

Does Digital Transformation Enhance ESG Performance: A Bibliometric Review

Nasyiah Hasanah Purnomowati*, Bambang Sutopo
Faculty of Economics and Business, Universitas Sebelas Maret, Indonesia
*corresponding author e-mail: nhp.wati@staff.uns.ac.id

Article Info	Abstract
Keywords: Digital Transformation; ESG Performance; Disclosure; Sustainability	The purpose of this study is to map and analyze the development of the research about the relationship between digital transformation and ESG performance through a bibliometric approach. We use Scopus database in the range of 2020–2025. A total of 169 articles were identified and analyzed using Scopus Analyze menu and the VOSviewer. The bibliometric results show a sharply increasing trend of publications since 2020, and China leads with 95 publications. The analysis of keywords and citations reveals five main clusters that describe the latest research directions. The most frequently cited articles such as the work of Lu (2024) and Wang et al., (2023) are central to the influence in shaping the next direction of research. The implication of this research or academics is that the results of this study open up further research opportunities to deeply explore how digitalization can be useful in an ethical and effective way in improving transparency and accountability of sustainability reporting. For business practitioners, the findings of this research emphasized on the importance of digital transformation development to improve corporate environmental, social, and governance performance.
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1. Introduction

In the last decade, the digital transformation phenomenon in accounting and business cannot be ignored due to its significant role. Different kinds of technologies such as AI (artificial intelligence), big data, cloud computing, blockchain, and the Internet of Things (IoT) have significantly affect the generation, the process, and the communication of information in the organizations (Agostino et al., 2022).

In accounting and accountability fields, digitalization also has impact not only on operational efficiency but also on the way of the accounting’s role in developing corporate value, transparency, and accountability (Quattrone, 2016). This change underlined the remarkably shifts from simply managing data to creating knowledge and governance powered by technology.

In line with digital transformation, there is an urgency of global demands for sustainability practices measured through Environmental, Social, and Governance (ESG) performance. ESG is now the primary instrument for assessing the impact of corporate sustainability on the environment, society, and corporate governance (Tan et al., 2025). Under the pressure of global policies such as the European Green Deal and commitments to the Sustainable Development Goals (SDGs), companies in various sectors are seeking to improve their accountability and transparency in the aspect of sustainability (Morea et al., 2025). However, there is still inconsistent results and contradictory conclusion about the relationship between digital transformation and ESG performance.

Several empirical studies have concluded that digital transformation can strengthen ESG performance through improved information efficiency, green innovation, and reduced information asymmetry (Li et al., 2025; Wu & Li, 2023; Zheng & Bu, 2024). Digitalization allows companies to monitor environmental impacts in real-time, increase social transparency, and strengthen governance (Chen et al., 2024). However, other studies highlight new risks, such as the digital divide, algorithmic bias, and the potential for ESG decoupling, where ESG reporting does not reflect actual practice

(Chen et al., 2024); Velte, 2023). In this context, digital transformation plays an ambivalent role: it can strengthen the integrity of ESG reporting while opening up opportunities for symbolic manipulation of sustainability data.

Furthermore, the results of cross-country research show significant variation in the digitalization–ESG relationship. Morea et al., (2025) found that digitalization moderates the positive relationship between ESG and financial performance in the energy and utilities sectors, while Li et al., (2025) revealed that external environmental uncertainty can weaken the positive influence of digital transformation on ESG performance. These findings point to the need for a more systematic and comprehensive approach to understanding the patterns of such relationships across a variety of economic, industrial, and geographic contexts.

In this context, bibliometric review is the right approach to map the development of research in a systematic and objective manner. The bibliometric approach provides a systematic way for researchers to evaluate scientific productivity, map collaboration structure, and identify dominant thematic as well as theoretical patterns within a body of literature (Donthu et al., 2021; Zupic & Čater, 2015). In addition, this method often which supported by digital applications such as VOSviewer, Bibliometrix, or other txt-processing and paraphrasing tools has been widely accepted in accounting and management, and sustainability field to trace the development of knowledge and formulate the directions of future research (Donthu et al., 2021; Tan et al., 2025). Although the literature on ESG and digital transformation is growing rapidly, bibliometric studies that map the research landscape in this field are still very limited (Tan et al., 2025). In fact, the bibliometric approach is able to identify key trends, contributions of scientists and countries, and research gaps that can be directed for further research. Thus, this study aims to systematically analyze the development of research on the effects of digital transformation on ESG performance, identify key themes, and provide map for future research based on bibliometric evidence.

Digital transformation (through big data adoption, AI, cloud, IoT, blockchain) improves corporate's capability to manage, monitor, report, and disclose sustainability performance. The effects flow to the three dimensions of ESG; 1) environmental such as energy efficiency, emission reduction, environmental monitoring, 2) social in the form of workforce safety, data protection, stakeholder relationship quality, and 3) governance in the form of transparency, accountability, reporting quality, and anti-fraud. The conceptual framework of the interconnected roles of digital transformation in shaping ESG performance can be illustrated in this below image.

