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A Bibliometric Analysis of Sustainable Leadership

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Abstract

Nowadays, every leader is concerned about sustainability in their organization. They think about the negative impact of their decisions on the environment, society, and economy. After they plan accordingly, how can they reduce and minimize their negative impact? So, sustainable leadership is the long-term leadership approach in which to study how the leader's actions and decisions impact the organizations, societies, and economies; how to balance among environmental, social, and economic sustainability and minimize the negative impact of them. The purpose of this paper is to conduct a bibliometric analysis of sustainable leadership from 1998-2025. This research analyzed 366 articles extracted through the Scopus database using the keywords "sustainable leadership" OR "sustainability leadership". The science mapping approach and performance analysis were used as an analysis technique. The publication and citation-related metrics were employed as a performance analysis. In the science mapping approach, the analysis techniques have been used as a bibliographic coupling, co-occurrence, citation and co-citation analysis. VOSviewer, R-Studio and Biblioshiny were utilized as a software tool to perform both analyses. The most productive year was 2024. The most productive and impactful author is Qaisar Iqbal. The most productive and impactful organizations are the Human Development Network and the World Bank. The most productive and impactful country is United States. Similarly, the most productive and impactful source is Sustainability. Furthermore, the most impactful article is Sahlberg (2007) and the most referenced article is (2011). The three and five clusters were identified through co-citation and bibliographic coupling analysis respectively. This research also discusses the future trends, future research directions, limitations and implications at the end of the paper.

Keywords: Sustainable leadership, Sustainability leadership, Bibliometric Analysis

Introduction

The 'Center for Sustainability Leadership' has been established by the FICCI. The founding member of the center is Hindustan Unilever Limited. Decarbonization, green entrepreneurship, and nature-based solutions are the main aims of this center. (HUL, 2023) As per 'The Economics Times', the Centre for Sustainable Development (CSD) hosted a Sustainable Leadership Summit in Bengaluru, marking the 20th anniversary of the organisation. The summit also adopted the 'Bengaluru declaration on Acceleration of Sustainable development goals (SDG).' (The Economics Times, 2023)

We often hear about the words 'sustainable' and 'sustainability'. These words look similar but are different in terms of identity and meaning. First of all, we try to know these words one by one. What is the exact meaning of these words? Firstly, we need to understand the word 'sustainable'. The word 'sustainable' is an adjective that is comprise of two words, i.e., sustain + able. Here, the former word is 'sustain' which is the 'verb' that means "to maintain or continue something for a long period" and the later word is 'able' which is the 'adjective' that means "to have the ability to do something" so we can say that sustainable literally means that 'which has the ability to sustain for a long time or generation to generation without harming environment, economic and society'. When we hear the word 'sustainable' then another pair of words come into our mind such as sustainable business, sustainable product, sustainable consumption, sustainable growth etc. The second word is 'sustainability' which is a noun that consists of two words, i.e., sustain + ability. The former word is 'sustain' which is the 'verb' that means "to make something continue for a long period" and the subsequent word is 'ability' which is the 'noun' that means "the quality or state of being able". The word 'sustainability' is a concept or practice which means "maintaining balance, particularly in environmental, economic and social contexts". When we talk about sustainability then we discuss about environmental sustainability, business sustainability, economic sustainability, social sustainability etc.

Usually, we hear, speak and see the word 'development'. Is it true development? We compromise our natural resources and human wellbeing in exchange of development. We face many challenges like environmental (global warming, pollution, climate change, deforestation, biodiversity loss etc.), social (health issues i.e., rare diseases, stress, depression, corruption etc.) and economic (inflation, poverty, unemployment, income inequality etc.) challenges. So, we need sustainable development in which we take care of all these three aspects.

Sustainable development is a path for people to use resources without the resources running out for future generations.

Now we are hearing the new word 'sustainable leadership' or 'sustainability leadership'. It is not a new word. As per the Scopus database, the first time appeared in the year 1998, in an article Lynham (1998). Now we understand the word 'Sustainable leadership' or 'sustainability leadership'. Many scholars use both terms interchangeably. Sustainable leadership is defined as an action in which the leaders think, act and lead in a sustainable manner and analyze how much positive and negative impact of their actions or decisions have on the environment, economy and society as a whole.

To know about sustainable leadership, what is the current status and past development of sustainable leadership and their future prospects so we will explore this domain through bibliometric analysis using performance analysis and a science mapping approach. As per Scopus database, three bibliometric review articles are found relevant to this research area. The first review article Hallinger & Suriyankietkaew (2018) covers the years from 1990 - 2018 with mix of bibliometric analysis and conceptual model. This review paper added the other keywords with core keywords. So, it does not give true picture of development of this domain. The second review article Aung & Hallinger (2022) covers the years from 1998–2021 with bibliometric analysis and different search strategy employed. Again, it does not provide real development of this domain. It is also limited to one specific area i.e., higher education. The third review article Jusoh et al. (2024) covers the year from 1991–2023 with bibliometric analysis. This review paper added the additional keywords with core keywords. It is limited to only one specific area business and management. Our study covers the year from 1998–2025 with bibliometric analysis and employed various analysis techniques. Our study included those articles which are related to only core keywords. So that the true picture comes out. It covers all areas which are related to social science domain. So like this, this research is distinct in many aspects from the previous studies.

This research study covers following research questions: -

What are the trends in the sustainable leadership research?

