











“Sustainability reporting nexus to corporate governance in scholarly literature”

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SUSTAINABILITY REPORTING NEXUS TO CORPORATE GOVERNANCE IN SCHOLARLY LITERATURE

Abstract

Sustainability reporting has become a practice of the majority and is decided by boards of directors as the supreme governing body in the decision-making process of companies. The paper provides a high-view picture and visualizes research to portray the historical shifts in sustainability reporting nexus to corporate governance through an analysis utilizing CiteSpace software on 935 articles published in Web of Science Core Collection from 2009 to 2021.

The number of papers in the area has expanded, especially since 2013 (a branching point), while the study determines a type of bifurcation spot (the year 2017) that evinces the SR-CG field maturity. The study determined the dominant countries through affiliated to them researchers (the United Kingdom, Spain, Italy, China and Australia), the most esteemed journals (Journal of Business Ethics, Business Strategy and the Environment and Accounting, Auditing & Accountability Journal), and the major co-occurrence of hot keywords (carbon disclosure project, environmental disclosure quality, integrated reporting, financial performance, foreign director, environmental reporting, public sector, sustainability assurance statement).

The paper identifies principal issues where SR-CG research lags (dearth of those research in developing economies and geographical limitation of research) and unravels uncharted so far domains (jurisdictions-related studies) in the realm. Future research in the realm is likely to focus on ESG, disclosures and governance performance, as well as on specific areas (geography, industry, etc.), and will explore in depth the role of multiple factors together. This papers indicate the growing convergence between SR and CG in literature, and given predominance of 'SR as a function of CG' approach a more stalwart and sound CG framework could bring about more tenable SR practices. The paper puts forward an agenda for advancing forthcoming research in the realm of SR-CG interdependence.

Keywords

sustainability reporting, corporate governance, board's composition, ESG, corporate social responsibility, scientometric, CiteSpace, web of science core collection

JEL Classification

G34, M14, Q56

INTRODUCTION

Sustainability reporting (SR) for the last decade has gone from voluntary to in many instances mandatory enterprise and a voluminous number of companies are being reported sustainability-related disclosures (Gerwing et al., 2022). In its latest global survey, KPMG reveals that a whopping 96 per cent of G250 companies (global 250 largest corporation by revenue according to the Fortune 500 ranking of 2019) reports on sustainability and about 80% of N100 companies (a global sample of 5,200 firms) (KPMG, 2020, p. 10), thus, confirming that sustainability reporting already morphed into the practice of majority.

In turn, the issue of corporate governance (CG) has for a long time attracted the interests of researchers as in essence good management is at the core of companies' success (Makarenko et al., 2020; Masud et

al., 2018; Pasko et al., 2021e; Tibiletti et al., 2020). Governance permeates all corners of firms, therefore sustainability reporting practices as well is an issue that is decided by boards of directors as the supreme governing body in the decision-making process of companies (Pasko et al., 2021e; Tibiletti et al., 2020). Undoubtedly, the connection between the governance structure and sustainability reporting policies is fundamental to shaping the companies' strategic vision (Sokil et al., 2020; Tibiletti et al., 2020). This linkage is of paramount importance in terms of further development of sustainability reporting and sustainability-related stances companies take. The next stage in the development of SR is a leap from quantity to quality, and in this matter, corporate governance and board attributes play a key role, because it is recognized that in many cases firms are incentivized to report on sustainability intending to conceal their other corporate malpractice, like earnings management (Pasko et al., 2021a).

This study comes from an assumption that the appearance of links such as typologies of internal vs. external CG and SR contrivances, responsible governance, and generally increased appreciation of interconnection between SR and CG in the shape of structures, policies and deeds warrants a thorough assessment. A number of first-rate reviews have determined the tempo of research in the realm (Garriga & Melé, 2004; Zaman et al., 2022). Yet, these extant reviews hardly cover the full spectrum of associations between SR and CG, while using differing from this study method. Thus, in spite of a generous research pool existing on SR nexus to CG, there is an absence of common consent on the essence of the association between these two notions and on how this connection materializes throughout diverse institutional settings (Garriga & Melé, 2004; Zaman et al., 2022).

1. LITERATURE REVIEW

Sustainability reporting unlike customary financial reports providing data on only financial performance supplies details on economic, social and environmental performance to a panoply of stakeholders (Junior et al., 2014; La Torre et al., 2020). Sustainability reporting as a vehicle for environmental and social disclosures is a key tool for strengthening transparency and informing wider stakeholders about companies' short- and long-term strategies, actions and policies regarding the environment firms operate (Adams, 2020; La Torre et al., 2020; Székely & Vom Brocke, 2017). Sustainability-related disclosures are one of the instruments to advance accountability for the exploitation of natural resources in the provision of products and services between corporations, enhance company image, stimulate the workforce and facilitate competitiveness in a tightly competitive market (Adams & Whelan, 2009; Correa-Garcia et al., 2020; Tumwebaze et al., 2022).

From the literature, there are studies covering the effect of corporate governance on sustainability reporting from various angles, although almost exclusively on structural, demographic, or ownership factors of boards (Mazutis et al., 2022). Be it women in the boardroom and overall Board

Gender Diversity (Ben-Amar et al., 2017; Bruna et al., 2022), various CEO characteristics like narcissism (Ahn et al., 2020; Hong et al., 2022), institutional investors (Kordsachia et al., 2022), ownership structure (Dam & Scholtens, 2012; Dong et al., 2022).

Managerial entrenchment as a phenomenon closely related to SR is also considered widely (Garcia-Sanchez et al., 2020; Surroca et al., 2020). In fact, the very relationship SR-CG this study is studying is being extensively researched as well (Jain & Jamali, 2016; Jizi, 2017; Pasko et al., 2021e).

Zaman et al. (2022) indicates that researchers approach this issue from different points of view, although, in general, two broad approaches can be distinguished: 1) SR as a function of CG; and 2) CG as a function of SR (Zaman et al., 2022). Approach 'SR as a function of CG' is built on how various configurations and alterations in the corporate governance system, and its processes affect the company's policy and practice in the field of SR. Conversely, the second approach 'CG as a function of SR' emphasizes that the SR is a means of strengthening CG, building an effective and responsible CG. It should be noted that today the approach 'SR as a function of CG' prevails, being the default approach in most research in this field (Zaman et al., 2022).