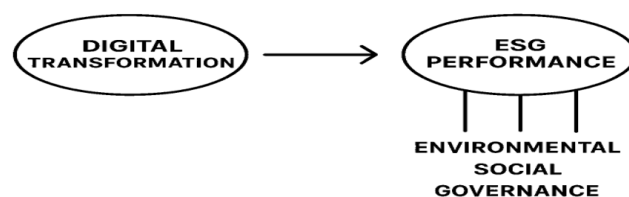


Figure 1. ESG Performance

Based on this background, this study is designed to answer the following questions:

- 1) What are the developments in international publication trends and patterns related to the relationship between digital transformation and ESG (Environmental, Social, and Governance) performance during the 2020–2025 period?
- 2) Who are the authors, institutions, and countries that contribute the most to the development of studies on digital transformation and ESG performance, and what is the pattern of collaboration (co-authorship) between them?
- 3) What are some of the key themes, concepts, and clusters that emerge in the literature regarding the linkage between digital transformation and ESG performance based on keyword co-occurrence analysis?

- 4) How does the citation network pattern show the development of influential knowledge and research in the field of digital transformation and ESG performance?
- 5) What are the future research directions and opportunities that can be developed based on the gaps and trends found in the literature on digital transformation and ESG performance?

Recent bibliometric studies show that research on ESG has grown very rapidly since 2015, with a sharp spike after 2020 (Mishra & Pandey, 2025). This increase was triggered by increased attention to the Sustainable Development Goals (SDGs) and the role of global regulations such as the EU (European Union) Taxonomy and ISSB (International Sustainability Standards Boards) Standards. Liao et al., (2021) conducted a bibliometric analysis of more than 1,000 ESG/CSR articles and found that topics such as corporate governance, CSR reporting, and stakeholder theory became the main foundations, while new themes such as digitalization, AI in sustainability, and blockchain transparency began to emerge as promising new subfields.

Geographically, the ESG literature was initially dominated by authors and institutions in the United States, the United Kingdom, and Western Europe. However, recent trends show a shift to Asia, especially China, India, and Malaysia, which are starting to lead publications on the topic of ESG disclosure and digital governance (Mishra & Pandey, 2025). This shift is in line with the increasing attention to digital transformation in developing countries and the role of technology in increasing the transparency of ESG reporting.

Recently, many literatures stated significant effects of digital transformation on ESG performance. Technological systems such as Artificial Intelligence (AI), Big Data Analytics, Internet of Things (IoT), and Blockchain are used to enhance the accuracy, auditability, and speed of ESG reporting (Liao et al., 2021). Mishra and Pandey (2025) explain that digital sustainability is now emerging as a new paradigm, where companies' digital capabilities not only improve operational efficiency but also expand non-financial reporting capacity. Bibliometric findings indicate that since 2022, terms such as "digital transformation," "ESG performance", and "sustainable business model" have increasingly appeared together in key keyword clusters, indicating stronger cross-sector integration.

O'Leary (2022) states that digital transformation in accounting is an effort to utilize digital technology to build new, more integrated and efficient business models through fundamental changes to accounting processes. This transformation goes beyond simply automating activities, but also emphasizes the importance of system integration, comprehensive digital data utilization, and process reengineering to align with modern technological capabilities such as artificial intelligence, big data, blockchain, and cloud computing.

2. Research Method

This study applies bibliometric methods to map and analyze scientific literature discussing the relationship between digital transformation and ESG performance. The bibliometric approach was chosen because it provides quantitative analysis of publication patterns, scientific collaborations, and the development of themes within a research field (Zupic & Čater, 2015). Through this method, researchers can objectively and systematically explore the intellectual structure and conceptual tendencies of a knowledge domain (Donthu et al., 2021).

Bibliometric review is widely implemented in the applied social sciences, including accounting, management, and sustainability, as it can uncover research dynamics, scientific productivity, and relationships between researchers and institutions (Aria & Cuccurullo, 2017; Cobo et al., 2011). Thus, this study focuses on mapping the scientific landscape to answer key questions: "How is the development of research on the effect of digital transformation on ESG performance in the international academic literature?"

Data Source and Search Procedures

Data was obtained from the Scopus database, which is widely recognized as the largest and most reliable source of academic reference in the social sciences and management (Donthu et al., 2021). The use of Scopus is also in line with previous bibliometric research in the field of ESG digitalization (Tan et al., 2025).

The search process was conducted in November 2025 using a combination of relevant keywords to cover the two main concepts of this research, namely digital transformation and ESG performance. ESG performance in this study refers to the ESG disclosures stated in the annual report. The keyword formulation used is as follows:

TITLE-ABS-KEY: ("digital transformation" OR "digitalization" OR "digitization" OR "digital technologies") AND ("ESG performance" OR "environmental social governance" OR "sustainability performance" OR "ESG disclosure" OR "sustainability disclosure" OR "CSR disclosure").

The inclusion criteria applied in this study consist of several focused parameters. First, the publication period is limited to **2020–2025**, as the year 2020 marked a global phase of accelerated technology adoption triggered by the COVID-19 pandemic. During this period, nearly all sectors—including accounting, finance, management, and information systems—underwent significant digital transformation. As a result, research on digital transformation, artificial intelligence, sustainability, corporate governance, and related areas increased sharply after 2020. Thus, the 2020–2025 timeframe empirically represents the early to mature stages of current research developments. Second, the **subject area** is restricted to *Business, Management, and Accounting* to maintain the relevance and focus of the analysis. Third, only **articles** are included to ensure consistency in research quality and structure. Fourth, the **language** is limited to *English* to facilitate broader accessibility and comparability across international publications.

