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## Article

# A bibliometric approach to Sustainable Development Goals (SDGs) systematic analysis

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# A bibliometric approach to Sustainable Development Goals (SDGs) systematic analysis

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## MANAGEMENT | REVIEW ARTICLE

# A bibliometric approach to Sustainable Development Goals (SDGs) systematic analysis

Faida Indana<sup>1\*</sup> and Reza Widhar Pahlevi<sup>2</sup>

**Abstract:** In this study, research on the Sustainable Development Goals (SDGs) will be carefully analyzed from the perspectives of keywords, research locations and subjects, as well as the research methodologies employed. Four key findings are presented after reviewing 347 scientific articles in this investigation. The economic and social effects of achieving the SDGs are the first theme in sustainable development research, and the added value of established plans is the second theme. Second, the most often utilized data sets are exploratory and case studies. Third, there are nearly equal numbers of studies on the Sustainable Development Goals (SDGs) in industrialized and developing nations. Fourth, based on VOSviewer-based bibliometric methods. Recommendations for more research to develop the theoretical and methodological. It will further contribute to the creation of the Sustainable Development Goals (SDGs) in the future by examining these four issues.

**Subjects:** Corporate Social Responsibility & Business Ethics; Governance - Politics & International Relations; Environmental Ethics;

**Keywords:** Sustainable Development Goals (SDGs); economic and social impacts; VOSviewer; bibliometric analysis

## 1. Introduction

Since the Sustainable Development Goals (SDGs) were established, Asia Pacific countries have struggled to meet the SDGs' objectives because addressing environmental degradation problems while maintaining environmental quality has become difficult. Additional challenges include issues with sustainable economic growth, clean and affordable energy, and education (Martin & Walker, 2015). Several studies have made an effort to combat climate change using an integrated strategy to the three Goals (technology, innovation and economic growth). The primary objective of such an approach is the direct impact of technological advancement on economic growth so that good effects are afterwards evident in development processes (Xie et al., 2021). So, the process of economic development is indirectly impacted by technological advancement (Sinha et al., 2021). Studies the effects of accomplishing SDGs with technological aid in the Nigerian education sector and draws attention to the necessity to extend awareness and implementation of existing technology, namely the transfer of technology to achieve various SDGs (Cole & Broadhurst, 2021). (Giuliani et al., 2020). finds that there is still a lack of attention paid to the issue of addressing policy directions for using technology to achieve the SDGs.

With regard to themes, regions, research subjects, and research methodologies, this study aims to conduct research on international scientific articles for research on the Sustainable

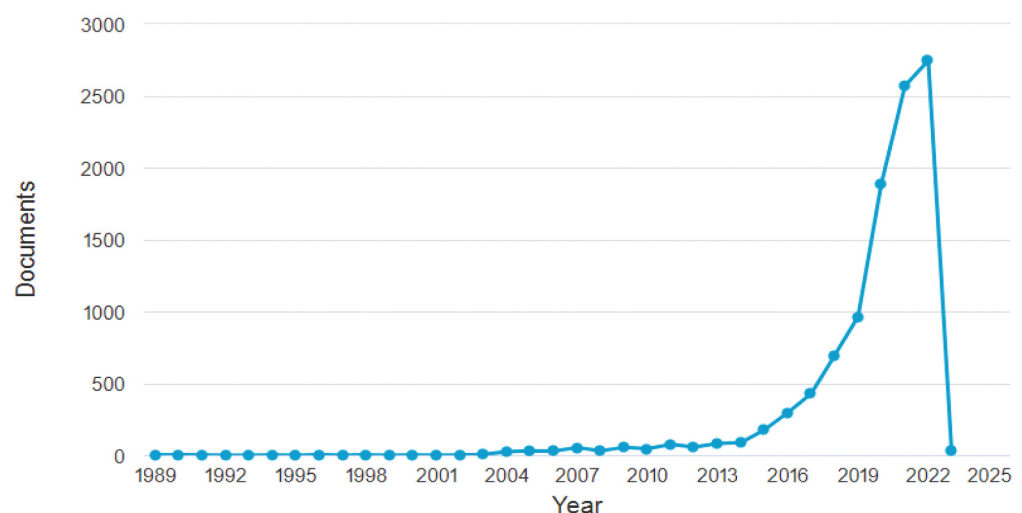
Development Goals (SDGs). SDGs are political objectives that fall primarily under the purview of governments in wealthy or developing nations, despite the fact that their accomplishment calls on the participation and cooperation of all relevant parties. One of the reasons for this is that self-regulation programs like the United Nations Global Compact have so far been ineffectual because there aren't any monitoring systems in place and there aren't any clear aims. As a result, each government establishes its own SDGs policy, taking into consideration the national circumstances, because the SDGs demand a strong political commitment. In response to these demands, the SDGs have gained support from numerous businesses worldwide (Nishitani et al., 2021). In their sustainability reports and financial reports, many corporations do indeed highlight their social and environmental sustainability operations (hence, sustainability activities) using the SDGs logo and image. This is understandable given that many businesses view sustainability initiatives as essential to their continued existence and expansion and that many of them began implementing these initiatives even before the SDGs were established (Martin & Walker, 2015). However, if a company's sustainability efforts to advance the SDGs are the same as the current initiatives made in support of the SDGs, it is only greenwashing (SDGs washing) because the organization's sustainable efforts have not been significantly altered (Mohammed et al., 2018). This study sheds light on how SDGs research has been distributed throughout a number of nations, years, themes, research methodologies, and relationships across developed themes.

