Sustainable leadership: An empirical investigation using bibliometric analysis

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Abstract
Sustainable leadership is a necessity to achieve the goals of sustainable development, such as addressing complex global issues, preserving environmental and social balance, ensuring the well-being of future generations, and promoting innovation. This research paper provides a summary of scientific research on sustainable leadership by using bibliometric analysis. Data analysis as well as visualization utilising vosviewer program and the scopus function for analyze search results. Using the scopus database, the paper analyzed 390 publications and identified research gaps and new study topics through "vos-viewer" Software. The study reveals that iqbal, q and mahidol university were the most active individual scientists and affiliated institutions in sustainable leadership publication. The findings provide a starting point for further investigation and offer opportunities for researchers to expand their expertise in exciting and innovative studies. Overall, this study seeks to help researchers discover new avenues for exploration in sustainable leadership while advancing their present understanding.

Keywords : Sustainable leadership, sustainability, leadership, bibliometric analysis, vosviewer

1.   Introduction

Sustainable leadership, a concept that has gained significant traction in recent years, represents a paradigm shift in leadership philosophy and practice. This approach integrates the principles of sustainability—balancing economic, social, and environmental concerns—into the core strategies and operations of organizations. The urgency of addressing global challenges such as climate change, resource depletion, and social inequities has catalyzed the need for leaders who can navigate the complexities of these issues while driving organizational success.

The roots of sustainable leadership can be traced back to the broader discourse on sustainable development, which gained prominence with the brundtland report in 1987. This report introduced the idea of meeting "the needs of the present without compromising the ability of future generations to meet their own needs" (world commission on environment and development, 1987). Building on this foundation, sustainable leadership emphasizes long-term thinking, ethical decision-making, and the creation of value for all stakeholders, including employees, communities, and the environment (avery & bergsteiner, 2011a).

Research has demonstrated that sustainable leadership can lead to positive outcomes across various dimensions of organizational performance. For instance, leaders who prioritize sustainability are more likely to foster organizational cultures that enhance employee commitment and job satisfaction (suriyankietkaew & avery, 2014). Additionally, sustainable leadership has been linked to improved organizational trust (dalati et al., 2017), better

financial performance (kantabutra & thepha-aphiraks, 2016; suriyankietkaew & avery, 2016), and greater organizational resilience (avery & bergsteiner, 2011b).

Despite these benefits, the implementation of sustainable leadership faces several challenges. Many organizations struggle to move beyond superficial commitments to sustainability, often limiting their efforts to corporate social responsibility (csr) initiatives or philanthropic activities. This gap between rhetoric and action underscores the need for a deeper integration of sustainability into leadership practices and organizational strategies (piwowar-sulej et al., 2021). Moreover, there is a growing recognition that sustainable leadership requires a fundamental shift in how leaders perceive their roles and responsibilities, moving from a narrow focus on profit maximization to a broader consideration of their impact on society and the planet (tideman et al., 2013).

As the field of sustainable leadership continues to evolve, scholars and practitioners are increasingly exploring ways to operationalize these principles effectively. Recent studies have highlighted the importance of leadership development programs that instill sustainable values and competencies in current and future leaders (gerard et al., 2017). Additionally, there is a call for more comprehensive frameworks that can guide organizations in measuring and managing their sustainability performance holistically (burawat, 2019; iqbal et al., 2020a,b).

This introduction sets the stage for a deeper exploration of sustainable leadership, examining its theoretical foundations, practical applications, and the ongoing challenges in its implementation. By understanding the critical role of leadership in advancing sustainability, organizations can better navigate the complexities of today's global landscape and contribute to a more sustainable future.

2.   Literature review:

With increasing globalization and unprecedented global challenges, such as climate change, resource depletion, and societal disparities over the past decade, the market scenario has undergone a metamorphosis. Institutions need notion of sustainability as a foundational doctrine to disrupt the attainment of short-term goals. (sharma). It guides not only organizations but also communities and individuals in their actions (rockström et al., 2009). Sustainable construction is a critical global problem and nowadays, even more than before, it is not possible to exaggerate the value of responsible and efficient sustainable development in industry and business. This critical juncture necessitates individuals possessing profound insights into the intricate interplay among ecological, social, and economic dynamics. These individuals, commonly referred to as sustainable leaders, assume a central role in instigating transformative changes directed toward harmonizing current imperatives with the expectations of forthcoming generations (liao, 2022).

Sustainable leadership is distinguished from the classic notion of leadership in that it places more emphasis on long-term prosperity than short-term gains. Initial concern for sustainability grew from the fields of economic development and environmental studies. The concept of sustainable development into the field of organizational management was introduced by brundtland committee. They pointed out that sustainable development is a way of development that meets current needs without harming future generations' needs. Pearce and turner (1990) introduced the circular economy model, highlighting the interdependence between the economy and the environment. Weale (1992) argued that sustainable development challenges the traditional conflict between economic and environmental interests. Building on this, elkington and rowlands (1999) proposed the triple bottom line framework, which measures business performance based on social, environmental, and

financial indicators. This framework urges businesses to consider their environmental and social responsibilities alongside profits, aiming to reduce the negative impacts of economic growth for sustainable development.