The initial search yielded **601 documents**, which were subsequently filtered using the above criteria, resulting in **169 relevant articles** for further bibliometric analysis. No duplicate documents were found during the search process because the study relied on a single database, Scopus.

3. Results and Discussion

Annual publication trends (number of articles per year)

This graph shows the development of the number of scientific publications at Scopus that discuss the relationship between digital with the topics of ESG performance/ESG disclosures, in the business sector (BUSI), during the period 2020 to 2025. From the graph, it can be seen that there is a very considerable increase in the publication counts every year. In 2020 and 2021, there were only 1 document each that addressed this topic, showing that research on digitalization and ESG is still in its infancy. Entering 2022, the number of publications began to increase to 8 documents, then almost doubled in 2023 to 19 documents.

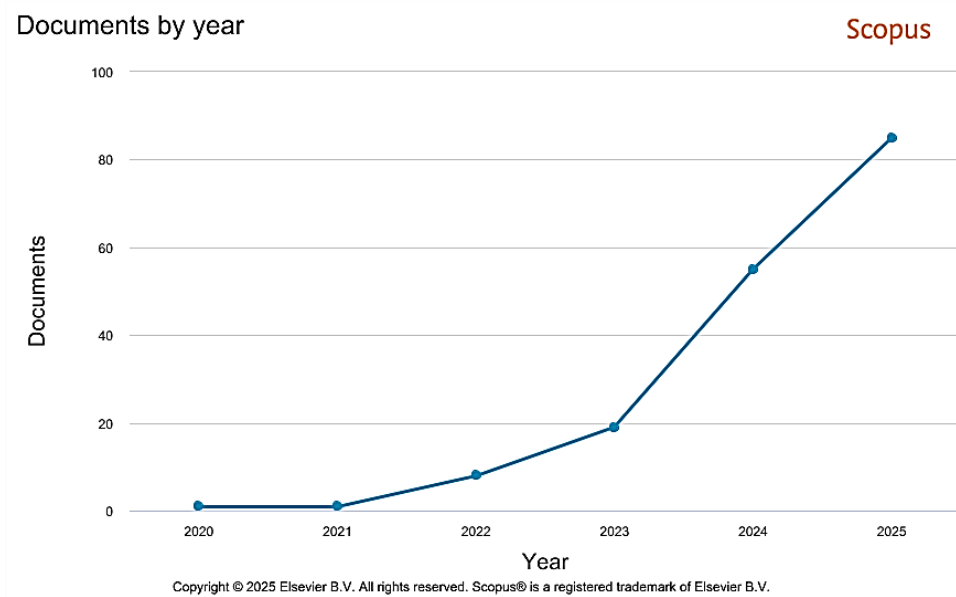


Figure 2. Documents by Year
Source: Scopus

The sharpest increase occurred in the last two years. In 2024, it recorded 55 publications, and jumped again in 2025 to reach 85 documents. This increase shows that the growing scholarly attention to how digital transformation intersects with ESG-related sustainability outcomes is getting stronger and is becoming an increasingly relevant topic in modern business research and accounting.

Annual Documents by Source (The most productive and influential journal)

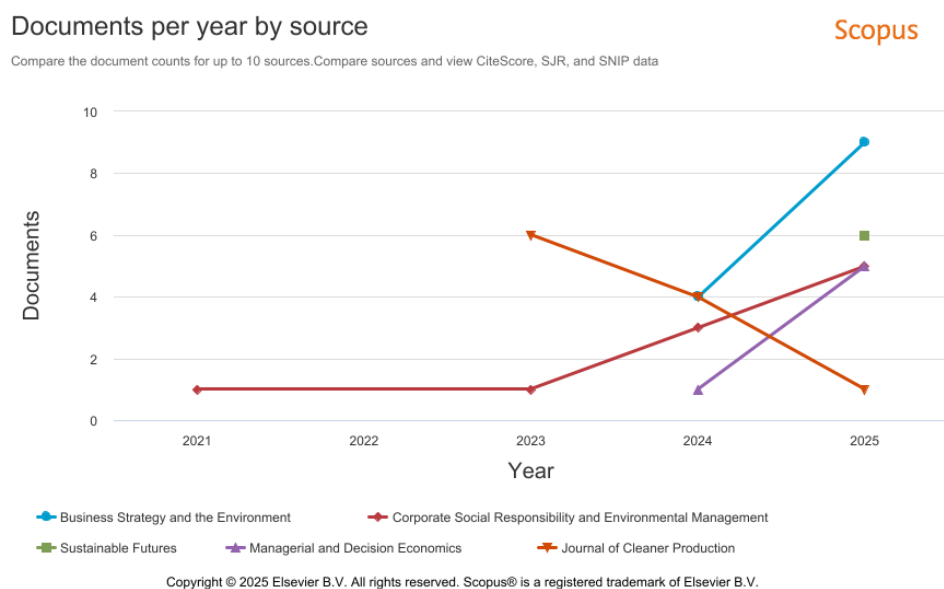


Figure 3. Documents per Year by Source
Source: Scopus

This graph shows publication trends based on the sources or journals that publish the most articles related to the topics of digital transformation, ESG performance, and sustainability disclosure in the business sector (BUSI) since 2021 until 2025.

