

The outlook of sustainability assurance in global trends: a bibliometric review and research agenda

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Abstract

Purpose – There is a growing interest in how firms respond to environmental degradation and societal challenges. Firms respond through their sustainability reports, but assurance of the reports gives confidence to the stakeholders. This study aims to identify the main research development in sustainability assurance which is rising in global studies.

Design/methodology/approach – This study uses a bibliometric analysis to assess the global trend in sustainability assurance studies. The methodology is based on descriptive, performance and science mapping. The set is based on 655 documents from the Scopus database, covering the period from 2005 to 2022.

Findings – The findings from the study suggest that sustainability studies are relevant, and the researcher's examination of the domain has dramatically increased from 2014 to date. This is due to the rise in the concerns expressed by stakeholders in satisfying themselves about the firm's responsibility to the Sustainable Development Agenda 2030. The findings also show that most research on sustainability assurance is from Spain, the USA, the United Kingdom (UK) and Australia. However, the UK has the most collaboration in terms of co-authorship. It is suggestive that the UK has more links than Spain, which is the most productive country with more publications. This may be attributed to the influx of more international students completing a second and third degree in the UK. The study highlights intellectual foundations and emerging trends and outlines avenues for future studies.

Research limitations/implications – This study is limited to the data obtained from the Scopus database.

Originality/value – This study is the first bibliometric study of the sustainability assurance domain.

Keywords Sustainability assurance, Bibliometric literature review, Scopus, VOSviewer, Keywords analysis, Co-citation analysis

Paper type Literature review

1. Introduction

The new wave of sustainable development goals has put listed companies on the government, community and society's radar (Sustainable Development Goals, 2019). Firms use sustainability reports to inform society and stakeholders about their contributions to the United Nations' global sustainable development goals (Elkington, 1998; United Nations, 2013; Velte and Stawinoga, 2017; Jayarathne *et al.*, 2021). An assured sustainability report increases



the confidence of stakeholders in a firm's social activity verification (Akisik and Gal, 2014) because accountability to the public is increased, leading to information quality. It can also be argued that a relationship exists between sustainability reporting and the assurance of the sustainability reports because a firm to produce a sustainability report requires the services of assurance providers, constituting interdependency (Aldrich, 1976; Hillman *et al.*, 2009).

The auditing, verification and evaluation of the quality of public reports, management systems and competencies that offer essential information that underlies an organization's performance is known as sustainability assurance (Reeve, 2003). However, this study expands the definition criteria to include sustainability assurance services and the providers of assurance reports. One of the advantages of sustainability assurance is that sustainability certification guarantees that corporate social responsibility (CSR) reporting to stakeholders is accurate, provides social legitimacy to a company's operations and puts pressure on the company to act responsibly (Owen and Dwyer, 2004; Jones and Solomon, 2010). The effect is the creation of credibility for the firms (Nicole and Swift, 2003; O'Dwyer and Owen, 2005; Kolk and Perego, 2010b). Another advantage to the engagement of sustainability assurance is the reduction of whitewashing of sustainability reports to stakeholders (Javed *et al.*, 2016).

Different authors have also discussed the standards that guide sustainability assurance services' performance (Farooq and Villiers, 2017; O'Dwyer and Owen, 2005). Most auditing firms use the International Standard on Assurance Engagement (ISAE) 3000, and consulting firms mostly use AccountAbility (AA) 1000 (Farooq and Villiers, 2017). Studies show that ISAE3000 and AA1000 complement each other, even though they are different (O'Dwyer and Owen, 2005). The assurance service providers consist of accounting and nonaccounting firms, but consulting firms' expertise comes from various fields, including engineering consulting (Deegan *et al.*, 2006). Farooq and Villiers (2017) argued a distinction between consulting and auditing firms in the assurance service provision. The distinction covers knowledge and expertise, stakeholders' preferences, perceived independence, impact on the disclosure quality and differences in approach to sustainability assurance (Farooq and Villiers, 2017). From an empirical perspective, it is also argued that selecting sustainability assurance service providers relates to firm size, profitability, liquidity and nation (Wong *et al.*, 2016). Also, other studies have an assurance service provider and sustainability disclosures (Maroun, 2019; Wong and Millington, 2014). Some studies also relate to the differences in attributes, which influence the choice between accountants and nonaccountants (Green *et al.*, 2017; Channuntapipat *et al.*, 2020). A brief examination of the concept of sustainability assurance indicates that the domain has different facets, including assurance levels, assurance providers, standalone sustainability reporting or integrated reporting. What is lacking is the cross-discipline effect on sustainability assurance or sustainability assurance on other variables. Even though researchers' interest in the area is growing, more opportunities exist for future studies. Therefore, there is a need for a comprehensive review of the sustainability assurance so that the knowledge structure in the research area can be identified and links for future research directions are suggested.

The summary findings from the study suggest that sustainability studies are relevant, and the researcher's examination of the domain has dramatically increased from 2014 to date. This is due to the rise in the concerns expressed by stakeholders in satisfying themselves about the firm's responsibility to the Sustainable Development Agenda 2030. Our findings also show that most research on sustainability assurance is from Spain, USA, United Kingdom (UK) and Australia. However, the UK has the most collaboration in terms of co-authorship. It is suggestive that the UK has more links than Spain, which is the most productive country with more publications. This may be attributed to the influx of more international students completing a second and third degree in the UK.

