.

Table 2 shows the bibliometrics of the selected studies from 2015 to November 2023. At the end, 352 documents were obtained from 167 different sources, encompassing a total of 20,949 references and 352 documents. By an interdisciplinary perspective, it is possible to highlight some points that will be further explored in this document.

It is possible to highlight the international co-authorship presented in Table 2. The comparative results from Senthilvadevel et al. (2024) regarding special needs dentistry indicate that international co-authorship figures (15.83, 3.983, 11.43 and 18.99) for

TABLE 2 | Main information.

Description		Results
Main information about data	Timespan	2015:2023
	Sources (journals, books, etc.)	167
	Documents	352
	Annual growth rate, %	26.03
	Document average age	2.79
	Average citations per doc	19.73
	References	20,949
Document contents	Keywords plus (ID)	865
	Author's keywords (DE)	1350
Authors	Authors	993
	Authors of single-authored docs	37
Authors' collaboration	Single-authored docs	38
	Co-authors per doc	2.99
	International co-authorships, %	33.52
Document types	Article	247
	Article and early access	33
	Article and proceedings paper	3
	Proceedings paper	57
	Review	11
	Review and early access	1

each segmented time period (1985–2021, 1985–1997, 1998–2009 and 2010–2021) are lower than those (33.52) showed in Table 2. This suggests that the results in Table 2 reflect a more interdisciplinary approach of the theme, which will be explored in detail in Sections 3.4 and 3.5.

3.2 | Temporal Analysis and Interdisciplinarity

Figure 1 shows the evolution of publications and average citation.

As demonstrated in Figure 1, there has been an upward trend in research. Vinayavekhin et al. (2023) also observed a growth trend in a period from 1981 to 2020 using the Scopus database, stating that 'exponential growth means that sustainability is gaining increasing attention in business and management literature, and this trend is expected to continue'. In the management category of Web of Science, the years 2016, 2017, 2021 and 2019, in that order, were identified as those with the highest average citations, as demonstrated in Figure 1.

The 352 documents had one document with 13 authors, one with 11, one with 10 and one with eight. Three documents with seven authors, 15 documents with six authors, 29 documents with five authors, 76 documents with four authors, 93 documents with three authors, 94 documents with two authors and 38 documents with one author. These figures indicate a very interdisciplinary character in the subject of management in the scope of this work. The interdisciplinarity of this production will be evaluated in depth in the following sections.

3.3 | Sources Analysis, Interdisciplinarity and SDG

The research returned 167 sources. Figure 2 shows the core sources by Bradford's Law.

According to the Bradford's Law, there are six core sources in the first zone. The United Kingdom is the main country of

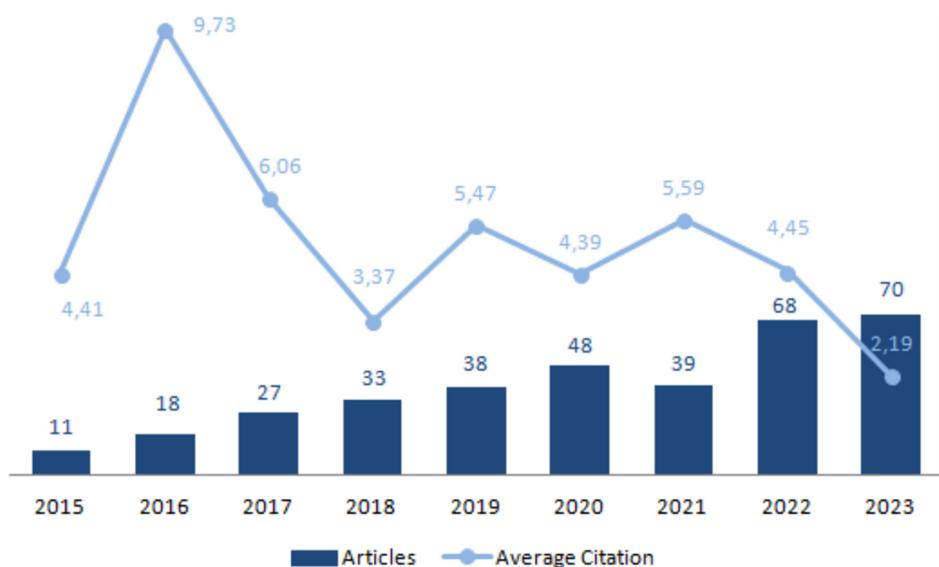


FIGURE 1 | Evolution of publications and average citation.

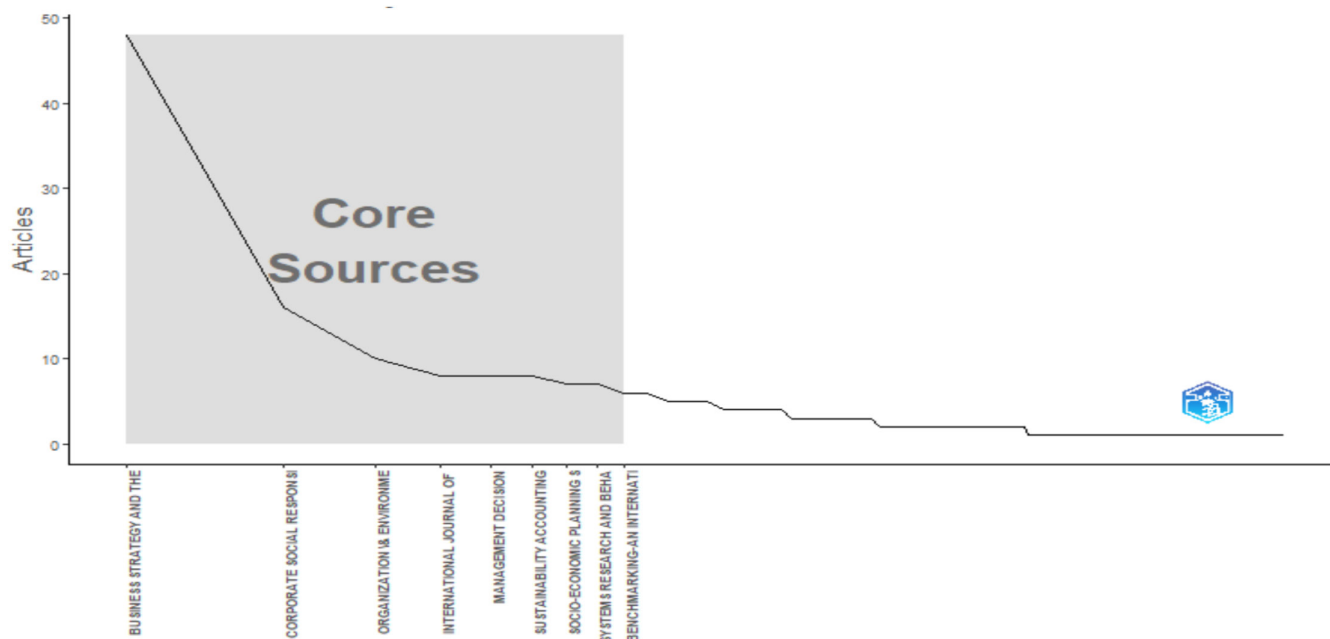


FIGURE 2 | Core sources by Bradford's Law.

TABLE 3 | Source articles and h-index.