Several journals play a dominant role in disseminating research within this field. **Business Strategy and the Environment** showed no publications between 2021 and 2023 but began

contributing in 2024 with 4 documents and experienced a sharp increase in 2025 with 9 publications, making it the journal with the most significant growth. **Corporate Social Responsibility and Environmental Management** demonstrated steady progress, starting with 1 publication in 2021 and 2022, then gradually increasing to 2 documents in 2023, 3 in 2024, and 5 in 2025. **Sustainable Futures** appeared only in 2025 but made a substantial impact with 6 publications. Meanwhile, **Managerial and Decision Economics** had no contributions until 2023, but began publishing in 2024 with 1 document and rose to 5 publications in 2025. In contrast, **Journal of Cleaner Production** was the most active journal early in the period with 6 documents in 2023, but its output gradually declined to 4 publications in 2024 and only 1 in 2025.

With 13 publications, the Journal of Business Strategy and the Environment stated as the highest publication contributor in the topic of digital transformation and sustainability. The Journal of Cleaner Production and Corporate Social Responsibility and Environmental Management also show important contributions, with 11 and 10 publications, respectively.

In addition, journals such as Managerial and Decision Economics, Sustainable Futures, and Technological Forecasting and Social Change are starting to show an increase in 2024–2025, signaling the expansion of interest in these topics into the areas of decision management, economics, and future planning.

Documents by Authors

The "Documents by Author" graph shows a list of the most prolific authors in a given research topic, along with the number of documents they have published in a given time frame or keyword.

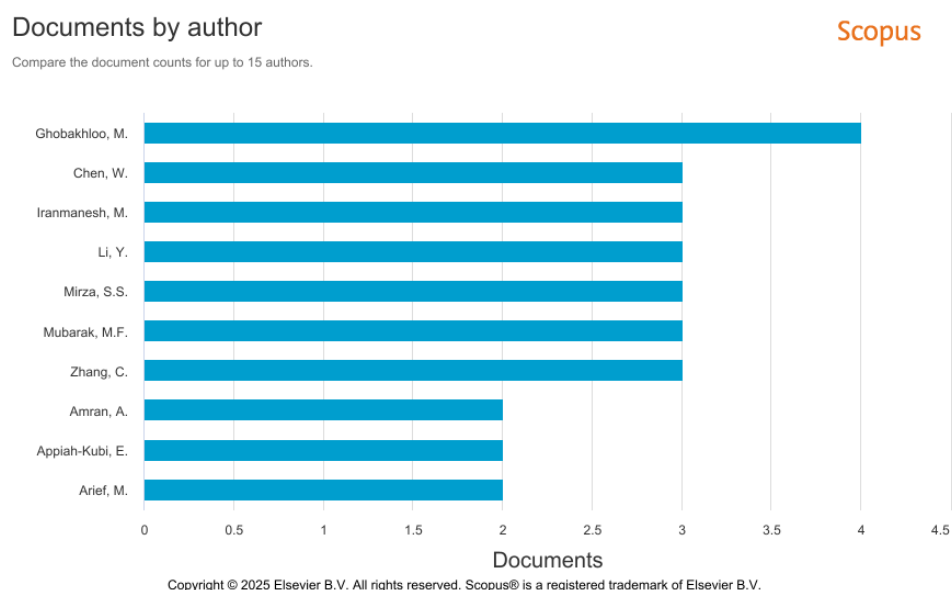


Figure 4. Documents by Author
Source: Scopus

The graph shows the 10 authors with the highest number of publications on digital transformation, ESG performance, and sustainability disclosure indexed in Scopus. Ghobakhloo, M. becomes the most prolific author with 4 documents, demonstrating a dominant role in this research area and the potential to serve as a key authority in the field. Following him, Chen, W., Iranmanesh, M., Li, Y., Mirza, S.S., Mubarak, M.F., and Zhang, C. each have 3 publications, placing them among the core group of productive contributors who actively shape the development of the literature. Their consistent output reflects strong engagement in the topic, with several authors also strengthening representation from the East Asian region. Meanwhile, Amran, A., Appiah-Kubi, E., and Arief, M. each have 2 publications, indicating a relatively lower level of contribution compared to the other

authors, yet they still remain part of the 10 contributors, showing regional diversity—including representation from Southeast Asia.