What are the most impactful and productive authors, organizations and countries in the sustainable leadership research?

What are the most impactful and productive journals in the sustainable leadership research?

What are the most impactful and referenced articles in the sustainable leadership research?

What are the intellectual structures and thematic clusters of sustainable leadership research?

What are the future trends and future research avenues of sustainable leadership research?

To get the answers of these research questions, a bibliometric analysis of the documents in sustainable leadership will be executed. The scope of the study highlights various analysis of the research area. The first research question is about the trends in which we describe the current status, growth and development of the sustainable leadership research domain. The second research question presents the most impactful and productive organizations, authors and countries in the sustainable leadership research where the total citations show the most impactful authors, organizations and countries whereas the total publications show the most productive authors, organization and counties. The third research question depicts the most impactful and the productive journals in the sustainable leadership research where the total citations show the most impactful journals whereas the total publications show the most productive journals. The fourth research question presents the most impactful and referenced articles in the sustainable leadership research where the global citations (GC) show the most impactful journals whereas the local citations (LC) show the most referenced journals. All these five units of analysis like authors, organizations, countries, documents and journals cover under the citation analysis. The fifth research question presents the intellection structures and thematic clusters of sustainable leadership research where the intellectual structures show through the co-citation analysis whereas thematic clusters show through the bibliographic coupling. The sixth research question presents the future trends and future research directions where both show through co-occurrence analysis. The fifth and sixth research question also present network analysis through visualization.

This research study is divided into seven sections. This first section presents introduction in which we covered significance of study, meaning and definition of the research area, research objectives, literature review, research gap, research questions and the scope of study. The next section shows research methodology. The third section contains findings in which we covered trends, citation, co-citations, bibliographic coupling and co-occurrence analysis. The next section offers the future research avenues. The fifth section shows the conclusion. The sixth section has the limitations. The last section shows the implications of the study.

Research Methodology

Deciding the Search Strategy and Selecting the Appropriate Keywords

The selection of keywords plays an important role in bibliometric analysis. Which documents will appear depends on the search method. Here, the core keyword is “sustainable leadership” in this study. It consists of two words i.e., sustainable and leadership. The keyword sustainable leadership is put in the inverted comma like “sustainable leadership” because the database will search only those documents in which both words appear together. If it doesn’t use inverted comma then the database will also show the two types of results in which both words appear together and both words appear separately also.

The second one will show similar results when both words are searched separately with and without inverted commas, along with the ‘and’ operator. When reviewed the documents, some scholars are also using the keyword “sustainability leadership” Both keywords look similar, but the only difference is available in the first word of both keywords with respect to spelling. The maximum documents are covered by the core keyword, but more than one third of articles were found by the secondary keywords. So, it is finally decided that both keywords will put for documents extraction with “or” operator. The database will show the documents either “sustainable leadership” or “sustainability leadership”. Another important thing is that no additional keywords or supplementary keywords have been added because the true picture will not come out of this domain. In this study So, both keywords were used for this bibliometric analysis and are shown in stage 5 of Table 1.

Table No1: Documents Inclusion and Exclusion Criteria

| Stage | Filtering Criteria | Excluded | Included |
|-------|---|----------|----------|
| 1 | Search Database: Scopus | - | - |
| 2 | Search Date: 25 January 2025 | - | - |
| 3 | Publication Period: 1998-2025 | - | - |
| 4 | Search Fields: Title, Abstract and Keywords | - | - |
| 5 | Search Term: Sustainable Leadership OR Sustainability Leadership | - | 693 |
| 6 | Subject Area: - Social Sciences, Psychology, Business, Econometrics and Finance, Management and Accounting, Multidisciplinary, Economics, Arts and Humanities | 87 | 606 |
| 7 | Document Types: Article and Review Article | 200 | 406 |
| 8 | Publication Stage: - Final | 27 | 379 |
| 9 | Source Type: - Journal | 5 | 374 |
| 10 | Language: “English” | 4 | 370 |
| 11 | Erroneous Records Screening: Documents which have only correct author information | 2 | 368 |
| 12 | Content Screening: Articles in which titles, abstracts and keywords showing relevancy of the study | 2 | 366 |

Steps for Data Collection

This research is extracted articles from Scopus database which provide wide coverage than any other database. The articles were extracted on 25 January 2025 and cover the year from 1998 to 2025. The search fields were title, abstract and keywords in which our keywords were found in those articles. The search term was sustainable leadership and sustainability leadership. The areas of subjects were covered social sciences, management and accounting, econometrics and finance, multidisciplinary, business, psychology, arts and humanities, economics. The types of documents were included articles and review articles. When the documents extracted then the publication stage was final, the source type was journal and the article language was English. In erroneous records screening, this study was included those documents which have with valid author information only. In content screening, this study was covered those articles in which titles, abstracts and keywords showing relevancy of the study. Finally, this study was selected 366 articles for the various analysis techniques.

Selection of Data Analysis Technique

Based on the research questions which were covered in this bibliometric analysis, the three types of analysis techniques were employed including performance analysis, science mapping approach and network analysis. In performance analysis, citation-and-publication-related metrics were used in this study. In science mapping approach, bibliographic coupling, co-occurrence, co-citation and citation were used as an analysis technique in this study. In network analysis, visualization technique was used in this study. Microsoft excel, VOSviewer, R-studio and Biblioshiny have been used in this study. Microsoft Excel was used as an analysis to draw results for publication trends. VOSviewer was used in the science mapping approach. R-studio and Biblioshiny were used to draw results for top-referenced articles based on the local citations (LC).