Two main contributions are derived from this study. Previous studies have undertaken meta-analysis and literature review on sustainability assurance (Velte and Stawinoga, 2017)

and sustainability reporting using a bibliometric analysis (Pasko *et al.*, 2021), but this is the first study that examines sustainability assurance using a bibliometric analysis. The outcome of this study allowed the domain of sustainability assurance to be better understood through the revelation of the seminar papers and their focus on the title of the studies. Secondly, the mappings from citation and keywords analysis project this study to the new areas yet to receive attention, including assurance levels and gender diversity in sustainability assurance. Sustainability assurance and disclosure quality are emerging areas that need researchers' attention. Researchers concerning sustainability assurance studies are revisiting theories such as agency theory. Understanding these subsets leads to the future direction of the studies in sustainability assurance and its cross-discipline research by combining sustainability assurance and its effect on other variables.

1.1 Rationale of the study

The study's rationale presents the motivation for using the bibliometric analysis on sustainability assurance as a domain. There is evidence of increased sustainability assurance studies (Velte and Stawinoga, 2017). This is because the wave of sustainable development goals has put listed companies on the government, community and society's radar (Sustainable Development Goals, 2019). A previous study undertook a systematic literature review on sustainability assurance (Velte and Stawinoga, 2017). Still, the use of the bibliometric analysis using VOSviewer is the first among researchers to examine sustainability assurance from the perspective of a science mapping and performance analysis. The bibliometric analysis allows large data from databases like Web of Science, Scopus index or Dimension. According to Block *et al.* (2020), Scopus has a broader journal than any other data mining site. Therefore, this study utilized this database for the mining of data for this bibliometric study. The bibliometric analysis moves the study on sustainability assurance from a single outcome to multi-dimensional outcomes. For example, it is argued in a single study that sustainability assurance has a positive association with firm performance (Akisik and Gal, 2014). Still, sometimes, it negatively affects financial performance (Oware and Mallikarjunappa, 2019) in emerging economies. Other studies on advanced economies argued for a negative significance (O'Dwyer and Owen, 2005; Hodge *et al.*, 2009; Jones and Solomon, 2010; Darus *et al.*, 2014). Other studies discussed the standards that guide sustainability assurance services' performance (Farooq and Villiers, 2017; O'Dwyer and Owen, 2005) and also other studies examined assurance service providers and sustainability disclosures (Maroun, 2019; Wong and Millington, 2014). This study employed a bibliometric and network analysis to map a network in a single study that includes authors, co-authors, occurrences of keywords and journal and author citations. The method can provide a comprehensive overview and identify the intellectual structure of the field (Donthu *et al.*, 2021). The objectives and associated research questions of this study are as follows:

- RO1. The first objective of the study is to describe the current trends in sustainability assurance studies.
- RO2. The second objective assesses the collaboration of country co-authorship analysis.
- RO3. The third objective assesses the most influential journal within the study area.
- RO4. The fourth objective assesses the most cited publication within the study area.
- RO5. The fifth objective assesses the intellectual structure of the knowledge on sustainable assurance.

We perform a comprehensive bibliometric evaluation to meet the research objectives by defining the search string and carefully extracting the sample literature using correct inclusion and exclusion criteria. A descriptive analysis was carried out in the first stage,

followed by a thorough bibliometric study in the second stage. To identify the intellectual structure of the research on sustainability assurance, citation and co-citation analyses were performed using VOSviewer. Lead papers from the clusters were identified using weighted citation measures. The rest of the study is structured as follows. [Section 2](#) illustrates the methodology of the research and the descriptive results, followed by the bibliometric assessment and keywords analysis in [Section 3](#). [Section 4](#) provides a brief discussion and suggestions for further investigations, followed by the study's conclusion in [Section 5](#).

2. Methods

The volume of the data allows this study to use a bibliometric approach to understand the past and future of the research agenda in sustainability assurance. To achieve the objectives of this study, this research puts forward the method of performance analysis of authors, institutions, countries and journals using publications and citations. Also, a different approach using science mapping is included in this study. The approach factors are co-authorship analysis, clustering, citation analysis and keywords analysis ([Van Eck and Waltman, 2013](#); [Donthu et al., 2021](#)). Recent studies have used bibliometric methodologies based on the Scopus database, and this study follows the same method ([Anand et al., 2020](#); [Kumar et al., 2022](#)). Following its use, we follow the approach adopted to prepare a bibliometric study ([Donthu et al., 2021](#)). The four-step process covers (1) data search and collection, (2) definition of the delimiting criteria, (3) data analysis and (4) discussions and conclusions. Data cleansing was done manually by the authors. We started by removing the duplicate entries from the data set to achieve this. Then, the data points were cleaned, including the names and affiliations of the writers. The names of writers who had previously been listed under more than one name were identified and corrected using their Scopus author IDs. By comparing the affiliations collected from Scopus with those listed in the article, the affiliations themselves were also cleansed. For uniformity, additional data points like author keywords were also edited. The study then used the cleansed data as the last step.