Figure 1 shows to the data the researchers gathered, there was an increase in research on SDGs between 1989 and 2022. The amount of research on the SDGs has greatly expanded, as evidenced by publications from 2015 to 2019 that caught the interest of SDG scholars. The chart below shows the evolution of publications related to the SDGs between 1989 and 2022. According to the description above, this study has helped to provide research questions with answers. What themes, research approaches, and study contexts (locations and business lines) are relevant to studies on the Sustainable Development Goals (SDGs)? Each government creates its own SDGs policy while taking the national circumstances into consideration. The SDGs demand a strong political commitment. Several organizations all throughout the world have embraced the SDGs in response to these aspirations. In their sustainability reports and financial reports, many corporations do indeed highlight their social and environmental sustainability operations (hence, sustainability activities) using the SDGs logo and image. This is understandable given that many businesses view sustainability initiatives as essential to their continued existence and expansion and that many of them began implementing these initiatives even before the SDGs were established. However, if a company's sustainability efforts to advance the SDGs are the same as the

**Figure 1. Articles about the Sustainable Development Goals (SDGs).**

**Source:** Authors' elaboration based on Scopus Database

**Documents by year**



current initiatives made in support of the SDGs, it is only greenwashing (SDGs washing) because the organization's sustainable efforts have not been significantly altered.

Application of bibliometric analysis methods to all Scopus publications in relation to the Sustainable Development Goals (SDGs). Bibliometric analysis provides a quantitative description of scientific communication by establishing a research framework, recurrent themes, and relationships (Pahlevi et al., 2022). The construction of a thorough examination of the numerous scientific facets of the Sustainable Development Goals will benefit from in-depth analysis (SDGs). It adds understanding both theoretically and practically. The construction of a thorough examination of the numerous scientific facets of the Sustainable Development Goals will benefit from in-depth analysis (SDGs). It adds understanding both theoretically and practically.

In addition, previous studies consider the theoretical predictive motives of the relationship between content analysis method to build an analytical framework based on policy instruments and the social-economic-ecological dimensions of sustainable development. The ecosystem and environment are the main obstacles to sustainable development, and there is room for improvement in the implementation of each specific goal (Xie et al., 2021). Environmental pollution as a threat to sustainable development results from these damages. Although it has been established that Sub-Saharan Africa would benefit from resource-management development, sustainable environmental strategies, and a reduction in urbanization and persistent poverty, the information on these issues has not been made public (Dagestani et al., 2022). Research Qing et al. (2022) results show first comprehensive and holistic bibliometric analysis of the relationship between green technology innovation and corporate financial performance. A growing number of entrepreneurs are becoming aware of their dependence on the environment. As a result, they are more heedful of financial returns and their contribution to the society and environment. On the other hand, the use of green, advanced, and energy-efficient building materials may have a contradiction with SDG 1 and its related targets due to their initial high cost. In addition, a large number of building materials (including local materials) were identified to contain some form of toxicity (Omer & Noguchi, 2020).