Source	Articles	h-index
<i>Business Strategy and the Environment</i> (BSE)	48	19
<i>Corporate Social Responsibility and Environmental Management</i> (CSR)	16	9
<i>Organisation and Environment</i> (OEA)	10	7
<i>International Journal of Construction Management</i> (IJCM)	8	4
<i>Management Decision</i> (MD)	8	4
<i>Sustainability Accounting Management and Policy Journal</i> (SAMPJ)	8	5

origin of the six core sources. The exception is Organisation and Environment (United States). Table 3 shows the h-index of the six core sources. Taking into account the Bradford's Law results, the h-index and the number of articles, the journal 'Business Strategy and the Environment' is the most relevant source. Other four relevant sources, taking into account the number of articles, were 'Socio-Economic Planning Sciences and Systems Research' and 'Behavioral Science', with seven articles, and 'Benchmarking: An International Journal' and 'Research Policy', with six articles.

Figure 3 shows the source production over time of the six core sources. The journal BSE stands out with an increasing number of publications in the analysed period (2015–2023). Another highlight related to the growth in the period is the journal CSR.

In Figure 4, the top 10 most cited local sources are as follows: *the Journal of Cleaner Production* is clearly distinguished,

followed by a significant disparity in citations for *Business Strategy and the Environment*. It is noteworthy that the second-place source is also substantially distant from the third-place source.

From an interdisciplinary perspective, it is possible to highlight some points related to the six core sources: scope or areas of coverage and editorial board composition (number of members, countries and affiliations).

The scope or areas of coverage of the six core sources is described, according to the description provided on their websites (BSE 2024a; CSR 2024a; OEA 2024a; IJCM 2024a; MD 2024a; SAMPJ 2024a). It is noteworthy that only BSE states their interdisciplinary intention. Nevertheless, the SAMPJ articulates its concerns and places emphasis on the SDGs, which can be viewed as a manifestation of interdisciplinarity.

One of the characteristics of interdisciplinarity is the search for solutions to complex problems. This can be seen in the scope or areas covered by the sources: BSE, relating to the 'responses to the challenges of climate change' (BSE 2024a); CSR, relating to the 'practical studies that contribute to the development of social and environmental responsibility assessment tools' (CSR 2024a); and SAMPJ, relating to the obligation that papers 'address issues relevant to achieving the United Nations Sustainable Development Goals' (SAMPJ 2024a). The IJCM focuses on building management: sustainability of buildings, construction economy, construction project and life-cycle management, materials and construction methods, acquisition of building materials, organisational management in the construction sector, among others (IJCM 2024a). It seems interdisciplinary as different knowledge disciplines are used to solve construction management problems.

The SAMPJ source is the one that strongly declares its concern with sustainable development and also with the SDGs. CSR also

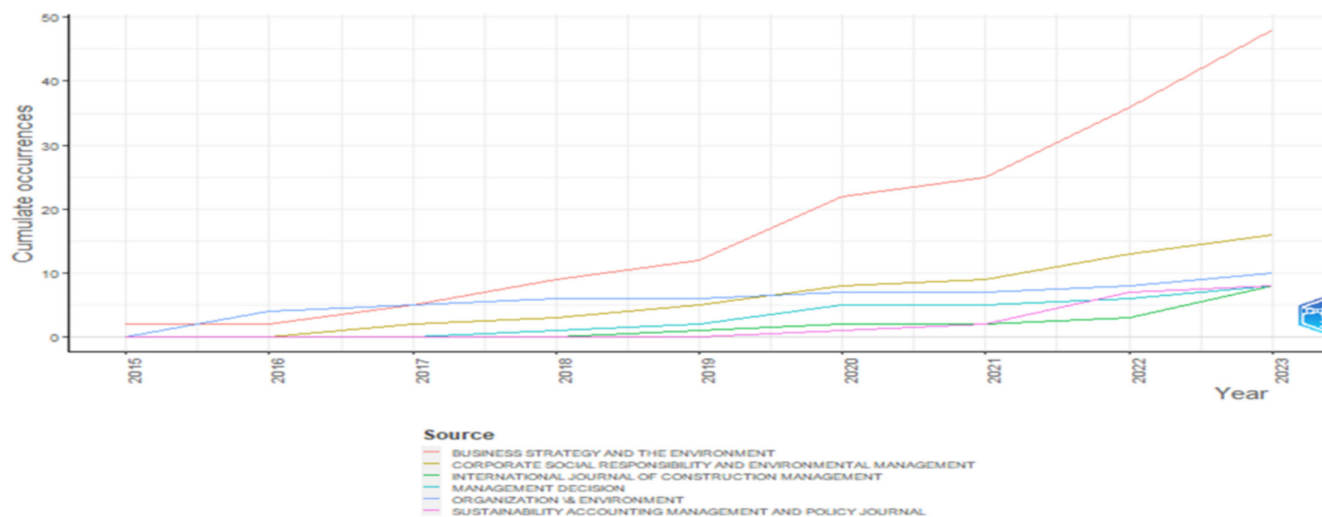


FIGURE 3 | Comparison of the production of the six core journals.

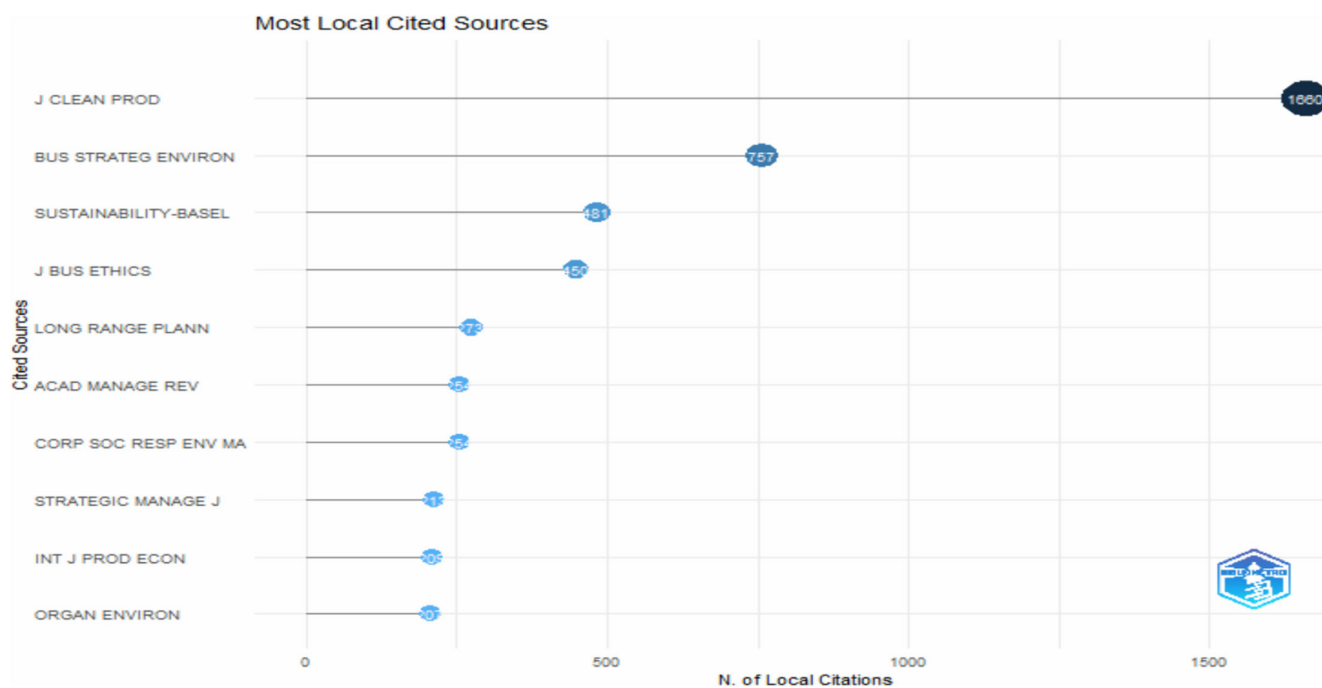


FIGURE 4 | Most cited local sources.

places its concern with ‘different approaches to sustainability’. The BSE, despite not using the previous terms, lists several topics related to the subject, including the SDGs, such as circular economy, governance, green finance, specific industrial sectors and business responses to climate change and other current environmental issues.