2.1 Defining the search terms

Sustainability assurance has become important in current research studies because it addresses stakeholders' concerns and gives investors' confidence in decision-making ([Jones and Solomon, 2010](#); [O'Dwyer et al., 2011](#)). Especially toward the firm's contribution in reducing environmental degradation and increasing the firm's commitment to the society through its CSR activities ([Fifka, 2013](#)). Given this background, this study search term covered (sustainability assurance).

Keyword protocol applied in Scopus for extracting articles are as follows.

"sustainability assurance" AND (LIMIT-TO (LANGUAGE," English")) AND (LIMIT-TO (SUBJAREA, "BUSI") OR LIMIT-TO (SUBJAREA, "ECON"))

2.2 Data search and collection

The Scopus database is the database for extracting the data for the study because many authors have used it for bibliometric research ([Anand et al., 2021](#); [Kumar et al., 2022](#)) and also, Scopus database contains a high number of indexed journals compared to Web of Science ([Anand et al., 2021](#)). The first data extraction phase occurred in March 2022, with 813

publications titled sustainability assurance or third-party assurance. The next stage of the data process was limited to English-speaking journals, which amounted to 798 journals. Lastly, the study is limited to business management, accounting, economics, econometrics and finance journals. The outcome of the final search of the research amounted to 665 articles published from 2005 to 2022. The sample size of 665 articles forms the bases for our literature review and the bibliometric analysis. [Figure 1](#) shows the process of data extraction.

2.3 Descriptive analysis

The study’s first objective seeks to understand the publication trends in sustainability assurance using the year, country region and journal as the extracting criteria.

2.3.1 *Publication growth.* [Figure 2](#) shows the publication growth. The study period is from 2005 to 2022 (amounting to 18 years) and shows the years that documents have been published in the subject area. The number of publications remained below 20 articles until

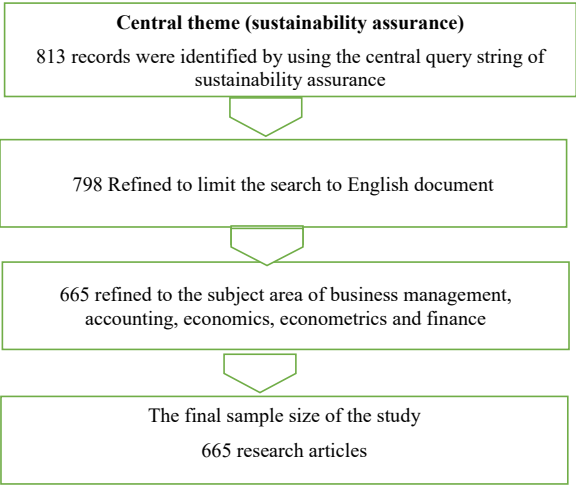


Figure 1.
Flow chart of the search strategy and data collection process

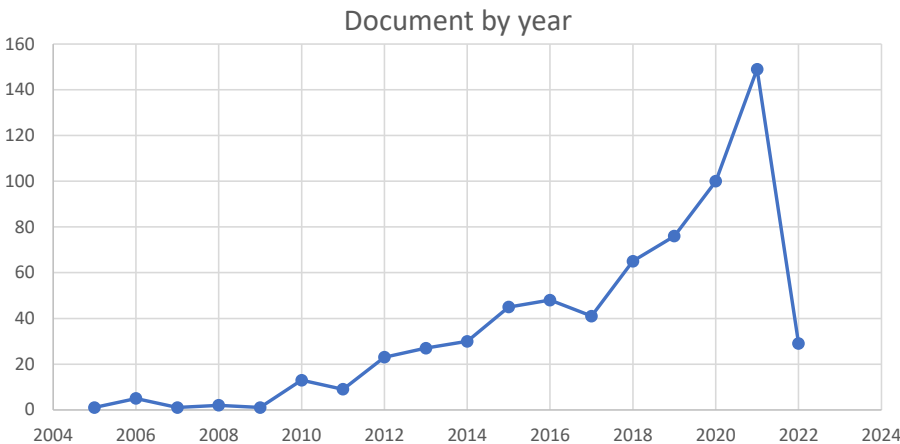


Figure 2.
Publication growth between 2005 and 2020

2012 and after a gradual rise. There is a rise in the concerns expressed by stakeholders in satisfying themselves about the firm's responsibility, leading to an increased demand for sustainability assurance (KPMG, 2013; Velte and Stawinoga, 2017). In 2014, there was a sharp increase in publication to 30 articles, and subsequent publication has not fallen below this threshold. It is also instrumental in knowing that out of the total articles of 665, the open-access with varying degrees, including fully open access, gold, hybrid gold, bronze and green amounted to 412 articles. A total of 61.9% of the journals attributed to open access indicating that sustainability assurance studies will have a high citation index (Gonzalez-Brancor and Dorta-Gozalez, 2019).