## 2. Literature review

The Sustainable Development Goals (SDGs) are a collection of 17 goals with 169 targets that were unanimously endorsed by the United Nations in 2015 (UNEP, 2015). They are meant to be accomplished by 2030 (Mozas-Moral et al., 2021). The SDGs aim to “end poverty and hunger everywhere; combat inter-country inequality; build peaceful, just, and inclusive societies; protect human rights; advance gender equality; and promote the empowerment of women and girls; as well as to ensure the long-term preservation of the planet and its natural resources.” Specifically, opposing such actions in light of the SDGs (Mwebesa et al., 2021). Businesses adopting SDGs are urged to adapt and adjust their processes. So, despite the fact that businesses are now expected to execute sustainability initiatives more aggressively than previously in order to accomplish the SDGs, there may be gaps between anticipated and actual initiatives, which raises the possibility of “green washing.” Unfortunately, this topic is mainly neglected in the academic literature due to the paucity of study on business sustainability initiatives to achieve the SDGs (Yin et al., 2019). Sustainability must be connected to a company's core business in order for it to effectively carry out its sustainability initiatives and ultimately support the SDGs. Management and stakeholders are therefore expected to close this gap (Zhu et al., 2022). Companies are urged by management and stakeholders to take into account the strategic impact of their operations and/or the ethical (legitimizing) demands of their stakeholders (Pahlevi et al., 2022).

The universal nature of the 2030 Agenda is one of its most significant features. The overall objective is to significantly advance sustainable development on a global scale. Throughout the past few decades, technology and innovation have been increasingly significant in the broader goal for sustainable development (Omer & Noguchi, 2020). The information era and digital economy have recently been driven by the main database. In addition to what may be gathered using new, inventive ways,

countries should invest in acquiring data using all practical conventional methods (Fulzele et al., 2021). Globalization 4.0 must be ready for developing countries with infrastructure, facilities, organization, and human resource skills and mindset (ElMassah & Mohieldin, 2020). The 2030 Agenda for sustainable development presents a data-driven concept of governance and highlights the challenge of significantly increasing the availability of high-quality, timely and reliable data. Digital transformation is defined as the in-depth transformation of business and organizational activities, processes, competencies and models to fully take advantage of the changes and fusion of digital technologies and accelerate the entire society in a strategic way and prioritize the present and the future (Subramanian & Jana, 2019). The study focuses on two digital transformation tools: big data and e-government. In order to enhance government performance, increase coordination, and speed up service delivery to the general public, e-government involves the digital transformation of governmental organizations. E-government allows better public service delivery, more connection with business and industry, information access that empowers individuals, or more effective government management (Chan, 2020). Less corruption, greater transparency, greater convenience, income growth, and/or cost savings may emerge from this. Big data, on the other hand, is a significant amount of structured and unstructured data that has been gathered from numerous sources, such as email, call logs, mobile banking transactions, user-generated online social media, online searches, satellite images, mobile devices, and applications. The SDGs could be supported through digital transformation, which involves the analysis of recorded data using computational methods to find trends and patterns and produce dynamic, useful knowledge about human behavior, the environment, and experience (Pizzi et al., 2020).

### 3. Method, data, and analysis

Most bibliometric analyses have a shared data source: Thomson Reuters' Web of Science (WoS) and Elsevier's Scopus (Mongeon & Paul-Hus, 2016). However, we selected only Elsevier's Scopus as the data source for our bibliometric analysis. There are two main reasons: on the one hand, it is one of the largest repositories from 1900 to nowadays, covering the best publications in a wide range of academic fields (Qing et al., 2022). Statistical analysis of books, papers, or other types of publishing is the term used to describe the systematic analysis of reviews using a bibliometric technique. A more thorough bibliometric approach, however, encourages transparent quantitative and qualitative analyses of particular information streams. We employed book meta-literature, which is a popular approach in contemporary literature and integrates bibliometric (quantitative) and content (qualitative) approaches, to conduct this research. To initially detect and comprehend networks based on citations, keywords, or authors, a bibliometric approach was first introduced (Fulzele et al., 2021).

The study team's initial analysis effort concentrated on keyword choice. A macro (top-down) strategy to keyword selection can be used, starting with broad search trajectories and moving toward general studies and themes. As a result, after taking into account the literature's interest in this subject and the dearth of systematic studies with comprehensive literature analyses, the Sustainable Development Goals (SDGs) are references in our series of research papers' article titles, abstracts, and keywords. The Scopus database was used for research analysis as part of a multidisciplinary study that enables researchers to examine different information science domains in accordance with the volume of data available in each research field, including social sciences. In this instance, we tested these findings by acquiring 347 previously published Scopus study articles; however, we did not carry out our analysis throughout the study's time period.

Researchers can utilize bibliometric analysis to support precise investigations with citations, citation counts, the nation of publishing, and the principal author in this field of study. Finally, researchers also employ Excel and VOSviewer software to produce more comprehensible data. The last tool enables the researcher to evaluate the relationships between keywords, supporting the parameters of the scientific subject under discussion. This phase is crucial to giving future research a structured research agenda.