The editorial board composition of the six core sources is described in Table 5, according to the description provided on their websites (BSE, 2024b; CSR 2024b; OEA 2024b; IJCM 2024b; MD 2024b; SAMPJ 2024b). Table 4 shows the number of members in the editorial board, the number of the country of origin of affiliations and the number of different affiliations for each of the six core sources.

The adoption of the Wiley Online Library facilitates the comparison of results with additional scholarly sources from different disciplines (Wiley Online Library 2024). Journals from a range of disciplines, including mathematics, physics and computing, were sampled to support reflection on the data in Table 4. The source *Mathematika*, for example, has 22 members of five countries and 15 different affiliations with the scope ‘traditional emphasis has been towards the purer side of mathematics but applied mathematics and articles addressing both aspects are equally welcome’ (*Mathematika* 2024a, 2024b). The source *Advanced Physics Research*, for example, has 33 members of 15 countries and 32 different affiliations with the scope ‘high-quality experimental and theoretical research in the field of applied and fundamental physics’ (*Advanced Physics Research* 2024a, 2024b). The

TABLE 4 | Editorial board composition of the sources.

Source (composition)	Members	Countries	Affiliations
MD (Editorial advisory board and the editor-in-chief)	197	38	100
BSE (Editorial board and the editor)	76	22	72
OEA (Editorial review board and the editor)	74	20	70
SAMPJ (Editorial advisory board and the editor-in-chief)	62	17	55
CSR (Editorial board and the editor)	42	16	38
IJCM (Editorial members, editors and the editor-in-chief)	35	7	27

source Journal of Software: Evolution and Process, for example, has 18 members among reviews editor and editors, 10 different countries and 18 different affiliations with the scope ‘high quality, state-of-the-art research and practice papers dealing with the conception, development, testing, management, quality, maintenance, and evolution of software, systems, and services, as well as the continuous improvement of processes and capabilities surrounding them’ (Journal of Software: Evolution and Process 2024a, 2024b). As shown in Table 4, almost all the six core sources under discussion in this paper have data that exceed that of the disciplinary sources presented here.

However, it is important to point out that neither the number of members nor the number of countries or affiliations per se means an interdisciplinarity of editorial board. It is a drive for the selection of the source by scholars who are interested in interdisciplinary sources. In this case, even a great number of members not seem to represent diversity and consequently more interdisciplinarity of editorial board. Nevertheless, it is important to point out that an interdisciplinary approach might be well received by a diverse editorial board, which tends to lead to a larger number of members. Figure 5 shows the country of origin of the affiliation of the member of the editorial board from the six core sources: BSE (blue), CSR (red), OEA (yellow), IJCM (magenta), MD (purple) and SAMPJ (green).

Figure 5 shows the countries with the highest number of members in all editorial boards (six core sources). As a rule, the majority of editorial board members come from the country of the editor-in-chief. However, an exception to this general rule is evident in the cases of BSE, CSR, SAMPJ and IJCM. Figure 6 shows the number of members in each of the core sources from the top five countries.

Furthermore, it is evident that there is a clear predominance of members from the United States (85), Italy (81), United Kingdom (63), Australia (41) and China (36). In addition to the analysis per country, it is also important to aggregate the data per continent in order to assess this diversity.

In the American continent, the most prominent countries are the United States and Canada, with representation in five of the

six sources. The following European countries have been identified as having the highest number of members in the editorial boards from each of the six main sources: the United Kingdom (6/6), Italy (5/6), Germany (5/6), Spain (5/6) and France (3/6). In the Asian continent, the most prominent countries are China (6/6) and Japan (4/6). Within the continent of Oceania, the most prominent countries are Australia (6/6) and New Zealand (5/6). There is a lack of representativeness of institutions in Latin America, with the exception of Brazil and Mexico, present in the editorial board of three of the six core sources pointed out in this study. There is a lack of representativeness of institutions in Africa, with the exception of South Africa, present in the editorial board of two of the six core sources pointed out in this study.

3.4 | Author Analysis, Interdisciplinarity and SDGs

The research returned 993 authors. Figure 7 shows the author productivity through Lotka’s Law.

Figure 7 shows that there are no authors with more than three written documents. In this set of results, there are only three authors with three written documents. There are 54 documents written by two authors and the main set of 936 authors with only one document. There is no author or group of authors whose work stands out.

Table 5 shows a list of the top 10 most productive and most cited authors, ranked according to these two variables. Table 5 also reveals other important author statistics such as h-index, g-index, m-index, total citations and year of production of the first document.

In Figure 8, the 10 most relevant affiliations are displayed. The countries of the most relevant affiliations are listed in the same order as in Figure 8: Italy, Malaysia, Indonesia, Iran, the United Kingdom, Romania, Brazil, Hong Kong and India. It shows that Asian universities have a preponderance of affiliated authors, suggesting that these universities, in contrast to European universities, have a comparatively stronger emphasis on sustainability research in management.

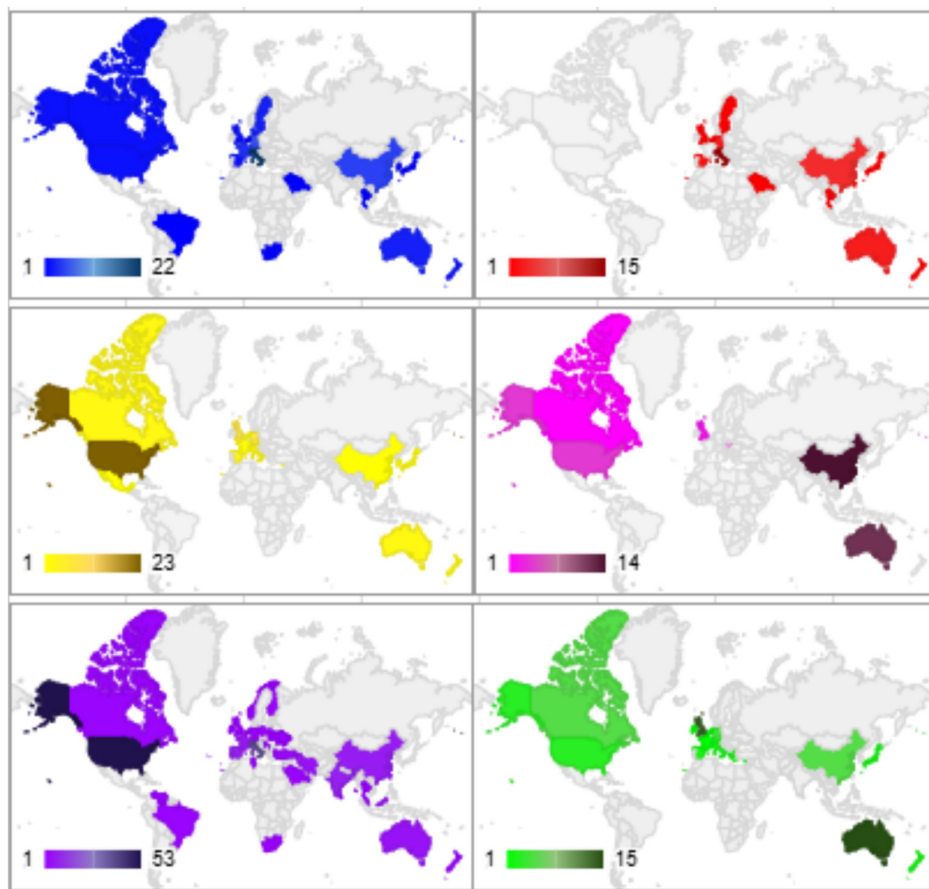


FIGURE 5 | Editorial board of the six core journal maps.