2.3.2 Productivity of journals, authors and publishers. Table 1 of the study concentrates on the productivity of journals in sustainability assurance. The evidence from the study shows that Business Strategy and Environment has the highest number of publications at 41 (7.19%). The associated publisher of the journal with the most publication is John Wiley and Sons. The associated author has the second most cited publication with 346 citations (Kolk and Perego, 2010b). Observation indicates that even though Business Strategy and Environment have the most publications, the authors' citations do not match their publications (see Table 2).

2.3.3 Leading countries and institutions. The descriptive statistics also show that Universidad de Salamanca has the highest publication. This is reflected in the country analysis, which shows Spain has the highest publication amounting to 119 documents. The University of the Witwatersrand in South Africa is among the top three institutions.

Journal name	TP	Journal publishers	Total citation
<i>Business Strategy and the Environment</i>	41	John Wiley and Sons Ltd	Kolk and Perego (2010a) 346
<i>Journal of Business Ethics</i>	38	Springer	Prado-Lorenzo and Garcia-Sanchez (2010) 291
<i>Corporate Social Responsibility and Environmental Management</i>	36	John Wiley and Sons Ltd	Fonseca (2010) 132
<i>Accounting Auditing and Accountability Journal</i>	33	Emerald Group	Thorne <i>et al.</i> (2014) 98
<i>Journal of Clean Production</i>	30	Elsevier	Hahn and Lulfs (2014) 568
<i>Sustainability Accounting, Management and Policy Journal</i>	30	Emerald Group	Cho <i>et al.</i> (2014) 104
<i>Meditari Accountancy</i>	20	Emerald Group	La Torre <i>et al.</i> (2018) 76
<i>British Accounting Review</i>	8	Elsevier	O'Dwyer and Owen (2005) 322

Table 1.
Types of Journal,
Publishers, no of
publication

Institutions	Country	TP	Country	TP
Universidad de Salamanca	Spain	47	Spain	119
UNSW Sydney	Australia	20	US	109
University of the Witwatersrand	South Africa	14	UK	106
Université Laval	Canada	14	Australia	94
The University of Auckland	New Zealand	13	Italy	57
Universidade de Vigo	Spain	13	Canada	53
Alliance Manchester Business School	UK	12	Germany	49
Universitat de València	Spain	11	France	45
Macquarie University	Australia	11	South Africa	34

Table 2.
Leading countries and
institutions

South Africa is represented because listed firms must ensure that their sustainability reports are given to shareholders (Ackers and Eccles, 2015). We also see that Universidad de Salamanca contributes to 39.4% of the 119 publications of all universities in Spain. Similarly, UNSW Sydney contributes 21.2% of the 94 publications attributed to Australia. Also, the University of the Witwatersrand contributes to 41.1% of the total publications of 34 attributed to South Africa.

3. Bibliometric analysis

3.1 Country collaboration of co-authors analysis

The most productive country in terms of publication in sustainability assurance is Spain, and the least among the countries are Taiwan, Poland, South Korea and Hungary. However, Figure 3 shows that the UK has the most collaboration, with 24 links and 93 times co-authorship. The second most collaborated country is Australia, which has 19 links and 68 times co-authorship. Ukraine is the least country with one link and one time co-authorship. Reasons for the UK to have more links than Spain, which carries the most productive country with more publications, may be attributed to the influx of more international students completing a second and third degree in the UK (Khatib et al., 2021).

3.2 Journal influence analysis

Following the previous work by different authors (Cohen and Simnett, 2015; Mariani et al., 2021; Kumar et al., 2022; White and Borgholthaus, 2022) in assessing journal influence, we apply the same principle. A journal's influence is measured by two indicators, the average citation per article (ACA) and the rating of the journal-based journal rating agencies (using ABDC rating). It is important to distinguish between journal productivity and journal influence. The former addresses the number of journals produced by the journal within the study period. The latter is measured as the journal's average citation based on total citations divided by total publications (White and Borgholthaus, 2022).