Sustainable leadership endeavors to strike a balance between environmental, social, and economic responsibilities while taking into account the needs of future generations (bansal, 2005). It represents an approach geared towards steering organizations to operate with consideration for both short-term objectives and enduring sustainability goals (avery and bergsteiner, 2011). It aims to transcend the confines of traditional managerial competencies, embodying a paradigm that encompasses the capacity to embrace the comprehensive well-being of ecosystems and societies, surpassing immediate gains (kantabutra, 2012). Sustainable leaders are responsible for cultivating ethical values, engaging stakeholders, and promoting innovative initiatives that support long-term sustainability goals (hallinger and suriyankietkaew, 2018; avery and bergsteiner, 2011).

In educational settings, sustainable leadership not only responds to evolving environmental and societal challenges but also inspires positive behaviors among students and faculty (hargreaves and fink, 2004). It fosters innovation, enhances employee commitment, and strengthens organizational resilience in the face of future uncertainties (çayak, 2021; liu and heizmann, 2018). In educational contexts, the demand for sustainable leadership acumen is increasingly urgent as leaders navigate complex environmental and societal shifts (hargreaves and fink, 2004). This approach not only enhances current educational achievements but also focuses on developing students with ethical values, environmental awareness, and social responsibility (hargreaves and fink, 2004).

Studies also show that sustainable leadership behaviors correlate positively with organizational commitment and job satisfaction among teachers (çayak and çetin, 2018).

Sustainable leadership plays a crucial role in risk management, enabling organizations to proactively identify and address potential issues (liu and heizmann, 2018). By embedding sustainable values into organizational culture, this leadership approach aligns internal stakeholders more deeply with sustainability goals (moreira et al., 2022).

Research indicates that sustainable leadership fosters reduced turnover rates and cynicism among staff, contributing to organizational stability (hargreaves and fink, 2004; moreira et al., 2022).

Moreira et al. (2022) have found that sustainable leadership enhances employees' perceptions of organizational support, places value on their competency development, and mitigates their intentions to leave their positions çayak and çetin (2018) have demonstrated that the sustainable leadership behaviors of school principals can predict high levels of organizational commitment and job satisfaction among teachers. Dalati et al. (2017) have ascertained that sustainable leadership can enhance employees' levels of organizational trust.

3. Research methodology

3.1. Data collection:

Scopus was used as the data source for this review due to its broad coverage across education, management and the social sciences, as well as its capabilities for exporting bibliographic data for analysis in bibliometric software (hallinger and chatpinyakoop, 2019

The keyword based search process followed preferred reporting items for systematic reviews and meta analyses (prisma) guidelines for conducting systematic reviews of research (moher et al., 2015). Figure 1 illustrates this acronym's network. It assists us in defining how we have limited the articles, what screening factors are included, and how we recognize the research materials. The following keyword string was used in the scopus search: Title-abs-key

("sustainable leadership"). We have located 416 research papers in the scopus database that meet the criteria of year, publication stage, document type, keyword, topic area, and language. The initial search showed 416 documents. These records have been narrowed down to 390 by eliminating documents on the basis of stage of publication and language. We are only allowed to take into account complete articles that have been published and must disregard studies that are either in the communication stage or are currently being prepared for publication. This results in the elimination

of 19 different papers. Since we were only interested in papers written in english at this level, we had to exclude 7 documents based on the language they were written in. Thus, the final review corpus was comprised of 390 scopus-indexed journal articles, conference papers and book chapters.
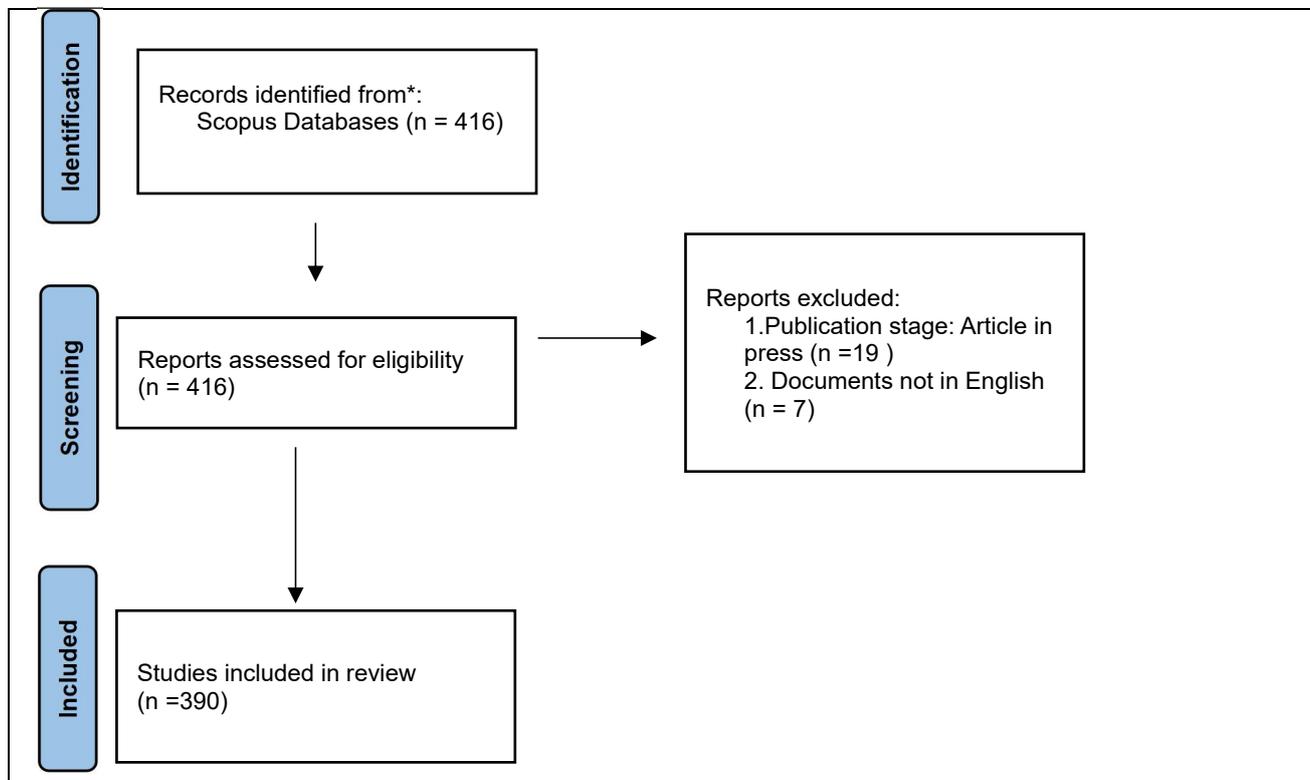