Findings

This section shows the findings of the various analysis techniques used in the bibliometric analysis.

Performance Analysis

In the figure 1, the total document(s) has been presented on the vertical-axis and the year of publication has been presented on the horizontal-axis. The publication trends were shown on sustainable leadership research as per the Scopus database from 1998 to 2025 (till 25 January). The total documents are three hundred and sixty-six after inclusion and exclusion criteria during the periods in which three hundred and thirty-nine are the articles and twenty-seven are review articles.

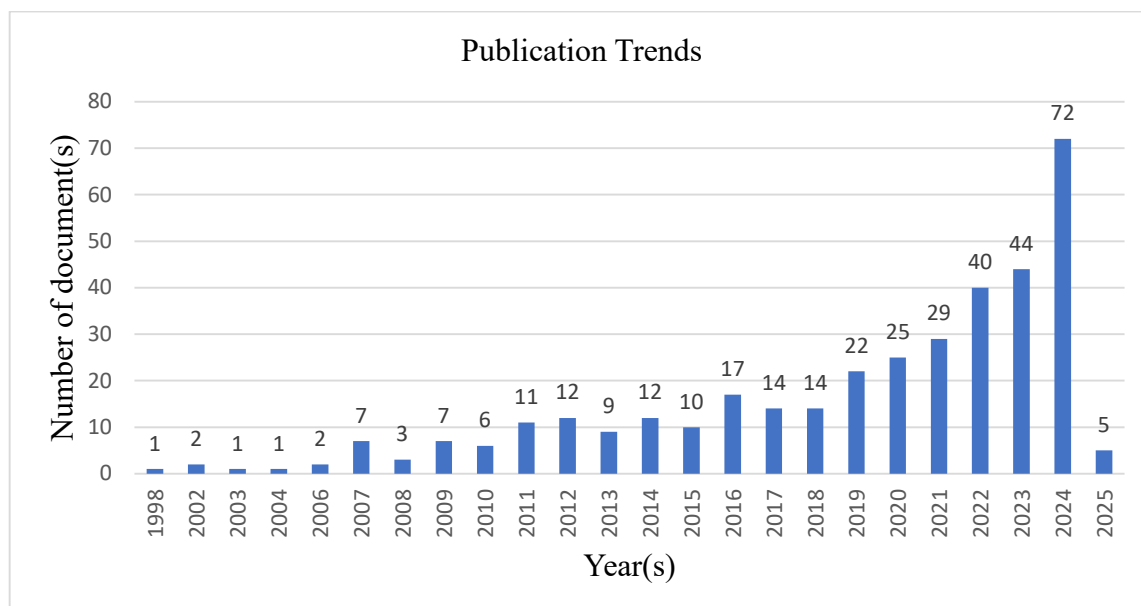


Figure 1: Publication trend of Sustainable Leadership research

Sustainable leadership is not a new topic in the field of social science. As per the Scopus database, it was published for the first time in the year 1998. This was the year when Amartya Sen, an Indian professor won the Nobel Prize in Economics for his contribution to welfare economics. The most productive year is 2024 in which seventy-four articles were published which is the highest in number.

The documents were only fourteen in the first decade (1998-2007). Sustainable leadership is scored a century in which the documents increased from fourteen to one hundred and one in the next decade (2008-2017). Sustainable leadership has achieved growth in the next five years (2018-2022) from one hundred and one to one hundred and thirty. Sustainable leadership got a century in only two years (2023-2024) in which published one hundred and sixteen articles.

Such evidence suggests that most intellectual debates on sustainable leadership occurred following the COVID-19 pandemic. Overall, looking at the trends in recent years, the study in this area will increase in the coming years.

The most impactful and productive authors, organizations and countries in sustainable leadership research

Table 1 presents the most impactful organizations, authors and countries through the highest citations which is shown by total citations (TC). It also presents the most productive organization, authors and countries through the highest publications which is shown by total publications (TP). As per the Scopus database, 835 authors from 688 organizations and 74 countries were published 366 documents on sustainable leadership research.

The minimum documents of an author and citations were taken 1 and 281 respectively, to get the top 10 authors out of 835, based on the Authors–Citation Analysis. Qaisar Iqbal, Noor Hazlina Ahmad and Suparak Suriyankietkaew are the most impactful authors with 924, 606 and 415 citations respectively. Qaisar Iqbal, Sooksan Kantabutra and Suparak Suriyankietkaew are the most productive authors with 20, 18 and 9 documents respectively.

The minimum articles of an organization and citations were taken 1 and 243 respectively, to get the top 10 organizations out of 688, based on the Organizations - Citation Analysis. Human Development Network & World Bank (Washington), Federation Institute of Education Science & Technology & University of Caxias Do Sul (Brazil) and Universiti Sains Malaysia are the most impactful organizations with 332, 311 and 307 citations

respectively. The Universiti Sains Malaysia, Macquarie Graduation School of Management, Sydney and Human Development Network & World Bank (Washington) are the most productive organizations with 3, 2 and 1 documents respectively.

