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The academic landscape of sustainability in management literature: Towards a more interdisciplinary research agenda

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Abstract

Sustainability research is vast and complex, making it difficult to grasp the big picture. To help researchers understand the field better, we created a comprehensive knowledge map of sustainability in management literature by utilising citation-based clustering and text mining techniques to analyse 25,737 sustainability-related papers across 22 academic disciplines, as categorised by the Chartered Association of Business Schools (ABS)'s Academic Journal Guide. We identify 23 research streams, with the top three being corporate social responsibility, operations & supply chain and tourism. Each research stream has varying degrees of definition coverage, levels of analysis, levels of interdisciplinarity and connections to the 17 United Nations' Sustainable Development Goals (SDGs). Goals #9, #10, #12 and #13 receive more attention than Goals #3, #14 and #15. Our findings suggest a need for more interdisciplinary collaboration between researchers, and we propose four research directions to achieve this.

KEYWORDS

bibliometric analysis, citation network analysis, sustainability, sustainable development goal (SDG), text mining, literature review

1 | INTRODUCTION

We should not 'miss the forest for the trees'. This idiom is applicable to business and management research. However, the rapidly increasing number of published papers in almost every research field means that it is difficult to manually screen all papers to get a comprehensive view of some fields (e.g., Caputo et al., 2021). Current literature review practices require researchers to carry out substantial manual tasks, often meaning that datasets must be reduced to make the number of papers analysed manageable (e.g., Sharma et al., 2021).

For instance, in the field of sustainability research, scholars have aimed to understand specific dimensions such as how some sustainable practices are beneficial for the financial performance of businesses (Bartolacci et al., 2020). These include emerging conversations around business strategy practices (e.g., De Angelis et al., 2023), sustainable strategic management (P. K. Rao & Shukla, 2022), corporate

Abbreviations: ABS, Chartered Association of Business School; ACCOUNTING, Accounting; BUS HIST, Business and Economic History; DNCT, Data construction, network construction, cluster analysis, and text analysis; ECONOMICS, Economics, Econometrics and Statistics; ENTREPRENEURSHIP, Entrepreneurship and Small Business Management; FINANCE, Finance; GENERAL MAN, General Management, Ethics, Gender and Social Responsibility; HRM, Human Resource Management and Employment Studies; IB & AREA, International Business and Area Studies; IDF, Inverse Document Frequency; INFO MAN, Information Management; INNOVATION, Innovation; MARKETING, Marketing; MDEV & EDU, Management Development and Education; OPS & TECH, Operations and Technology Management; OR & MANSCI, Operations Research and Management Science; ORG STUDIES, Organisational Studies; PSYCHOLOGY (GEN), Psychology (General); PSYCHOLOGY (OB), Psychology (Organisational); PUBLIC SECTOR, Public Sector and Health Care; REGIONAL STUDIES, Regional Studies, Planning and Environment; SDGs, Sustainable Development Goals; SECTOR STUDIES, Sector Studies; SOCIAL SCIENCES, Social Sciences; STRATEGY, Strategy; TF, Term frequency.

sustainability (Camilleri et al., 2023) and supply chain strategies (Agrawal et al., 2022). These reviews add value. However, there is still a paucity of understanding of the wider impact and direction of sustainability research, particularly in the context of the United Nations' Sustainable Development Goals (SDGs).

These previous reviews have focused on the 'trees' rather than the 'forest' of sustainability research. Few have reviewed the research on SDGs by looking at the papers that explicitly mention them (e.g., Mio et al., 2020). In response to the need to provide a broader and deeper view of the 'forest', in this paper, we outline two main objectives that will contribute to the management and sustainability research. First, we aim to identify a suitable methodology for conducting a comprehensive review of a vast and interdisciplinary research field with many ramifications. Second, we assess and highlight these ramifications, providing a knowledge map that identifies key concepts and theories to facilitate further research.

Combining several bibliometric tools such as citation-based clustering, text mining and topic similarity analyses, we follow the DNCT (data construction, network construction, cluster analysis and text analysis) procedures adopted by some studies (Asatani et al., 2020; Sakata et al., 2013; Vinayavekhin et al., 2021). Based on a direct citation network analysis of 25,737 papers, we identify 23 research streams and the influential authors, main journals and key papers of each research stream. We also assess the interdisciplinary level of each research stream and the link between each research stream and the SDGs. We identify four research directions to aid business and management scholars towards a more interdisciplinary research agenda.

The rest of this paper is organised as follows. Section 2 discusses previous bibliometric reviews of sustainability research and identifies our research questions. Section 3 describes the methodology of citation-based clustering. Section 4 presents and discusses the results of our analysis. Section 5 highlights the potential research directions towards an interdisciplinary agenda. Finally, the paper concludes with a summary of our findings, contributions to the field and limitations.

2 | OVERVIEW OF BIBLIOMETRIC STUDIES ON SUSTAINABILITY

Sustainability is a grand, complex challenge consisting of various dimensions, including social, environmental and economic factors and the integration between social and physical systems (Brandt et al., 2013; Schaltegger et al., 2013). Researchers require multi-level and multi-disciplinary approaches to comprehensively understand the interconnection between these dimensions and systems to tackle this grand challenge (Bansal, 2019). Thus, a holistic overview of sustainability research is needed (Howard-Grenville et al., 2019).

However, when examining literature reviews that use bibliometric analysis and have been published in the field of sustainability research, we find that the majority of them focus on specific topics, disciplines or journals. Table 1 shows examples of recent bibliometric reviews. For example, P. K. Rao and Shukla (2022) conducted a bibliometric analysis of 221 papers related to sustainable strategic management. Agrawal et al. (2022) covered 144 peer-reviewed articles on the topic of supply chain management and SDGs. Bartolacci et al. (2020) focused on the sustainability and financial performance of small and medium-sized enterprises and looked at only 62 papers. These reviews analysed only a small number of papers, usually in the order of a few hundred. In essence, they focus on the 'trees' rather than the 'forest'.

TABLE 1 Recent bibliometric reviews focusing on specific topics within business and management literature.

Author (year)	Topic	Database	Paper source	No. of papers
Nimsai et al. (2020)	Sustainable supply chain management	Scopus	Journal articles	1454
Bartolacci et al. (2020)	Sustainability and financial performance of small and medium sized enterprises	Web of science	Journal articles	62
Pizzi, Caputo, et al. (2020)	Sustainable development goals (SDGs)	Scopus	Journal articles	226
Bhatt et al. (2020)	Sustainable manufacturing	Web of science	Journal articles	343
Suriyankietkaew and Petison (2020)	Strategic management for sustainability	Scopus	Books, book chapters, journal articles, and conference papers	988
Moyle et al. (2021)	Sustainable tourism	-	Top 4 tourism journals	839
Anand et al. (2021)	Sustainable entrepreneurship	Scopus	Journal articles	299
Ferreira et al. (2021)	Sustainability in family business	Web of science	Journal articles	161
Preghenella and Battistella (2021)	Business model for sustainability	Web of science/ Scopus	Journal articles	134
Agrawal et al. (2022)	Supply chain management and sustainable development goals (SDGs)	Scopus	Journal articles	144
P. K. Rao and Shukla (2022)	Sustainable strategic management	Web of science/ Scopus	Journal articles	221

Several attempts have been made to analyse sustainability-related business and management papers in a wider context by considering the 'forest' of sustainability research. For example, Lúcia et al. (2012) analysed 3009 journal papers in the areas of business, finance, economics and management published up to 2012 in the Web of Science database. Kordestani et al. (2015) reviewed 1502 articles published in journals ranked by the Chartered Association of Business Schools (ABS) during 1991–2010. A common issue with previous reviews is the use of expert-based judgements to decide whether a paper should be included in the analysis, resulting in a limited number of papers being analysed. A recent attempt to cover the highest number of papers was by Hallinger (2020), who manually combined seven bibliometric reviews in the areas of leadership, human resource management, entrepreneurship, innovation management, supply chain management, knowledge management and strategic management. It analysed 9476 papers from the Scopus database. Although this provided a broader interdisciplinarity perspective, it covered only seven out of the 22 academic disciplines categorised by the ABS. Thus, there is still a lack of comprehensive reviews that include all academic disciplines within the whole business and management literature. Moreover, the link between sustainability research and the SDGs is still underexplored (Asatani et al., 2020; Howard-Grenville et al., 2019).

This paper aims to answer the following research questions: (1) What are the main research streams in sustainability? (2) How interdisciplinary is sustainability research? (3) How does sustainability research link to the SDGs?

3 | METHODOLOGY: CITATION-BASED CLUSTERING AND DNCT

Bibliometrics is a powerful methodology. Using quantitative techniques, it analyses bibliometric information such as author name, publication title, publication date, journal name, abstract and references. Originally developed in the 1960s (Pritchard, 1969), bibliometric methods have been recently adopted by wider communities of researchers due to the advancement of software and the emergence of online database systems (Zupic & Čater, 2014).

One bibliometric method is citation-based clustering. This is popularly used in fields such as statistics, computer science and network science (Zupic & Čater, 2014). It uses graph theory to represent each paper as a node and each citation relationship as a link (Small, 1973). Citation-based clustering is suitable for exploring enormous datasets of many millions of publications (van Eck & Waltman, 2017). It has rarely been used to review management literature, where at most only several hundreds to thousands of papers have been analysed bibliometrically to date (Donthu et al., 2021). The few exceptions are Sakata et al. (2013) and Gaviria-Marin et al. (2019). The former analysed 54,928 papers on service innovation research, while the former analysed 23,494 papers on knowledge management research. To address this gap, we use citation-based clustering to explore the vast literature on sustainability and, in doing so, create a comprehensive knowledge map of sustainability in management literature and then identify the main research streams and key areas for future research.

Citation-based clustering has three types of networks based on the relationship between papers: direct citation, co-citation and bibliographic coupling (Figure 1). Direct citation is when one paper is cited in another paper. Co-citation is when two papers are cited in the same paper. Bibliographic coupling is when two papers cite the same paper.

We focus on direct citation because it outperforms the other two types in three aspects:

1. Detecting research fronts (Shibata et al., 2009) and emerging clusters
2. Providing more accurate information on publication relatedness (Waltman & van Eck, 2012)
3. Fewer computational problems due to fewer links (van Eck & Waltman, 2017)

One significant limitation of direct citation is that it can be unreliable for short-term analysis. This is because recently published papers that are not yet cited may be excluded from the citation network, even if they are important. A period of at least 10 years is considered long enough to construct a direct citation network for analysis (Klavans & Boyack, 2017).

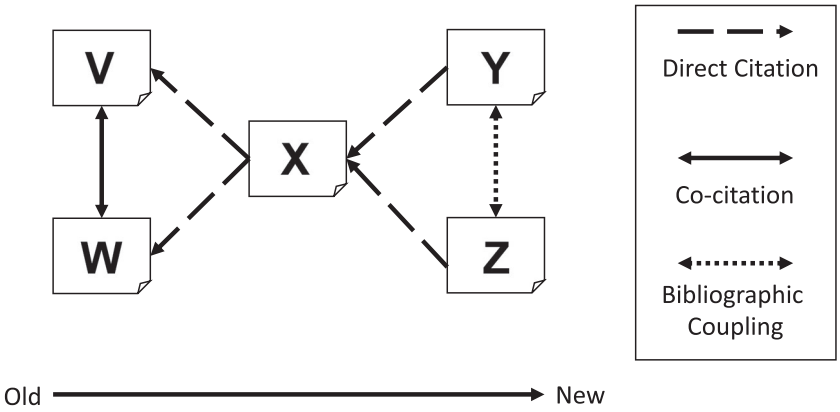

FIGURE 1 Direct citation, co-citation, and bibliographic coupling.