Analysis from a point of view of the national business system from an institutional perspective is also revealing, showing that the predominance of papers devoted to the SR-CG link is related to advanced liberal market economies (about 60% of papers), followed by emerging economies (about 20%) (Zaman et al., 2022). This indicates a dearth of research on these issues in developing economies and this is related in many aspects to the insipient state of corporate governance, the stock market, and the stakeholders' engagement in these jurisdictions.

Despite this setting, though, notwithstanding the extensive search, it was impossible to identify a single literature scientometric review study devoted exactly to CG-SR linkage. Thus, aiming to provide researchers with a more quantifiable high-view picture of the field this paper performs a scientometric review of 935 articles related to the topic issued during the period from 2009 to 2021 and indexed in the Web of Science Core Collection. This scientometric review is intended to supplement and enhance extant literature by integrating a quantitative standpoint into it. The paper resorts to scientometrics to achieve the analysis of the results of "the study of science, technology, and innovation from a quantitative perspective" (Leydesdorff & Milojević, 2012, p. 1). Scientometrics is concerned with the analysis of citations in the academic literature and basically, scientometrics can be viewed as the quantitative method of research on the development of science as an informational process (Mingers & Yang, 2017).

In light of the foregoing, the paper aims to map global research on the CG-SR nexus over the last decade based on scholarly literature analysis on data from the Web of Science Core Collection. The goal of the paper is a systematization of the most consequential literature produced by research community worldwide over the last decade on SR nexus to CG thereby refining its research fields and revealing trends.

2. METHODOLOGY

2.1. Data collection and screening

This study uses the Web Science Core Collection as the data source.

The inclusion and exclusion criteria of this study are presented in Table 1.

Table 1. Inclusion and exclusion criteria of sample selection

Criterion	Eligibility	Exclusion
Database	Web of Science Core Collection	All other
Document type	Article	Conference paper, book chapter, review
Source type	Journals	Book series, book
Publication stage	Final	Article in press
WoS categories	All	–
Language	English	Non-English
Period	Between 2009 – December 2021	< 2009, & > December 2021
Search formula	See table 2	All not included in table 2

In order to focus the search results on the original academic research, the authors select the language in the search as English and the document type as research papers. The authors perform a search on September 2022 and intently limited ourselves to that period in order to cover a decade-long period. The search conditions are 2009–2021, the language is English, and the document type is Article. The overall search formula used in this article is presented in Table 2. The search result for this article is a total of 935 related articles.

Table 2. The search formula used in the study

Corporate governance	Sustainability reporting
TS="corporate governance" or TS="governance" or TS="board of directors" or TS="independent director" or TS="CEO duality"	TS="Global Reporting Initiative" or TS="GRI" or TS="social report*" or TS="environment* report*" or TS="sustainab* report*" or TS="CSR report*" or TS="responsib* report*" or TS="non-financ* report*" or TS="TBL report*" or TS="triple* report*" or TS="integr* report*" or TS="CSR report*" or TS="GRI report*" or TS="TBL report*" or TS="IR report*" or TS="triple bottom line report* "
The overall search formula	
((TS="corporate governance" or TS="governance" or TS="board of directors" or TS="independent director" or TS="CEO duality") and (TS="Global Reporting Initiative" or TS="GRI" or TS="social report*" or TS="environment* report*" or TS="sustainab* report*" or TS="CSR report*" or TS="responsib* report*" or TS="non-financ* report*" or TS="TBL report*" or TS="triple* report*" or TS="integr* report*" or TS="CSR report*" or TS="GRI report*" or TS="TBL report*" or TS="IR report*" or TS="triple bottom line report*")) AND LA=(English) AND DT=(Article) AND DOP=(2009-01-01/2021-12-31).	

2.2. Research tools

There are many software packages available in the field of scientific bibliometrics, including BibExcel, Carrot2, CiteSpace, CitNetExplorer, HistCite, Pajek, VOSviewer, etc. They each have different functions and advantages. For example, BibExcel is suitable for scientific measurement and pre-visualization processing. Carrot2 is the best fit for auxiliary text visualization. CiteSpace, VOSviewer are a perfect match for scientific measurement and visual analysis. CitNetExplorer is suitable for citation networks and visualization. HistCite is a network suitable for scientific measurement and citation. Pajek is suitable for network visualization analysis.

The paper utilizes CiteSpace as scientific metrology and knowledge graph drawing tool in this research, and the version used is V6.1.R2. CiteSpace is a Java-based software with comprehensive functions. The roots of CiteSpace can be traced to 2003, when “the US National Academy of Sciences proposed the concept of mapping knowledge domain” (Shiffrin & Borner, 2004, p. 5183). Currently, CiteSpace is duly recognized as “one of the most representative knowledge mapping tools” (Wu et al., 2019).

The advantages of CiteSpace for scientometrics and visualization are as follows: First, CiteSpace can output detailed statistical tables, which is conducive to the understanding of the map. Secondly, CiteSpace can perform co-occurrence analysis of bibliographic information from multiple dimensions, presenting various aspects. Third, CiteSpace has a burst word detection function, which allows us to visually see the development process of the analyzed field. It is assumed that this paper is the

first to employ this methodology in the CG-SR nexus domain, thus shedding more light on the issue and complementing the qualitative studies on the subject.

Thus, the overall research methodology (Figure 1) is built on the waterfall concept, where each other step is performed after the prior is finished. Stage-wise research construction gives reason to name it an analysis-based scientometric review.

3. RESULTS

3.1. Research profile analysis

Figure 2 is a graphical presentation of the research trend from 2009 to 2021. The number of publications that see the world can be a good indicator of the development of a certain field of research and is a proxy for researchers to assess the current state of the field and the status of the subject area.

It can be seen that before 2012, the number of articles on this topic in WoS was relatively small, not breaking through 10. Since 2013, the number of documents began to grow rapidly. Moreover, since 2017, the number of publications on the SR-CG nexus has increased by at least 20 per year, which may indicate a watershed moment. A sharp annual increase in the number of publications in this field since 2017 may indicate that the field has moved from the development stage to the maturity stage, thus, the year 2017 could be regarded as a bifurcation spot that evinces the SR-CG field maturity. In 2020, there are 42 articles more than in 2019. This shows that this research field is rapidly gaining more and more attention from researchers.