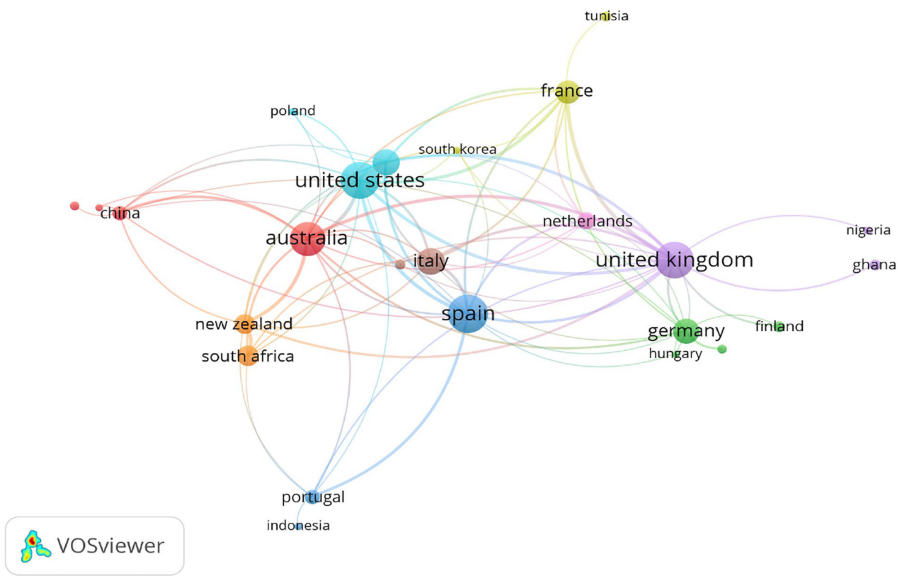


Figure 3.
Country collaboration
of co-authors analysis

3.2.1 Average citation article analysis of journals. From Table 3 below, the study shows that *Accounting, Organization and Society* has the highest ACA and is followed by the *British Accounting Review*. Even though *Business Strategy and the Environment* is the most productive journal with 41 publications, its ACA of 58.41 is lower than *Accounting, Organization and Society* of 72.89. The third most productive journal is *Corporate Social Responsibility and Environmental Management* and the *Journal of Cleaner Production*, with 30 publications each. However, further analysis shows *Journal of Cleaner Production* with ACA 62.63 is more influential than the *Corporate Social Responsibility and Environmental Management* with ACA 16.17. The lowest journal with influence measured using ACA is *Meditari Accountancy Research*.

3.2.2 Journal rating agency analysis (quality analysis). This study uses Australian Business School Council (ABDC) rating and ranking, and this ranking is current on 6 December 2019. ABDC rates and ranks journal quality with A* as the best quality journal, followed by A and B as the second- and third-quality journals. C is the least quality journal in the ABDC ranking. Following a look at the data on sustainability assurance studies in Table 4, we see that most publications in the top 13 journals are in the A* and A ranking. It indicates that researchers and leading journals acknowledge the relevance of sustainability assurance research studies.

Journal name	TP	No. of citations	ACA
<i>Journal of Business Ethics</i>	38	2,456	64.63
<i>Business Strategy and the Environment</i>	41	2,395	58.41
<i>Auditing</i>	16	1,003	62.69
<i>Corporate Social Responsibility and Environmental Management</i>	36	1,395	38.75
<i>Sustainability Accounting, Management and Policy Journal</i>	30	485	16.17
<i>Journal of Cleaner Production</i>	30	1,909	63.63
<i>Meditari Accountancy Research</i>	20	176	8.80
<i>British Accounting Review</i>	8	522	65.25
<i>Managerial Auditing Journal</i>	6	280	46.67
<i>Accounting, Organization and Society</i>	9	656	72.89
<i>Contemporary Accounting Research</i>	9	321	35.67
<i>Australian Accounting Review</i>	11	292	26.55
<i>European Accounting Review</i>	9	175	19.44

Table 3.
Average citation per
article (ACA) for
journals within the
period between 2005
and 2020

Journal name	TP	No. of citations	ACA	ABDC
<i>Journal of Business Ethics</i>	38	2,456	64.63	A
<i>Business Strategy and the Environment</i>	41	2,395	58.41	A
<i>Auditing</i>	16	1,003	62.69	A*
<i>Corporate Social Responsibility and Environmental Management</i>	36	1,395	38.75	B
<i>Sustainability Accounting, Management and Policy Journal</i>	30	485	16.17	C
<i>Journal of Cleaner Production</i>	30	1,909	63.63	A
<i>Meditari Accountancy Research</i>	20	176	8.80	A
<i>British Accounting Review</i>	8	522	65.25	A*
<i>Managerial Auditing Journal</i>	6	280	46.67	A
<i>Accounting, Organization and Society</i>	9	656	72.89	A*
<i>Contemporary Accounting Research</i>	9	321	35.67	A*
<i>Australian Accounting Review</i>	11	292	26.55	B
<i>European Accounting Review</i>	9	175	19.44	A*

Table 4.
Journal rating (quality
analysis) within the
period between 2005
and 2022

3.3 Citation analysis

We used citation analysis to identify the most popular articles in sustainability assurance research. Citation analysis is defined as analyzing the relationship among publications by identifying the influential publication in the research field (Donthu *et al.*, 2021). Similar studies have also examined research using citation analysis based on the Scopus database (Khatib *et al.*, 2021). Table 5 shows the authors' citation analysis and the study's focus. The most cited article is published by the *Journal of Cleaner Production* and is followed by *Business Strategy and the Environment*. The authors of these articles are Hahn and Lulfs (2014) and Kolk and Perego (2010b). Even though sustainability assurance publications started in 2005, the papers with high citations are in 2010 and 2014 (see Table 6).