Table No. 2: The top ten most impactful and productive authors, organizations and countries in sustainable leadership research

| TP | Author | TC | TP | Organization | TC | TP | Country | TC |
|----|-------------------------|-----|----|--|-----|----|----------------|------|
| 20 | Qaisar Iqbal | 924 | 1 | Human Dev Net, Washington | 332 | 68 | United States | 2274 |
| 8 | Noor Hazlina Ahmad | 606 | 1 | World Bank Washington | 332 | 39 | Australia | 1005 |
| 9 | Suparak Suriyankietkaew | 415 | 1 | Fed Ins of Edu, Sci &Tech Brazil | 311 | 35 | Thailand | 901 |
| 5 | Gayle C. Avery | 382 | 1 | University of Caxias Do Sul Brazil | 311 | 18 | Canada | 883 |
| 18 | Sooksan Kantabutra | 333 | 3 | Universiti Sains Malaysia | 307 | 27 | Malaysia | 851 |
| 1 | Pasi Sahlberg | 332 | 2 | Mac Grad Sch of Mgmt, Sydney | 281 | 24 | China | 590 |
| 1 | Denise Genari | 311 | 1 | N270 Eli Michigan State University | 273 | 36 | United Kingdom | 520 |
| 2 | Janaina Macke | 311 | 1 | N370 Business, Michigan State University | 273 | 10 | Brazil | 512 |
| 2 | Andy Hargreaves | 303 | 1 | N370 Eli Michigan State University | 273 | 19 | Spain | 494 |
| 2 | Harald Bergsteiner | 281 | 1 | Institute for Sustainable Leadership, Sydney | 243 | 15 | Poland | 437 |

Note: TP = Total Production and TC = Total Citation

The minimum documents of a country and citations and were taken 1 and 437 respectively, to get the top 10 countries out of 74, based on the Countries - Citation Analysis. The United States, Australia and Thailand are the most impactful countries with 2274, 1005 and 901 citations respectively. The United States, Australia and United Kingdom are the most productive countries with 68, 39 and 36 documents respectively.

The most impactful and productive journals in sustainable leadership research

Table 3 shows the most impactful journals through the highest citations. It also shows the most productive journals through the highest publications. As per the Scopus database, 188 journals published 366 documents on sustainable leadership research.

The minimum documents of a journal and citations were taken 1 and 185, respectively, to get the top 10 journals out of 188, based on the Sources (Journals)-Citation Analysis. 'Sustainability (Switzerland)' is the most impactful journal with 1177 citations followed by 'Journal of Cleaner Production' along with 'Journal of Business Ethics' have 726 and 579 citations respectively. 'Sustainability (Switzerland)' is the most productive journal with 58 publications followed by 'International Journal of Sustainability in Higher Education' along with 'Journal of Cleaner Production' which have 15 and 12 publications.

'Journal of the Academy of Marketing Science' is placed in the A* category. 'Journal of Cleaner Production' & 'Journal of Business Ethics' were ranked in the A category in the ABDC 2022 Journal Quality List. The eight out of the ten journals are placed Q1 in the journal ranking of SCOPUS. 'Journal of the Academy of Marketing Science' is got 7.19 SJR (Scimago Journal Rank) scores which is the highest in the top 10 journals after that 'Journal of Business Ethics' along with 'Journal of Cleaner Production' with 2.62 and 2.06 SJR scores respectively.

Table No. 3: The top ten most impactful and productive journals on sustainable leadership research

| Source | TP | TC | Quartile | ABDC 2022 | SJR 2023 | H-Index | Number of Paper(s) | |
|---|----|------|----------|-----------|----------|---------|--------------------|-----------|
| | | | | | | | 1998-2011 | 2012-2025 |
| Sustainability (Switzerland) | 58 | 1177 | Q1 | - | 0.67 | 169 | - | 58 |
| Journal of Cleaner Production | 12 | 726 | Q1 | A | 2.06 | 309 | 1 | 11 |
| Journal of Business Ethics | 7 | 579 | Q1 | A | 2.62 | 253 | 1 | 6 |
| Journal of Education Policy | 1 | 332 | Q1 | - | 1.63 | 90 | 1 | - |
| Journal of the Academy of Marketing Science | 1 | 273 | Q1 | A* | 7.19 | 207 | 1 | - |
| International Journal of Sustainability in Higher Education | 15 | 268 | Q1 | - | 0.83 | 77 | 1 | 14 |
| Strategy & Leadership | 1 | 243 | Q3 | C | 0.24 | 54 | 1 | - |
| Educational Leadership | 1 | 205 | - | - | 0 | 71 | 1 | - |
| PLoS ONE | 1 | 186 | Q1 | - | 0.84 | 435 | - | 1 |
| Journal of Change Management | 1 | 185 | Q1 | C | 1.02 | 53 | 1 | - |

Note: Total Production (TP), Total Citation (TC), Australian Business Deans Council (ABDC) and SCImago Journal Rank (SJR)

PLoS ONE', 'Journal of Cleaner Production' & 'Journal of Business Ethics' are the top 3 journals which is the highest H-Index values with 435, 309 and 253 respectively. The 2012-2025 period is the most productive compared to the 1998-2011 period which have 8 documents but the previous one has 90 documents in the top 10 journals. 'Sustainability' is the most productive journal with 58 documents published in the period 2015-24 after that 'International Journal of Sustainability in Higher Education' & 'Journal of Cleaner Production' with 14, 11 documents respectively.