Documents by Affiliation

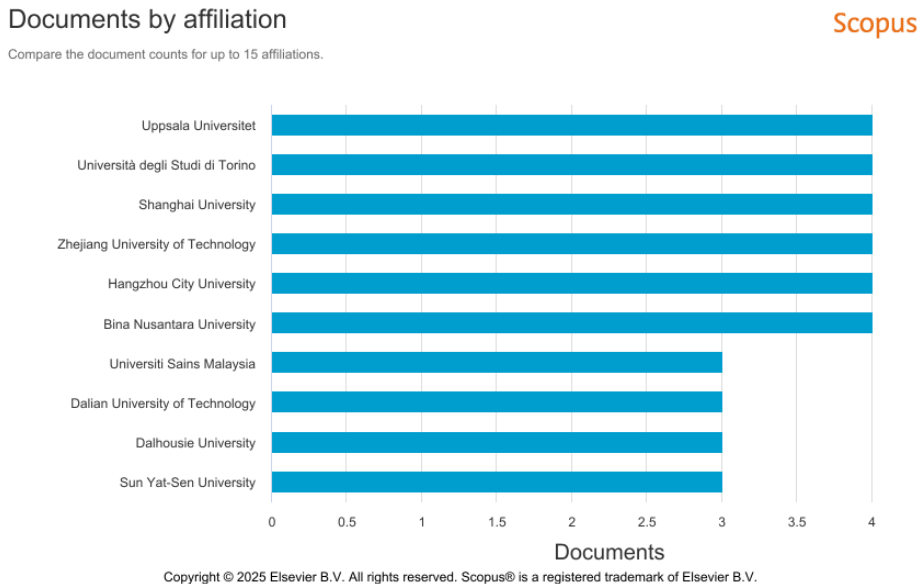


Figure 5. Documents by Affiliation

Source: Scopus

From the graph, it can be seen that Uppsala Universitet (Sweden), Università degli Studi di Torino (Italy), Shanghai University (China), Zhejiang University of Technology (China), Hangzhou City University (China), and Bina Nusantara University (Indonesia) are the top contributor which recorded each 4 publications. Moreover, Universiti Sains Malaysia, Dalian University of Technology (China), and Dalhousie University (Canada) have significant contribution with each produced 3 publications.

Documents by Country or Territory

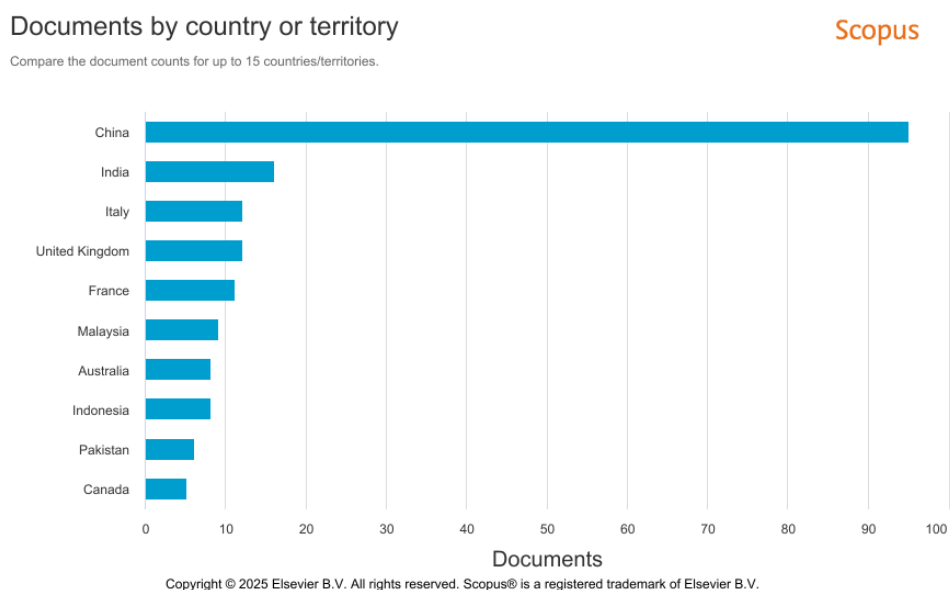


Figure 6. Documents by Country or Territory

Source: Scopus

The graph shows that with 95 publications, China become the highest contributor to this research area. This dominance leads to China as major center of study on the correlation between digital transformation and sustainability. India is occupied the second position with 16 publications. Next, Italy and the United Kingdom with 12 publications each, and then France (11 publications). Furthermore, Malaysia (9 publications) and Indonesia (8 publications) from Southeast Asia are the next contributor, which indicate the development of digital transformation and ESG issues in developing countries. The lowest of the top ten list are Australia and Pakistan with 8 and 6 publications, respectively.

Documents by Subject Area

Documents by subject area

Scopus

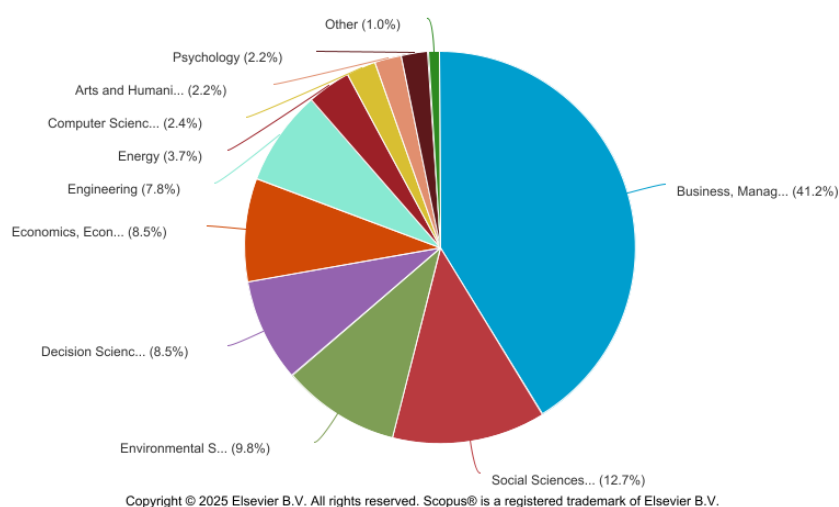


Figure 6. Documents by Subject Area
Source: Scopus

Having 41,2% of the total published articles, the Business, Management, and Accounting sector become the highest contributor. This concludes that research on digital transformation and sustainability are most studied from a business and management perspective. Moreover, the Social Sciences sector (12.7%) places the next position followed by Environmental Science (9.8%), Decision Sciences (8.5%), and Economics, Econometrics, and Finance (8.5%). IN addition, Engineering (7.8%), Energy (3.7%), and Computer Science (2.4%) also become contributors, indicate the relationship between technology development and the application of digitalization for sustainability. Furthermore, Arts and Humanities (2.2%), Psychology (2.2%), and Other categories (1%) contribute on a smaller scale.