3.4 Cluster analysis (co-citation analysis)

To address the fifth objective of this study, we applied the co-citation network analysis of the reference map, which helps identify the intellectual structure of sustainability assurance literature. Several clusters were identified from the co-citation network to conduct the content analysis. To study the intellectual structure of the topic "sustainability assurance", we start by using VOSviewer for the co-citation network analysis. Co-citation analysis in VOSviewer gave us a TEXT file, which we used in Excel to read the co-citation network. The initial findings resulted in 50,566 references that are at least twice co-cited with one another. Among them, 65 articles occurred together more than 20 times. VOSviewer formed a random cluster map that was too complex to understand to visualize the co-citation map. Therefore, we follow Kumar *et al.* (2020), who relied on the leading 13 papers from each cluster. Similarly, we

No.	Author	Citations	Journal name	Focus of the study
1	Hahn and Lulfs (2014)	568	<i>Journal of Cleaner Production</i>	Determinants of sustainability reporting: A review of results, trends, theory and opportunities in an expanding field of research
2	Kolk and Perego (2010a)	346	<i>Business Strategy and the Environment</i>	Determinants of the adoption of sustainability assurance statements: An international investigation
3	O'Dwyer and Owen (2005)	322	<i>British Accounting Review</i>	Assurance statement practice in environmental, social and sustainability reporting: A critical evaluation
4	Fifka (2013)	311	<i>Business Strategy and the Environment</i>	Corporate Responsibility Reporting and its Determinants in Comparative Perspective – A Review of the Empirical Literature and a Meta-analysis
5	O'Dwyer <i>et al.</i> (2011)	306	<i>Accounting, Organizations and Society</i>	Seeking legitimacy for new assurance forms: The case of assurance on sustainability reporting
6	Prado-Lorenzo and Garcia-Sanchez (2010)	291	<i>Journal of Business Ethics</i>	The Role of the Board of Directors in Disseminating Relevant Information on Greenhouse Gases
7	Perego and Kolk (2012)	237	<i>Journal of Business Ethics</i>	Multinationals' Accountability on Sustainability: The Evolution of Third-party Assurance of Sustainability Reports
8	Jensen and Berg (2012)	237	<i>Business Strategy and the Environment</i>	Determinants of Traditional Sustainability Reporting Versus Integrated Reporting. An Institutional Approach

Table 5.
Citation analysis

Table 6.
Top seven lead papers
in clusters using a
weighted score
citations

Cluster 1 (red, 21 papers) sustainability reporting and disclosures	Cluster 2 (green, 18 papers) third-party assurance and assurance services	Cluster 3 (blue, 16 papers) user confidence in assurance reports and their evaluation	Cluster 4 (yellow, 10 papers) adoption of sustainability assurance statements
Simnett <i>et al.</i> (2009) Hahn and Lulfs (2014)	Perego and Kolk (2012) Perego (2009)	Deegan <i>et al.</i> (2006) O'dwyer (2011)	Kolk and Perego (2010b) DiMaggio and Powell (1983)
Patten (2002) Dhaliwal <i>et al.</i> (2011) Michelon <i>et al.</i> (2015) Suchman (1995)	O'dwyer (2011) O'Dwyer <i>et al.</i> (2011) Hodge <i>et al.</i> (2009) Becatti and Manetti (2009)	Hodge <i>et al.</i> (2009) Jones and Solomon (2010) Park and Brorson (2005) O'Dwyer and Owen (2005)	Kolk and Perego (2010b) Becatti and Manetti (2009) Meyer and Rowan (1977) Gray (2000)
Dhaliwal <i>et al.</i> (2012)	O'Dwyer and Owen (2005)	Mock <i>et al.</i> (2007)	Simnett and Huggins (2015)

used the weighted citation count provided by VOSviewer to ensure high-quality articles in cluster analysis. We summarize the findings of each cluster's seven most influential studies, with Cluster 1 leading the list.

Further analysis using an in-depth content analysis of the clusters shows four themes identified based on three leading studies in each cluster. The theme of Cluster 1 concentrated on sustainability reporting and disclosures. Cluster 2 focused on third-party assurance engagement and assurance services. Cluster 3 concentrated on user confidence in assurance reports. Lastly, Cluster 4 concentrated on the adoption of sustainability assurance statements (see Figure 4).

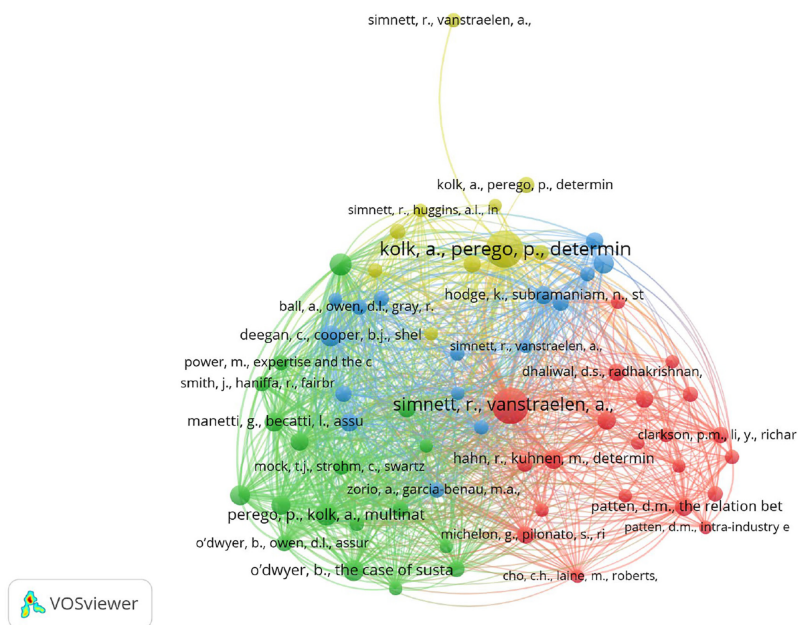


Figure 4.
Co-citation network of
reference map

3.5 Keywords analysis

The key research direction for future studies can be seen in the patterns in the keywords shown in various studies (Pesta *et al.*, 2018). This study extracts the author's keywords and uses the VOSviewer software, which other authors have previously used (Anand *et al.*, 2020; Khatib *et al.*, 2021). The VOSviewer software creates a co-occurrences network in a dimensional map (Anand *et al.*, 2020) (see Figure 5).