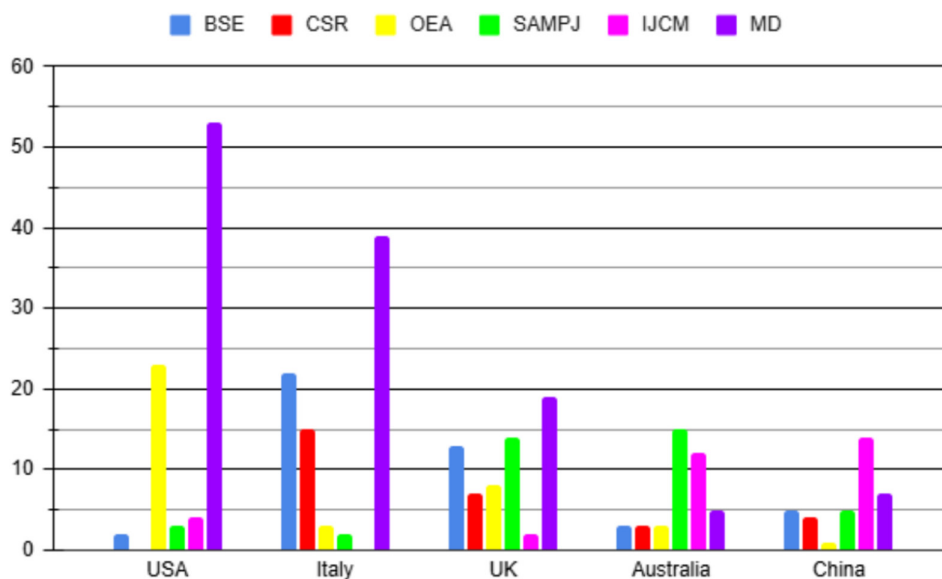


FIGURE 6 | Members in each of the core sources from the top five countries.

Waldman and Dalpian (2017: 119) posit the requirement for universities to organise themselves in an interdisciplinary manner, with a view to mould professionals who are endowed with interdisciplinary knowledge and skills. As knowledge production, to a considerable extent, is the responsibility of universities, the interdisciplinary organisational effort can be reflected in publications and their characteristics. Figure 9 provides a quantitative

representation of the number of authors from the six core sources: BSE (blue), CSR (red), OEA (yellow), IJCM (magenta), MD (purple) and SAMPJ (green).

In Figure 9, it can be seen that only BSE and CSR contain documents with more than six authors, indicating interdisciplinarity. BSE and CSR sources present documents with 13 and 11 authors,

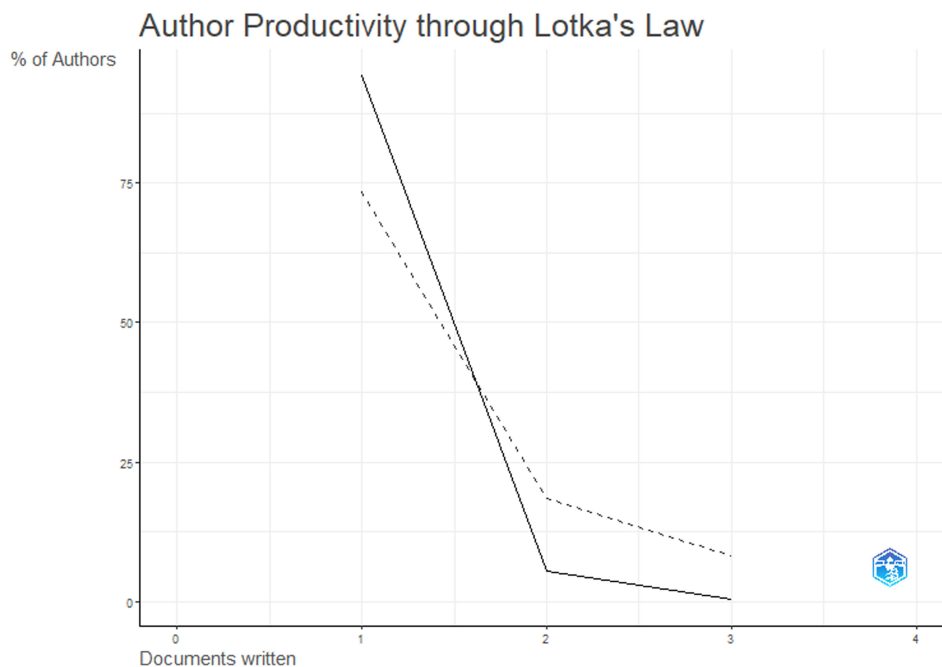


FIGURE 7 | Core sources by Lotka's Law.

TABLE 5 | Most productive authors of publications.

Rank	Author's name	No. of articles	Total citations	h-index	g-index	m-index	PY start
1	Bag, S.	3	292	3	3	1	2021
2	Evangelinos, K.	3	109	3	3	0.5	2018
3	Sahu, A. K.	3	98	2	3	1	2022
4	Albareda, L.	2	198	2	2	0.286	2017
5	Battistella, C.	2	46	2	2	0.667	2021
6	Bhakar, V.	2	41	2	3	0.333	2018
7	Bagnoli, C.	2	25	1	2	0.25	2020
8	Antony, J.	2	22	1	2	1	2023
9	Bengtsson, M.	2	20	1	2	0.5	2022
10	Caputo, F.	2	13	1	2	0.5	2022

respectively. Among the six main sources, in this order, with more than four authors per document, the following stand out: BSE with 34.4% and CSR with 32.1%, while IJCM, MD and SAMPJ do not have documents with more than four authors. On the other hand, among the six main sources, in descending order, with only one author per document, there are CSR with 7.5%, SAMPJ with 5%, IJCM with 4.8%, OEA with 3.8%, BSE with 2.5% and MD with 0%.

The work of Addison et al. (2020), with 13 authors, is a positive example in which the metric finds support in reality. In addition to 13 authors, the work involves international collaboration, different affiliations, different countries (concentrated in Europe) and a problem that involves the integration of distant disciplines such as biology and management. The paper aims to 'support those working in the environment and sustainability departments of businesses who want to progress biodiversity

performance management from within, by introducing approaches from the field of conservation science and management' (Addison et al. 2020).

The work of Molin et al. (2023), with 11 authors, is another positive example in which the metric finds support in reality. The paper has 11 authors, without international collaboration, with different affiliations, all from Italy, and with a complex problem that affects many organisations concerned with sustainability. The paper mentions the 'increasingly aware of the negative externalities such as climate change, biodiversity loss and over-exploitation'. The objective of the work is 'to design a logical tool, identified as a sustainability decision-making framework (SDMF), that can guide companies in the process of identifying a personalized and strategic path towards sustainable development'.