Figure 1. Prisma flow chart. Source: Author's contribution.

3.2 methodology:

The research was carried out using bibliometric techniques. Data analysis as well as visualization utilising vosviewer program and the scopus function for analyze search results (purnomo, septianto, et al.),(purnomo, rosyidah, et al.). The bibliometric review method is a variant of systematic review that provides a nonbiased, transparent and empirically-grounded approach to analyzing patterns of knowledge production within a discipline or line of inquiry (hallinger and kovacevic, in press; zupic and cater, 2015). Bibliometric analysis helps us to determine who is the most influential author is on a certain subject, and it will also assist scholars in identifying knowledge gaps (aria and cuccurullo 2017). In contrast to other review methods (e.g. Integrative, scoping and meta-analysis) that focus on synthesizing "research findings" From a body of literature, bibliometric reviews synthesize "bibliographic data" Associated with a set of research documents (zupic and cater, 2015). Moreover, while these other methods of review typically limit their focus to a limited number of studies, bibliometric reviews leverage the capabilities of software to analyze a large numbers of documents in order to reveal broader trends in knowledge production that evolve over time (hallinger and kovacevic, in press). A bibliometric network, researchers, number of studies, academic affiliation, region, area, keywords, and author collaboration, is developed and visualized using the vosviewer tool (natakusumah).