It is suggested that a dimensional map based on keywords can communicate with global representations of concepts and their associated relationships (Walter and Ribière, 2013). Subsequent studies by Chen and Xiao (2016) indicate that the relationship between keywords reveals the knowledge structure of the research domain. The keywords analysis showed 1,447 keywords, but some of the keywords' duplication led to 1,371 keywords meeting the study's threshold. The main keywords used in the study show that CSR has 135 occurrences, Sustainability reporting has 120 occurrences, sustainability assurances have 48 occurrences and assurance providers have 13 occurrences. Table 7 shows the 36 keywords in the sustainability assurance study. Even though our study's theme is sustainability assurance, we found most studies were on sustainability reporting and CSR. A close examination of the map shows the thematic areas that researchers are engaged in. The following thematic areas include (1) sustainability assurance with its associated assurance levels and providers of assurance services, (2) sustainability reporting in terms of social performances and environmental performances, (3) the role of CSR committees and CSR performances, (4) the impact of carbon disclosure and carbon performances and (5) do independent directors affect social and environmental accounting or environmental management? It should be noted that several aspects of sustainability assurances, including report format (integrated reporting or stand-alone reporting), has received limited attention. Also, we see that not all sustainability reporting includes assurance by external parties or external assurance.

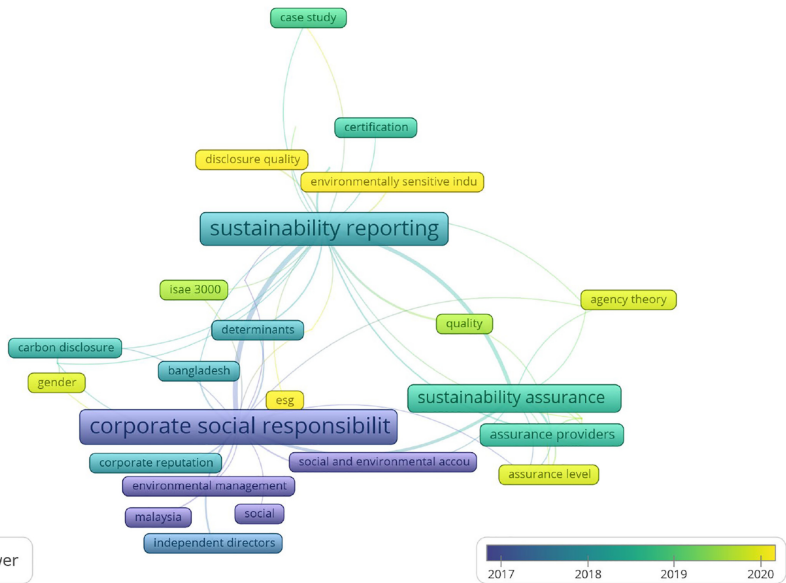


Figure 5.
Bibliometric map of
author keywords
co-occurrence with five
minimum occurrences
and overlay
visualization mode

Keyword	TO	Keyword	TO	Assurance in global trends
Corporate social responsibility	135	Environmentally sensitive industries	4	121 Table 7. Thirty-six keywords occurring in the period between 2005 and 2022
Sustainability reporting	120	ESG	4	
Sustainability assurance	48	Genderik	4	
Assurance providers	13	Independence	4	
Agency theory	4	Independent directors	4	
Assurance level	4	Industry specialization	4	
Bangladesh	4	Institutional logics	4	
Carbon disclosure	4	Internationalization	4	
Carbon performance	4	ISAE 3000	4	
Case study	4	Malaysia	4	
Certification	4	Neo-institutional theory	4	
Corporate reputation	4	Normativity	4	
CSR committee	4	Quality	4	
CSR performance	4	Social	4	
Determinants	4	Social and environmental accounting	4	
Disclosure quality	4	Stakeholder management	4	
Environmental management	4	Sustainability reporting assurance	4	

4. Discussions and future research agenda

The study is structured under different objectives with research questions. The first objective sought to describe the current trends of sustainability assurance studies. There is a gradual increase in the subject area. Recent demands by stakeholders on the authenticity of integrated reports are increasing the need to assure the sustainability reports of listed firms. Current information indicates that sustainability assurance is not mandatory, even though some countries have mandated preparing sustainability reports (Velte and Stawinoga, 2017). The top leading countries for sustainability assurance studies are occupied by Spain and the US. South Africa is the only African country with significant studies on sustainability assurance. It is suggestive that the lack of studies on the African continent lacks data on the sustainability performance of the listed firms.