The most impactful articles in sustainable leadership research

Table 4 presents the most impactful articles through the highest citations. This analysis is based on global citations (GC). Global citation refers to the documents which are available in the database (Scopus) without filtration.

Based on the Documents-Citation Analysis, the minimum citation of a document is 157 to get the top 10 articles out of 366. Sahlberg (2007), Macke & Genari (2019) and Closs et al. (2011) are the most impactful articles with 332, 311 and 273 citations respectively.

Table 4: The top ten most impactful articles on sustainable leadership research

| Rank | Author(s) | TC |
|------|----------------------------|-----|
| 1 | Sahlberg (2007) | 332 |
| 2 | Macke & Genari (2019) | 311 |
| 3 | Closs et al. (2011) | 273 |
| 4 | Avery & Bergsteiner (2011) | 243 |
| 5 | Hargreaves & Fink (2004) | 205 |
| 6 | Osterblom et al. (2015) | 186 |
| 7 | Ferdig (2007) | 185 |
| 8 | Robinson et al. (2011) | 176 |
| 9 | Iqbal et al. (2020a) | 164 |
| 10 | Lourenço et al. (2014) | 157 |

Note: TC = Total Citation

The most referenced articles in sustainable leadership research

Table 5 presents the top referenced articles based on local and global citations. These results get through the R-Studio and biblioshiny. The local citation (LC) refers to getting citations from the articles available in our dataset (366 documents) to get the articles after all filtrations. We have already discussed about global citations (GC) in the previous section (d).

Table No. 5: The top ten most referenced articles in sustainable leadership research

| Rank | Author(s) | LC | GC |
|------|------------------------------|----|-----|
| 1 | Avery & Bergsteiner (2011) | 59 | 243 |
| 2 | Iqbal et al. (2021) | 48 | 40 |
| 3 | Iqbal et al. (2020a) | 35 | 164 |
| 4 | Iqbal et al. (2020b) | 35 | 80 |
| 5 | Burawat (2019) | 32 | 125 |
| 6 | Gerard et al. (2017) | 30 | 62 |
| 7 | Ferdig (2007) | 28 | 185 |
| 8 | Iqbal & Piwowar-Sulej (2022) | 22 | 21 |
| 9 | Kantabutra & Avery (2011) | 21 | 43 |
| 10 | McCann & Sweet (2014) | 21 | 51 |

Note: GC = Global Citation, LC = Local Citation

Previously, Table 4 described the most impactful articles based on the documents-citation analysis, which is the same as the global citation because all articles are included and cited each other in the database. Here, the analysis is shown based on local citations. Avery & Bergsteiner (2011), Iqbal et al. (2021) and Iqbal et al. (2020a) are the most referenced article with 59, 48 and 35 local citations respectively.

The intellectual structure of sustainable leadership through co-citation technique

Figure 2 shows the development of the foundational themes in sustainable leadership research through the co-citation. A co-citation is when two articles are cited together in the reference list of another article. Co-citation was introduced by Henri Small and Irina Marshakova in 1973. A co-citation analysis shows intellectual structure, seminal publication and knowledge foundations. In this co-citation map, out of 20743 cited references, each has at least 10 citations, and 24 cited references fulfill this criterion.

Table 6 exhibits three foundational themes of sustainable leadership research through cited references co-citation analysis. Sustainable Performance (Red Cluster), Sustainable Education (Green Cluster), and Sustainable Business (Blue Cluster) are the names of foundational themes (clusters) for past development of sustainable leadership research.

The size of the node indicates that a node has how many connections. The links between nodes denote two or more publications that are cited together in other publications. TLS is the total of the link strengths of one node on other nodes.

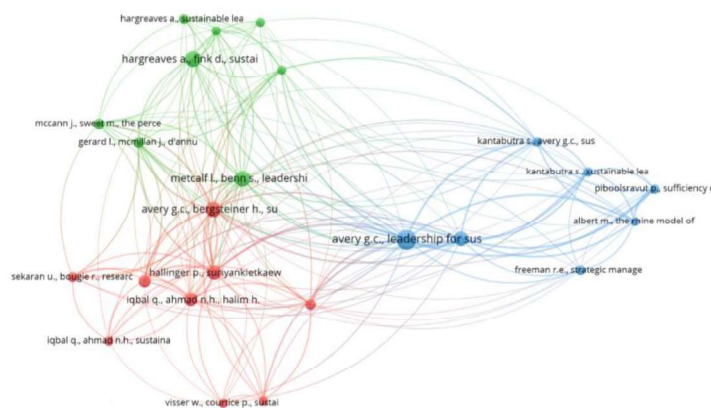


Figure 2: Network of Cited References - Co-Citation Analysis

The first theme (Red Cluster) consists of 9 sustainable performance articles cited 153 times. Avery & Bergsteiner (2011), Hallinger & Suriyankietkaew (2018) and Iqbal et al. (2020b) are the top three cited documents in this cluster with 29, 27, and 21 citations respectively. The second theme (Green Cluster) consists of 8 sustainable education articles cited 135 times. Hargreaves & Fink (2005), Metcalf & Benn (2013) and

Gerard et al. (2017) are the top three cited documents in this cluster with 32, 30 and 15 citations respectively. The third theme (Blue Cluster) consists of 7 sustainable business articles cited 129 times. Avery (2005), Avery & Bergsteiner (2010) and Kantabutra (2011) are the top three cited documents in this cluster with 46, 26 and 12 citations, respectively.