4. Result and discussion
4.1 annual trends in publications
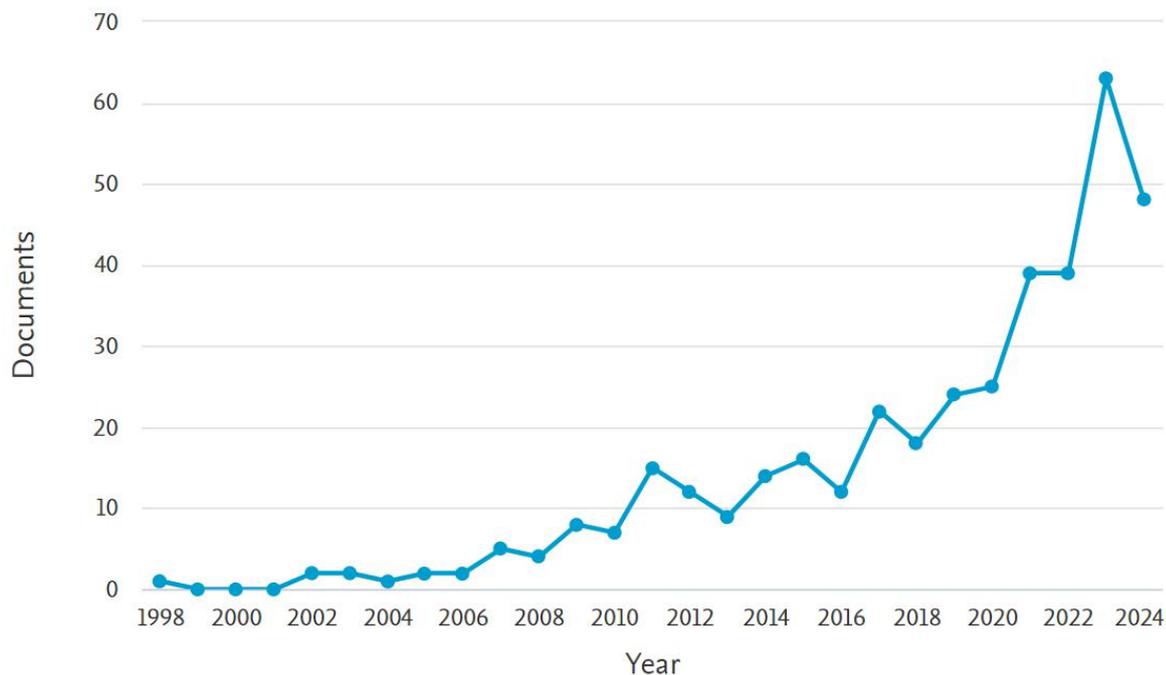
Documents by year

Figure 2

From figure 2, it can be seen that the increase of international academic document publications in the sustainable leadership area has increased every year. The peak of the publication of international academic documents in the field of sustainable innovation was the highest in 2023 with 63 documents. The first paper was published in 1998. Up to the year 2010, paper published are in single digit, but from 2011 it gained momentum and in 2023 the growth almost doubled from 39 publications in 2022 to 63 publications in 2023.

4.2. Distribution of organizations
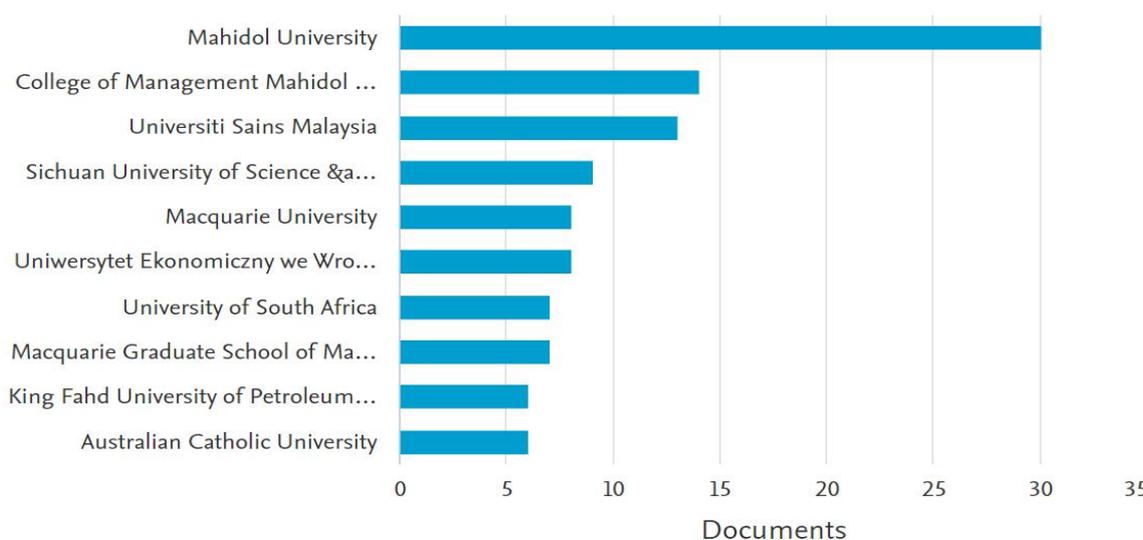
Figure 3

The leading research organizations in sustainable leadership publications was mahidol university with 30 documents, followed by college of management mahidol university with 14 documents, universiti sains malaysia with 13 documents, sichuan university of science & engineering with 9 documents, macquarie university and uniwersytet ekonomiczny we wrocławiu with 8 documents.
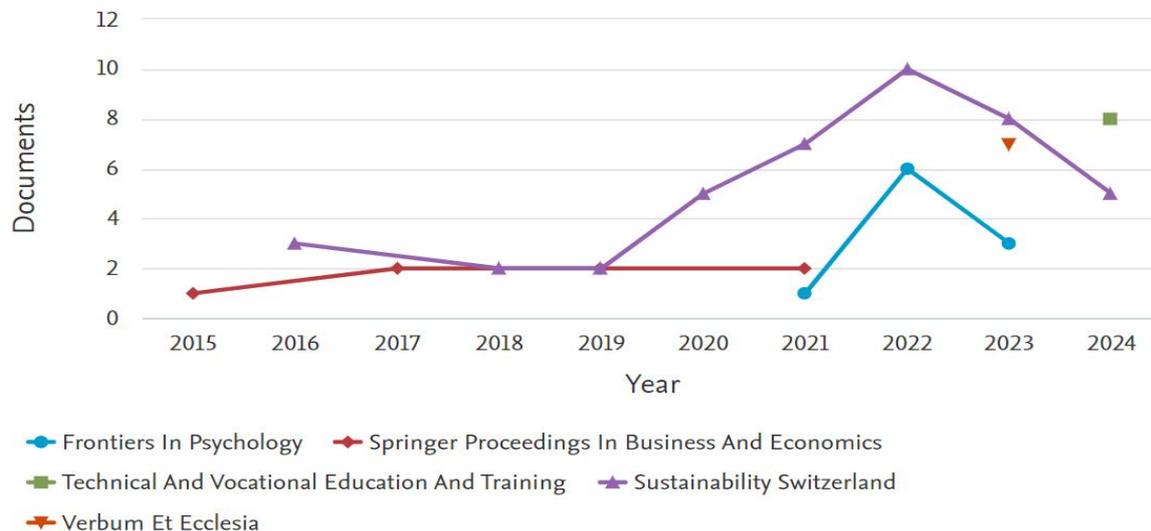
4.3. Document per year by source