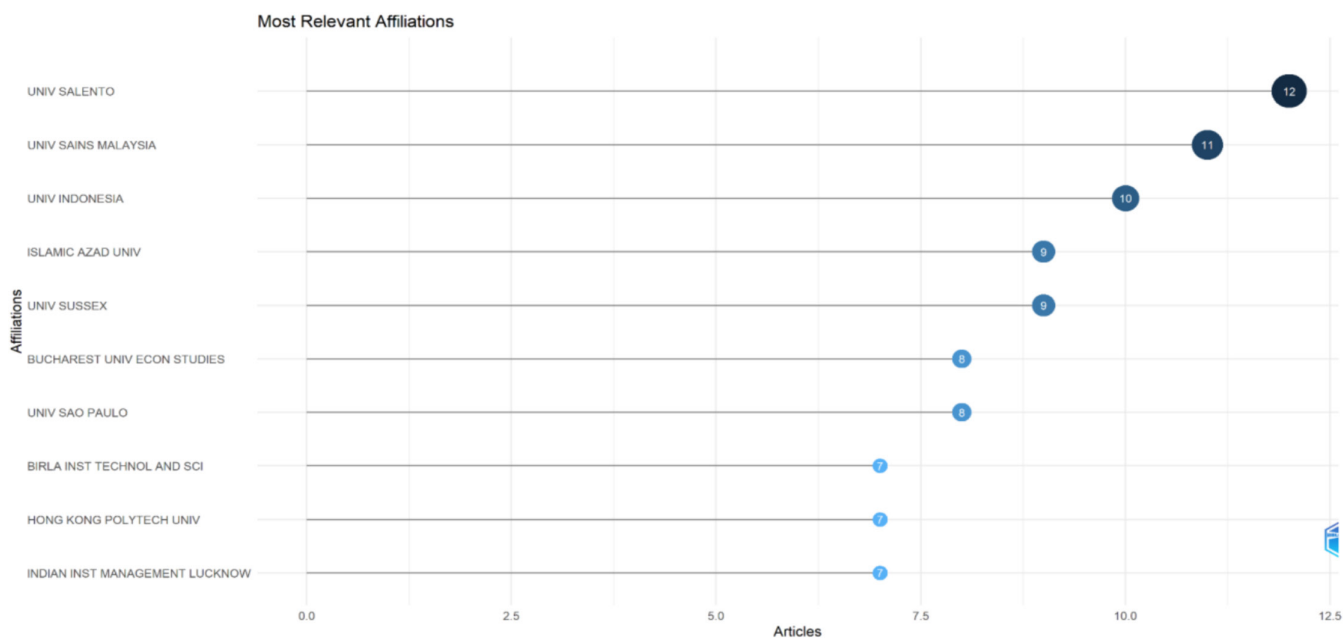


FIGURE 8 | Most relevant affiliations.

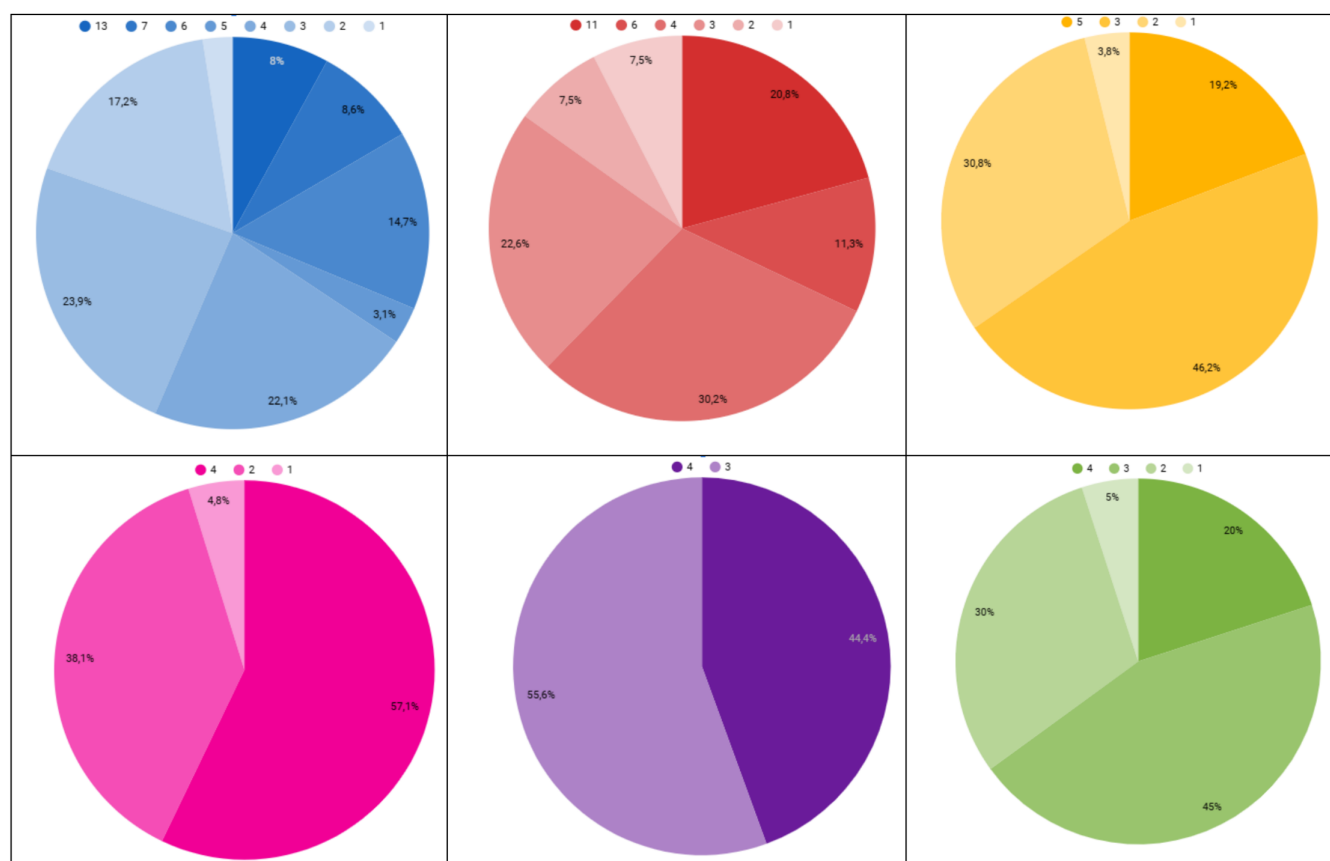


FIGURE 9 | Numbers of authors by source.

Figure 10 shows the top 10 most cited authors. Eight of these authors have 23 citations, while two authors have 11 citations. Still with 11 citations, there is one author, Schaltegger, and two with 10 citations, Jolink and Niesten, not shown in Figure 10.

There are also another 45 authors with more than one citation and 21 with more than five citations. The importance of these authors lies in their presentation of the basic concepts used by researchers in the context of this work.

3.5 | Scientific Production by Country Analysis and Interdisciplinarity

The 10 countries with the highest production are India (113), China (111), the United Kingdom (111), Italy (102), the United States (65), Brazil (51), Germany (45), Australia (39), Spain (36) and Indonesia (32). Figure 11 shows that the African continent, like much of South America, does not stand out in terms of scientific production on the subject of this paper. In particular, the impacts of climate change and environmental problems are more likely to affect countries and people at lower socioeconomic levels (United Nations 2023). It is essential that partnerships, collaborations and copyrights emerge from countries in these conditions seeking to create instruments and mechanisms to increase resilience in the global context of climate and environmental crisis. In this context, interdisciplinarity could play a key role in the search for solutions for sustainable management.

In terms of collaboration between countries, Figure 12 indicates the different relations in the publications performed. Internationalisation is an indicator of interdisciplinarity, as it provides views of different sociocultural contexts on a theme (Filho and Gargioni 2017).

Figure 12 shows that there is an opportunity for increasing cooperation between countries in the North and South. This might facilitate the identification of issues of global interest and the search for solutions to complex, interdisciplinary problems. Issues like these are being highlighted by the SDGs.