Table No. 6: Clusters of sustainable leadership research through co-citation analysis

| Cluster | Author(s) | TC | TLS |
|---------------------------------------|------------------------------------|----|-----|
| Sustainable Performance (Red Cluster) | Avery & Bergsteiner (2011) | 29 | 96 |
| | Hallinger & Suriyankietkaew (2018) | 27 | 83 |
| | Iqbal et al. (2020b) | 21 | 52 |
| Sustainable Education (Green Cluster) | Hargreaves & Fink (2005) | 32 | 55 |
| | Metcalf & Benn (2013) | 30 | 85 |
| | Gerard et al. (2017) | 15 | 53 |
| Sustainable Business (Blue Cluster) | Avery (2005) | 46 | 137 |
| | Avery & Bergsteiner (2010) | 26 | 97 |
| | Kantabutra (2011) | 12 | 47 |

Note: Total Citation = TC and Total Link Strength = TLS

The thematic cluster of sustainable leadership research through bibliographic coupling

Figure 3 presents the current or latest development of sustainable leadership research through the documents – bibliographic coupling analysis. Bibliographic coupling means that two articles cite another article in their reference list. The bibliographic coupling also shows the recent and niche publications, the latest developments, and the present development of the research. In this bibliographic coupling map, out of 366 documents, each has at least 50 citations, and 36 documents fulfill this criterion.

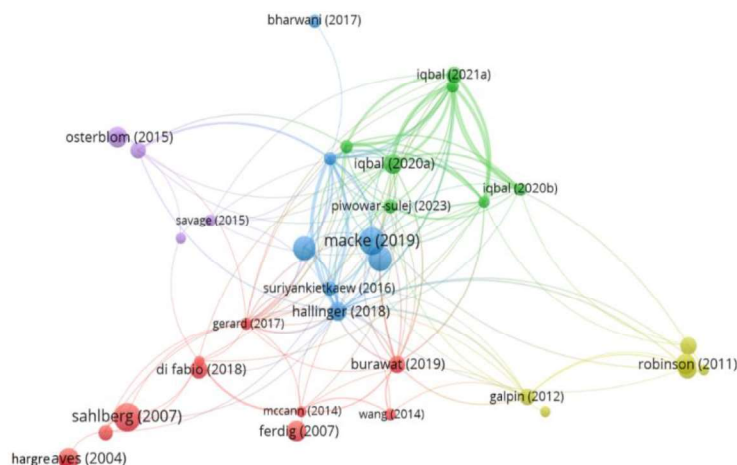


Figure 3: Network of Documents - Bibliographic Coupling

Table 7 presents the five thematic clusters of sustainable leadership research through the documents - bibliographic coupling analysis. Sustainable leadership (Red Cluster), Leadership for Sustainable Performance (Green Cluster), Leadership for Business Sustainability (Blue Cluster), Corporate Social Responsibility (Orange Cluster) and Education for Sustainable Leadership (Purple Cluster) are the names of themes for the present development of sustainable leadership research. The size of the node presents the citations of the document. The links between nodes indicate the number of references shared. TLS is the sum of the link strength of two documents that cite one document.

Table No 7: Thematic clusters of sustainable leadership research

| Cluster | Author(s) | TC | TLS |
|---|------------------------------|-----|-----|
| Sustainable Leadership (Red Cluster) | Sahlberg (2007) | 332 | 5 |
| | Hargreaves & Fink (2004) | 205 | 2 |
| | Ferdig (2007) | 185 | 1 |
| Leadership for Sustainable Performance (Green Cluster) | Iqbal et al. (2020a) | 164 | 76 |
| | Iqbal & Ahmad (2020) | 118 | 121 |
| | Piwowar-Sulej & Iqbal (2023) | 88 | 26 |
| Leadership for Business Sustainability (Blue Cluster) | Macke & Genari (2019) | 311 | 34 |
| | Closs et al. (2011) | 273 | 2 |
| | Avery & Bergsteiner (2011) | 243 | 21 |
| Corporate Social Responsibility (Orange Cluster) | Robinson et al. (2011) | 176 | 6 |
| | Lourenço et al. (2014) | 157 | 24 |
| | Wiengarten et al. (2017) | 133 | 4 |
| Education for Sustainable Leadership (Purple Cluster) | Osterblom et al. (2015) | 186 | 1 |
| | Leal Filho et al. (2020) | 113 | 16 |
| | Savage et al. (2015) | 62 | 7 |

Note: Total Citation = TC and Total Link Strength = TLS

The first theme (Red Cluster) consists of 11 sustainable leadership articles which have been cited 1385 times. Sahlberg (2007), Hargreaves & Fink (2004) and Ferdig (2007) are the top three cited documents in this cluster with 332, 205 and 185 citations respectively. The second theme (Green Cluster) consists of 7 leadership for sustainable performance articles which have been cited 659 times. Iqbal et al. (2020a), Iqbal & Ahmad (2020) and Piwowar-Sulej & Iqbal (2023) are the top three cited documents in this cluster with 164, 118, and 88 citations, respectively. The third theme (Blue Cluster) consists of 7 leadership for business sustainability articles which have been cited 1195 times. Macke & Genari (2019), Closs et al. (2011) and Avery & Bergsteiner (2011) are the top three cited documents in this cluster with 311, 273, and 243 citations respectively. The fourth theme (Orange Cluster) consists of 6 corporate social responsibility articles which have been cited 682 times. Robinson et al. (2011), Lourenço et al. (2014) and Wiengarten et al. (2017) are the top three cited documents in this cluster with 176, 157 and 133 citations respectively. The fifth theme (Purple Cluster) consists of 5 Education for sustainable leadership articles which have been cited 470 times. Osterblom et al. (2015), Leal Filho et al. (2020) and Savage et al. (2015) are the top three cited documents in this cluster with 186, 113 and 62 citations respectively.