TABLE 2 Methodological table.

Research step	Core data	Analysis
1. Data construction	Simple bibliographic information such as authors, affiliations, journals, years of publication	Data cleaning
2. Network construction	Citation information in reference section	Direct citation network Simple statistic such as fluency counting and ranking
3. Cluster analysis	Citation information in reference section, abstract, keywords	Network clustering technique
4. Text analysis	Relevant full-text papers	Text mining using python

We follow the DNCT procedures shown in Table 2 (for more information see Asatani et al., 2020; Sakata et al., 2013; Vinayavekhin et al., 2021).

3.1 | Step 1: Data construction

We first derived the dataset from the Scopus database, which is the largest database of peer-reviewed literature managed by Elsevier publishing. The initial search found over 60,000 papers with the term 'sustainab*' (e.g., sustainable and sustainability) appearing in the title, abstract or keywords. As the focus was on business and management literature, the search was restricted by using the International Standard Serial Number to select papers published in 1582 journals listed in the *ABS Academic Journal Guide 2018*. These are the main journals in which business and management academics publish their research, and their quality is assured to meet at least normal scholarly standards. It was noted that the Scopus databasecovered 94% of all the journals, and 100 specific journals were not listed in the database. As a result, bibliographical metadata such as author information, citation information, abstracts and keywords of 57,078 papers that met the criteria was retrieved from the database in November 2020. The retrieved data were then reduced to 56,960 papers after cleaning up any incomplete and irrelevant parts of the data. The earliest paper was published in 1960, and the latest was published in 2021.

3.2 | Step 2: Network construction

Using the retrieved dataset, we conducted a direct citation network analysis (Lewis-Beck et al., 2004). A direct citation network simply consists of nodes and links, whereby each paper is represented as a node and its citations as links. This step can exclude irrelevant papers that receive no citations or do not cite any other papers, as suggested by a previous study (Kajikawa et al., 2007). Thus, the number of papers in the data was narrowed down to 25,737 papers, accounting for 45% of the total papers in the dataset. This number is considered acceptable as it is consistent with previous papers' findings (Asatani et al., 2020; Fahimnia et al., 2015; Kajikawa et al., 2014).

After constructing the dataset, the Bibilometrix package in R Studio was adopted to perform initial statistical analysis (Aria & Cuccurullo, 2017). This package is an open-source code published on the official Comprehensive R Archive Network and on GitHub. Its simple statistical commands were used to identify the overall trends of publications and influential authors, affiliations and journals.

3.3 | Step 3: Cluster analysis

To identify the research streams, we used the Louvain algorithm to group papers into clusters. This algorithm determines the best cluster set based on the maximised value of the modularity (Blondel et al., 2008). As a result, each paper was assigned to a different cluster according to its closeness within the citation network, whereby papers within the same cluster are well connected, implying that they have the same research focus. Next, each cluster was visualised using a large graph layout method, whereby intra-cluster links are illustrated with the same colour so that each cluster's structure and location can be easily identified (Kajikawa et al., 2014). A cluster with a dense and round structure represents the strong tendency of papers to cite each other within the same cluster, while a cluster with a dispersed and spiky structure represents the strong tendency of that cluster to link closely to clusters located nearby (Kajikawa et al., 2007).

3.4 | Step 4: Text analysis

Due to the high volume of papers in each cluster, we also used text mining techniques to analyse the actual words written by the authors in the title and abstract of each paper, aiming for an objectively content-driven literature review (Biesenthal & Wilden, 2014). We used the natural language processing included in NLTK WordNet Lemmatizer and Python inflection library to extract, lemmatise and singularise terms from each paper (Loper & Bird, 2002). Next, a term-rating technique called TF-IDF value was adopted to rank the significant terms of each cluster. This can be calculated by multiplying the term frequency (TF) by the inverse document frequency (IDF) (Aizawa, 2003). Terms with high TF-IDF value are important terms with common uniqueness among the papers in the same cluster.

Similarly, we calculated the TF-IDF for terms that appeared in 17 SDGs. Our intention was to assess the linguistic similarity between each cluster and each SDG by calculating the cosine similarity of the TF-IDF vectors between these two (Asatani et al., 2020). A high score of linguistic similarity shows the strong connections between the particular cluster and the goal.

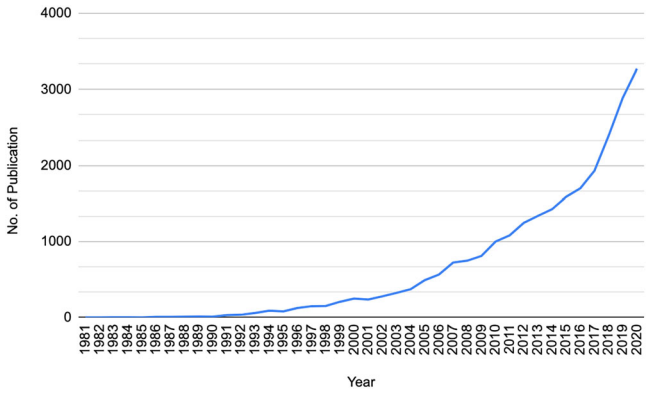

FIGURE 2 Yearly publication trends.

4 | RESULTS

Among the downloaded papers, 45% of them cite each other at least once, constructing a direct citation network of 25,737 nodes and 79,162 links. Figure 2 shows the publishing trend from 1981 to 2020. This is consistent with the conclusion of a previous study that the sustainability concept started to emerge in the 1980s (Holden et al., 2014). The past decade has seen a dramatic increase from 1082 papers per year in 2011, to a peak at 3272 papers per year in 2020. The majority of research has been published in the past decade, with 18,865 papers published, accounting for 74% of all published papers. This exponential growth means that sustainability is gaining increasing attention in the business and management literature, and this trend is expected to continue.

4.1 | Research streams in sustainability research

Louvain clustering of the citation network reveals 23 clusters, each cluster containing more than 100 papers. These clusters account for 98% of all papers in the citation network. Based on the number of publications, these research streams can be divided into clusters by size: three large (>3000 papers), five medium-size (>1000 papers), seven small (<1000 papers) and eight micro-size (<500 papers). The three large research streams are Cluster #1 Corporate social responsibility, Cluster #2 Operations & supply chain and Cluster #3 Tourism, accounting for 42% of all papers. The five medium-size research streams account for 30% of the papers and are Cluster #4 Transition, Cluster #5 Consumption, Cluster #6 Economic, Cluster #7 Project management and Cluster #8 Entrepreneurship. The seven small research streams account for 18% of papers and are Cluster #9 Industrial ecology, Cluster #10 Competitive advantage, Cluster #11 Natural resource, Cluster #12 Transportation, Cluster #13 Governance, Cluster #14 Education and Cluster #15 Human resource management. Finally, the eight micro-size research streams together account for only 7% of the papers and are Cluster #16 Information management, Cluster #17 Microfinance, Cluster #18 Fiscal policy, Cluster #19 Smart city, Cluster #20 System thinking, Cluster #21 Machining, Cluster #22 Lean Six Sigma and Cluster #23 Sport.

The information on each cluster, such as influential journals, key papers and top keywords, is reported in Appendix A. In addition, the visualised version of the citation network, known as the academic landscape (Kajikawa et al., 2007), is reported in Appendix B. The results show that the concepts of sustainability across research streams are inconsistent in two dimensions: definition coverage and level of analysis.

4.1.1 | Definition coverage

In the business and management literature, the definition coverage of sustainability varies across clusters. Some clusters reflect on capitalism while focusing narrowly on the traditional financial aspect. For example, Cluster #6 discusses the sustainability of countries from economic disciplines, as the significant terms are 'economic', 'growth' and 'economic growth'. Some papers study the Genuine Saving rate, which is a crucial indicator measuring a country's sustainable economic development, such as Hamilton and Hartwick (2014) and Hanley et al. (2015). Another example is Cluster #17 Microfinance, in which some papers specifically look at the sustainability of microfinance institutions in terms of long-term financial performance (Hartarska & Nadolnyak, 2007; Hermes & Lensink, 2011). Cluster #10, which has 'advantage', 'competitive' and 'competitive advantage' as notable terms, focuses on how firms can sustain their competitive advantage by viewing the firm as a bundle of resources and capabilities (Amit & Schoemaker, 1993). A key paper by Teece (2007) is a well-known influential paper in the strategy literature; it proposes the concept of dynamic capabilities, building on an assumption that 'excellence in these orchestration capacities undergirds an enterprise's capacity to successfully innovate and capture sufficient value to deliver superior long-term financial performance'. It appears, then, that these clusters are not necessarily related to sustainable development.

Some clusters focus on a broader definition referring to the triple bottom line framework coined by Elkington (1997), which adds another two dimensions: social and environmental. The most discussed dimension is environmental, with the term 'environmental' mentioned across 12 clusters. Other related terms include 'energy' and 'water', which appear in 11 and 7 clusters, respectively. Some clusters use the specific term 'green' to refer to environmental sustainability, such as green supply chain in Cluster #2 (P. Rao & Holt, 2005), green consumption in Cluster #5 (Gleim et al., 2013; White et al., 2019), green human resource management in Cluster #15 (Ren et al., 2018) and green information technology in Cluster #16 (Jenkin et al., 2011). It is also common to use the terms 'environmental', 'social' and 'financial' in front of the term 'sustainability' to avoid any confusion.

Some clusters broadly refer to sustainability as sustainable development, which is defined widely among international organisations as development that 'meets the needs of the present without

compromising the ability of future generations to meet their own needs' (Brundtland, 1987). For example, Cluster #3 Tourism includes the key terms 'tourism', 'tourist', 'sustainable tourism' and 'ecotourism', and as Ruhanen et al. (2015) explain, sustainable tourism emerged as a research stream following the ideology of sustainable development. A key paper by Sharpley (2000) compared the concepts of sustainable tourism and sustainable development, finding that some principles of sustainable development cannot be used in the context of tourism. Another example is Cluster #14 Education, with key terms 'education for sustainable development', 'higher education' and 'university'. This cluster mainly studies educational organisations such as higher education institutions and business schools, and their contribution towards sustainable development. The discussions in key papers range from the adoption of sustainable development in the curriculum at Cardiff University (Lozano, 2010), to the development of fundamental competencies for sustainable development in university instruction and learning (Rieckmann, 2012) and to a review of sustainable research conducted within the university context (Waas et al., 2010).

4.1.2 | Level of analysis

The level of analysis also varies across clusters, ranging from micro level, firm level and macro level. At the micro level, Cluster #5 often discusses sustainability from consumers' perspectives, as the top terms include 'consumer', 'consumption' and 'sustainable consumption'. Papers in this cluster focus on customers at the individual level together with their consumption and behaviours. A notable paper by Sheth et al. (2011) highlights the lack of customer involvement and proposes the concept of mindful consumption, defined as 'behaviourally tempering the self-defeating excesses associated with acquisitive, repetitive and aspirational consumption'. Other key papers examine the relationship between customers' preferences and product sustainability (Luchs et al., 2010) and the psychological factors influencing pro-environmental behaviours (White et al., 2019).