Although most publications originated in India and China, most citations were made to papers originating in the United Kingdom (1770), followed by Germany (570), Italy (489), India (482) and China (442), as shown in Figure 13, which ranks the most cited countries.

Figure 13 shows that there is room for the pursuit of interdisciplinarity, which can be achieved through greater collaboration with researchers from countries most affected by climate change and environmental problems. At least with the participation of the countries most affected by these complex problems, which can be overcome through interdisciplinarity. Another interesting point, as already mentioned, is to increase the representation of the most affected countries in the editorial board of the sources. This move would have larger impact if it were adopted by the main sources, such as those identified in this work.

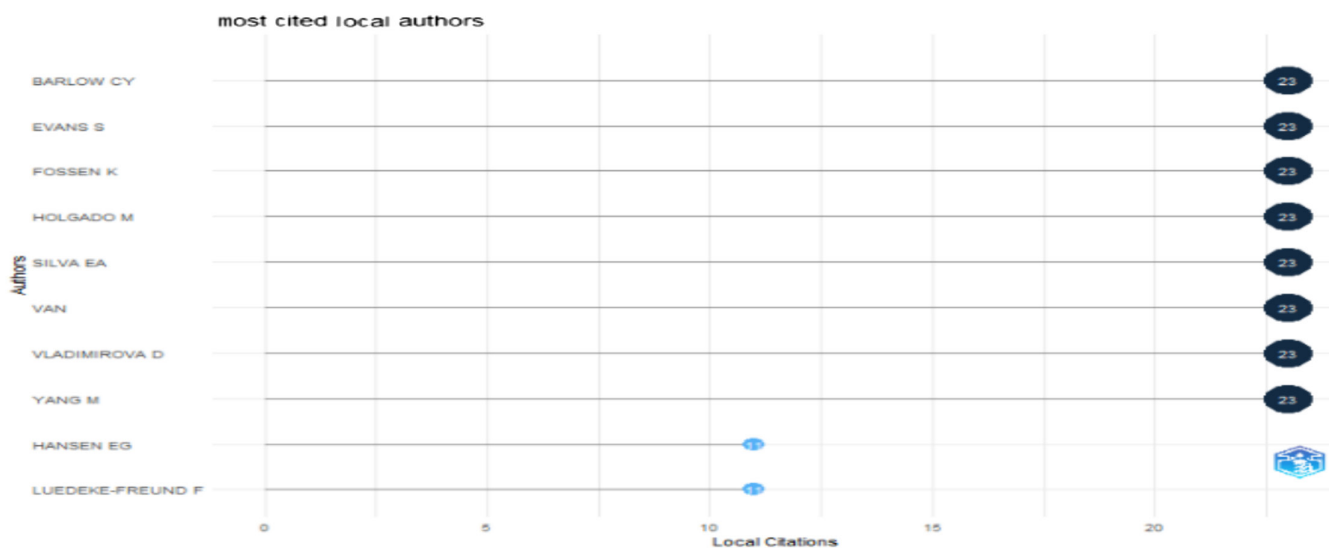


FIGURE 10 | Most cited local authors.

Country Scientific Production

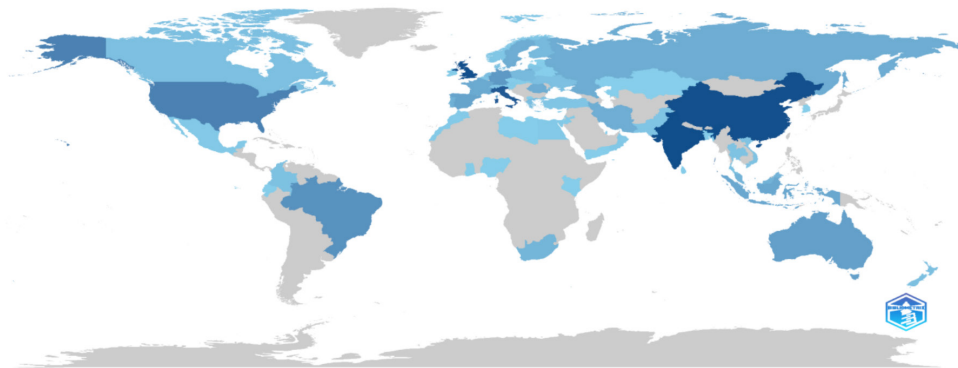


FIGURE 11 | Map of the scientific production of countries.

Country Collaboration Map

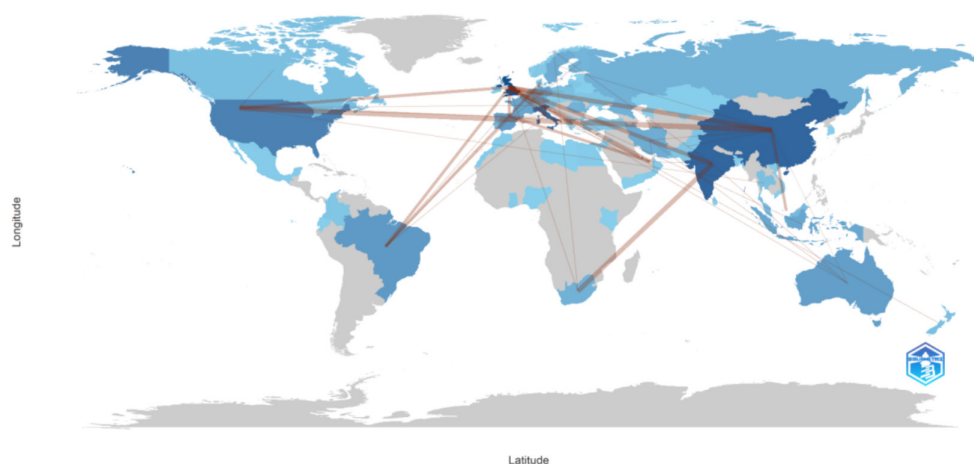


FIGURE 12 | Map of collaboration among countries.

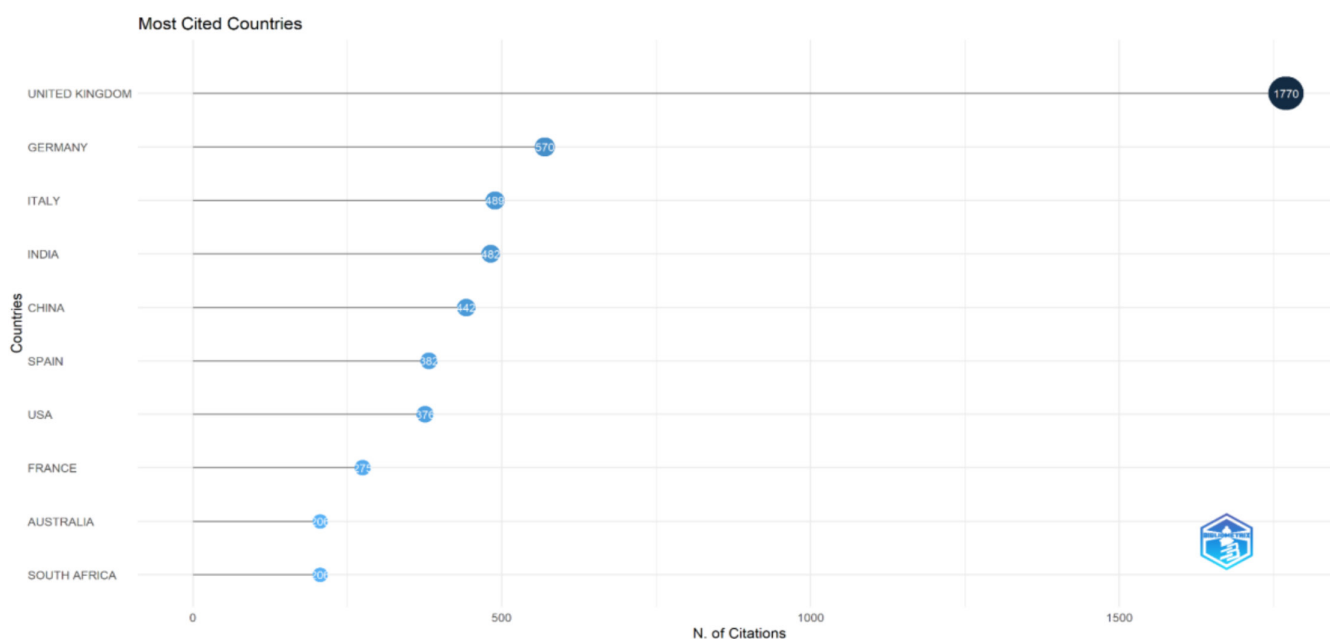


FIGURE 13 | Graph of countries of origin of the most cited publications.