The future trends of sustainable leadership research through co-word analysis

Figure 4 shows the prediction of sustainable leadership research through the co-word analysis. It is also known as co-occurrence analysis because two keywords come together in an article. Co-word was introduced by Callon et al. in 1991. The minimum occurrence of a keyword out of 1100 are 3 in the 366 articles based on the author keywords and co-occurrence analysis.

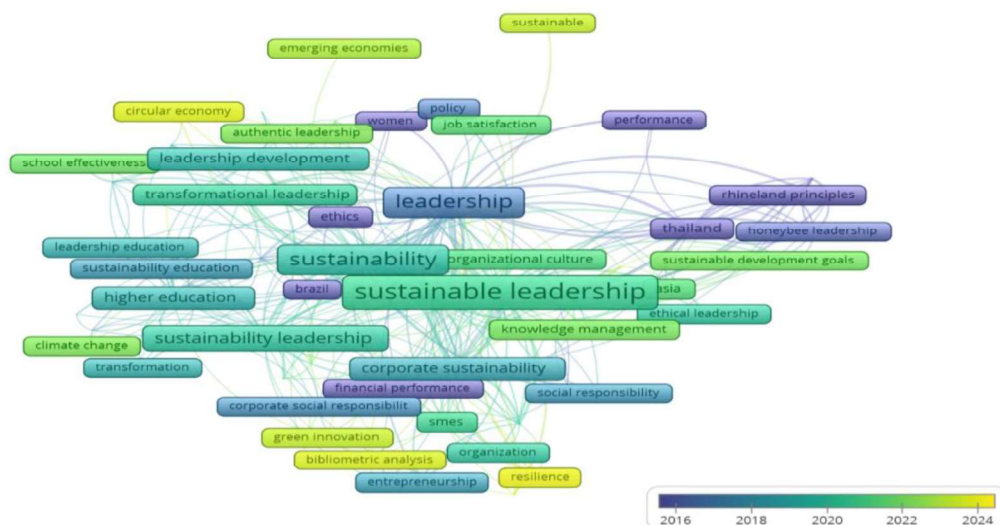
**Figure 4: Network of Author Keywords – Co-Word Analysis**

Figure 4 shows an overlay visualization of the author's keywords. This network suggests keyword trends over a year. It can be understood through the average publication year (Avg. pub. year). The high average publication

year indicates that research in this area is relatively recent and rapidly evolving. Employee well-being, resilience, circular economy, sustainable entrepreneurship, green innovation and sustainable (Avg. pub. year between 2023-2024) are the most recent keywords used in this sustainable leadership research followed by sustainable performance, responsible leadership, culture, human capital sustainability leadership, authentic leadership, social sustainability, project management and climate change (Avg. pub. year between 2022-2023). As a result, future researchers can use these keywords in their future studies. Most importantly, it determines that employee well-being, resilience, circular economy, sustainable entrepreneurship, green innovation and sustainable are the most recent research topics investigated.

Table 7 presents the author's keywords, representing sustainable leadership research's most frequently used words. The term sustainable leadership holds first rank with 123 frequencies followed by leadership, sustainability, sustainable development, sustainability leadership, corporate sustainability, leadership development and transformational leadership with 76, 71, 40, 31, 17, 14 and 12 occurrences respectively. It shows that most previous studies on the author's keywords which are sustainable leadership, leadership, sustainability, sustainable development, sustainability leadership, corporate sustainability, leadership development and transformational leadership. These have been mentioned in sustainable leadership research. Table 7 also presents the link strength between keywords, indicating that sustainable leadership is placed the first rank with 212 TLS (Total Link Strength) which is the highest followed by leadership, sustainability, sustainable development, corporate sustainability and sustainability leadership have strong network links with 153, 146, 83, 64 and 60 TLS respectively. This implies that these six keywords had been regularly used in research over the last 25 years.

Table 8: List of author's keywords in sustainable leadership research through co-occurrence analysis

| Keyword | Occurrences | Total Link Strength (TLS) |
|---------------------------------------|--------------------|----------------------------------|
| Sustainable Leadership | 123 | 212 |
| Leadership | 76 | 153 |
| Sustainability | 71 | 146 |
| Sustainable Development | 40 | 83 |
| Sustainability Leadership | 31 | 60 |
| Corporate Sustainability | 17 | 64 |
| Higher Education | 16 | 33 |
| Leadership Development | 14 | 16 |
| Transformational Leadership | 12 | 23 |
| Thailand | 10 | 46 |
| Education | 9 | 20 |
| Education for Sustainable Development | 9 | 15 |
| Organizational Culture | 8 | 20 |
| Innovation | 8 | 17 |
| Ethics | 7 | 13 |
| Sustainability Education | 7 | 11 |
| Rhineland Principles | 6 | 32 |
| Sufficiency Economy | 6 | 27 |
| Asia | 6 | 23 |
| Smes | 6 | 16 |
| Knowledge Management | 6 | 14 |
| Environmental Sustainability | 6 | 10 |
| Sustainable Performance | 6 | 7 |

Future research avenues

Evaluating sustainable leadership research in social science from a past context is significant for deciding present and future results. By investigating related papers, this research may establish a baseline for the fast-developing domain of sustainable leadership research in social science, allowing future researchers to investigate the usage and benefits of sustainable leadership in the social science area.