Network of Collaboration Between Authors, Institutions, and Countries (Co-Authorship Analysis)

The output from VOSviewer show the collaborative networks between authors on digital transformation and sustainability disclosures issues. The dot represents an author, while the link line indicates that there are many collaborations between authors. Dot size describes the level of author contributions, while color express different collaboration clusters.

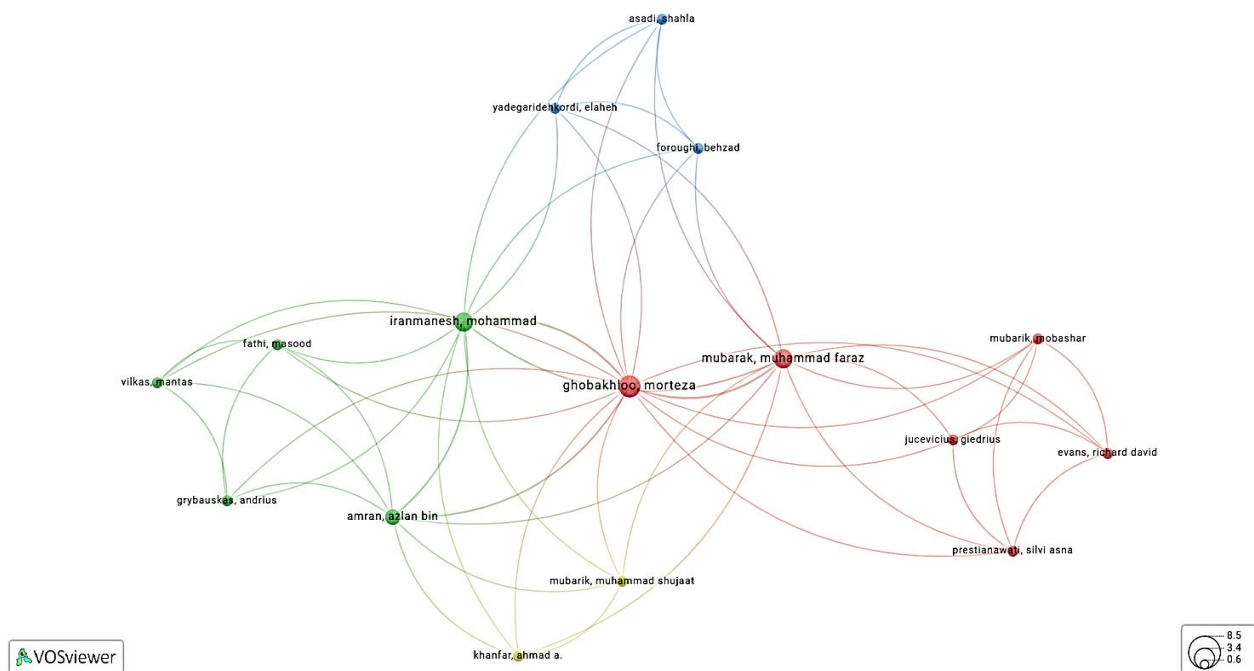


Figure 7. Co-Authorship Pattern

Source: Vosviewer

The image reveals several main clusters within the research collaboration network. The red cluster is led by Morteza Ghobakhloo, who maintains strong collaborative research relationships with Muhammad Faraz Mubarak, Richard David Evans, Giedrius Jucevičius, and Silvi Asna Prestianawati. This cluster focuses on digital transformation and its implementation in the context of business sustainability. The green cluster is led by Mohammad Iranmanesh and Azlan Amran, along with collaborators such as Masood Fathi, Mantas Vilkas, and Andrius Grybauskas. Their research primarily explores the relationship between digitalization, managerial innovation, and ESG performance across different industry sectors. The blue cluster is led by Shahla Asadi, Elaheh Yadegaridehkordi, and Behzad Foroughi, with research centered on digitalization and technology-based decision-making in sustainability contexts. Meanwhile, the yellow cluster highlights the collaboration between Muhammad Shujaat Mubarak and Ahmad A. Khanfar, indicating an additional collaborative network connected to the main structure. Overall, the visualization shows that Ghobakhloo, M. and Iranmanesh, M. are two central figures within the research landscape on digital transformation and ESG performance. The intercluster relationships also demonstrate strong cross-border collaboration, particularly among researchers from Asia, Europe, and the Middle East.

Analysis VOSviewer Based on Citations

This image shows a map of the citation network between documents in research on digital transformation, ESG performance, and sustainability disclosure based on data from Scopus. Each node (dot) in the image represents one scientific article, and the size of the node reflects the number of citations that the article receives. The larger the size of the node, the higher the level of influence or visibility of the article in the related field of research. The connecting line between nodes indicates the existence of a citation relationship between documents, i.e. one article is cited or cited by another.