## 4. Result and discussion

This section will concentrate on the dissemination of publications and the Sustainable Development Goals' influencing factors (SDGs). Based on annual publishing and the quantity of articles published by journal sources, publications are distributed. The Sustainable Development Goals (SDGs) will highlight the most fruitful aspects, including those from the study field, authors, institutions, and nations.

### 4.1. Descriptive literary analysis

By responding to two research questions on the study setting (theme, subject, and location of the research), research methodology, and research theme clusters, this session will analyze the findings of the 347 selected articles. It's intriguing to see a top resource on top Affiliates for SDGs that strikes a good mix.

Figure 2 shows top resource on top Affiliates for SDG. There is international research on the SDGs. The SDGs are political objectives that fall primarily under the purview of governments in both rich and developing nations, but their accomplishment calls on the participation and cooperation of all relevant parties. One reason for this is because prior self-regulatory projects, including the United Nations Global Compact, lacked monitoring methods and had no set objectives, which made them ineffective.

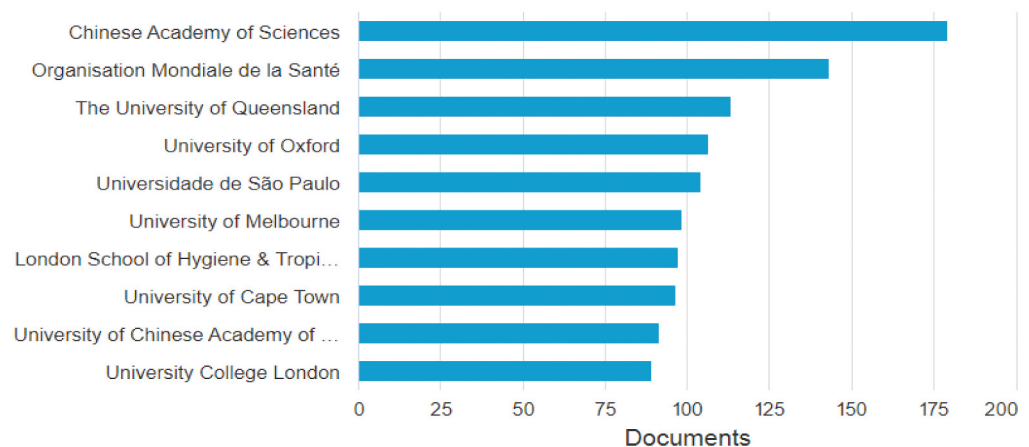
Many businesses all over the world have adopted the SDGs in response to these expectations. In their sustainability reports and integrated reports, many firms do indeed highlight their social and environmental sustainability activities (hence, sustainability activities) with the logos and icons of the SDGs. This makes sense given that many businesses view their sustainability initiatives as crucial to their continued existence and expansion and that many of them had already adopted such initiatives prior to the SDGs (Sinha et al., 2020). However, if a company's sustainability activities to meet the SDGs are the same as existing activities conducted in the name of SDGs, they are simply greenwashing (or "SDG washing") (Abad Segura & González-Zamar, 2021). In short, these activities may be just "cosmetic gestures and re-labelling, without serious modification of their activities". This could happen because it is widely believed that a company's motivation for disclosing sustainability activities to the public is to gain legitimacy, and if so, the rhetoric of such disclosures may differ from the underlying reality (Acuti et al., 2020). Indeed, recent critical literature on greenwashing and impression management in sustainability reporting supports this view. Companies pursuing the SDGs are expected to change practices and adapt (Cole & Broadhurst, 2021). Thus, although companies are currently expected to implement sustainability

**Figure 2. Article count by affiliation (top ten institutions).**

**Source:** Authors' elaboration based on Scopus Database

### Documents by affiliation ⓘ

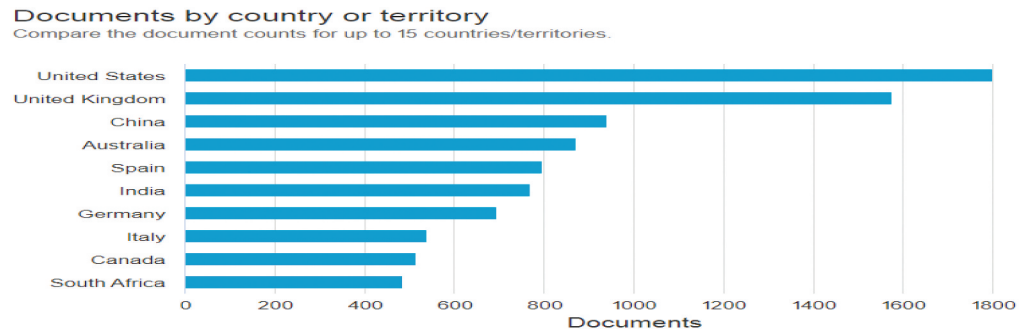
Compare the document counts for up to 15 affiliations.