Figure 4

The leader in the annual number of sources of sustainable leadership publications is "sustainability switzerland" With 42 documents. Followed by "frontiers in psychology" With 10 documents, "technical and vocational education and training" With 8 documents, "springer proceedings in business and economics" And "verbum et ecclesia" With 7 documents, "journal of educational change" With 3 documents as shown in figure.
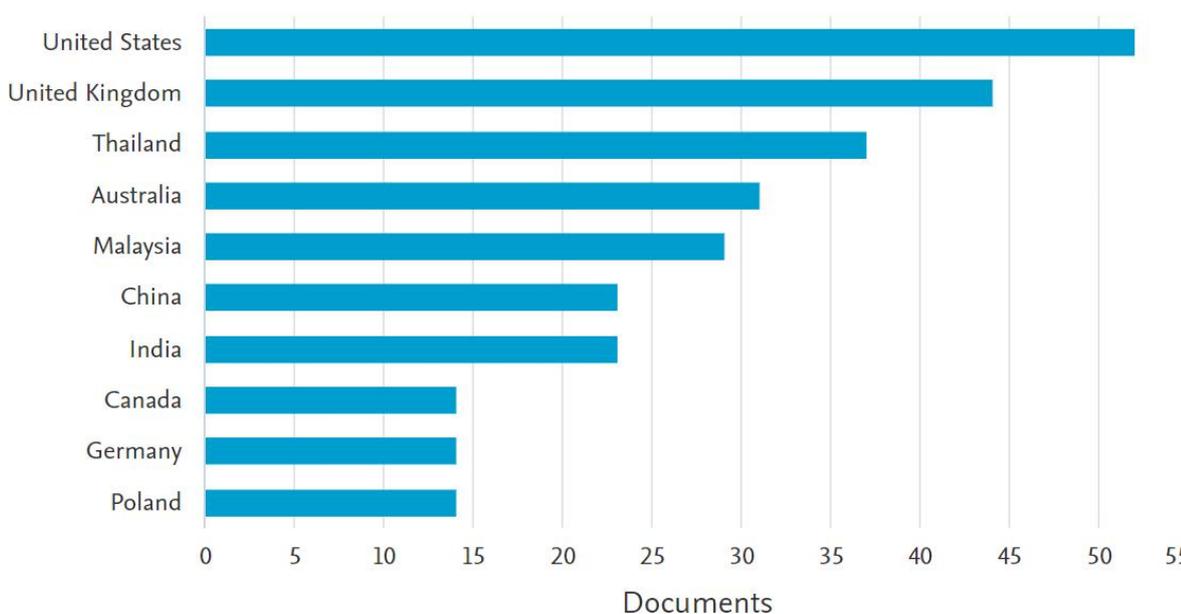
4.4 distribution by nation:

Figure 5

United states with 52 academic documents was the leading research nation, then, with 44 articles, the united kingdom followed, thailand with 37 documents, australia with 31 documents, malaysia with 29 documents, china and india with 23 documents.

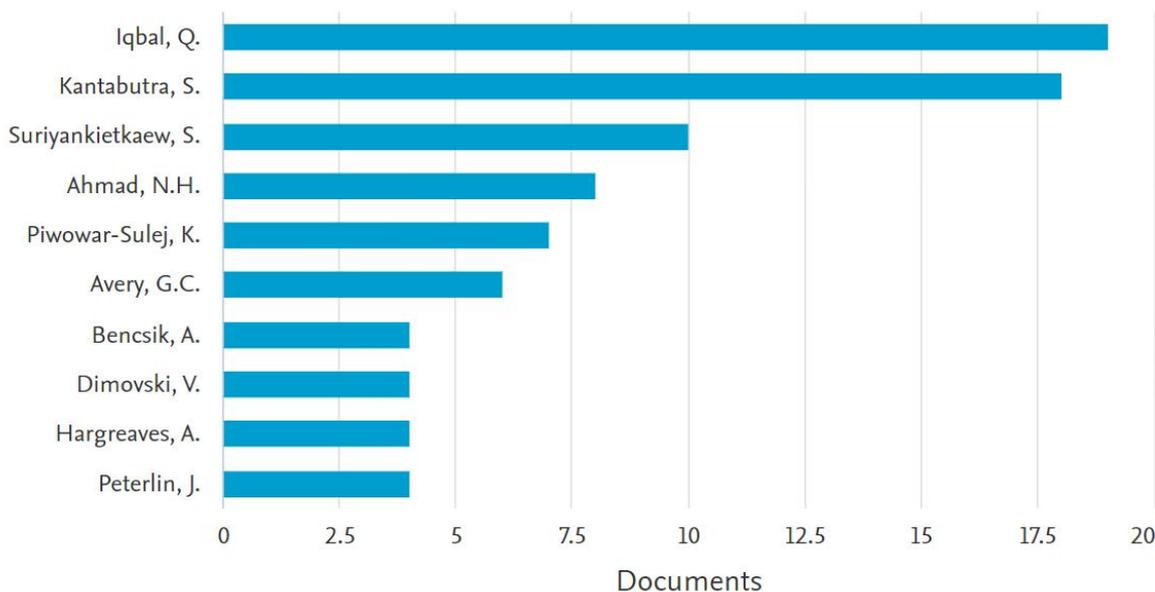### 4.5. Sustainable leadership publications most individual researcher