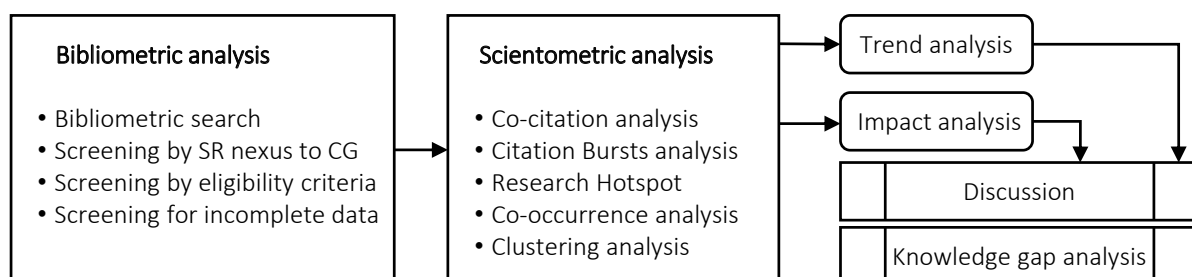
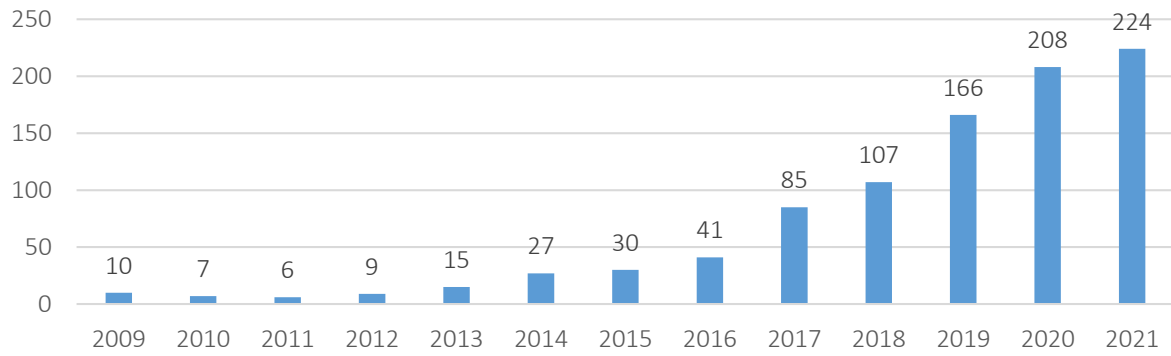


Figure 1. Summary of the overall research methodology employed



Note: Contains 935 documents.

Figure 2. Number of publications (2009–2021) forming the studies’ sample

3.2. Performance of countries

The country distribution shows the contribution of each country in the study of this issue. The following parameters for analysis are used:

- (1) Time Slicing: From JAN 2009 to DEC 2021; #Years per slice = 1;
- (2) Node Types = Country;
- (3) Links: Strength = Cosine; Scope = Within Slices;
- (4) Selection Criteria: g-index, factor k = 10;

(5) Pruning = None;

(6) look back years = 5; link retaining factor = 3.

The obtained network parameters are: N = 80, E = 286 (Density = 0.0905), largest CC = 74 (92%). For convenience Check, the position of the nodes representing each country and got the map shown in Figure 3 is adjusted.

The United Kingdom, Spain, Italy, China and Australia are the top five countries in the field of published papers. The top 10 countries are located on 5 continents, including 3 countries in Europe, 3 countries in Asia, 2 countries in North America, and 1 country each in Australia and Africa.

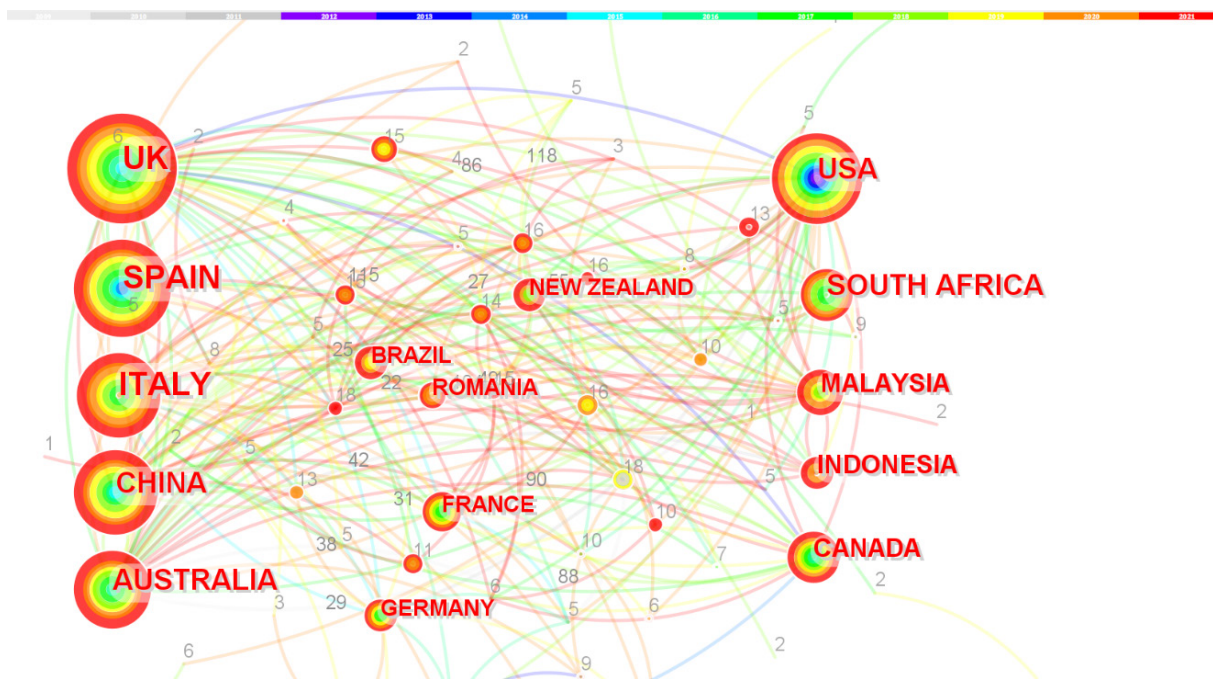


Figure 3. Number of articles in each country

Table 3. Top 20 countries in the number of articles

No.	Freq	Country	No.	Freq	Country
1	118	UK	11	31	FRANCE
2	115	SPAIN	12	29	GERMANY
3	104	ITALY	13	27	NEW ZEALAND
4	90	CHINA	14	25	BRAZIL
5	88	AUSTRALIA	15	22	ROMANIA
6	86	USA	16	18	POLAND
7	55	SOUTH AFRICA	17	18	NETHERLANDS
8	49	MALAYSIA	18	16	TURKEY
9	42	INDONESIA	19	16	PORTUGAL
10	38	CANADA	20	16	PAKISTAN

Table 3 shows the top 20 countries in terms of the number of articles published related to SR-CG nexus. To facilitate analysis, this papers merges England, Scotland, Wales, and Northern Ireland into the United Kingdom, merges the PRC and Taiwan into China. Among the top 20 countries, apart from the 8 developing countries of China, South Africa, Malaysia, Indonesia, Brazil, Romania, Turkey, And Pakistan, the other 12 are all developed countries. This shows that the research on this topic is mainly concentrated in developed countries, because these countries have relatively standardized corporate governance legal systems, and related scholars are more concerned about sustainable development issues.