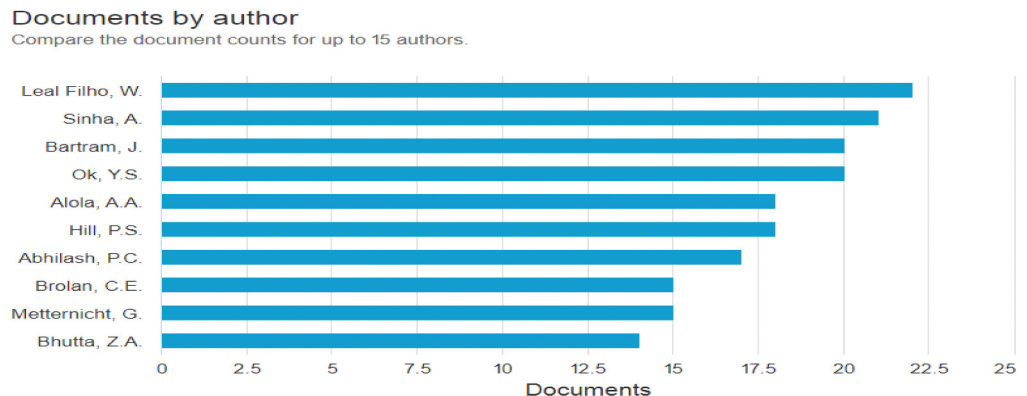
**Figure 3. Article count by nation or territory (top ten).**

**Source:** Authors' elaboration based on Scopus Database



**Figure 4. Articles by author.**

**Source:** Authors' elaboration based on Scopus Database



activities more proactively than ever to achieve the SDGs, there may be a discrepancy between the expected and actual activities, which raises the possibility of greenwashing (Giuliani et al., 2020). However, because relatively few studies have addressed corporate sustainability activities to meet the SDGs, this issue has been largely unexamined in the academic literature (Hinson et al., 2019).

Figure 3 shows the graph shows that research on the SDGs is done in both developed and developing nations. The United States, UK, Australia, China, Spain, and India are examples of developed nations. There is international research on the SDGs. The graph shows that research on the SDGs is done in both developed and developing nations. The United States, UK, Australia, China, Spain, and India are examples of developed nations. The graph shows that research on the SDGs is done in both developed and developing nations. The United States, UK, Australia, China, Spain, and India are examples of developed nations.

Figure 4 shows the graph shows that research on the SDGs is done in both developed and developing nations. The United States, UK, Australia, China, Spain, and India are examples of developed nations. There is international research on the SDGs. The most prolific SDG authors are depicted in Figure 4. This table simply takes into account the total number of publications, not the author's impact. The following section will talk about the authors' influence. At first, we intended to introduce the author.

#### 4.2. Mapping and visualization of bibliometric data

In accordance with the aforementioned standards, the final sample consists of 347 documents (analysis as of 1 October 2022). Students ought to do their research utilizing a bibliometric strategy that examines the headings and summaries of each source. The use of bibliometric analysis to support precise conclusions based on citations and citations, country of publication, and primary author for this research topic can be aided by this scientific package. Also, the researcher used Excel and VOSviewer software to provide results that were more understandable. This last tool



enables researchers to investigate associations between keywords, helping their discussion of scientific subjects. This stage is crucial to creating a planned research agenda to investigate the future.

#### 4.2.1. Research themes related to a group of Sustainable Development Goals (SDGs)

Researchers visualize the possibility for clusters in each keyword from the reviewed papers using the software VOSviewer. First, based on the distinct hues (red, blue, green, and yellow) for each issue that showed on the graphic, the researchers determined 4 primary clusters. The analysis's interrelated linkages and subjects are described by the variations in color. The frequency of use of these themes is then determined by these nodes (SDGs).

Figure 5 shows divides the 347 articles it examined into 4 clusters, namely clusters of red, blue, green, and yellow. Sustainable Development Goals (SDGs) are a connected topic in the cluster red, whereas human, policy, and socioeconomics are linked topics in the cluster green. SDGs are a connected topic with industrialization, energy storage, and pollution in the blue cluster. Sustainable supply chains, economic growth, and the Sustainable Development Goals (SDGs) are related themes in the cluster of yellow. Moreover, the SDGs are related to sustainable development and energy policy.