Firm-level analysis is studied in Cluster #1. Key terms directly relate to the context, such as 'CSR' (standing for corporate social responsibility), 'responsibility', 'corporate social', 'social responsibility' and 'corporate sustainability'. A key paper by Bansal (2005) builds on the concepts of the resource-based view and institutional theory, finding the positive influence of related factors such as international experience, media pressure and mimicry on corporate sustainable development.

Several clusters study sustainability at macro levels, focusing on industry, country and ecology. Cluster #9 is about industrial ecology as the key terms are 'industrial', 'industrial ecology' and 'ecology'. For example, Ehrenfeld and Gertler (1997) applied the concept of physical exchanges (e.g., materials, waste and by-products) between closely located firms in the industrial ecology to analyse an industrial ecosystem in Denmark. Chertow (2007) studied the same phenomenon and emphasises the need for symbiotic exchanges in the industrial ecosystem. Cluster #19 includes the key terms 'smart', 'smart city' and 'city'. Ismagilova et al. (2019) discuss various aspects of a smart city, such as architecture, living and citizens, aligning towards the SDGs. Lim et al. (2019) review papers related to smart city development, finding 12 positive and four negative consequences.

Some clusters have called for a multi-level approach. Cluster #4 Transition consists of 1935 papers with 3692 within-cluster links. Directly related key terms are 'transition', 'change' and 'sustainability transition'. Rotmans et al. (2001) state that transition management is based on 'a more process-orientated philosophy that balances coherence with uncertainty and complexity' with key features such as 'long-term thinking (at least 25 years) as a framework for shaping short-term policy' and 'thinking in terms of more than one domain (multi-domain) and different actors (multi-actor) at different scale levels (multi-level)'. Also, Cluster #20 is related to System thinking, with related significant terms including 'system', 'system thinking' and 'thinking'. The papers in this cluster commonly view sustainability as being very complex and multi-dimensional. Many key papers use the concept of system thinking to tackle this challenge systematically (Bosch et al., 2007; Nguyen & Bosch, 2013).

The changing proportion of each cluster's papers in each year is shown in Figure 3. In the early years, Cluster #3 Tourism was at the top, followed by Cluster #10 Competitive advantage and Cluster #6 Economics. All of these three mainstream clusters have been declining, particularly Clusters #10 and #6. Although Cluster #3 Tourism is still in the top three in recent years, it has been outperformed by Cluster #1 Corporate social responsibility and Cluster #2 Operations & supply chain since 2012. Upward trends are also observed in Cluster #5 Consumption and Cluster #8 Entrepreneurship.

4.2 | Interdisciplinary nature of sustainability research

Sustainability research has been contributed by all 22 academic disciplines within the business and management literature according to the *ABS Academic Journal Guide*, as shown in Table 3. The top seven academic disciplines are considered to be the main academic disciplines because they contain almost 80% of the whole literature. The academic discipline with the highest number of papers is Sector Studies (SECTOR STUDIES), with 8527 papers, accounting for 33% of all sustainability papers. A further six academic disciplines, containing more than 1000 papers, are Regional Studies, Planning and Environment (REGIONAL STUDIES); Operations and Technology Management (OPS & TECH); Economics, Econometrics and Statistics (ECONOMICS); General Management, Ethics, Gender and Social Responsibility (GENERAL MAN); Social Sciences (SOCIAL SCIENCES); and Marketing (MARKETING). We find that Strategy (STRATEGY) is not a main academic discipline, having a ranking of 17 out of the 22 with 305 papers published in STRATEGY journals. The four academic disciplines with the lowest numbers of papers are Human Resource Management and Employment Studies (HRM) with 154 papers, Psychology (General) (PSYCHOLOGY [GEN]) with 124 papers, Psychology (Organisational) (PSYCHOLOGY [OB]) with

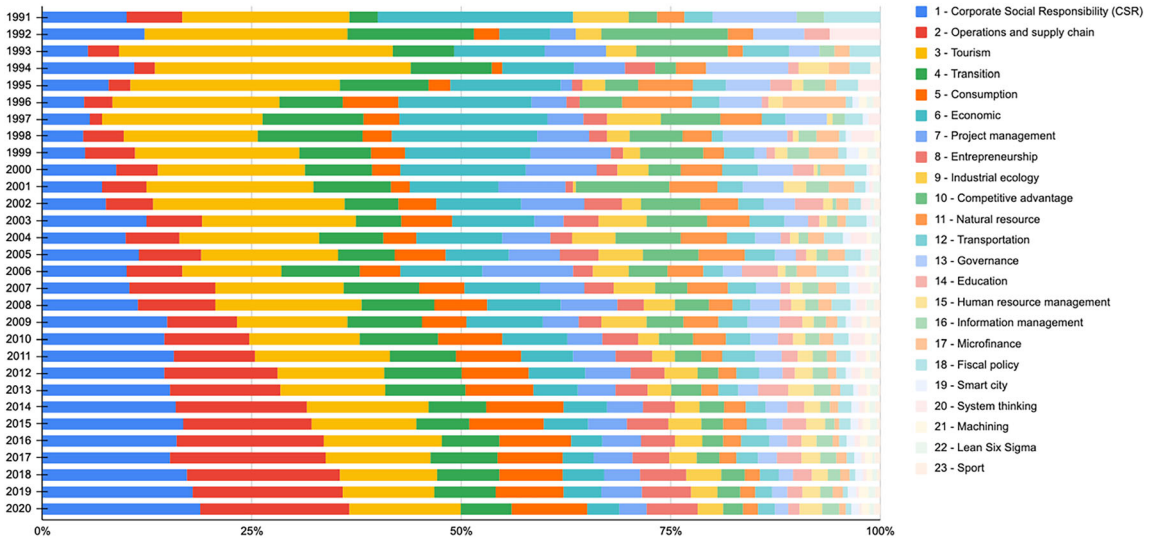

FIGURE 3 Proportion of clusters' papers from 1991 to 2020.

TABLE 3 Contributions by 22 academic disciplines.

Academic discipline	Abbreviation	No. of papers	%	Accumulated %
Sector studies	SECTOR STUDIES	8527	33.13	33.13
Regional studies, planning and environment	REGIONAL STUDIES	3360	13.06	46.19
Operations and technology management	OPS & TECH	2472	9.60	55.79
Economics, econometrics and statistics	ECONOMICS	2290	8.90	64.69
General management, ethics, gender and social responsibility	GENERAL MAN	1639	6.37	71.06
Social sciences	SOCIAL SCIENCES	1246	4.84	75.90
Marketing	MARKETING	1020	3.96	79.86
Accounting	ACCOUNTING	693	2.69	82.55
Operations research and management science	OR & MANSCI	670	2.60	85.16
Information management	INFO MAN	550	2.14	87.29
Innovation	INNOVATION	454	1.76	89.06
Entrepreneurship and small business management	ENTREPRENEURSHIP	423	1.64	90.70
Organisational studies	ORG STUDIES	389	1.51	92.21
International business and area studies	IB & AREA	384	1.49	93.71
Public sector and health care	PUBLIC SECTOR	350	1.36	95.07
Finance	FINANCE	348	1.35	96.42
Strategy	STRATEGY	305	1.19	97.60
Management development and education	MDEV & EDU	274	1.06	98.67
Human resource management and employment studies	HRM	154	0.60	99.27
Psychology (general)	PSYCHOLOGY (GEN)	124	0.48	99.75
Psychology (organisational)	PSYCHOLOGY (OB)	48	0.19	99.93
Business and economic history	BUS HIST	17	0.07	100.00

48 papers and Business and Economic History (BUS HIST) with 17 papers. Papers contained in each of these academic disciplines account for less than 1% of all sustainability-related papers.

The interdisciplinary aspect of sustainability research varies across research streams (Figure 4). On the one hand, some research streams such as Cluster #1 Corporate social responsibility and Cluster #2 Operations & supply chain have been studied across various academic disciplines. On the other hand, some research streams are still being discussed by limited academic disciplines. This finding is consistent with our previous analysis of cluster location within the citation

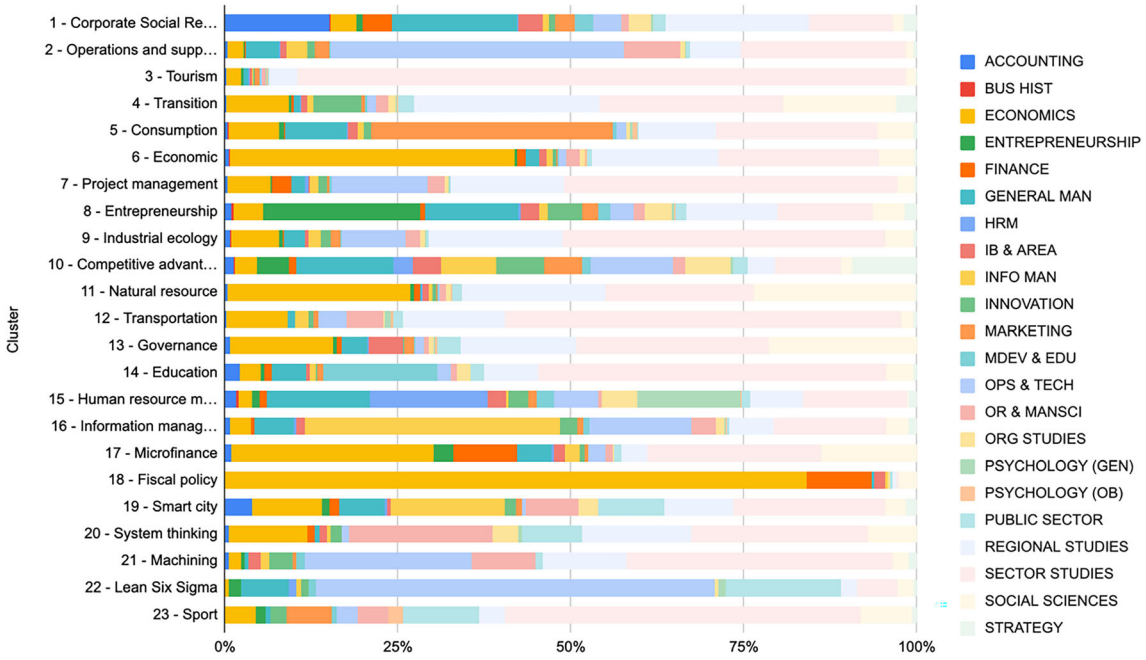

FIGURE 4 Proportion of academic disciplines in each cluster.

network, which found that Cluster #3 Tourism and Cluster #18 Fiscal policy are independent as they have fewer connections to other research streams. In fact, the former is dominated by SECTOR STUDIES, with 88% of papers published in SECTOR STUDIES journals, particularly the *Journal of Sustainable Tourism*. The latter is dominated by 84% of papers published in ECONOMICS journals.