3.3. Cited journals

Citation impact is used as a proxy for the usefulness, accuracy and significance of publications, sources or countries therefore often considered as a substitute for research quality (Bornmann & Wohlrabe, 2019). Notwithstanding the constraints of citation analysis, like, that citation count does not indicate breakthrough research, scholars of bibliometric by and large recognize it as a good although imperfect indicator of impact measurement (Maddi & Sapinho, 2022).

The more citations a certain journal is cited, the greater the influence the journal has published in the research field. The following parameters for analysis are used:

- (1) Time Slicing: From JAN 2009 to DEC 2021; #Years per slice = 1;
- (2) Node Types = Cited Journal;
- (3) Links: Strength = PMI (0.75); Scope = Within Slices;
- (4) Selection Criteria: Top N%; N=5%; maximum number = 40;

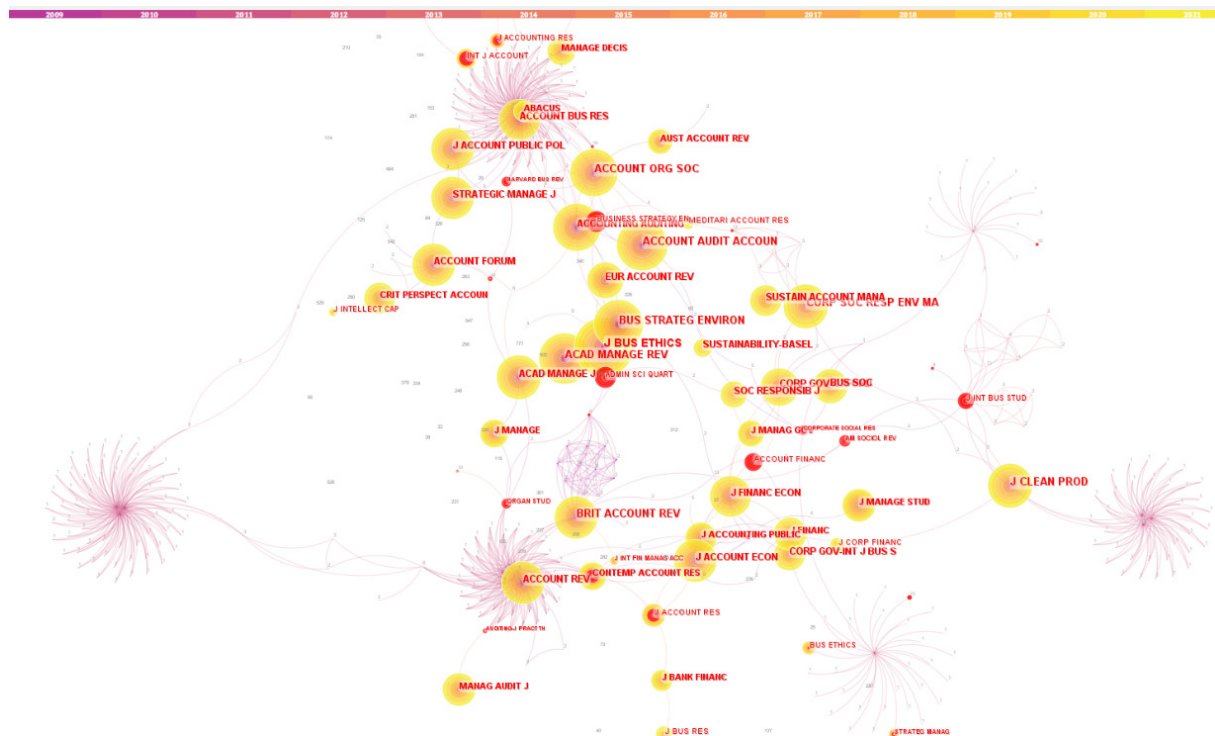


Figure 4. Co-cited journal

(5) Pruning = Pathfinder; Pruning sliced networks; Pruning the merged network;

(6) look back years = 5; link retaining factor = 3.

The obtained network parameters are: N = 80, E = 286 (Density = 0.0905), largest CC = 74 (92%).

The larger the node area representing a journal, the more times that journal is cited. Different colors represent the year cited, and the year and color are indicated at the top of the figure. The lighter the color, the later the year is being cited. Export the citation co-occurrence graph of the journals, and get the statistics of the number of citations (top 20) of the journals shown in Table 4. The full data table shows that 935 papers have been cited in 410 journals for a total of 15,347 citations.

It can be seen from Table 4 that the most cited journal is the Journal of Business Ethics (ISSN/eISSN: 0167-4544/1573-0697), followed by Business Strategy and the Environment (Online ISSN: 1099-0836), and third is Accounting, Auditing & Accountability Journal (ISSN: 0951-3574). All three journals have been cited more than 540 times. The top 20 journals have been cited more than 280 times.

3.4. Performance of authors

CiteSpace can count the number of authors' posts to understand the academic output of researchers. The settings in CiteSpace are as follows:

(1) Time Slicing: From JAN 2009 to DEC 2021; #Years per slice = 1;

(2) Node Types = Author;

(3) Links: Strength = Cosine; Scope = Within Slices;

(4) Selection Criteria: g-index; k = 90;

(5) Pruning = None;

(6) look back years = 5; link retaining factor = 3.

Use the export function of CiteSpace to export the network summary table. According to statistics, a total of 819 authors participated in the creation of 935 papers. By intercepting the authors whose number of articles is greater than or equal to 5, the paper gets Table 5.