#### 4.2.2. Co-authorship analysis of authors

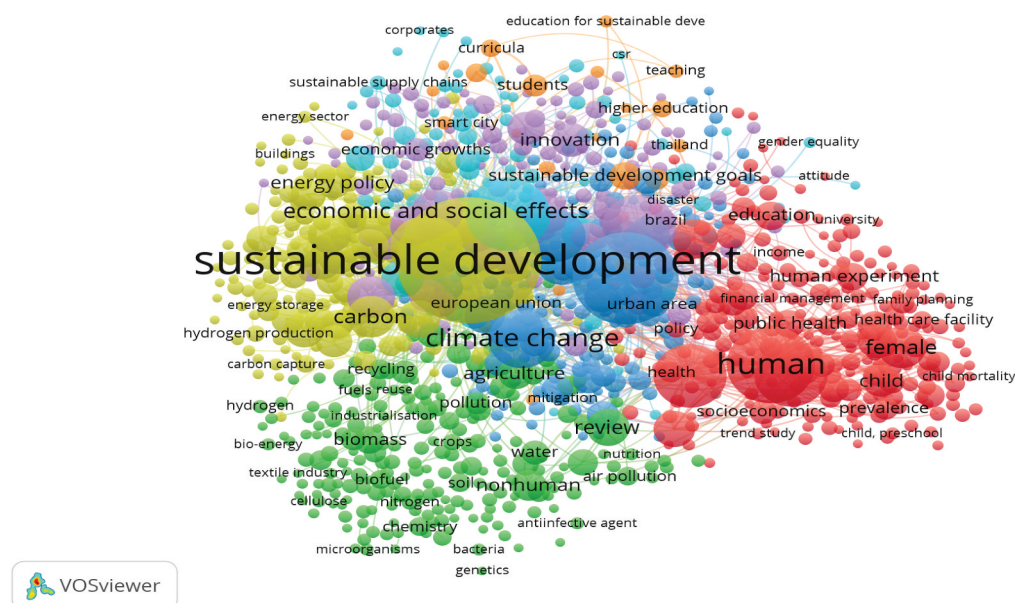
Co-authorship analysis is broken down into units of analysis, namely authors and institutions, based on the VOS viewer program. The findings of the co-author analysis are likewise shown for the most successful writers, contributions, and nations as shown in the previous picture.

Figure 6 shows, the co-authorship of author analysis is the only topic of this study 347 authors are listed in the findings, however according to VOSviewer, the majority of them are not yet connected. The largest connected item set among them, as seen in Figure 6, has only 61 writers.

#### 4.2.3. Co-occurrence of Sustainable Development Goals (SDGs)

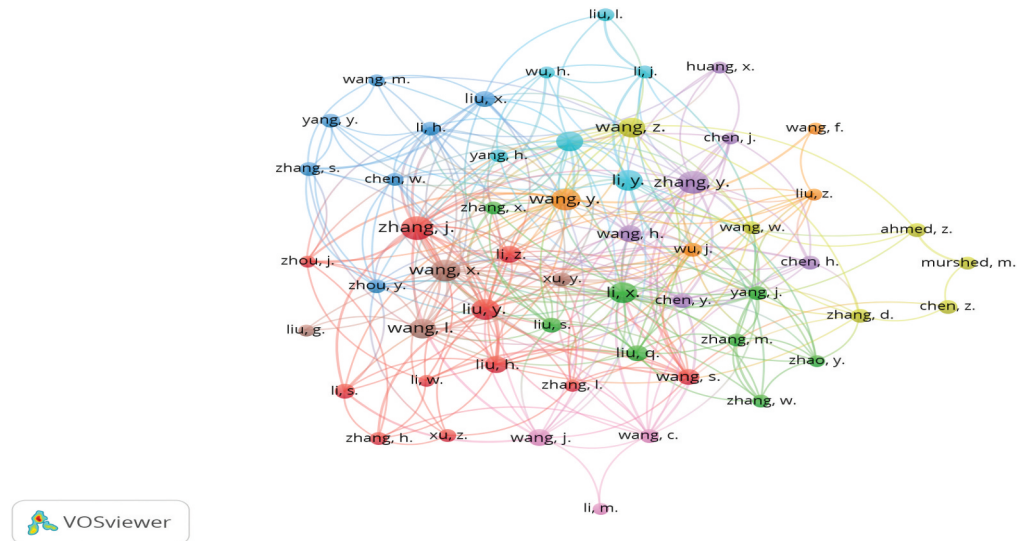
The co-occurrence map demonstrates the scientific field's contribution. This work examined the Scopus database search results in order to transparent the image.