Figure 6

The researcher in the area of sustainable leadership to the most writings was iqbal, q. With 19 documents. Pursued by kantabutra, s. With 18 documents, suriyankietkaew, s. With 10 documents, ahmad, n.h. With 8 documents, piwowar-sulej, k., with 7 documents, avery, g.c. With 6 documents and xuecheng, w., peterlin, j. Xuecheng, w. With 4 documents each.

4.6. The largest frequency of publication of sustainable leadership by subject area
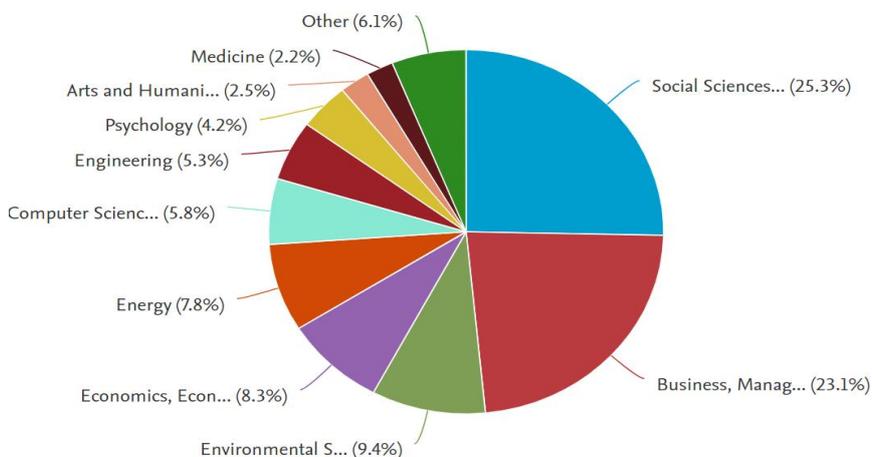

Figure 7

With 25.3 percent which represents 195 documents social sciences subject area was the highest frequent subject area in international publications on sustainable leadership. Followed by business,

management and accounting with 23.1%, environmental science with a proportion of 8.1%, economics, econometrics and finance with a proportion of 8.3%, energy 7.8%, computer science with a proportion of 5.8%, engineering with a proportion of 5.3%, psychology with a proportion of 2.7%, arts and humanities with a proportion of 2.5%, medicine with a proportion of 2.2%.

4.7. Most frequency of sustainable leadership research by document type
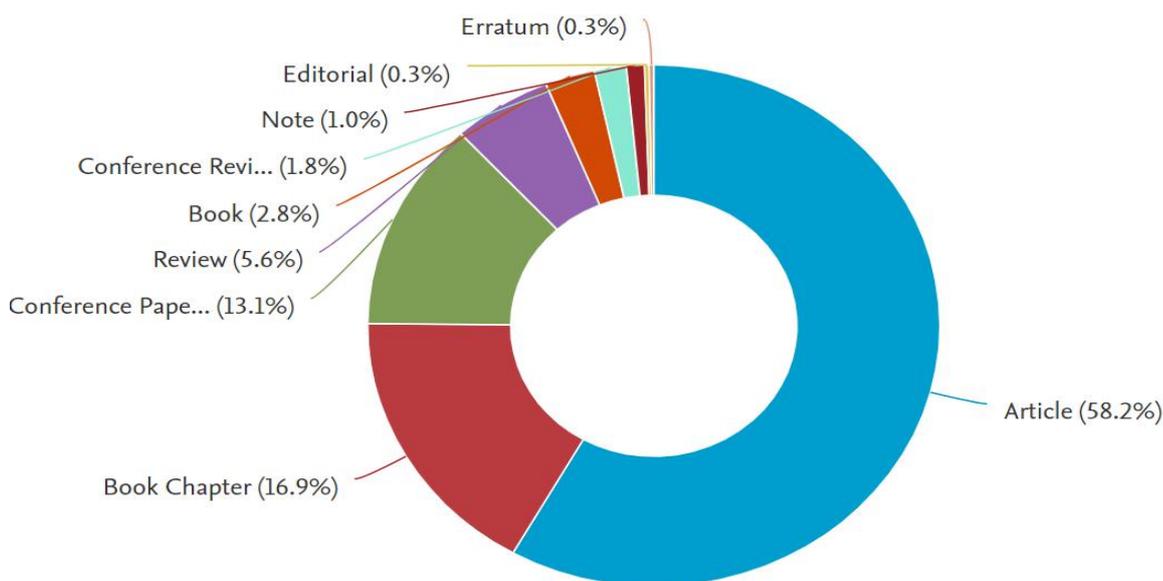

Figure 8

The largest frequent document scientific type in sustainable leadership publication is article (58.2%) with 227 documents, then documents, book chapter (16.9%) with 66 documents, then conference paper (13.1%) with 51 documents. Review (5.6%) with 22 documents and book (2.8%) with 11 documents.