Looking at the top 20 journal list (Table 4), the journal with the greatest number of relevant papers is the *Journal of Cleaner Production*. This journal alone has published 3154 papers, accounting for 12% of all papers. The remaining journals have published fewer than 1000 papers. The second- and third-ranking journals are the *Journal of Sustainable Tourism* with 887 papers and *Ecological Economics* with 833 papers, respectively. The journal *Business Strategy and the Environment* comes in fourth place, with 659 papers. According to the *ABS Academic Journal Guide* ranking, no journal among these top 20 has a 4* rating. The only journal with a rating of 4 is *Tourism Management*, while most of the top journals are rated 3 and 2 (nine and eight journals, respectively). Two journals have a rating of 1: *Corporate Social Responsibility and Environmental Management* and *Management of Environmental Quality*.

The level of interdisciplinarity among journals varies across research streams. Some journals have a relatively high level of interdisciplinarity and contribute to multiple research streams. For instance, the *Journal of Cleaner Production*, which is ranked as the top contributing journal overall, also ranks among the top 10 contributing journals for almost all research streams. Similarly, *Business Strategy and the Environment* is a top 10 contributing journal for several research streams, including Cluster #1 Corporate social responsibility, Cluster #2 Operations & supply chain, Cluster #5 Consumption, Cluster #8 Entrepreneurship and Cluster #9 Industrial ecology. However, some journals have a lower level of interdisciplinarity and contribute to only a limited number of research streams. Although the *Journal of Sustainable Tourism* is ranked as the second top contributing journal overall, it mainly contributes to only one research stream: Cluster #3 Tourism. Similarly, the *International Journal of Production Economics* mainly contributes to Cluster #2 Operations & supply chain.

4.3 | Links between sustainability research and the SDGs

Using linguistic similarity analysis, we explored the connections between each research stream and each SDG (Figure 5). We find that Goal #9 Industry, Innovation & Infrastructure; Goal #10 Reduced Inequality; Goal #12 Responsible Consumption & Production and Goal #13 Climate Action receive high attention from many research streams. In contrast, Goal #3 Good Health and Well-being, Goal #14 Life Below Water and Goal #15 Life on Land receive the least attention among all 17 goals. It also should be noted that Cluster #3 Tourism seems to have the highest coverage of all SDGs compared with other research streams. This finding is inconsistent with the analysis by Mio et al. (2020), which looked at papers that only explicitly mentioned SDGs, finding that Goals #1, #4, #15 and #16 were absent from business and management literature. Thus, we argue that business and management research contributes to all SDGs but to varying degrees across research streams.

TABLE 4 Top 20 contributing journals.

Journal	ABS ranking	Total no. of papers	No. of papers in each cluster																					
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Journal of Cleaner Production	2	3,154	338	711	86	226	209	178	259	104	349	35	30	48	57	230	38	38	15	0	20	18	64	8	6
Journal of Sustainable Tourism	3	887	3	0	859	4	3	5	0	1	0	0	0	0	3	1	3	0	0	0	0	0	0	0	1
Ecological Economics	3	833	27	30	27	100	50	350	32	12	33	0	68	9	42	4	3	5	6	0	8	11	1	0	5
Business Strategy and the Environment	3	659	377	89	9	5	59	2	5	76	16	1	0	0	3	5	9	2	0	0	0	0	0	0	0
Energy policy	2	574	18	11	5	154	26	74	30	7	14	6	4	41	47	1	3	11	60	0	7	21	1	1	1
Journal of Business Ethics	3	546	310	49	4	4	61	7	1	42	2	8	1	0	8	10	27	4	2	0	4	0	0	1	0
Corporate Social Responsibility and Environmental Management	1	447	326	25	7	3	14	5	3	34	2	3	0	1	0	1	19	2	0	0	0	0	0	1	0
Journal of Industrial Ecology	2	371	2	41	0	60	22	90	13	5	91	3	0	8	4	13	1	8	2	0	0	1	3	1	0
International Journal of Production Economics	3	283	7	241	2	2	4	0	3	0	6	4	0	0	0	0	2	4	0	0	0	0	2	2	0
International Journal of Production Research	3	274	3	214	0	0	0	1	0	2	15	6	0	2	0	0	1	4	0	0	0	0	12	5	0
Journal of Environmental Management	3	270	20	22	31	23	13	46	11	4	17	5	29	5	10	3	3	2	1	0	3	8	4	1	0
Technological Forecasting and Social Change	3	265	9	24	2	138	13	9	9	17	5	6	2	2	1	4	1	6	5	0	1	0	3	2	0
Tourism Management	4	244	4	0	222	2	1	2	0	2	0	4	1	0	0	0	0	3	0	0	1	0	0	0	0
World Development	3	231	4	1	8	14	5	21	5	8	3	1	81	2	30	0	0	4	26	3	3	7	0	0	0
Management of Environmental Quality	1	199	33	55	7	6	10	11	17	5	9	3	8	19	9	2	1	2	0	0	0	0	1	0	0
Marine Policy	2	191	3	5	29	13	34	18	2	6	1	2	56	0	13	1	0	0	0	0	1	1	1	0	0

(Continues)

TABLE 4 (Continued)

Journal	ABS ranking	Total no. of papers	No. of papers in each cluster																				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Geoforum	2	191	9	0	11	22	27	6	12	3	10	0	23	2	43	3	0	0	5	0	1	1	0	0	0
Cities	2	185	2	0	15	70	2	22	15	3	3	1	6	21	1	0	1	1	0	0	6	0	13	0	0
Environmental Management	2	169	12	2	27	13	5	19	5	7	4	0	34	1	11	4	0	1	0	0	1	3	0	0	0
Futures	2	166	13	2	11	65	8	13	2	4	8	0	4	2	12	8	0	2	1	1	1	1	0	0	4

5 | DISCUSSION

We use our results to identify four potential evidence-based research directions towards a more interdisciplinary research agenda.

5.1 | Consulting literature across disciplines and boundaries

This paper is the first bibliometric review to provide a holistic overview of sustainability in business and management literature. While a previous study by Hallinger (2020) constructed a dataset from existing bibliometric reviews in only seven disciplines—entrepreneurship, human resource management, innovation, knowledge management, leadership, strategy and supply chain management—our paper uses a more overarching dataset to cover all 22 research disciplines. As a result, we are able to identify at least 23 research streams. Schaltegger et al. (2013) point out that sustainability researchers usually collaborate within academic disciplines, often called intellectual silos. This can limit their perspective on sustainability challenges that require interdisciplinary approaches. Our paper provides empirical evidence that sustainability research is now more collaborative across intellectual silos.

Our findings also highlight the importance of reviewing papers across academic disciplines and not limiting them to just a few. Hallinger (2020) find that sustainability is rarely studied in human resource management literature, with a low number of published papers. However, we find that Cluster #15 Human resource management contains over 500 papers. These are published not only in HRM journals but also in GENERAL MAN, PSYCHOLOGY (GEN) and SECTOR STUDIES journals. Similarly, Cluster #10 Competitive advantage includes papers from not only STRATEGY but also GENERAL MAN, OPS & TECH and SECTOR STUDIES journals.

5.2 | Consolidating the sustainability research landscape by connecting independent research streams

We find that the identified 23 research streams differ noticeably with regard to their level of development and their connection with other research streams and academic disciplines. Isolated and independent research streams should be considered to consolidate the sustainability research landscape whenever theoretically or logically appropriate. For example, Cluster #3 Tourism is a top three research stream with a dense and complex intra-connected network. However, it locates relatively far away and has less overlap with the other two top research streams, namely Cluster #1 Corporate social responsibility and Cluster #2 Operations & Supply Chain. Furthermore, 88% of the papers belonging to this cluster are dominated by SECTOR STUDIES. This suggests the high independency of Cluster #3's research stream. The gap between Cluster #3 and the two above-mentioned clusters can be viewed as an existing research gap, suggesting the need for more

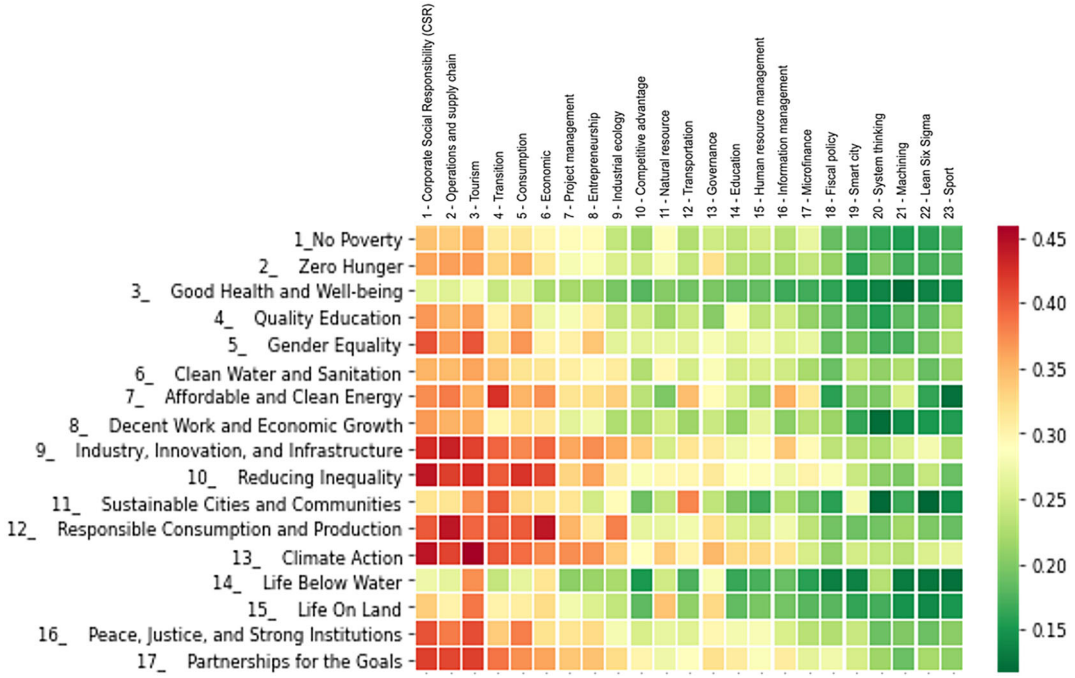

FIGURE 5 Linguistic similarity analysis between research streams and SDGs.

collaboration in the future connecting tourism literature with corporate social responsibility or operations and supply chain or both.

Cluster #10 Competitive advantage is located between Cluster #1 and #2. Cluster #10 can be seen as an important research stream connecting the literature between corporate social responsibility and operations & supply chain. For example, Agrawal et al. (2022) identify several strategies, including corporate social responsibility strategy, to achieve SDGs in the supply chain and suggest several phenomena that could link both research streams, such as sustainable procurement, waste management and reverse logistics. De Angelis et al. (2023) suggest studying the circular economy, which requires traceability and transparency along supply chains, through the lens of open strategy and dynamic capabilities.