Table 4. Statistics of cited journals

#	Freq	Journal full name	Journal name abbreviation	ISSN	E-ISSN
1	777	Journal of Business Ethics	J BUSETHICS	0167-4544	1573-0697
2	547	Business Strategy and the Environment	Bus STRATEGENVIRON	–	1099-0836
3	542	Accounting, Auditing & Accountability Journal	Account AUDITACCOUN	0951-3574	–
4	529	Corporate Social Responsibility and Environmental Management	Corp SOCRESPEENVMA	–	1535-3966
5	526	Journal of Cleaner Production	J CLEANPROD	0959-6526	1879-1786
6	502	Academy of Management Review	Acad MANAGEREV	0363-7425	1930-3807
7	484	Accounting, Organizations and Society	Account ORGSOC	0361-3682	–
8	425	The British Accounting Review	Brit ACCOUNTREV	0890-8389	–
9	379	Strategic Management Journal	Strategic MANAGEJ	0143-2095	1097-0266
10	378	Journal of Accounting and Public Policy	J ACCOUNTPUBLICPOL	0278-4254	–
11	376	The Accounting Review	Account REV	0001-4826	–
12	361	Journal of Financial Economics	J FINANCECON	0304-405X	–
13	340	Accounting Forum	Account FORUM	0155-9982	1467-6303
14	334	Academy of Management Journal	Acad MANAGEJ	0001-4273	–
15	334	Corporate Governance: An International Review (Oxford)	Corp GOV-OXFORD	0964-8410	–
16	326	Journal of Accounting, Auditing & Finance	Accounting AUDITING	0148-558X	–
17	284	Corporate Governance International Journal of Business in Society	Corp GOV-INTJBUSS	1472-0701	1758-6054
18	282	Journal of Accounting and Economics	J ACCOUNTECON	0165-4101	–
19	281	Accounting and Business Research	Account BUSRES	0001-4788	2159-4260
20	280	Sustainability Accounting, Management and Policy Journal	Sustain ACCOUNTMANA	2040-8021	–

Table 5. Number of articles published by authors

No.	Number of articles	Author
1	28	Garcia-Sanchez, I.
2	12	Gallego-Alvarez, I.
3	11	Martinez-Ferrero, J.
4	11	Buallay, A.
5	10	Raimo, N.
6	10	Consuelo Pucheta-Martinez, M.
7	10	Vitolla, F.
8	9	Al-Shaer, H.
9	9	Maroun, W.
10	7	Kilic, M.
11	7	Rodriguez-Ariza, L.
12	6	Rubino, M.
13	5	Garcia-Benau, M.
14	5	Amran, A.
15	5	Uyar, A.
16	5	Rashid, A.
17	5	Zorio-Grima, A.
18	5	Frias-Aceituno, J.
19	5	Karaman, A.

It can be seen from Table 5 that the author with the most articles published is Garcia-Sanchez and the number of articles published is 28. Followed by Gallego-Alvarez (published 12 articles), Martinez-Ferrero and Buallay tied for third place (both published 11 articles each).

3.5. Institutions

Analyzing the researcher’s institution can understand the contribution of each institution to the research topic and the academic cooperation between the research institutions. The parameters in CiteSpace are set as follows:

- (1) Time Slicing: From JAN 2009 to DEC 2021; #Years per slice = 1;
- (2) Node Types = Institution;
- (3) Links: Strength = Cosine; Scope = Within Slices;
- (4) Selection Criteria: g-index; k = 65;
- (5) Pruning = None;
- (6) look back years = 5; link retaining factor = 3.

Export the network summary table, and intercept the institutions whose number of articles is greater than or equal to 6 and the results in Appendix A.

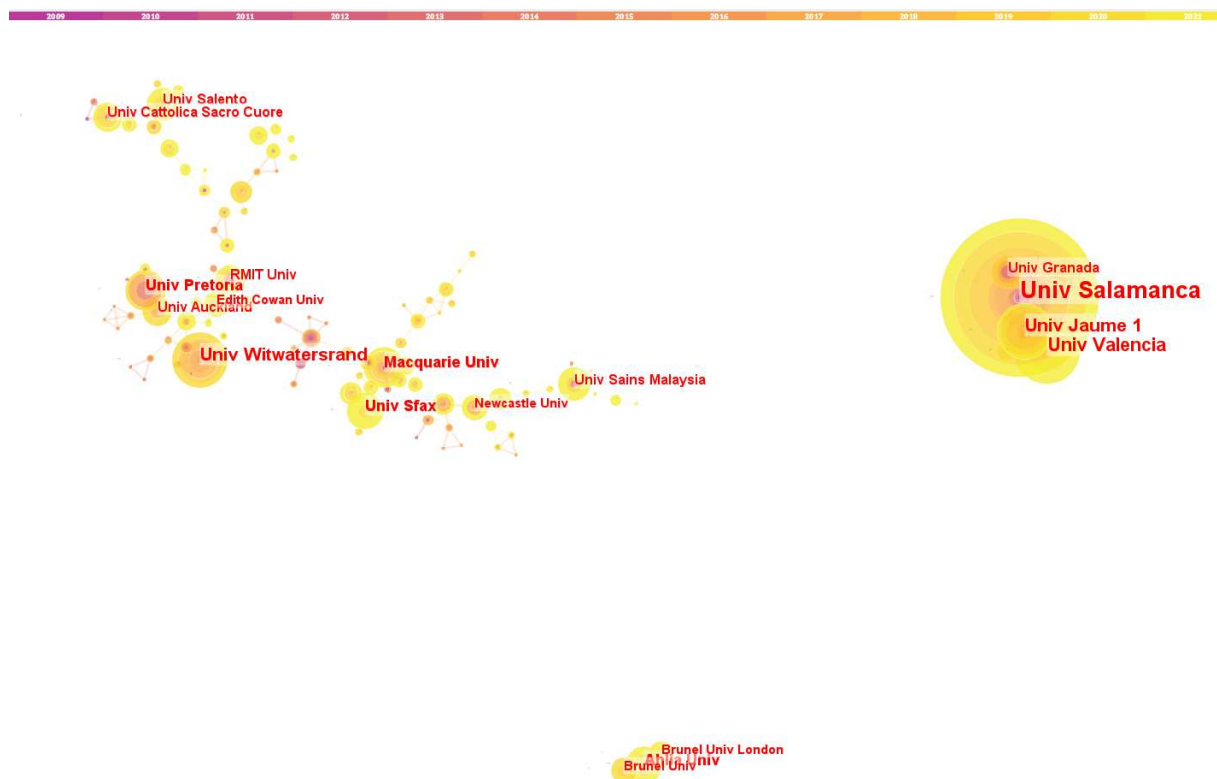


Figure 5. Map of articles published by institutions

From Appendix A, it can be seen that University Salamanca is the No.1, publishing 43 articles, which is greater than the sum of No. 2, and No. 3 taken together. The organization with the second largest number of articles published is University Valencia, with 18 articles published, while University Witwatersrand tied for third place with 15 articles.