4.8. Keyword analysis

We have conducted the co-occurrence analysis using the author keywords and identified seven main clusters of sustainable leadership literature, as shown in figure 9. Five repetitions were the criterion for the minimum amount of keyword-related documents. Therefore, 26 keywords among 1015 keywords reached the thresholds.

As depicted in figure 9, an analysis of studies about sustainable leadership reveals the prominence of three keywords: Sustainable leadership, leadership and sustainability,

Table 1: Most used keywords

Keyword	No. Of uses
Sustainable leadership	147
Leadership	79
Sustainability	59
Sustainable development	24
Corporate sustainability	13
Thailand	12
Transformational leadership	11

Higher education	10
Innovation	10
Leadership development	8

Keyword network diagrams assist researchers in identifying barren research areas.
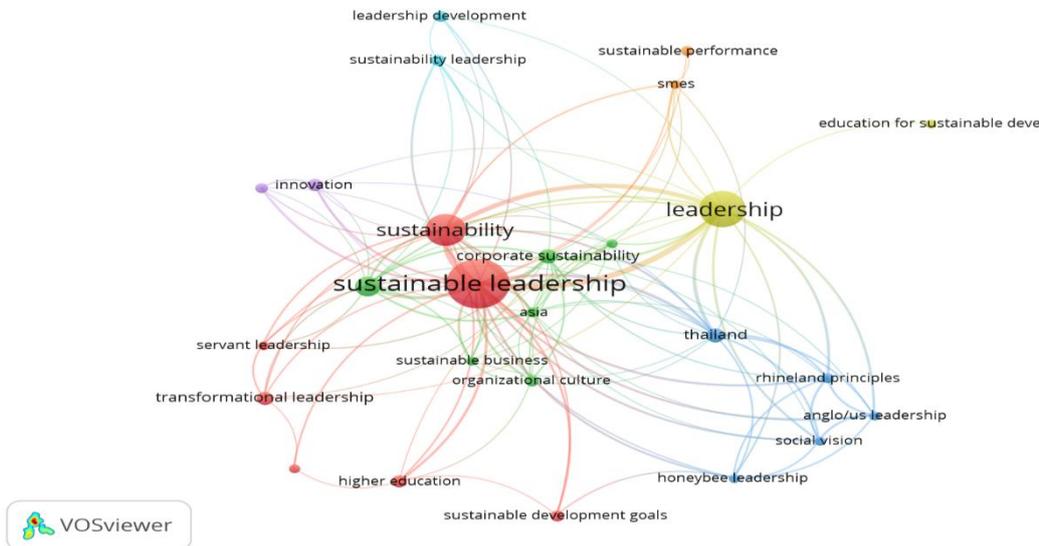

Figure 9

4.9. Co-authorship analysis:

Through the utilization of co-authorship analysis, this study has discerned the key contributors, academic institutions, and international collaborators engaged in substantial collaborative efforts within the domain of sustainable leadership, as manifested in network visualizations. This co-authorship investigation has strategically underscored those scholars exhibiting the highest degrees of collaborative involvement in the realm of sustainable leadership research. Because of this comprehensive analysis, it was ascertained that 802 authors were encompassed within this purview. By imposing a criterion of a minimum of four publications and citations, it became evident that 18 researchers met this predefined threshold. Figure 5, provided herein, furnishes a network map delineating the identities of researchers who partake in the most robust collaborative endeavors amongst themselves.
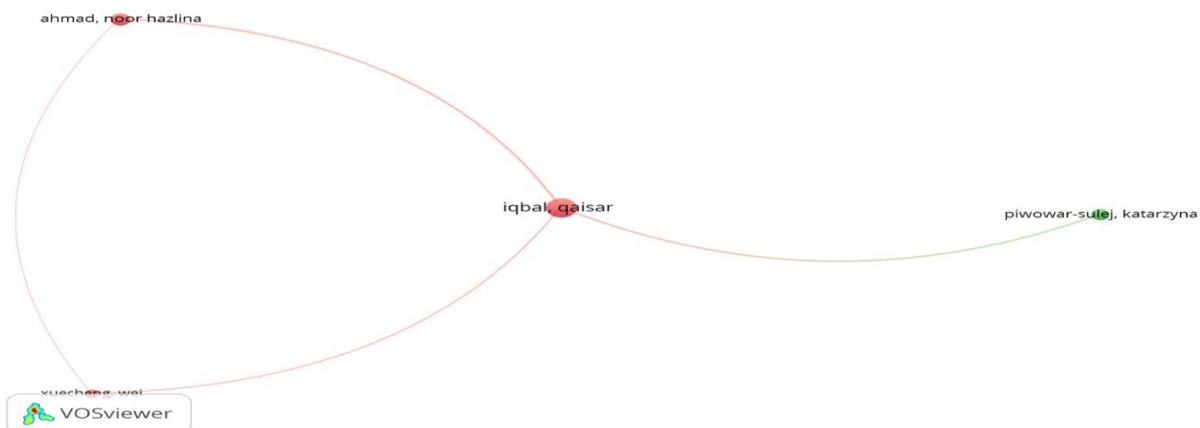