5.3 | Exploring novel research by combining literature from different research streams

Our analysis of sub-clusters highlights possible research collaboration among fast-growing research streams. For example, Table 5 shows sub-clusters within Cluster #1 Corporate social responsibility and Cluster #2 Operations & supply chain. The former has 12 sub-clusters, of which the top 3 fast-growing topics are C1–6 Board & committee, C1–12 Emerging industries and C1–2 Assurance. The latter contains nine sub-clusters, with the top 3 fast-growing ones being C2–9 X-network, C2–3 Supply Chain Collaboration and C2–5 Supplier Selection. On the one hand, papers in C1–2 mainly discuss the assurance of sustainability reports and practices, pointing out problems of transparency, consistency and quality (Maroun, 2020; Pizzi, Rosati, & Venturelli, 2020). On the other hand, papers in C2–9 discuss using digital technologies to build a sustainable supply chain with more agility and resilience (Dolgui et al., 2020; Ivanov, 2020). In fact, blockchain technologies are expected to increase the transparency and traceability of sustainability practices at individual, organisational and supply chain levels. Thus, future research can, combine both literature

TABLE 5 Sub-clusters within Cluster #1 Corporate social responsibility and Cluster #2 Operations & supply chain.

Cluster #1 (Average publication year)	Cluster #2 (Average publication year)
C1–1 Stakeholder (2014.9)	C2–1 Metric (2015.8)
C1–2 Assurance (2015.3)	C2–2 Manufacturing (2014.6)
C1–3 Firm performance (2015.2)	C2–3 Supply chain collaboration (2016.2)
C1–4 Reporting (2014.1)	C2–4 Theory building (2015.3)
C1–5 Finance (2015.2)	C2–5 Supplier selection (2016.2)
C1–6 Board & committee (2016.3)	C2–6 Remanufacturing (2016)
C1–7 Measurement (2013.1)	C2–7 Green supply chain (2015.3)
C1–8 Multinational (2015.2)	C2–8 Procurement (2014.1)
C1–9 Mining (2013)	C2–9 X-network (2016.6)
C1–10 Higher education (2013.3)	
C1–11 Developing countries (2015.3)	
C1–12 Emerging industries (2016)	

streams, exploring the impact of blockchains on sustainability reports and practices in terms of transparency, consistency and quality.

Interdisciplinary journals have the potential to facilitate the integration of research across different streams. For example, mainstream STRATEGY journals such as *Strategic Management Journal*, *Long Range Planning* and *Technology Analysis and Strategic Management* primarily contribute to three research streams: Cluster #1 Corporate social responsibility, Cluster #4 Transition and Cluster #10 Competitive advantage. However, by including citations from related interdisciplinary journals such as *Business Strategy and the Environment*, the scope of their contributions could be extended to other research streams. One example is the topic of supply chain strategies for SDGs (e.g., Agrawal et al., 2022), which is also closely related to Cluster #2 Operations & supply chain. Another example is the topic of social entrepreneurship and its open innovation strategy (e.g., Camilleri et al., 2023), which is also linked to Cluster #8 Entrepreneurship.

5.4 | Increasing attention to SDGs with sparse research

Our findings reveal that several SDGs, such as Goals #3, #14 and #15, have been neglected by business and management researchers. However, this does not apply to every research stream. Only relevant research streams should respond to these SDGs when applicable.

One solution is to look at the literature in existing research streams and then consider possible applications. As Cluster #3 Tourism has contributed the most to Goal #3, we can find some examples from this cluster. Coghlan (2015), in Cluster #3, incorporates positive psychology principles to simultaneously contribute to both tourist well-being and community development. Thus, the concept of positive psychology could be applied to other relevant clusters such as Cluster #5 Consumption, Cluster #8 Entrepreneurship and Cluster #15 Human resource management.

Although Cluster #15 Human resource management mostly analyses individual employees as a unit of analysis, it is surprisingly labelled with low text similarity to Goal #3. In fact, the most common research context lies in ergonomics, leadership and career, as shown in our TF-IDF results. The closest link to Goal #3 is ergonomics, but its attention is currently focused more on productivity and safety. Future research should either extend the existing theory to cover good health and well-being or borrow from outside literature such as positive psychology and happiness economics.

6 | CONCLUSION

We find that the vast and complicated field of sustainability research has grown exponentially and has become increasingly diverse in 23 research streams with varying degrees of interdisciplinarity and connections to the SDGs. Our findings highlight four research directions that business and management scholars can take towards a more interdisciplinary research agenda in sustainability: (1) consulting literature across disciplines and boundaries, (2) consolidating the sustainability research landscape by connecting independent research streams, (3) exploring novel research by combining literature from different research streams and (4) paying more attention to SDGs with sparse research.

This paper has both theoretical and practical contributions. It contributes theoretically in three main ways. First, by building on previous literature reviews of the 'trees', it provides a methodology to look at the 'forest' of the sustainability research. Second, it incorporates interdisciplinary perspectives, for example analysing the interaction between all 22 academic disciplines and exploring the links between sustainability research and the 17 SDGs. Third, it proposes several novel methodologies for investigating large datasets of literature, such as citation-based clustering analysis and text similarity analysis. This methodology allowed us to identify papers that even implicitly contributed to SDGs, therefore building on earlier efforts that focused solely on explicit contributions (e.g., Mio et al., 2020).

Practically, researchers and practitioners can benefit from the results and insights in this paper in several ways. For example, young scholars will be able to identify which journals or key papers to read to get a basic understanding of their own research streams. Senior scholars from isolated research streams can use our findings as a platform to conduct interdisciplinary research. Journal editors and related stakeholders may propose plans to encourage more research on SDGs that have historically received less attention. In terms of policy implications, our findings highlight the potential benefit of involving business and management scholars in policymaker strategic groups (Pizzi, Caputo, et al., 2020). To further enhance this approach, policymakers could also use the insights from this paper to identify potential scholars from relevant academic disciplines who can contribute to policy development related to each SDG.

This paper is not without limitations. First, the target journals are journals ranked by the *ABS Academic Journal Guide*. These journals were selected due to their ensured paper quality. However, there are undoubtedly papers from other journals of similar quality that are not included in the analysis. Second, our citation network analysis relies on direct citation, with the assumption that a paper directly cites another paper because of their similarity. Other techniques such as keyword co-occurrence network analysis can also be used in combination to compare the similarities and differences between findings (Ciano et al., 2019). Finally, this paper aims to provide quantitative and objective views of sustainability literature, but the interpretation of the results is subject to the researchers' prior knowledge and experiences. However, these limitations provide new opportunities for future research to continue to explore the rapidly expanding field of sustainability research in business and management.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest concerning this publication.

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APPENDIX A: TWENTY-THREE CLUSTERS AND THEIR INFORMATION

Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
#1	2014.7	3,821	12,152	Business Strategy and the Environment (377)	Svensson G. (38)	Evolving sustainably: A longitudinal study of corporate sustainable development (Strategic Management Journal)	Corporate
				Journal of Cleaner Production (338)	Schaltegger S. (29)	What we know and do not know about corporate social responsibility: A review and research agenda (Journal of Management)	Reporting
				Corporate Social Responsibility and Environmental Management (326)	Searcy C. (26)	W(h)ither ecology? The triple bottom line, the global reporting initiative, and corporate sustainability reporting (Journal of Business Ethics)	Csr
				Journal of Business Ethics (310)	Martínez-Ferrero J. (19)	The impact of corporate sustainability on organizational processes and performance (Management Science)	Disclosure
				Sustainability Accounting, Management and Policy Journal (83)	García-Sánchez I.-M. (18)	The business case for corporate sustainability: Literature review and research options (European Management Journal)	Company
				Accounting, Auditing and Accountability Journal (82)	Kolk A. (18)	Determinants of the adoption of sustainability assurance statements: An international investigation (Business Strategy and the Environment)	Performance
				Resources Policy (51)	Boiral O. (17)	Corporate social responsibility and access to finance (Strategic Management Journal)	Firm
				Organization and Environment (47)	Figge F. (16)	Multinationals' accountability on sustainability: The evolution of third-party assurance of sustainability reports (Journal of Business Ethics)	Business
				Corporate governance (Bingley) (42)	Bebbington J. (15)	Editorial trade-offs in corporate sustainability: You can't have your cake and eat it (Business Strategy and the Environment)	Stakeholder
				Journal of Sustainable Finance and Investment (41)	Pinkse J. (15)	Tensions in corporate sustainability: Towards an integrative framework (Journal of Business Ethics)	Responsibility

Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
#2	2015.4	3,571	16,192	Journal of Cleaner Production (711)	Sarkis J. (72)	From a literature review to a conceptual framework for sustainable supply chain management (Journal of Cleaner Production)	Chain
				International Journal of Production Economics (241)	Govindan K. (50)	Building a more complete theory of sustainable supply chain management using case studies of 10 exemplars (Journal of Supply Chain Management)	Supply chain
				International Journal of Production Research (214)	Gunasekaran A. (48)	Environmental management and manufacturing performance: The role of collaboration in the supply chain (International Journal of Production Economics)	Supply
				Supply Chain Management (92)	Seuring S. (39)	Sustainable operations management (Production and Operations Management)	Supplier
				Business Strategy and the Environment (89)	Luthra S. (29)	A literature review and a case study of sustainable supply chains with a focus on metrics (International Journal of Production Economics)	Performance
				International Journal of Operations and Production Management (82)	Mangla S.K. (27)	Sustainable supply chains: An introduction (Journal of Operations Management)	Chain management
				Production Planning and Control (80)	Tseng M.-L. (23)	A framework of sustainable supply chain management: Moving toward new theory (International Journal of Physical Distribution and Logistics Management)	Green
				European Journal of Operational Research (80)	Jabbour C.J.C. (23)	Quantitative models for sustainable supply chain management: Developments and directions (European Journal of Operational Research)	Manufacturing
				Annals of Operations Research (68)	Zhu Q. (22)	A review of modeling approaches for sustainable supply chain management (Decision Support Systems)	Management
				Benchmarking (64)	Dubey R. (21)	Do green supply chains lead to competitiveness and economic performance? (International Journal of Operations and Production Management)	Product
#3	2012.6	3,451	11,387	Journal of Sustainable Tourism (859)	Font X. (37)	Sustainable tourism: Research and reality (Annals of Tourism Research)	Tourism
				Tourism Management (222)	Hall C.M. (31)		Destination

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Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
						Tourism and sustainable development: Exploring the theoretical divide (Journal of Sustainable Tourism)	
				Current Issues in Tourism (143)	Bramwell B. (31)	Sustainable tourism development: A critique (Journal of Sustainable Tourism)	Tourist
				Annals of Tourism Research (111)	Gössling S. (30)	Sustainable tourism: An evolving global approach (Journal of Sustainable Tourism)	Sustainable tourism
				Tourism Geographies (110)	Lane B. (25)	Traditions of sustainability in tourism studies (annals of tourism research)	Ecotourism
				Tourism Recreation Research (105)	Becken S. (22)	Sustainable tourism as an adaptive paradigm (annals of tourism research)	Tourism development
				Journal of Ecotourism (92)	Ruhanen L. (22)	Sustainable tourism: A state-of-the-art review [Le tourisme durable: Un état de la question] (tourism geographies)	Community
				Journal of Cleaner Production (86)	Dolnicar S. (22)	Public understanding of sustainable tourism (annals of tourism research)	Hotel
				Asia Pacific Journal of Tourism Research (78)	Boley B.B. (21)	Sustainable tourism research: An analysis of papers published in the journal of sustainable tourism (journal of sustainable tourism)	Heritage
				Worldwide Hospitality and Tourism Themes (78)	Han H. (20)	Sustainability indicators for managing community tourism (tourism management)	Visitor
#4	2013.1	1,935	3,692	Journal of Cleaner Production (226)	Raven R. (16)	More evolution than revolution: Transition management in public policy (Foresight)	Urban
				Energy Policy (154)	Hekkert M.P. (15)	Sustainability transitions: An emerging field of research and its prospects (Research Policy)	Energy
				Technological Forecasting and Social Change (138)	Truffer B. (15)	Regime shifts to sustainability through processes of niche formation: The approach of strategic niche management (Technology Analysis and Strategic Management)	Innovation
				Ecological Economics (100)	Smith A. (15)	The governance of sustainable socio-technical transitions (Research Policy)	Transition
				Urban Studies (77)	Geels F.W. (14)	Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges (Research Policy)	City

Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
				Cities (70)	Frantzeskaki N. (12)	Redefining innovation—Eco-innovation research and the contribution from ecological economics (Ecological Economics)	Policy
				Futures (65)	Wiek A. (12)	What is protective space? Reconsidering niches in transitions to sustainability (Research Policy)	Technology
				Journal of Industrial Ecology (60)	Seyfang G. (11)	Ontologies, socio-technical transitions (to sustainability), and the multi-level perspective (Research Policy)	System
				Research Policy (57)	Loorbach D. (11)	Toward a spatial perspective on sustainability transitions (Research Policy)	Water
				European Planning Studies (53)	Kern F. (10)	Functions of innovation systems: A new approach for analysing technological change (Technological Forecasting and Social Change)	Change
#5	2014.6	1,892	4,315	Journal of Cleaner Production (209)	Prothero A. (12)	Mindful consumption: A customer-centric approach to sustainability (Journal of the Academy of Marketing Science)	Consumer
				International Journal of Consumer Studies (105)	Carrigan M. (11)	The sustainability liability: Potential negative effects of ethicality on product preference (Journal of Marketing)	Food
				Journal of Macromarketing (92)	Jackson T. (9)	Reinventing marketing to manage the environmental imperative (Journal of Marketing)	Consumption
				British Food Journal (65)	Gupta S. (9)	How to SHIFT consumer behaviors to be more sustainable: A literature review and guiding framework (Journal of Marketing)	Marketing
				Journal of Business Ethics (61)	McDonagh P. (9)	Sustainable food consumption among young adults in Belgium: Theory of planned behaviour and the role of confidence and values (Ecological Economics)	Product
				Business Strategy and the Environment (59)	Wang Y. (9)	Addressing sustainability and consumption (Journal of Macromarketing)	Sustainable consumption
				Journal of Business Research (58)	Mont O. (8)	Social marketing: A pathway to consumption reduction? (Journal of Business Research)	Green

(Continues)

Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
				Ecological Economics (50)	Fuentes C. (8)	Sustainability marketing research: Past, present and future (Journal of Marketing Management)	Brand
				Journal of Rural Studies (43)	Luchs M.G. (7)	Against the green: A multi-method examination of the barriers to green consumption (Journal of Retailing)	Organic
				Marine Policy (34)	Verbeke W. (7)	Sustainable consumption and the quality of life: A macromarketing challenge to the dominant social paradigm (Journal of Macromarketing)	Purchase
#6	2010.9	1,539	2,202	Ecological Economics (350)	Schandl H. (19)	Genuine savings rates in developing countries (World Bank Economic Review)	Energy
				Journal of Cleaner Production (178)	Lenzen M. (13)	In defence of degrowth (Ecological Economics)	Growth
				Journal of Industrial Ecology (90)	Krausmann F. (13)	Crisis or opportunity? Economic degrowth for social equity and ecological sustainability. Introduction to this special issue (Journal of Cleaner Production)	Resource
				Energy Policy (74)	Hanley N. (11)	Genuine savings and sustainability (Journal of Economic Surveys)	Economic
				Journal of Environmental Management (46)	Doyen L. (11)	Methodology and indicators of economy-wide material flow accounting: State of the art and reliability across sources (Journal of Industrial Ecology)	Indicator
				Environmental Science and Technology (30)	Asheim G.B. (10)	Capital theory and the measurement of sustainable development: An indicator of "weak" sustainability (Ecological Economics)	Emission
				Environmental and Resource Economics (26)	Hamilton K. (10)	Measuring farm sustainability and explaining differences in sustainable efficiency (Ecological Economics)	Ecological
				Cities (22)	Jackson T. (9)	Economic de-growth vs. steady-state economy (Journal of Cleaner Production)	Environmental
				Resources Policy (21)	Kallis G. (9)	Jevons' paradox (Ecological Economics)	Water
				World Development (21)	Hubacek K. (9)	Human development and economic sustainability (World Development)	Consumption
#7	2012.6	1,215	1,996	Journal of Cleaner Production (259)	Zhang X. (16)	Sustainable construction: Principles and a framework for attainment (Construction Management and Economics)	Construction
				Building Research and Information (116)	Skitmore M. (10)		Building

Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
						Project sustainability strategies: A systematic literature review (International Journal of Project Management)	
				Journal of Construction Engineering and Management (67)	Chan A.P.C. (10)	Sustainability integration in the management of construction projects: A morphological analysis of over two decades' research literature (Journal of Cleaner Production)	Project
				Construction Management and Economics (61)	Chan E.H.W. (10)	Assessing the sustainability performances of industries (Journal of Cleaner Production)	Energy
				International Journal of Construction Management (37)	Xia B. (9)	Project management for social good: A conceptual framework and research agenda for socially sustainable construction project management (International Journal of Managing Projects in Business)	Construction industry
				Journal of Management in Engineering (36)	Lützkendorf T. (8)	Deductive content analysis of research on sustainable construction in India: Current progress and future directions (Journal of Cleaner Production)	Green
				Engineering, Construction and Architectural Management (34)	Tam V.W.Y. (8)	Key factors of sustainability in project management context: A survey exploring the project managers' perspective (International Journal of Project Management)	Design
				Ecological Economics (32)	Li J. (8)	Social sustainability considerations during planning and design: Framework of processes for construction projects (Journal of Construction Engineering and Management)	Green building
				Energy Policy (30)	Darko A. (8)	Sustainable project life cycle management: The need to integrate life cycles in the manufacturing sector (International Journal of Project Management)	Assessment
				Facilities (30)	Cole R.J. (8)	Sustainable construction-the role of environmental assessment tools (Journal of Environmental Management)	Life cycle

(Continues)

Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
#8	2014.9	1,138	2,765	Journal of Cleaner Production (104)	Danes S.M. (10)	Market imperfections, opportunity and sustainable entrepreneurship (Journal of Business Venturing)	Entrepreneurship
				Business Strategy and the Environment (76)	Schaltegger S. (10)	Toward a theory of sustainable entrepreneurship: Reducing environmental degradation through entrepreneurial action (Journal of Business Venturing)	Business
				Journal of Business Ethics (42)	Hansen E.G. (9)	Sustainable entrepreneurship and sustainability innovation: Categories and interactions (Business Strategy and the Environment)	Innovation
				Corporate Social Responsibility and Environmental Management (34)	Muñoz P. (8)	Sustainable development and entrepreneurship: Past contributions and future directions (Journal of Business Venturing)	Entrepreneurial
				Journal of Business Venturing (22)	Cohen B. (8)	Greening Goliaths versus emerging Davids—Theorizing about the role of incumbents and new entrants in sustainable entrepreneurship (Journal of Business Venturing)	Enterprise
				International Journal of Entrepreneurial Behaviour and Research (21)	York J.G. (7)	The new field of sustainable entrepreneurship: Studying entrepreneurial action linking "what is to be sustained" with "what is to be developed" (Entrepreneurship: Theory and Practice)	Social
				Journal of Social Entrepreneurship (19)	Wagner M. (7)	Sustainability-driven entrepreneurship: Principles of organization design (Journal of Business Venturing)	Entrepreneur
				International Journal of Entrepreneurial Venturing (18)	Ndubisi N.O. (7)	The influence of sustainability orientation on entrepreneurial intentions—Investigating the role of business experience (Journal of Business Venturing)	Smes
				Journal of Business Research (18)	Hockerts K. (6)	The entrepreneur-environment nexus: Uncertainty, innovation, and allocation (Journal of Business Venturing)	Social enterprise
				Management Decision (17)	Fichter K. (6)	Escaping the green prison: Entrepreneurship and the creation of opportunities for sustainable	Business model

Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
						development (Journal of Business Venturing)	
#9	2013.3	881	1,436	Journal of Cleaner Production (349)	Huisingh D. (10)	Industrial ecology in practice: The evolution of interdependence at Kalundborg (Journal of Industrial Ecology)	Industrial
				Journal of Industrial Ecology (91)	Wang Y. (9)	Product-services as a research field: Past, present and future. Reflections from a decade of research (Journal of Cleaner Production)	Circular
				Ecological Economics (33)	Zhang Y. (9)	Uncovering industrial symbiosis (Journal of Industrial Ecology)	Eco
				Journal of Environmental Management (17)	Geng Y. (9)	Clarifying the concept of product-service system (Journal of Cleaner Production)	Circular economy
				Business Strategy and the Environment (16)	Evans S. (7)	A strategic design approach to develop sustainable product service systems: Examples taken from the 'environmentally friendly innovation' Italian prize (Journal of Cleaner Production)	Efficiency
				Environmental Science and Technology (16)	Sarkis J. (7)	The circular economy: An interdisciplinary exploration of the concept and application in a global context (Journal of Business Ethics)	Service
				International Journal of Production Research (15)	Zhu Q. (7)	Progress toward a circular economy in China: The drivers (and inhibitors) of eco-industrial initiative (Journal of Industrial Ecology)	Industrial ecology
				Energy Policy (14)	Korhonen J. (6)	A framework for quantified eco-efficiency analysis (Journal of Industrial Ecology)	System
				Geoforum (10)	Huppes G. (6)	Redefining industrial Symbiosis: Crossing academic-practitioner boundaries (Journal of Industrial Ecology)	Ecology
				Management of Environmental Quality: An International Journal (9)	Huang G.H. (6)	Reflections on implementing industrial ecology through eco-industrial park development (Journal of Cleaner Production)	Product
#10	2011.1	858	1,134	Strategic Management Journal (53)	Liu Y. (8)	Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance (Strategic Management Journal)	Advantage

(Continues)

Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
				Journal of Cleaner Production (35)	Mahoney J.T. (5)	Strategic assets and organizational rent (Strategic Management Journal)	Competitive
				Journal of Knowledge Management (29)	Teece D.J. (4)	Information technology as competitive advantage: The role of human, business, and technology resources (Strategic Management Journal)	Competitive advantage
				Journal of Business Research (21)	Pillania R.K. (4)	The strategic analysis of intangible resources (Strategic Management Journal)	Capability
				Management Decision (17)	Corso M. (4)	Sustainable competitive advantage: Combining institutional and resource-based views (Strategic Management Journal)	Firm
				Technovation (14)	Schiuma G. (4)	A framework linking intangible resources and capabiliites to sustainable competitive advantage (Strategic Management Journal)	Knowledge
				Long Range Planning (11)	Zhang Y. (4)	Benchmarking marketing capabilities for sustainable competitive advantage (Journal of Marketing)	Innovation
				International Journal of Technology Management (10)	Mohamed M. (4)	A demand-based perspective on sustainable competitive advantage (Strategic Management Journal)	Resource
				Journal of Intellectual Capital (9)	Giannetti B.F. (4)	Human capital and learning as a source of sustainable competitive advantage (Strategic Management Journal)	Sustainable competitive
				Knowledge Management Research and Practice (9)	Almeida C.M.V.B. (4)	On becoming a strategic partner: The role of human resources in gaining competitive advantage (Human Resource Management)	Sustainable competitive advantage
#11	2011.3	681	773	World Development (81)	Pender J. (11)	Common property institutions and sustainable governance of resources (World Development)	Forest
				Ecological Economics (68)	Shiferaw B. (8)	Capitals and capabilities: A framework for analyzing peasant viability, rural livelihoods and poverty (World Development)	Land
				Marine Policy (56)	Kassie M. (8)	Social and ecological resilience: Are they related? (Progress in Human Geography)	Livelihood

Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
				Environmental Management (34)	Deininger K. (5)	Farmers' adoption of conservation agriculture: A review and synthesis of recent research (Food Policy)	Agricultural
				Environmental Science and Policy (31)	Holden S.T. (5)	Adaptation, adaptive capacity and vulnerability (Global Environmental Change)	Water
				Journal of Cleaner Production (30)	Caviglia-Harris J.L. (4)	Can payments for environmental services help reduce poverty? An exploration of the issues and the evidence to date from Latin America (World Development)	Fishery
				Journal of Environmental Management (28)	Gebremedhin B. (4)	Ecosystem services: From eye-opening metaphor to complexity blinder (Ecological Economics)	Community
				Global Environmental Change (27)	Barrett C.B. (4)	Community-based and -driven development: A critical review (World Bank Research Observer)	Conservation
				Geoforum (23)	Holden S. (4)	The livelihoods approach and management of small-scale fisheries (Marine Policy)	Resource
				Journal of Rural Studies (19)	Li M. (4)	Local enforcement and better forests (World Development)	Rural
#12	2012.6	657	801	Journal of Transport Geography (74)	Banister D. (14)	The sustainable mobility paradigm (Transport Policy)	Transport
				Transport Policy (69)	Fujii S. (6)	Part II: Policy instruments for sustainable road transport (Research in Transportation Economics)	Urban
				Transportation Research Part A: Policy and Practice (50)	Phillis Y.A. (5)	Sustainable transport (Journal of Transport Geography)	Transportation
				Journal of Cleaner Production (48)	Currie G. (5)	Determinants of transport mode choice: A comparison of Germany and the USA (Journal of Transport Geography)	Mobility
				Energy Policy (41)	Colapinto C. (5)	Sustainable transport: Analysis frameworks (Journal of Transport Geography)	Travel
				Transportation Research Part D: Transport and Environment (30)	Soria-Lara J.A. (5)	Development of a life cycle assessment tool for construction and maintenance of asphalt pavements (Journal of Cleaner Production)	City
				Research in Transportation Economics (26)	Kouikoglou V.S. (4)	Sustainable transportation strategies for decoupling road vehicle transport and carbon dioxide emissions (Management of Environmental Quality: An International Journal)	Car

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Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
				Transport Reviews (26)	Macharis C. (4)	Multicriteria decision making for sustainable development: A systematic review (Journal of Multi-Criteria Decision Analysis)	Policy
				Transportation (23)	La Torre D. (4)	Modelling of linguistic variables in multicriteria energy policy support (European Journal of Operational Research)	Energy
				Cities (21)	Liuzzi D. (4)	The trilogy of distance, speed and time (Journal of Transport Geography)	Public transport
#13	2011.5	624	770	Journal of Cleaner Production (57)	Ponte S. (6)	Legitimacy and the privatization of environmental governance: How non-state market-driven (NSMD) governance systems gain rule-making authority (Governance)	Food
				Energy Policy (47)	Qaim M. (5)	Standards as a new form of social contract? Sustainability initiatives in the coffee industry (Food Policy)	Certification
				Geoforum (43)	Miklian J. (5)	Creating legitimacy in global private governance: The case of the roundtable on sustainable palm oil (Ecological Economics)	Governance
				Ecological Economics (42)	Marsden T. (5)	Third-party certification in the global agrifood system (Food Policy)	Agricultural
				World Development (30)	Glasbergen P. (4)	Greener than thou: The political economy of fish ecolabeling and its local manifestations in South Africa (World Development)	Production
				Global Environmental Change (20)	Wollni M. (4)	Globalisation and unequalisation: What can be learned from value chain analysis? (Journal of Development Studies)	Standard
				Journal of Rural Studies (17)	Kalfagianni A. (4)	Voluntary standards, expert knowledge and the governance of sustainability networks (Global Networks)	Oil
				Food Policy (16)	Manos B. (4)	The economic sustainability of certified coffee: Recent evidence from Mexico and Peru (World Development)	Energy
				Marine Policy (13)	Leeuwis C. (4)	Standardizing sustainable development? The Forest stewardship Council's	Policy

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						plantation policy review process as neoliberal environmental governance (Geoforum)	
				Futures (12)	Bush S.R. (4)	Certifying in contested spaces: Private regulation in Indonesian forestry and palm oil (Third World Quarterly)	Water
#14	2013.8	505	781	Journal of Cleaner Production (230)	Huisingh D. (15)	Diffusion of sustainable development in universities' curricula: An empirical example from Cardiff University (Journal of Cleaner Production)	Education
				International Journal of Management Education (27)	Lozano R. (12)	Future-oriented higher education: Which key competencies should be fostered through university teaching and learning? (Futures)	Higher education
				Higher Education Policy (13)	Robinson J. (6)	An integrated approach to achieving campus sustainability: Assessment of the current campus environmental management practices (Journal of Cleaner Production)	University
				Journal of Industrial Ecology (13)	Ceulemans K. (6)	Toward an empirical research agenda for sustainability in higher education: Exploring the transition management framework (Journal of Cleaner Production)	Higher
				Journal of Business Ethics (10)	Barrutia J.M. (6)	University research for sustainable development: Definition and characteristics explored (Journal of Cleaner Production)	Student
				Studies in Higher Education (10)	Echebarria C. (6)	Going beyond the rhetoric: System-wide changes in universities for sustainable societies (Journal of Cleaner Production)	Learning
				Journal of Management Development (9)	Leal Filho W. (6)	Explorations on the University's role in society for sustainable development through a systems transition approach. Case-study of the Technical University of Catalonia (UPC) (Journal of Cleaner Production)	Curriculum
				Higher Education (8)	Rieckmann M. (5)	Should responsible management education become a priority? A qualitative study of academics in Egyptian public business schools (International Journal of Management Education)	Campus

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Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
				Futures (8)	Dyllick T. (5)	The roles of academia in regional sustainability initiatives (Journal of Cleaner Production)	Education for sustainable
				Sustainability Accounting, Management and Policy Journal (6)	Caeiro S. (5)	University ranking using research, educational and environmental indicators (Journal of Cleaner Production)	Education for sustainable development
#15	2014.7	503	1,116	Journal of Cleaner Production (38)	Jabbour C.J.C. (10)	Beyond strategic human resource management: Is sustainable human resource management the next approach? (International Journal of Human Resource Management)	Hrm
				Ergonomics (31)	Mariappanadar S. (7)	The central role of human resource management in the search for sustainable organizations (International Journal of Human Resource Management)	Employee
				Journal of Business Ethics (27)	Kantabutra S. (7)	The greening of strategic HRM scholarship (Organisation Management Journal)	Human
				Corporate Social Responsibility and Environmental Management (19)	Paillé P. (7)	Green human resource management research in emergence: A review and future directions (Asia Pacific Journal of Management)	Human resource
				International Journal of Human Resource Management (18)	Afsar B. (7)	Greening organizations through leaders' influence on employees' pro-environmental behaviors (Journal of Organizational Behavior)	Ergonomics
				Applied Ergonomics (12)	Jackson S.E. (5)	Achieving sustainability through attention to human resource factors in environmental management (International Journal of Operations and Production Management)	Work
				Human Resource Management Review (10)	Waterson P. (5)	Sustainable human resource strategy: The sustainable and unsustainable dilemmas of retrenchment (International Journal of Social Economics)	Green
				Employee Relations (10)	Kira M. (5)	Reporting on sustainability and HRM: A comparative study of sustainability reporting practices by the world's largest companies (International Journal of Human Resource Management)	Human resource management
				International Journal of Manpower (10)	Winkel J. (5)		Leadership

Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
						Systematic literature review on sustainable human resource management (Journal of Cleaner Production)	
				Journal of Vocational Behavior (10)	Thatcher A. (5)	An aspirational framework for strategic human resource management (Academy of Management Annals)	Career
#16	2014	405	692	Journal of Cleaner Production (38)	Watson R.T. (9)	From green to sustainability: Information technology and an integrated sustainability framework (Journal of Strategic Information Systems)	Green
				Production and Operations Management (12)	Molla A. (8)	An agenda for 'green' information technology and systems research (Information and Organization)	Information
				Manufacturing and Service Operations Management (12)	Corbett J. (7)	Compliance with institutional imperatives on environmental sustainability: Building theory on the role of Green IS (Journal of Strategic Information Systems)	Information system
				International Journal of Information Management (11)	Wang Y. (7)	Green IS research: A modernity perspective (Communications of the Association for Information Systems)	Technology
				Information Systems Frontiers (11)	Lund H. (6)	Unleashing the convergence amid digitalization and sustainability towards pursuing the sustainable development goals (SDGs): A holistic review (Journal of Cleaner Production)	Energy
				Energy Policy (11)	Webster J. (5)	Towards adoption of Green IS: A literature review using classification methodology (International Journal of Information Management)	System
				Communications of the Association for Information Systems (10)	Sarkis J. (5)	Information systems and sustainable supply chain management towards a more sustainable society: Where we are and where we are going (International Journal of Information Management)	Online
				Journal of the Association for Information Systems (9)	Sun J. (4)	Organizational green motivations for information technology: Empirical study (Journal of Computer Information Systems)	Business

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Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
				Journal of Industrial Ecology (8)	Ketter W. (4)	Green information system integration for environmental performance in organizations: An extension of belief–action–outcome framework and natural resource-based view theory (Benchmarking)	Environmental
				Management Science (8)	Zhang Y. (4)	Information systems solutions for environmental sustainability: How can we do more? (Journal of the Association for Information Systems)	Ict
#17	2011.6	318	519	Energy Policy (60)	Hartarska V. (6)	Outreach and efficiency of microfinance institutions (World Development)	Microfinance
				World Development (26)	Lensink R. (6)	Where does microfinance flourish? Microfinance institution performance in macroeconomic context (Journal of Development Economics)	Energy
				Journal of Cleaner Production (15)	Lin B. (5)	Aspects of outreach: A framework for discussion of the social benefits of microfinance (Journal of International Development)	Mfis
				Journal of International Development (10)	Hermes N. (5)	Governance and performance of microfinance institutions in central and Eastern Europe and the newly independent states (World Development)	Rural
				Global Business Review (8)	Mersland R. (5)	Do regulated microfinance institutions achieve better sustainability and outreach? Cross-country evidence (Applied Economics)	Microfinance institution
				International Journal of Social Economics (7)	Onishi A. (4)	Microcredit and the poorest of the poor: Theory and evidence from Bolivia (World Development)	Financial
				Ecological Economics (6)	Sebitosi A.B. (4)	Microfinance: Its impact, outreach, and sustainability (World Development)	Institution
				Applied Economics (6)	Quayes S. (3)	Determinants of the performance of microfinance institutions: A systematic review (Journal of Economic Surveys)	Household
				Journal of Development Economics (5)	Warnecke T. (3)	Islamic banking sustainability: A review of literature and directions for future research (Emerging Markets Finance and Trade)	Outreach