3.6. Co-citation analysis of articles

Document co-citation analysis means that two or more articles are cited by one or more subsequent articles at the same time. If two articles have a co-citation relationship, then the two articles have similar themes. Through co-citation analysis, documents with greater influence could be found.

The references in CiteSpace are analyzed using the following parameters:

- (1) Time Slicing: From JAN 2009 to DEC 2021; #Years per slice = 1;
- (2) Node Types = Reference;
- (3) Links: Strength = Cosine; Scope = Within Slices;

(4) Selection Criteria: g-index; $k = 5$;

(5) Pruning = Pathfinder; Pruning sliced networks; Pruning the merged network;

(6) look back years = 5; link retaining factor = 3.

Export the network summary table and intercept the top 30 cited articles, and the results are in Table 6.

Thus, the three most cited articles are Liao et al. (2015), Zhou et al. (2017) and Adams (2015). The higher the Burst value of an article, it means that the subject of this article has led to a new research trend in this research field. The top three Burst values are: Khan et al. (2013), Fifka (2013) and Jizi et al. (2014) (Appendix B).

3.7. Research hotspot

The co-occurrence analysis of the research keywords can understand the hot topics in the research field and the degree of attention to these topics. The co-occurrence of keywords reveals the links, or the inter-closeness among them (Jin et al., 2019). The hotspot in CiteSpace are analysed