3.6 | Most Cited Articles (Top Five), Interdisciplinarity and SDGs

The five most commonly cited documents are listed in Table 6. The journals that host the most cited publications are generally the same ones indicated as the most relevant sources on the subject, according to the result of the present bibliometric study (Figure 2). The journals in question are ‘Business Strategy and Environment’ (first most relevant source), ‘Organization and Environment’ (third most relevant source) with two articles and ‘Research Policy’ (10th most relevant source) with two articles.

In the publication by Rogge and Reichardt (2016), the most cited document, it is observed that the authors come from different affiliations, nationalities and institutions. The topic addressed is about sustainability transition policy. Facing the challenges of this transition, the authors develop an interdisciplinary policy

mixed concept for the implementation of transition policies for sustainability, taking into account aspects such as innovation, environmental economics and policy analysis (Rogge and Reichardt 2016). The methodology was based on a literature review on innovation studies, environmental economics, policy analysis and strategic management. The paper presents a framework to analyse the link between the policy mix and technological change. The document does not explicitly explore the SDGs but cites important documents on climate change and the achievement of the Millennium Development Goals. This article is significant for its emphasis on an interdisciplinary approach.

In the publication by Evans et al. (2017), the second most cited document, it is observed that the seven authors are from the same affiliation, nationality and institution. The authors' interests are in sustainable business models (SBM) and the development of a unified theoretical perspective for understanding

TABLE 6 | Five most cited global documents.

Source	Authors	Year	DOI	Total citations	TC per year	Normalised TC
Res Policy	Rogge, K. S.	2016	10.1016/j.respol.2016.04.004	535	66.875	6.87366167
Bus Strateg Environ	Evans, S.	2017	10.1002/bse.1939	506	72.286	11.9318777
Organ Environ	Schaltegger, S.	2016	10.1177/1086026616633272	227	28.375	2.91648822
Organ Environ	Abdelkafi, N.	2016	10.1177/1086026615592930	185	23.125	2.37687366
Res Policy	Edmondson, D. L.	2019	10.1016/j.respol.2018.03.010	181	36.2	6.61982676

business model innovations that lead to better organisational economic, environmental and social performance. The methodology was based on a literature review. As a result of the research, the authors developed proposals to support the creation of sustainable business models (Evans et al. 2017). Despite the number of authors, an indicator of interdisciplinarity, the proximity of the disciplinary fields (economics and engineering) reduces this characteristic. The document does not explicitly address the SDGs. This seems to be a gap, as the SDGs could be an element of attraction between stakeholders.

In the publication by Schaltegger et al. (2016), the third most cited document, it is observed that the three authors are from the same affiliation and nationality but different institutions. The authors developed a theoretical framework to analyse the co-evolutionary business model development for sustainable niche pioneers and conventional mass market players aiming at the sustainability transformation of markets. The methodology was based on a literature review. All the authors of this work were linked to the Centre for Sustainability Management (CSM). The authors present a research limitation in the evolutionary framework, because it does not differentiate between intentional and blind variations. (Schaltegger et al. 2016). There is no explicit exploration of the SDGs in the document.

In the publication by Abdelkafi and Täuscher (2016), the fourth most cited document, it is observed that the two authors are from the same affiliation, nationality and institution. This work aims to investigate the inner logic of BMfS by integrating different perspectives and system levels while developing a graphical representation that supports the design of BMfS (business model for sustainability). The methodology was based on a literature review. The work proposed a comprehensive multilevel model of BMfS and four propositions (Abdelkafi and Täuscher 2016). The authors proposed a large research program and future research directions directly related to the four propositions. There is no explicit exploration of the SDGs in the document.

Finally in the fifth most cited publication, by Edmondson et al. (2019), it is observed that the three authors has the same affiliation, nationality and institution. The authors are interested in combining policy studies and innovation study literatures to conceptualise the co-evolutionary dynamics of policy mixes and sociotechnical systems. This also studies sustainable transition using the example of the zero-carbon homes policy mix in the United Kingdom. The methodology was based on a

literature review. (Edmondson et al. 2019). This article is linked to the most cited work, not only by one of the authors but also by the source and the subject. There is no explicit exploration of the SDGs in the document.

None of these five most prominent publications makes a direct relation to the 2030 Agenda. The proposed management models do not seek to assess to what extent the practices of organisations are aligned with the SDGs. Regarding the interdisciplinarity of these publications, different aspects were observed. The five most prominent publications address complex problems, which are analysed by more than one author, elaborated in co-authorship, which are indicators of interdisciplinarity (Filho and Gargioni 2017).

3.7 | SDG Analysis and Interdisciplinarity

The acronym SDG or SDGs and 'sustainable development goals' appear in the titles, keywords and abstracts of 23 documents. The documents were subjected to a screening process, with the objective of identifying those that addressed the specified work objectives. Table 7 presents these documents, organised according to the DOI and source of the document.

The first point to note is the low proportion between the number of documents identified in this work and the number of documents related to the SDGs listed in Table 7, 18 out of 352, which is only 5.1%. Another point to highlight in Table 7 is that five of the 18 documents listed have more than 10 citations in total, which corresponds to 1.4%. The works by Weybrecht (2017), with a total of 71 citations, and by Raub and Martin-Rios (2019), with a total of 45 citations, stand out in terms of the total number of citations.

This analysis suggests a limited adherence to the SDGs by scholars in the management subject area in this work context, and it is possible that there is insufficient time to evaluate the 2030 Agenda. As suggested by Folqué et al. (2023), the brief period since the establishment of the SDGs in 2015 may impede a definitive evaluation of their entire impact on the management subject in this specific work environment. It is crucial to recognise that this is an agenda for 2030, and in that sense, the data indicate that the management sector to which this work pertains seems to have underappreciated urgency and its role in this global effort towards sustainability.

TABLE 7 | Documents related to the Sustainable Development Goals (SDGs).