**Figure 5. Network visualization Sustainable Development Goals (SDGs).**



**Figure 6. Co-authorship analysis of authors.**

Source: VOSviewer software



**Figure 7. Co-occurrence analysis.**

Source: VOSviewer software

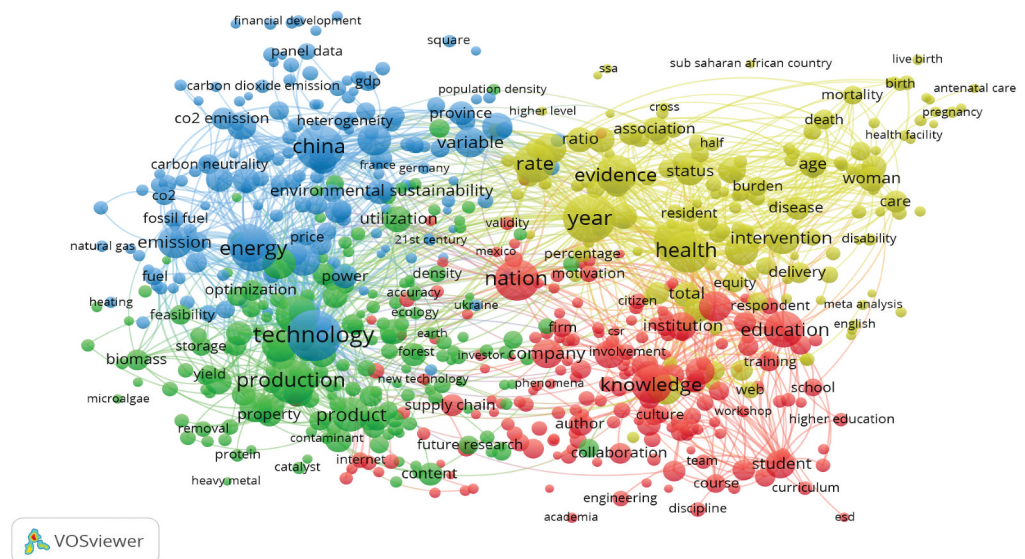


Figure 7 shows the nation co-occurrence map (Scopus database) after modifying the node size, label font size, and node location. The size of the nodes in Figure 7 indicates how much material there is on the subject of Sustainable Development Goals (SDGs).

## 5. Discussion

In September 2015, the United Nations adopted “Transforming Our World: The 2030 Agenda for Sustainable Development” as a global action plan for sustainable development. This action plan, which consists of 17 SDGs with 167 goals, is an international governance system in response to recent environmental challenges and social disparities (Izurieta et al., 2021). Importantly, the SDGs framework combines a goal to safeguard human rights with another to fight social injustice, preserve the environment and its natural resources, and foster inclusive and sustainable economic growth (United Nations General Assembly, 2015). A study conducted by KPMG indicates that only 39% of the sampled firms expressly published information on their implementations of the SDGs, despite the fact that the SDG framework might creatively extend the concept of non-financial reporting quality. Particularly in CSR reporting, businesses may exaggerate or understate their SDG implementations (Yesuf & Aassouli, 2020).

Thus, in collaboration with the Global Reporting Initiative (GRI) and the World Bank Council for Sustainable Development (WBCSD), the UN developed the first effort to document businesses' contributions to SDGs through non-financial metrics in 2017. To assist businesses in aligning their CSR initiatives and reporting with the SDG framework, this effort introduced the SDG framework (Gerged & Almontaser, 2021).

The 17 goals and 169 targets of the sustainable development agenda must take into account a vast number of potential interactions due to the holistic structure of the SDGs, as was previously noted (Van Assche et al., 2020). The five stages of the suggested methodology are as follows: To define and categorize building materials and to obscure the connection between different categories of building materials and SDGs, extensive peer-reviewed studies were adopted from a variety of online databases. In addition, sources that address important insights learning were integrated and categorized, scores were developed, scores were applied to SDGs within a theoretical framework, and results from the skeleton were refined and put into practice (Buckingham et al., 2021).

Gray literature that was pertinent to this study was also used as an additional source of data. Websites, reports from experts and the government, conference proceedings, and policy documents are all included (Westman et al., 2019). Search phrases included (Sustainable Development Goals; SDGs; UN Agenda; 2030 Agenda) and (contribution; interaction; building construction; built environment); sustainable building materials; green building materials. This stage's immediate benefit demonstrates the need to define and choose building materials in accordance with the local environmental context (Bichler, 2021). To put it another way, building materials must be chosen and produced to maintain their performance in light of the changing context conditions at a particular place and time (Chuang et al., 2021). As a result, classifying the phrase organizes the numerous building materials that might be used to advance a sustainable development agenda. Moreover, documents categorised in fields of study other than those being investigated and non-English-language sources are not included (Ting et al., 2021).