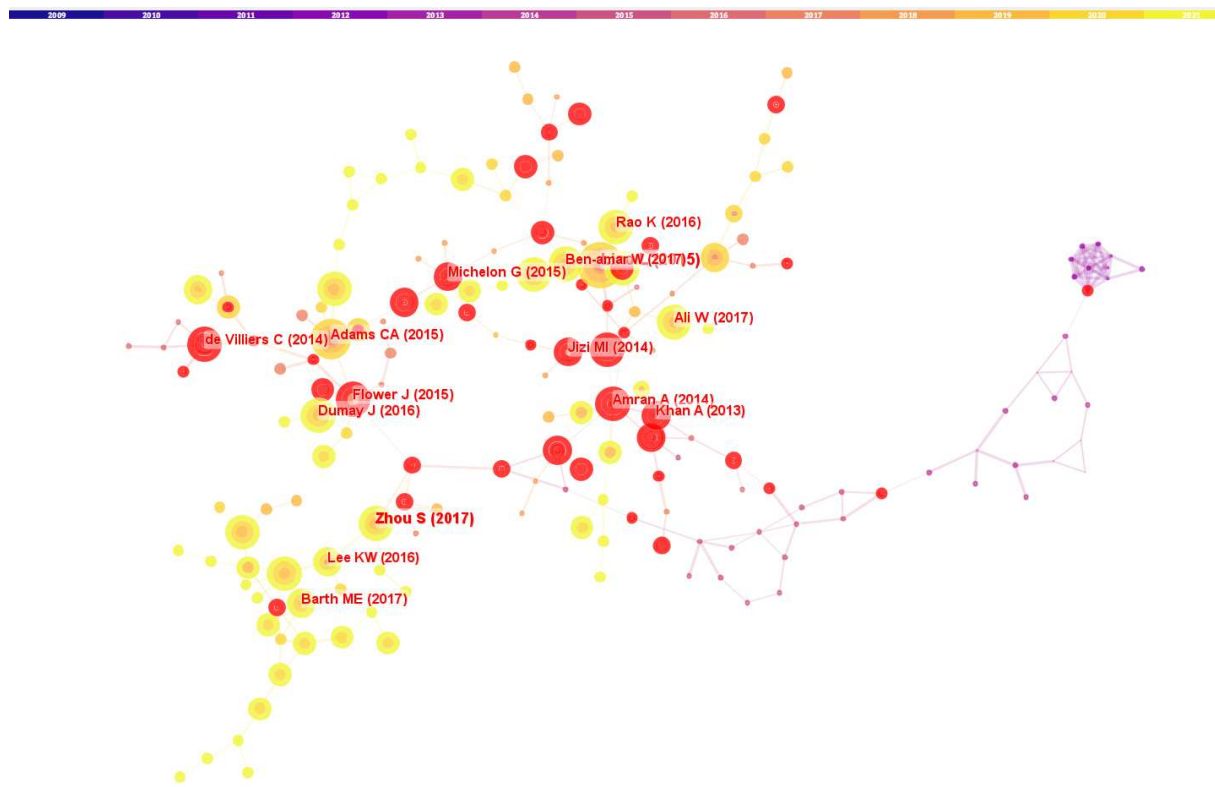


Figure 6. Co-cited article map

Table 6. Statistics of the number of references cited

No.	Freq	Burst	Author(s)	Year	Source	DOI
1	56	–	LinLiao, Le Luo, Qingliang Tang	2015	The British Accounting Review	10.1016/j.bar.2014.01.002
2	48	–	Shan Zhou, Roger Simnett, Wendy Green	2017	A Journal of Accounting, Finance and Business Studies	10.1111/abac.12104
3	41	–	Carol A. Adams	2015	Critical Perspectives on Accounting	10.1016/j.cpa.2014.07.001
4	41	–	Waris Ali, Jedrzej George Frynas, Zeeshan Mahmood	2017	Corporate Social Responsibility and Environmental Management	10.1002/csr.1410
5	40	–	John Dumay, Cristiana Bernardi, James Guthrie, Paola Demartini	2016	Accounting Forum	10.1016/j.accfor.2016.06.001
6	39	–	Mary E. Barth, Steven F. Cahan, Li Chen, Elmar R. Venter	2017	Accounting, Organizations and Society	10.1016/j.aos.2017.08.005
7	39	–	Kathyayini Rao, Carol Tilt	2016	Journal of Business Ethics	10.1007/s10551-015-2613-5
8	38	3.57	John Flower	2015	Critical Perspectives on Accounting	10.1016/j.cpa.2014.07.002
9	37	11.2	Mohammad Issam Jizi, Aly Salama, Robert Dixon, Rebecca Stratling	2014	Journal of Business Ethics	10.1007/s10551-013-1929-2
10	36	5.66	Giovanna Michelon, Silvia Pilonato, Federica Ricceri	2015	Critical Perspectives on Accounting	10.1016/j.cpa.2014.10.003
11	36	9.26	Azlan Amran, Shiau Ping Lee, S. Susela Devi	2014	Business Strategy and the Environment	10.1002/bse.1767
12	34	8.74	Charl de Villiers, Leonardo Rinaldi, Jeffrey Unerman	2014	Accounting, Auditing & Accountability Journal	10.1108/AAAJ-06-2014-1736
13	33	–	Kin-Wai Lee, Gillian Hian-Heng Yeo	2016	Review of Quantitative Finance and Accounting	10.1007/s11156-015-0536-y
14	30	–	Walid Ben-Amar, Millicent Chang, Philip McIlkenny	2017	Journal of Business Ethics	10.1007/s10551-015-2759-1
15	30	13.84	Arifur Khan, Mohammad Badrul Muttakin, Javed Siddiqui	2013	Journal of Business Ethics	10.1007/s10551-012-1336-0
16	29	–	J. A. Fuente, I. M. García-Sánchez M. B. Lozano	2017	Journal of Cleaner Production	10.1016/j.jclepro.2016.09.155
17	28	–	Lin Liao, Teng Lin, Yuyu Zhang	2018	Journal of Business Ethics	10.1007/s10551-016-3176-9
18	28	–	Gary F. Peters, Andrea M. Romi	2015	AUDITING: A Journal of Practice & Theory	10.2308/ajpt-50849
19	28	–	Charl de Villiers, Elmar R. Venter, Pei-Chi Kelly Hsiao	2017	Accounting & Finance	10.1111/acfi.12246
20	27	11.59	Matthias S. Fifka	2013	Business Strategy and the Environment	10.1002/bse.729
21	27	3.65	Mohammad Jizi	2017	Business Strategy and the Environment	10.1002/bse.1943
22	27	4.22	Merve Kiliç, Cemil Kuzey, Ali Uyar	2015	Corporate Governance	10.1108/CG-02-2014-0022
23	26	–	Cemil Kuzey, Ali Uyar	2017	Journal of Cleaner Production	10.1016/j.jclepro.2016.12.153
24	26	4.27	Roger Simnett, Anna Louise Huggins	2015	Sustainability Accounting, Management and Policy Journal	10.1108/SAMPJ-09-2014-0053
25	26	–	Gaia Melloni, Ariela Caglio, Paolo Perego	2017	Journal of Accounting and Public Policy	10.1016/j.jaccpubpol.2017.03.001
26	26	11.15	José V. Frias-Aceituno, Lazaro Rodriguez-Ariza, I. M. Garcia-Sanchez	2013	Corporate Social Responsibility and Environmental Management	10.1002/csr.1294
27	25	–	Cristiana Bernardi, Andrew W. Stark	2018	The British Accounting Review	10.1016/j.bar.2016.10.001
28	22	–	Diogenis Baboukardos, Gunnar Rimmel	2016	Journal of Accounting and Public Policy	10.1016/j.jaccpubpol.2016.04.004
29	22	3.43	Marlene Plumlee, Darrell Brown, Rachel M. Hayes, R. Scott Marshall	2015	Journal of Accounting and Public Policy	10.1016/j.jaccpubpol.2015.04.004
30	22	–	Anna Pistoni, Lucrezia Songini, Francesco Bavagnoli	2018	Corporate Social Responsibility and Environmental Management	10.1002/csr.1474



Figure 7. Keyword clustering map

using the following parameters: (1) Time Slicing: From JAN 2009 to DEC 2021; #Years per slice = 1; (2) Node Types = Keyword; (3) Links: Strength = Cosine; Scope = Within Slices; (4) Selection Criteria: Top N%; top 10%; maximum number = 75; (5) Pruning = Pathfinder; Pruning sliced networks; Pruning the merged network; (6) look back years = 5; link retaining factor = 3. Running the analysis and clustering operations resulted in the clustering graph shown in Figure 7.

Among them, Modularity $Q = 0.792$ and Mean Silhouette $S = 0.9119$. In general, a Q value greater than 0.3 indicates that the cluster structure is significant, and an S value greater than 0.5 indicates that the clustering is reasonable.

In the keyword clustering map, the keywords shown in Table 7 is extracted. Each cluster is composed of multiple closely related subordinates. The smaller the number, the more keywords the cluster contains.

Table 7. Keyword clustering results

Cluster ID	Cluster name
0	Carbon disclosure project
1	Sri Lanka
2	Environmental disclosure quality
3	Integrated reporting

Cluster ID	Cluster name
4	Financial performance
5	Foreign director
6	Environmental reporting
7	Public sector
9	Sustainability assurance statement

Important topics in the field of SR-CG nexus research include carbon disclosure projects, environmental disclosure quality, integrated reporting, financial performance, foreign director, environmental reporting, public sector, and sustainability assurance statement.

3.8. Future research trends

In searching for future research directions, the study summarized articles published in 2021 to identify innovative research opportunities. The following parameters were used to generate keyword co-occurrence maps and derive keyword clustering tables. (1) Time Slicing: From JAN 2021 to DEC 2021; #Years per slice = 1; (2) Node Types = Keyword; (3) Links: Strength = Cosine; Scope = Within Slices; (4) Selection Criteria: Top N%; top 10%; maximum number = 75; (5) Pruning = Pathfinder; Pruning sliced networks; Pruning the merged network; (6) look back years = 5; link retaining factor = 3. The results are shown in Table 8.

Table 8. Future research directions

No.	Cluster size	Research direction
1	30	ESG European companies
2	28	Cross effect
3	27	International evidence
4	26	Governance dynamics
5	25	Corporate social performance and over-investment
6	22	Corporate environmental disclosure
7	22	Construction industry look
8	18	Sustainability reporting
9	16	Independent director
10	13	Economic inhibition

Table 8 shows the top 10 largest clusters. The labelling technique is the log-likelihood ratio (LLR) (Chen et al., 2010). Cluster numbering is in descending order. The clusters are numbered in descending order of frequency and they are the main research directions for 2021 and will be the main research directions in the near future. Future research is likely to focus on ESG, disclosure and governance performance, as well as on specific areas (geography, industry, etc.), and will explore in depth the role of multiple factors together.

4. DISCUSSION

This paper proposes a systematization of the most consequential literature produced by research community worldwide over the last decade on SR nexus to CG thereby refining its research fields and revealing trends.