No.	DOI	Source	Number of authors/ TC citations
1	https://doi.org/10.3390/admsci12030103	Administrative Sciences	6/1
2	https://doi.org/10.1002/bse.3334	Business Strategy and the Environment	4/2
3	https://doi.org/10.1002/bse.3260	Business Strategy and the Environment	4/7
4	https://doi.org/10.1002/csr.2398	Corporate Social Responsibility Environmental Management	1/8
5	https://doi.org/10.1108/DPM-07-2022-0152	Disaster Prevention and Management	2/1
6	https://doi.org/10.15405/epsbs.2021.07.02.21	European Proceedings of Social and Behavioural Sciences	3/1
7	https://doi.org/10.1177/15344843231200930	Human Resource Development Review	2/1
8	https://doi.org/10.1108/INMR-07-2021-0125	Innovation and Management Review	2/14
9	https://doi.org/10.1108/IJCHM-06-2018-0453	International Journal of Contemporary Hospitality Management	2/45
10	https://doi.org/10.1016/j.jcom.2022.100188	Journal of Co-Operative Organisation and Management	4/1
11	https://doi.org/10.1108/JFM-11-2022-0120	Journal of Facilities Management	5/0
12	https://doi.org/10.1108/RAUSP-10-2021-0216	RAUSP Management Journal	3/1
13	https://doi.org/10.1108/SAMPJ-08-2021-0316	Sustainability Accounting, Management and Policy Journal	1/9
14	https://doi.org/10.1108/SAMPJ-01-2022-0044	Sustainability Accounting, Management and Policy Journal	3/1
15	https://doi.org/10.1016/j.technovation.2022.102606	Technovation	5/5
16	https://doi.org/10.1016/j.ijme.2017.02.008	International Journal of Management Education	1/71
17	https://doi.org/10.1016/j.ijme.2021.100515	International Journal of Management Education	2/15
18	https://doi.org/10.1016/j.ijme.2022.100658	International Journal of Management Education	4/20

Table 7 shows the documents of three of the six core sources: BSE, CSR and SAMPJ. It is interesting to highlight that, in addition to being one of the main sources, SAMPJ is the source that explicitly emphasises its commitment to the SDGs. According to SAMPJ (2023), 'papers that do not clearly articulate how they contribute to sustainable development will be desk rejected'. The content analysis of the three most frequently cited documents was undertaken, incorporating the following elements: the integration of the SDGs, the interdisciplinarity, the countries and affiliations of the authors, the purpose, the methodology of the work, the findings and, when available, future items for research.

The publication by Weybrecht (2017) is the most cited document in Table 7, a single author's work done by an independent researcher from Australia. The author explores what management education needs to consider in order to play this role, a role that not only embeds sustainability and responsible management throughout but also plays a critical and active role on the global stage in moving the SDGs forward. In order for schools to

embrace this opportunity and play this role, the work provided a framework with four steps, which can be used to understand the current position and to set out where and how to move forward. This work is a call to action published in 2017, stressing the importance of the changes for the next 10 years and asking stakeholders to take responsibility for transforming management education towards sustainability based on the SDGs (Weybrecht 2017).

The publication by Raub and Martin-Rios (2019) is the second most cited document in Table 7, two Switzerland authors from the same affiliation. The purpose of the work is to develop and illustrate a comprehensive framework for how hospitality firms can overcome the broad versus narrow dilemma in sustainable management. The framework is based on a comprehensive literature review on sustainability and sustainable management in the hospitality industry. It leads to the conclusion that there is currently a misalignment between the ambitious agenda of the SDGs and the actual sustainability

practices of many, if not most, hospitality companies (Raub and Martin-Rios 2019).

The publication by Greenland et al. (2022) is the third most cited document in Table 7, four Australian authors' work from the same affiliation. The purpose of the work is to develop a sustainability framework that is evidence based and empirically derived via the statistical analysis of HEI student perceptions of sustainability. A sequential mixed-method approach was used, combining the benefits of qualitative and quantitative data collection and analyses. This study's empirical approach confirms the validity of the common pillars to traditional three-pillar and four-pillar conceptual models of sustainability (economic, environmental, social and political) and also identifies a new and distinct fifth pillar—corporate sustainability. Future researches might duplicate this study approach, for example, to observe whether the same five sustainability pillars and their levels of importance are replicated in different regions, such as the Middle East and Africa (Greenland et al. 2022).

As Folqué et al. (2023) observe, the limited time since the SDGs' launch in 2015 may preclude a comprehensive analysis of their full impact on management subject matter within this professional context. It is perhaps the case that business schools 'are still to a certain degree hiding undisturbed, behind closed doors and, despite being crucial to the implementation of the SDGs, have not yet been as engaged as they could and need to be'.

4 | Conclusions

This study employs bibliometrics to offer a comprehensive overview of research in the domain of management (Web of Science), focusing on models, guidelines and frameworks for sustainability from 2015 to 2023, with a particular emphasis on interdisciplinarity. An additional element of the study is the mapping of the incorporation of SDGs in these researches.

Scientific production has shown an upward trend in general, but not to a significant extent. During the period under review, scientific production in the subject of management, as related to the SDGs, was not significant, representing only 5.1% of the 352 documents and with only 1.4% of the documents having more than 10 citations. The results indicate a low level of adherence to the SDGs among researchers working in the subject of management.

In order to analyse the sources, the work observes them from different perspectives: the production, the interdisciplinarity and the SDGs. Each analysis provides significant elements for reflection for both editors and authors who work in a more interdisciplinary way in the context of management research. Maybe interdisciplinary work in management needs more interdisciplinary editorial board.

The present study identified six core sources: BSE, CSR, OEA, IJCM, MD and SAMPJ. Among the aforementioned main sources, BSE stands out in several aspects within the scope of this study. These include its production, h-index, the increasing production over time, the number of citations to its works, its position as one of

the most cited global documents, its interdisciplinary nature and the alignment of its works with the SDG. It is also noteworthy to mention the *Journal of Cleaner Production* as the most cited, followed by BSE. Among the most cited global documents, the works of *Research Policy* (RP), BSE and OEA are particularly noteworthy.

The numerical composition of the editorial boards suggests the following ranking from the most interdisciplinary source to the least: MD, BSE, OEA, SAMPJ, CSR and IJCM. In this evaluation, MD performed better than other sources because of its larger editorial board. The editorial boards of the BSE and the MD have a greater degree of international representation. But, in general, the data show a lack of members from outside Europe, United States and China in the six core sources.

In regard to the adoption of the SDGs, the SAMPJ is distinguished from the other six core sources. The study also identified additional sources whose works are aligned with the SDGs, with particular emphasis on the *International Journal of Management Education* (IJME), *International Journal of Contemporary Hospitality Management* (IJCHM) and *Innovation and Management Review* (INMR).

There is no single author who stands out in the corpus of publications examined. However, when taking into account the total number of citations, the h-index and the g-index of Bag and Evangelinos stand out. Therefore, there is still room for new references on the topic, taking into consideration interdisciplinarity and alignment with the SDGs.

This research shows that the sustainability research on management is not remarkable for its interdisciplinary approach or alignment with the SDGs. This is worrying in light of the 2030 Agenda. The results suggest that the adoption of the 2030 Agenda has not had a significant impact on management. It appears that research in the field of management is progressing but without the degree of urgency that a global priority requires.

One major limitation is that not all possible interdisciplinary indicators that could be used in a bibliometric study have been explored. However, it is important to note that there are potential extensions that could be addressed by future research. For example, exploring the distance between areas or disciplines of interdisciplinary work. This could reveal the nature of this interdisciplinarity, whether it is strong or weak. The identification of relevant themes in interdisciplinary works represents a potentially fruitful area for new research. A case study of one of the countries related to this study would be another fruitful avenue for future research, seeking models, guidelines or frameworks adapted to local reality.

Author Contributions

Arnaldo Pinheiro Costa Gaio: conceptualisation, methodology, writing – original draft preparation, writing – review and editing. **Ana Paula Morais de Lima:** conceptualisation, methodology, writing – original draft preparation, writing – review and editing. **Marcelo Jasmim Meiriño:** supervision, writing – review and editing. **Daniel Vidal Pérez:** supervision, writing – review and editing. **Lidia Angulo Meza:** supervision, writing – review and editing. **Jacob Binsztok:** supervision, writing – review and editing.

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