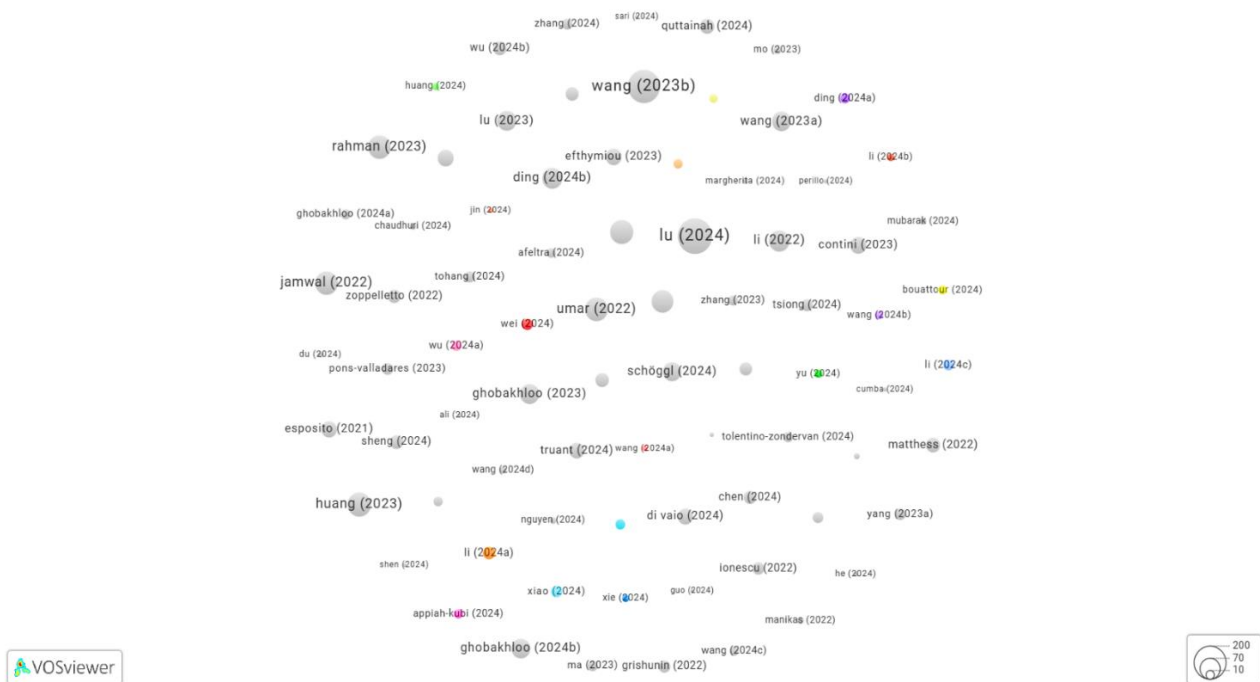


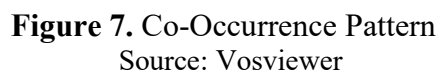
Figure 7. Citations Pattern
Source: Vosviewer

From the map, several articles can be identified as dominant within the citation network. Lu (2024) and Wang (2023) appear with the largest node sizes, indicating that they are the most cited publications and serve as major centers of influence in research on digital transformation and sustainability. Other highly referenced works include those by Rahman (2023), Li (2022), Umar (2022), and Ghobakhloo (2023), which also display relatively large nodes, showing that these studies are frequently used as primary references in subsequent research. Medium-sized nodes such as Jamwal (2022), Schöggel (2024), and Di Vaio (2024) reflect their role as bridging studies that connect various themes and methodological approaches within the field. The distribution of publication years, ranging from 2021 to 2024, shows that recent literature, particularly from 2023–2024, dominates the map. This indicates that research on digital transformation and ESG has grown rapidly over the past two years, accompanied by the emergence of several new influential studies.

Dominant Themes and Topics and Future Research Directions (Co-occurrence Analysis)

Co-Occurrence analysis shows the main themes and sub-themes that often appear together so that it can help uncover research trends and the direction of development of research topics.

This image (Figure 7) is a keyword linkage map that shows the relationships between concepts that often appear at the same time in publications on digital transformation, ESG performance, and sustainability disclosure in the Scopus database. This study uses a minimum occurrence threshold of two (2) in the co-occurrence analysis. This low threshold was chosen to comprehensively capture a variety of relevant keywords, including new topics that are still emerging in a limited number of publications. Given the rapidly evolving dynamics of research in the fields of digital transformation, ESG, and sustainability, a higher threshold has the potential to omit important emerging concepts. With a threshold of two, the cluster structure can be mapped in more detail, including smaller subthemes that provide a richer picture of the direction of the research field's development.