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				Annals of Public and Cooperative Economics (5)	Urpelainen J. (3)	Mission drift and ethical crisis in microfinance institutions: What matters? (Journal of Cleaner Production)	Poverty
#18	2011.2	308	521	Economic Modelling (20)	Afonso A. (11)	Are stationarity and cointegration restrictions really necessary for the intertemporal budget constraint? (Journal of Monetary Economics)	Fiscal
				Applied Economics (17)	Greiner A. (10)	Fiscal sustainability in India: Evidence from Markov switching and threshold regression models (Studies in Economics and Finance)	Debt
				Applied Economics Letters (14)	Baharumshah A.Z. (8)	Sustainability of the deficit process with structural shifts (Journal of Business and Economic Statistics)	Deficit
				Journal of Policy Modeling (14)	Lau E. (7)	Mean reversion of the fiscal conduct in 24 developing countries (Manchester School)	Fiscal policy
				Empirica (12)	Jalles J.T. (7)	Testing the intertemporal sustainability of current account in the presence of endogenous structural breaks: Evidence from the top deficit countries (Economic Modelling)	Current account
				Empirical Economics (11)	Uctum M. (5)	Debt sustainability in the European monetary union: Theory and empirical evidence for selected countries (Oxford Economic Papers)	Fiscal sustainability
				Journal of Macroeconomics (8)	Holmes M.J. (5)	Can fiscal paths be sustainable? Evidence from Poland (Emerging Markets Finance and Trade)	Public debt
				Japan and the World Economy (7)	Bajo-Rubio O. (5)	International evidence on fiscal solvency: Is fiscal policy "responsible"? (Journal of Monetary Economics)	Budget
				Manchester School (7)	Díaz-Roldán C. (5)	Fiscal fatigue, fiscal space and debt sustainability in advanced economies (Economic Journal)	Cointegration
				Journal of Monetary Economics (7)	Esteve V. (5)	Intertemporal sustainability of current account imbalances: New evidence from the OECD countries (Economic Notes)	Country

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Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
#19	2014.4	200	223	Journal of Cleaner Production (20)	Valentinov V. (13)	Public–private partnerships as instruments to achieve sustainability-related objectives: The state of the art and a research agenda (Public Management Review)	Smart
				International Journal of Green Energy (9)	Roth S. (4)	Smart cities: Advances in research—An information systems perspective (International Journal of Information Management)	Smart city
				Ecological Economics (8)	Berkowitz H. (4)	The complexity-sustainability trade-off in Niklas Luhmann's social systems theory (Systems Research and Behavioral Science)	City
				Government Information Quarterly (7)	Benlian A. (3)	Measuring the financial sustainability and its influential factors in local governments (Applied Economics)	Energy
				Systems Research and Behavioral Science (7)	Deng H. (3)	Kenneth boulding's theories of evolutionary economics and organizational change: A reconstruction (Journal of Economic Issues)	Water
				Energy Policy (7)	Dincer I. (3)	Partnering for good? An analysis of how to achieve sustainability-related outcomes in public–private partnerships (Business Research)	Partnership
				Cities (6)	Sovacool B.K. (3)	Cross-sector alliance learning and effectiveness of voluntary codes of corporate social responsibility (Business Ethics Quarterly)	Public
				Internet Research (5)	Irvine H. (3)	Identifying the results of smart city development: Findings from systematic literature review (Cities)	Financial
				Nonprofit Management and Leadership (5)	Ryan C. (3)	A smart city is a collaborative community: Lessons from smart Aarhus (California Management Review)	System
				Journal of Business Ethics (4)	Ward F.A. (2)	The ethics of functional differentiation: Reclaiming morality in Niklas Luhmann's social systems theory (Journal of Business Ethics)	Luhmann
#20	2011.2	184	217	Systems Research and Behavioral Science (24)	Bell S. (9)	A systems thinking approach to identify leverage points for sustainability: A case study in the cat Ba biosphere reserve,	Bioenergy

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						Vietnam (Systems Research and Behavioral Science)	
				Energy Policy (21)	Nguyen N.C. (9)	Multi criteria analysis for bioenergy systems assessments (Energy Policy)	System
				Journal of Cleaner Production (18)	Bosch O.J.H. (9)	Creating 'learning laboratories' for sustainable development in biospheres: A systems thinking approach (Systems Research and Behavioral Science)	Energy
				Ecological Economics (11)	Morse S. (5)	Struggling with sustainability—A comparative framework for evaluating sustainable development programs (World Development)	Policy
				Journal of Environmental Management (8)	Banson K.E. (5)	Delivering sustainability therapy in sustainable development projects (Journal of Environmental Management)	System thinking
				Systemic Practice and Action Research (7)	Levidow L. (3)	Environmental sustainability and multifaceted development: Multi-criteria decision models with applications (Annals of Operations Research)	Dpsir
				Australian Journal of Public Administration (7)	Papaioannou T. (3)	Getting the big picture in natural resource management-systems thinking as 'method' for scientists, policy makers and other stakeholders (Systems Research and Behavioral Science)	Biomass
				Environmental Science and Policy (7)	Béland D. (3)	Participatory learning for sustainable agriculture (World Development)	Decision
				World Development (7)	Coffey B. (3)	Systemic management to address the challenges facing the performance of agriculture in Africa: Case study in Ghana (Systems Research and Behavioral Science)	Learning
				European Journal of Operational Research (4)	Kopainsky B. (3)	An analysis of risks for biodiversity under the DPSIR framework (Ecological Economics)	Thinking
#21	2015.5	174	226	Journal of Cleaner Production (64)	Gao L. (5)	Transitioning to sustainable production—Part I: Application on machining technologies (Journal of Cleaner Production)	Scheduling
				Cities (13)	Li L. (4)	Energy-efficient scheduling in manufacturing companies: A review and	Energy

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Cluster	Average year	No. of papers	No. of within-cluster link	Top 10 journal (no. of paper)	Top 10 authors (no. of papers)	Top 10 papers: Paper title (journal)	TFIDF result (top 10 keywords)
						research framework (European Journal of Operational Research)	
				International Journal of Production Research (12)	Wang S. (4)	Green scheduling of a two-machine flowshop: Trade-off between makespan and energy consumption (European Journal of Operational Research)	Machining
				Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture (6)	Saritas O. (4)	Urban indicators and the integrative ideals of cities (Cities)	Manufacturing
				Computers and Industrial Engineering (6)	Trentesaux D. (3)	Sustainable machining: Selection of optimum turning conditions based on minimum energy considerations (Journal of Cleaner Production)	Cutting
				European Journal of Operational Research (6)	Iqbal A. (3)	Environmental aspects of laser-based and conventional tool and die manufacturing (Journal of Cleaner Production)	Machine
				Journal of Manufacturing Systems (5)	Yildirim M.B. (3)	Multi-objective genetic algorithm for energy-efficient job shop scheduling (International Journal of Production Research)	Algorithm
				Journal of Science and Technology Policy Management (4)	Li J. (3)	Transitioning to sustainable production—Part II: Evaluation of sustainable machining technologies (Journal of Cleaner Production)	Energy consumption
				Journal of Environmental Management (4)	Nonino F. (3)	The sustainability of university-industry research collaboration: An empirical assessment (Journal of Technology Transfer)	Optimization
				Journal of Industrial Ecology (3)	Vlachokostas C. (3)	Single-machine sustainable production planning to minimize total energy consumption and total completion time using a multiple objective genetic algorithm (IEEE Transactions on Engineering Management)	Water
#22	2013.5	174	224	TQM Journal (19)	Antony J. (10)	Lean six sigma—Getting better all the time (International Journal of Lean Six Sigma)	Lean
				International Journal of Lean Six Sigma (17)	Talwar B. (5)	Evolutionary model of continuous improvement behaviour (Technovation)	Sigma
				Total Quality Management and Business Excellence (10)	Farris J.A. (5)	Readiness factors for the lean six sigma journey in the higher education sector	Improvement

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						(International Journal of Productivity and Performance Management)	
				International Journal of Health Care Quality Assurance (8)	Viles E. (5)	No going back: A review of the literature on sustaining organizational change (International Journal of Management Reviews)	Quality
				Journal of Health, Organisation and Management (8)	Jurburg D. (4)	Lean Six Sigma for higher education institutions (HEIs): Challenges, barriers, success factors, tools/techniques (International Journal of Productivity and Performance Management)	Continuous improvement
				Journal of Cleaner Production (8)	Gijo E.V. (4)	Critical success factors for the sustainability of Kaizen event human resource outcomes: An empirical study (International Journal of Production Economics)	Healthcare
				International Journal of Quality and Reliability Management (7)	Kumar M. (4)	Impacts of Lean Six Sigma over organizational sustainability: A survey study (Journal of Cleaner Production)	Continuous
				International Journal of Productivity and Performance Management (7)	Vinodh S. (4)	The relationship between continuous improvement and rapid improvement sustainability (International Journal of Production Research)	Leadership
				International Journal of Operations and Production Management (6)	Glover W.J. (3)	Impacts of Lean Six Sigma over organizational sustainability: A systematic literature review on Scopus base (International Journal of Lean Six Sigma)	Quality management
				Journal of Manufacturing Technology Management (5)	Van Aken E.M. (3)	Readiness factors for lean implementation in healthcare settings - a literature review (Journal of Health)	Health
#23	2014.5	136	184	Sport Management Review (18)	Palumbo R. (7)	Sport versus climate: Introducing the climate vulnerability of sport organizations framework (Sport Management Review)	Sport
				Journal of Sport Management (8)	McCullough B.P. (7)	Service-dominant logic 2025 (International Journal of Research in Marketing)	Health
				European Sport Management Quarterly (8)	Schulenkorf N. (6)	Sport ecology: Conceptualizing an emerging subdiscipline within sport management (Journal of Sport Management)	Event

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				Journal of Sport and Tourism (6)	Mallen C. (6)	A content analysis of environmental sustainability research in a sport-related journal sample (Journal of Sport Management)	Care
				Journal of Cleaner Production (6)	Orr M. (5)	Environmental sustainability in sport facility management: A Delphi study (European Sport Management Quarterly)	Community
				Ecological Economics (5)	Greenhalgh T. (4)	Development through sport: Building social capital in disadvantaged communities (Sport Management Review)	Health care
				Futures (4)	Edwards M.B. (4)	Sustainable community development through sport and events: A conceptual framework for sport-for-development projects (Sport Management Review)	Creation
				Milbank Quarterly (3)	Ciasullo M.V. (3)	The roles and responsibilities of a change agent in sport event development projects (Sport Management Review)	Sport management
				International Journal of Forecasting (3)	Manna R. (3)	Managing sport-for-development: Reflections and outlook (Sport Management Review)	Service
				International Journal of Sports Marketing and Sponsorship (3)	Lehoux P. (3)	The assessment of the environmental performance of an international multi-sport event (European Sport Management Quarterly)	Sport for development

APPENDIX B: VISUALIZATION OF DIRECT CITATION NETWORK