Figure 10

Table 2

Author	No. Of documents	No. Of citations
Iqbal, qaisar	19	658
Kantabutra, sooksan	18	343
Suriyankietkaew, suparak	10	355
Ahmad, noor hazlina	8	476
Piwowar-sulej, katarzyna	7	151
Avery, gayle c.	6	483

As illustrated in table 2, the most prolific researcher in the field of sustainable leadership is undeniably iqbal, qaisar, who has amassed 19 published articles and garnered 658 citations. Subsequently, other prominent researchers in the field, in descending order, include sooksan kantabutra, suparak suriyankietkaew, hazlina ahmad noor, katarzyna piwowar-sulej and avery, gayle c.

Each contributing 18,10,8,7,6 published articles, respectively, and accumulating citation counts of 343, 355, 476, 151 and 483respectively.

4.10. Citation analysis

Table 3

Top 10 most cited documents

Title	Source title	Year	No. Of citations
Education policies for raising student learning: The finnish approach	Journal of education policy	2007	321
Science mapping of the knowledge base on sustainable leadership, 1990-2018	Sustainability (switzerland)	2018	112
Sustainable leadership practices for enhancing business resilience and performance	Strategy & leadership	2011	214
Systematic literature review on sustainable human resource management	Journal of cleaner production	2019	271
The relationships among transformational leadership, sustainable leadership, lean manufacturing and sustainability performance in thai smes manufacturing industry	International journal of quality and reliability management	2019	100
Sustainable leadership and development in education: Creating the future, conserving the past	European journal of education	2007	96
The seven principles of sustainable leadership	Educational leadership	2004	198
Transnational corporations as 'keystone actors' in marine ecosystems	Plos one	2015	175
A moderated-mediation analysis of psychological empowerment: Sustainable leadership and sustainable performance	Journal of cleaner production	2020	131

	Leadership for sustainable futures: Achieving success in a competitive world		
Leadership for sustainable futures: Achieving success in a competitive world		2005	144

From table 3, it can be seen that the top 10 international publications most cited in the area of sustainable leadership the most publications are the work of sahlbreg, p. In 2007 entitled "the education policies for raising student learning: The finnish approach"

4.11. Co- citation analysis

Co-citation analysis stands as an innovative method employed to comprehend the cognitive structure within a scientific domain. This analysis technique encompasses the tracking of pairs of source articles that are co referenced within source articles. When specific pairs of articles are co-referenced by multiple authors, it leads to the emergence of research clusters. In the context of this study, the examination of research related to sustainable leadership through co-citation analysis involves the creation of network maps that depict the interrelationships between cited references, source articles, and authors (gerçek and gerçek, 2022)

By imposing a minimum citation count threshold of 20 to determine the network map of co-cited references on sustainable leadership, it was ascertained that 3 references out of a total of 18621 citations met this threshold. Figure 10 provides a visual representation of the network map obtained from this analysis. As delineated in figure 10, a majority of the studies within this subject area predominantly co-cite the reference with the highest co-citations, which is avery (2005),and hargreaves (2006) both accounting for 36 co-citations.
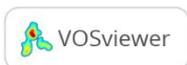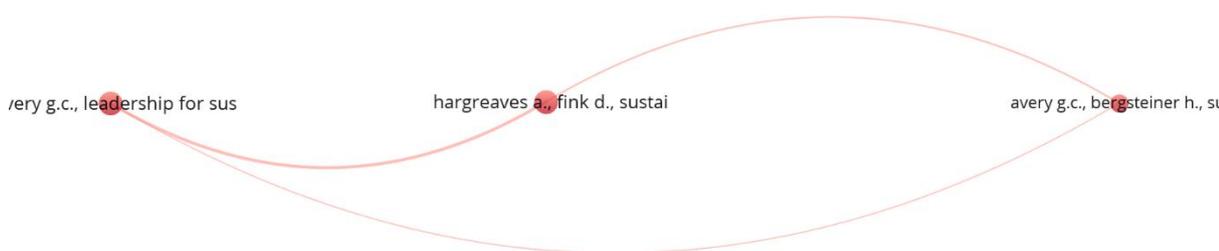

Figure 11

5.   Conclusion:

Researchers benefit from bibliometric analysis by learning which authors, countries, organisations and keywords are most often used in the literature around a certain issue. All of these features are being used in the current studies by the researchers. Using bibliometric analysis, they learn about

emerging tendencies and patterns in the studied subjects. It provides a basis for the creation of new theoretical frameworks and statistical tools for authors. Bibliometric analysis has gained prominence in the past decade, and numerous studies have been published using this methodology. It aids in comprehending essential factors in any particular research subject. In this study, we identified the significant authors and countries with the help of citation and co-citation analyses that have conducted research in sustainable leadership.

6.   Limitations:

This research paper is based on information taken from the scopus database, so it did not look at other well-known journals outside the scopus database. We limited ourselves to vosviewer software for co-citation analysis, co-occurrence analysis, and network diagrams, while many other software options are available

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