A future study could see how the most sustainable leadership practices to perform better in the organizations. Between 1998 and 2011, the total number of articles are 41 in which the studies focused on leadership, sustainable leadership, sustainable development, sustainability, ethics and sustainability leadership. The studies from 2012 to 2025, 325 articles are found in which the study concentrated on leadership, sustainability, sustainable leadership, sustainable development, sustainability leadership and corporate sustainability. Sustainability is noteworthy as a sustainable leadership research for sustainable development and leadership.

The practice of sustainability in sustainable leadership research is a demanding topic in current studies. Sustainability works in several forms, such as, economic sustainability, social sustainability, corporate sustainability, business sustainability, environmental sustainability and sustainability education. Future studies on sustainability and leadership themes shall work towards leadership for sustainability. Furthermore, future studies shall be on leadership development for sustainability etc. Furthermore, future research directions for sustainability leadership and education for sustainable development should also use sustainability. The studies on sustainable development are numerous. However, the studies focused on sustainable leadership are very less attention. So, research on this area in the future will change the destiny of the organizations and permit them to enforce sustainable leadership to encourage their business. Further, future studies on the corporate sustainability theme shall be given attention to the process of corporate social responsibility activities in business. Specifically, social responsibility, responsibility towards the environment, sustainable business, social welfare, and employment for the community apply to business. Further, future studies could be on the utilization and benefits of corporate sustainability for consumer co-creation and community involvement. Future studies on the execution of corporate sustainability for customer's response and reactions and the application of sustainability promote the products and services provided by businesses. Future study could be conducted on the applications of social welfare, employee welfare, ethics, and sustainable business in terms of corporate sustainability. Future study could be organized on business culture and the competitive advantage of corporate sustainability for business. Besides, future studies for innovation and sustainable development could focus on sustainable innovation, challenges of frugal innovation adoption, and organizational innovation climate to understand consumers' needs and behavior for social innovation exercises. Additionally, future studies could focus on the environmental innovation strategy, resource constraint innovation, and disruptive innovation aspects of organizations in adopting and implementing sustainable leadership in their businesses. Further, future studies on responsible leadership themes could be conducted, concentrating on environmental sustainability, environmental leadership, social environmental system, environmental identity, and environmental psychological ownership. The future study can also be explored through another database like web of science or others because previous studies were only focused on the Scopus database. Further we can also combine two databases because earlier studies were based on the only single database. The future research could be purely based on the keywords only related to the domain such as sustainable leadership or sustainability leadership and also included both of them because previous studies are mixed with other keywords also like leadership and sustainable development. From this, it does not come the true picture of the domain. Further, the future study may use proper search strategy that is extracted only those articles which is related to only domain because previous studies are far from the domain. Other analysis techniques can be also used for the future study such as co-authorship analysis, page rank etc. Last but not least, the future study could use another analysis software like Gephi, Biblioshiny, CiteSpace, Bibexcel etc.

Conclusion

This research highlights a bibliometric analysis of research trends, most impactful and productive authors, organizations, countries and the journals; the most impactful articles based on the global and local citations; intellectual structure, thematic clusters, future trends and future research avenues in the domain of sustainable leadership research.

This study revealed five major thematic research clusters with significant focus on sustainable leadership, leadership for sustainable performance, leadership for business sustainability, corporate social responsibility and education for sustainable leadership. The findings also highlight increasing attention towards employee well-being, resilience, circular economy, sustainable entrepreneurship, green innovation and sustainable, particularly after 2023. Qaisar Iqbal, Noor Hazlina Ahmad and Suparak Suriyankietkaew are the most impactful authors along with Qaisar Iqbal, Sooksan Kantabutra and Suparak Suriyankietkaew are the most productive authors. 'Sustainability (Switzerland)' and 'Journal of Cleaner Production' are the most impactful as well as the most productive journals. Overall, this study provides a valuable roadmap for researchers and practitioners, facilitating a deeper engagement with the evolving landscape of sustainable leadership.

Limitations

This research work also has limitations, just like any other research work. First, this study only looked at the bibliographies of articles published in the Scopus database. Second, the different analysis techniques will be used in future studies such as co-authorship analysis and page rank etc. Third, this study employed VOSviewer software for data analysis, in future study, it can be used other statistical tools like Gephi, BibExcel, etc.

Implications

These insights provide to a better understanding of the knowledge structure in the sustainable leadership, guiding future scholars towards emerging areas and underexplored topics. This research has a variety of implications for scholars, academicians, policy-makers, practitioners, managers, entrepreneurs and marketers. Further, it could also help them to see the gap in the current literature and future directions, which will help them to conduct future studies. They should be aware of the existing research in this domain. By getting the impactful and vital contributors of the research and the cause for becoming prominent contributors, they can use these documents to answer the existing educational and industrial problems.

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