From the visualization, several main clusters can be identified, each representing different yet interconnected research focuses. The red cluster centers on ESG and corporate performance, consisting of keywords such as ESG performance, corporate ESG performance, corporate social responsibility, stakeholder theory, and governance approach. The green cluster highlights themes related to digital transformation and business sustainability, incorporating terms such as digital transformation, digitalization, ESG, sustainable business, blockchain, and supply chain. The blue cluster emphasizes environmental management and sustainable development, reflecting themes such as circular economy implementation and resource efficiency. The purple cluster focuses on corporate governance and innovation, particularly the integration of innovation and internal control to support corporate sustainability in the digital era. Meanwhile, the yellow cluster is associated with dynamic capabilities and Industry 4.0, including concepts like industry 4.0, dynamic capability theory, technological innovation, and green manufacturing. Overall, the field is evolving toward a multidisciplinary and interconnected approach, where digital technologies are viewed not only as tools for efficiency but also as key catalysts for enhancing ESG performance and long-term corporate sustainability.

The bibliometric findings in this study not only illustrate publication patterns, collaborations, and research themes, but also demonstrate how the relationship between digital transformation and ESG performance is evolving as a new, increasingly integrated, multidisciplinary subfield. These results confirm and extend the findings of previous bibliometric studies, particularly those by Liao et

al. (2021), Mishra & Pandey (2025), and Tan et al. (2025), which show an increasing concentration of research on ESG, digital sustainability, and technologies supporting sustainability reporting.

The sharp increase in publications since 2020, from just one article in 2020 to 85 articles in 2025, demonstrates a paradigm shift. While before 2020, digital transformation was seen primarily as an efficiency measure, post-2020, research shifted to transformational issues: how technology impacts ESG transparency, green innovation, and governance quality. This finding differs from classic ESG bibliometrics (e.g., Mishra & Pandey, 2025), which focuses solely on the triple bottom line without in-depth exploration of the role of digital technology.

The finding that China dominates 95 of the 169 publications indicates a regulation-driven research orientation. China has an aggressive national digitalization policy (AI, IoT, big data), a growing mandatory ESG disclosure regulation, government support for smart green governance. This explains why much empirical research on digitalization-ESG originates from that country. This trend differs from the ESG bibliometrics prior to 2022, which was predominantly European and American (Liao et al., 2021). Therefore, the novelty of this study lies in mapping the geopolitical shift in ESG research triggered by technological developments.

The role of technological systems such as big data and blockchain has led to increased transparency, increased ESG auditability, reduced information asymmetry. This expands stakeholder theory to include “Technology-enabled stakeholder governance.” The implication is that corporate social legitimacy is now built through digital trust and digital traceability, not just narrative ESG reports.

Future Research Directions

Future research should address the gaps emerging from the bibliometric analysis. The following is a synthesis of the research gaps and future research directions:

Gap 1: Lack of cross-country studies (cross-country digital ESG).

China's dominance makes research results less generalizable.

Future research: Multi-country comparative studies (Asia–Europe–ASEAN), examining the effects of digital regulatory heterogeneity on ESG.

Gap 2: Lack of integrative theoretical models between digital transformation and ESG

The literature is still fragmented across theories (Resource Based View, Corporate Governance).

Future research: Developing a Digital–Sustainability Convergence framework, combining governance + dynamic capabilities + digital ethics theories.

Gap 3: Lack of longitudinal studies

The majority of research is cross-sectional.

Future research: Longitudinal digital maturity–ESG performance pathways, analyzing the long-term impact of digital ESG tools.

Gap 4: Lack of exploration of digital risks (algorithmic bias, digital divide) on ESG

The bibliometric map shows that this issue is still rarely raised.

Future research: Studies on digital bias in ESG scoring, the influence of the digital divide on the fairness of ESG reporting.

Gap 5: Lack of research on the implementation of specific technologies

Blockchain, IoT, and AI frequently appear as keywords but lack empirical studies.

Future research: The effectiveness of blockchain for carbon traceability, IoT-based environmental monitoring, the role of generative AI in ESG reporting.

Gap 6: Greenwashing and ESG decoupling have not been widely researched in the digital context. However, Chen et al.'s (2024) findings indicate that the issue of decoupling is increasingly relevant.

Future research: Evaluating whether digitalization reduces or increases greenwashing, a data-based early-warning system model for detecting ESG fraud.

4. Conclusion

A bibliometric study of 169 Scopus articles from 2020–2025 shows a rapid increase in research on the interrelationship between digital transformation and ESG performance. The analysis reveals five main clusters such as; ESG & governance, digital transformation & sustainability, environmental management & circular economy, governance & innovation, and dynamic capabilities & Industry 4.0, confirming that digital technology is now a strategic driver in improving transparency and sustainability performance.

The citation network places Lu (2024) and Wang et al. (2023) as the main centers of influence, while China dominates publications with 95 articles, supported by prolific authors such as Ghobakhloo and Iranmanesh. These findings highlight the emergence of a new domain, digital-enabled ESG, which integrates technological innovation with sustainability governance.

This study is limited by the use of a single database (Scopus), the English language restriction, the relatively short 2020–2025 timeframe, and the quantitative bibliometric approach. Future studies are recommended to expand data sources, incorporate multilingual literature, and combine bibliometrics with qualitative analysis to deepen theory. For business practitioners, these findings underscore the importance of investing in digital technology to improve the transparency and quality of ESG reporting, strengthen governance, and mitigate the risk of greenwashing. For policymakers, the study's findings highlight the need for standardization of digital-based ESG reporting, regulation of the use of technology (AI, big data) in sustainability, reduction of the digital divide, and support for cross-border research collaboration.

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