There are some crucial implications for future research that can be drawn from this study. First, the rapid growth of the number of papers published in this field attests to a broadened research interest in the CG-SR nexus. Still, in comparison with other comparable fields, this direction is an emerging realm in terms of scholarly output in peer-reviewed sources. Given the critical interdependence of sustainability reporting on corporate governance, this direction still has considerable potential for expansion, which in turn would lead to a better understanding of the essence of SR-CG interrelations and features of their reciprocal relationship in each given jurisdiction. The paper using special technics assumes that future research is likely to focus on ESG, disclosure and govern-

ance performance, as well as on specific areas (geography, industry, etc.), and will explore in depth the role of multiple factors together.

Second, the results of this study support the statement by (Zaman et al., 2022) that 'SR as a function of CG' as opposed to 'CG as a function of SR' prevails in the literature being the default approach in most research in this field. In a broad sense, this means that by strengthening the practice and regulation of corporate governance through the broadening the scope of corporate governance to the satisfaction of all stakeholders, not only shareholders, sustainability reporting can correspondently be strengthened, while the opposite piecemeal strategy of SR enhancement are unlike to impact in turn CG mechanism.

Third, global research on the SR-CG nexus has been produced chiefly in Spain, the United States, the United Kingdom, Australia and China which not only produced most of the productive research institutions as well as prolific authors but also countries of origin most of the cited journals. This becomes more obvious and backed by another conceptual framework indicator such as keyword co-occurrence networks. This, in turn, bolsters the recommendation for the plenteous potential for growth in SR-CG research, especially in countries (regions) uncovered to date. These findings are on par with that of (Garriga & Melé, 2004; Zaman et al., 2022).

Fourth, the findings presented in this paper indicate the growing convergence between SR and CG in literature, and given predominance of 'SR as a function of CG' approach a more stalwart and sound CG framework could bring about more tenable SR practices (Minciullo et al., 2022; Zaman et al., 2021).

This indicates a dearth of research on these issues in developing economies and this is related in many aspects to the insipient state of corporate governance, the stock market, and the stakeholders' engagement activities in these jurisdictions. Future researchers are encouraged to cover white spots on the world map, given that this article could be instrumental for every rookie researcher to start this adventure, providing a solid base and starting point for such research.

CONCLUSIONS

This paper aims to map global research on the CG-SR nexus over the last decade based on scholarly literature analysis on data from the Web of Science Core Collection by refining its research fields and revealing trends.

The present results shed light on emerging and gaining traction in scholarly literature SR nexus to CG. This enables the study to classify the dominant countries, the most esteemed journals, the major co-occurrence of hot keywords, future research directions in the realm, and identify principal issues where SR-CG research lags (paucity of those studies in developing economies and geographic constraint of research) and extricates uninvestigated hitherto areas (country-specific studies) in the domain. Furthermore, two key watershed moments in the evolution of this realm of knowledge were ascertained. The year 2014 marks a divergent point there steady year-to-year increase in the number of papers institutes, while the year 2017 indicates a substantial per annum increase in the number of publications compared to the previous year, evidence that this field of research is maturing and developing various branches and specializations, thus attracting more and more researchers to the field. The study shows the effects CG can generate on SR, and vice versa, based on the analysis of about 1000 publications devoted to this topic. This paper pinpoints the ever-expanding concurrence among SR and CG in periodicals and since the approach ‘SR as a function of CG’ reigns supreme nowadays a more persistent, reasonable and robust CG framework is instrumental in bringing about more cogent and credible SR procedures. The paper nominates a research agenda for advancement in the realm of SR-CG interdependence.

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APPENDIX A

Table A1. Statistics on the number of articles published by institutions

No.	Number of Articles	University
1	43	University Salamanca
2	18	University Valencia
3	15	University Witwatersrand
4	15	University Jaume I
5	11	University Pretoria
6	11	Macquarie University
7	10	Ahlia University
8	10	University of Sfax
9	9	University Salento
10	9	University Sains Malaysia
11	9	University Granada
12	8	University Auckland
13	8	University Cattolica Sacro Cuore
14	8	RMIT University
15	7	Brunel University
16	7	Newcastle University
17	7	Brunel University London
18	7	Edith Cowan University
19	6	University Seville
20	6	American University of the Middle East
21	6	Kings College London
22	6	Bucharest University of Economic Studies
23	6	University Portsmouth
24	6	Babes-Bolyai University
25	6	Queensland University of Technology

APPENDIX B

Table B1. The top three cited and three papers with the highest Burst value

Authors, year	Bibliography	Keywords
The top three cited papers		
Liao et al. (2015)	Liao, L., Luo, L., & Tang, Q. (2015). Gender diversity, board independence, environmental committee and greenhouse gas disclosure. <i>The British Accounting Review</i> , 47(4), 409-424. https://doi.org/10.1016/j.bar.2014.01.002	Female director, independent director, environmental committee, GHG disclosure
Zhou et al. (2017)	Zhou, S., Simnett, R., & Green, W. (2017). Does Integrated Reporting Matter to the Capital Market? <i>Abacus</i> , 53(1), 94-132. https://doi.org/10.1111/abac.12104	<IR> framework, analyst forecast dispersion, analyst forecast error, cost of equity capital, integrated reporting
Adams (2015)	Adams, C. A. (2015). The International Integrated Reporting Council: A call to action. <i>Critical Perspectives on Accounting</i> , 27, 23-28. https://doi.org/10.1016/j.cpa.2014.07.001	Accountability, corporate reporting, integrated reporting, sustainability
Three papers with the highest Burst value		
Khan et al. (2013)	Khan, A., Muttakin, M. B., & Siddiqui, J. (2013). Corporate Governance and Corporate Social Responsibility Disclosures: Evidence from an Emerging Economy. <i>Journal of Business Ethics</i> , 114(2), 207-223. https://doi.org/10.1007/s10551-012-1336-0	Corporate social responsibility, corporate governance, legitimacy theory, disclosure, Bangladesh
Fifka (2013)	Fifka, M. S. (2013). Corporate Responsibility Reporting and its Determinants in Comparative Perspective – a Review of the Empirical Literature and a Meta-analysis. <i>Business Strategy and the Environment</i> , 22(1), 1-35. https://doi.org/10.1002/bse.729	Sustainability, sustainable development, corporate responsibility, environmental policy, accountability, social and environmental reporting, disclosure, literature review, meta-analysis
Jizi et al. (2014)	Jizi, M. I., Salama, A., Dixon, R., & Stratling, R. (2014). Corporate Governance and Corporate Social Responsibility Disclosure: Evidence from the US Banking Sector. <i>Journal of Business Ethics</i> , 125(4), 601-615. https://doi.org/10.1007/s10551-013-1929-2	Corporate governance, CSR disclosure, US Banks, content analysis, financial crisis