The second objective assesses the country of authorship of co-authorship analysis. The most productive country in terms of publication in sustainability assurance is Spain, and the least among the countries is Taiwan. However, Figure 2 shows that the UK has the most collaboration, with 24 links and 93 times co-authorship. The second most collaborated country is Australia, which has 19 links and 68 times co-authorship. Reasons for the UK having more links than Spain, which is the most productive country with more publications, may be attributed to the influx of more international students completing second and third degrees in the United Kingdom (Khatib et al., 2021). The influx of students to China and India is gradually causing increased studies, and sustainability assurance is an emerging study in emerging countries. Future studies can look at emerging countries like Africa, India and China and compare sustainability practices against the developed economies.

The third objective of this study assesses the most influential journal within the study area and whether the journal that publishes sustainability assurance is highly rated. The top journal, such *Journal of Business Ethics* and *Business Strategy and Environment*, which has high citation and average citation per article, is among the journal that publishes sustainability assurance papers. The rankings are between A* and A, and it is suggestive that good journals are interested in publishing in the sustainability assurance domain.

The fourth objective of this study assesses the most popular articles within the sustainability assurance research. The most cited papers by Hahn and Lulfs (2014) focus on determinants of sustainability reporting: A review of results, trends, theory and opportunities

in an expanding field of research. Other authors include [Kolk and Perego \(2010b\)](#) and [O'Dwyer and Owen \(2005\)](#) concentrated on adopting and evaluating sustainability assurance statements. [Fifka \(2013\)](#) focused on a meta-analysis of CSR reporting and its determinants. [O'Dwyer et al. \(2011\)](#) sought to examine the legitimacy of assurance forms.

The fifth objective of the paper assesses the intellectual structure of the knowledge on sustainable assurance. A close examination of the map shows the thematic areas that researchers are engaged in. The following thematic areas include (1) sustainability assurance with its associated assurance levels and providers of assurance services, (2) sustainability reporting in terms of social performances and environmental performances, (3) the role of CSR committees and CSR performances and (4) the impact of carbon disclosure and carbon performances. It should be noted that several aspects of sustainability assurances, including report format (integrated reporting or stand-alone reporting), has received limited attention. Also, we see that not all sustainability reporting includes assurance by external parties or external assurance. Therefore, the analysis of pre- and post-engagement of sustainability assurance and its effect on other variables. Similarly, many countries operate voluntary sustainability assurance reports, but they need to make it mandatory to help CSR reports and sustainability reports to receive legitimacy from stakeholders.

5. Conclusion

This study aims to identify the main research development in sustainability assurance. This study uses bibliometric analysis to assess the global trend in sustainability assurance studies. The methodology is based on descriptive, performance and science mapping. The set is based on 655 documents from the Scopus database, covering 2005 to 2022. The findings from the study suggest that sustainability studies are relevant, and the researcher's examination of the domain has dramatically increased from 2014 to date. This is due to the rise in the concerns expressed by stakeholders in satisfying themselves about the firm's responsibility to the sustainable development agenda 2030. Our findings also show that most research on sustainability assurance is from Spain, USA, UK and Australia. However, the UK has the most collaboration in terms of co-authorship. It is suggestive that the UK has more links than Spain, which is the most productive country with more publications. This may be attributed to the influx of more international students completing a second and third degree in the UK. The study highlights intellectual foundations and emerging trends and outlines avenues for future studies. Some themes include sustainability assurance with its associated assurance levels and providers of assurance services, sustainability reporting in terms of social performances and environmental performances, the role of CSR committees and CSR performances and the impact of carbon disclosure and carbon performances.

5.1 Recommendation

The study's outcome draws scholars' attention to the limited engagement given to African countries. Stakeholders in emerging economies, including African countries, need to demand assurance from sustainability reports submitted by listed firms. The importance of environmentally sensitive industries and sustainability assurance is also an emerging area requiring researchers' attention. Policymakers and academia should direct the necessary research toward such fields.

5.2 Contribution to study

Previous studies have undertaken meta-analysis and literature review on sustainability assurance ([Velte and Stawinoga, 2017](#)) and sustainability reporting using a bibliometric analysis ([Pasko et al., 2021](#)), but this is the first study that examines sustainability assurance

using the bibliometric analysis. The outcome of this study allowed the domain of sustainability assurance to be better understood through the revelation of the seminar papers and their focus on the title of the studies. Secondly, the mappings from citation and keywords analysis to project this study to the new areas are yet to receive attention, including assurance levels and gender diversity in sustainability assurance. Sustainability assurance and disclosure quality are emerging areas that need researchers' attention. Theories such as the agency theory are being revisited by researchers in relation to sustainability assurance studies. Understanding these subsets leads to the future direction of the studies in sustainability assurance and its cross-discipline research by combining sustainability assurance and its effect on other variables.

5.3 Limitations

Our study has some limitations. The search technique was limited to abstracts and titles of articles and may exclude some papers that do have abstracts. The study extracted the data from Scopus, and even though Scopus has the highest data sources, it does not cover all databases of research on sustainability assurance. For example, the study excluded articles from the Web of Science because of inaccessibility. Also, this study is limited to English publications only, and the area only covers the scope of business, management, finance and economics. Using multiple databases will improve the data search and reduce the search limitation.

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Further reading

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