Previous studies have attempted to address the SDGs in a variety of ways, including the implications of a company's sustainable development and taking into account specific goals for implementing the SDGs framework by businesses, according to accounting scholarships (eg accounting scholarships to mine wood, calculate carbon, calculate and human rights, and calculate water) (Mozas-Moral et al., 2021). Many studies have also been done on SDG 6, "clean water and sanitation," SDG 13, "climate for action," and SDGs 14 and 15, "life on land/life under water," which are all related to equality and human rights. Although earlier research provides some insight into how the SDGs are being implemented, this work is not informed by the SDG framework because it was done before the UN SDG agenda was created (Sinha et al., 2021). The SDGs can therefore pave the way for extending current research and offering wide insights that can aid in advancing the sustainable growth of businesses throughout the world. More specifically, current research examines SDGR in various developed and emerging economic contexts worldwide (Xie et al., 2021).

Normative expectations are pervasive and affect the kinds of corporate activity that are acceptable or rejected during periods of political transition. Yet, coercive compliance with laws and moral commitments calls for a robust institutional setting (Martin & Walker, 2015). Given the lack of effective compliance mechanisms in developing nations, especially during political crises, institutional status can only result in compliance with normative standards to advance private interests and not pose a threat to public purposes (Hinson et al., 2019). Hence, in order to understand how and why SDGRs change in politically fragile nations in the most thorough way possible, we employ a neoinstitutional theoretical framework (Izurieta et al., 2021). Companies in contexts with significant degrees of information asymmetry may adopt the SDG framework in an effort to lessen tensions caused by information asymmetry and enhance performance. Companies may also increase their sustainability reporting during political upheaval as a strategy to show a less critical level of institutional availability (Cole & Broadhurst, 2021). Implementation of SDGs/sustainability initiatives by companies in developing countries is highly

dependent on institutions environment. For example, in a study conducted in South Africa (Cole & Broadhurst, 2021) Adoption of training reporting is associated with institutional changes in federal states that motivate companies to revise their competitive strategies and implement more “enlightened self-interest” strategies, including sustainability reporting (Acuti et al., 2020).

## 6. Conclusion and suggestion

### 6.1. Main findings

This study highlighted four key conclusions are presented in this study after reviewing 347 scientific papers. The economic and social effects of achieving the SDGs are the first issue in sustainable development research. The second theme pertains to a notion known as the added value of plans made for the function of communication. Second, the most often utilized data sets are exploratory and case studies. Third, there are approximately as many studies on the Sustainable Development Goals (SDGs) in wealthy and poor nations.

### 6.2. Theoretical and policy implications

On the other hand, since 1989, many building materials and products have been introduced to the construction market for exhibition ability to meet international sustainable development goals (Omer & Noguchi, 2020). Some terminology regarding development and sustainability material has been widely used without a clear definition. For this reason, controversy and settlement occurred among researchers and many of them give different explanations (Abad Segura & González-Zamar, 2021). In many cases, the terms are sustainable and green used interchangeably, but its main building material is a much broader term that fulfills a lot more criteria and looks than another term. The demands for eco-friendly and green building materials have increased dramatically over the past several years and is expected to drive the growth of the building materials and construction industry in the coming years (Sinha et al., 2020). Moreover, it is multifaceted the nature of the SDGs provides a great opportunity for building materials to reveal their significant impact on the realization of sustainable development. Building materials have a significant impact (direct and indirect) in achieving various goals and targets in the sustainable development goals (SDGs), these goals include SDG3, SDG6, SDG7, SDG8, SDG9, SDG11, and SDG12 (Pizzi et al., 2020). However, the relationship between building materials and the SDGs is still briefly discussed in the literature, so a more systematic and theoretical analysis is needed to fill this tension, which contributes to further research.

### 6.3. Limitations and future research

Recommend further research agenda to exploring these four themes, it will further contribute to the development of Sustainable Development Goals (SDGs) in the future. It will make additional contributions to the creation of the Sustainable Development Goals (SDGs) in the future by examining these four issues. This research has several limitations. First, our choice of database may influence the number of relevant articles. Although we chose the Scopus database, using other database could increase the number of research articles question. Future studies may consider selecting additional database. Second, although some criteria included in the search for literature to see literature, still there personal subjectivity, which may also be a limitation of this research. Future studies must apply more objective criteria to examine and organize the literature.

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No potential conflict of interest was reported by the author(s).

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