

---

# International Journal of Management, Finance and Accounting

---

## Exploring the Pathways of Artificial Intelligence and Sustainable Development in the Era of Industrial Revolutions: A Bibliometric Analysis and Future Research Agenda

Xu Bin<sup>1</sup>, Teh Sin Yin<sup>1,\*</sup>, Sajal Saha<sup>2</sup>

<sup>1</sup>School of Management, Universiti Sains Malaysia, Penang, Malaysia

<sup>2</sup>Department of Mathematics, International University of Business Agriculture and Technology, Dhaka, Bangladesh

\*Corresponding author: [tehsyin@usm.my](mailto:tehsyin@usm.my) (ORCID: 0000-0001-9439-4407)

### Abstract

Artificial Intelligence (AI) is playing an increasingly pivotal role in driving innovation and promoting sustainable development across various sectors amid the ongoing wave of industrial revolutions. However, the existing research lacks a systematic and quantitative overview of how AI contributes to sustainability goals. This study addresses this gap by conducting a bibliometric analysis of 101 articles from the Web of Science Core Collection, using the keywords “sustainab\*”, “artificial intelligence”, and “industrial revolution”. Analytical tools such as VOSviewer and Scimago Graphica were employed to generate keyword co-occurrence maps, publication trends, and research collaboration networks. The results show that scholarly interest in the intersection of AI and sustainability has significantly increased since 2018, with rapid growth in publication and citation numbers. Keyword clustering reveals five major research themes: intelligent technologies, sustainability-focused innovation, industrial transformation, digital integration, and collaborative ecosystems. Moreover, overlay and density visualisations demonstrate a clear evolution from early theoretical innovations to recent application-driven and governance-oriented research. This study contributes to the literature by mapping the intellectual landscape of this interdisciplinary field and providing a strategic foundation for future research directions aligned with Sustainable Development Goals (SDGs). Specifically, future research should explore the integration of AI with circular economy practices to enhance sustainable production. It should also address the

development of governance and ethical frameworks for AI-driven decision-making in sustainability contexts. In addition, scholars are encouraged to expand cross-industry applications of AI to accelerate progress toward multiple SDGs.

**Keywords:** Artificial Intelligence, Bibliometric Analysis, Industrial Revolutions, Scimago Graphica, Sustainable Development

Received on 15 July 2025; Accepted on 31 October 2025; Published on 28 February 2026.

**To cite this article:** Xu, B., Teh, S. Y., & Sajal, S. (2026). Exploring the pathways of artificial intelligence and sustainable development in the era of industrial revolutions: A bibliometric analysis and future research agenda. *International Journal of Management, Finance and Accounting*, 7(1), 392–413. <https://doi.org/10.33093/ijomfa.2026.7.1.14>

## 1.0 Introduction

The rapid evolution of artificial intelligence (AI) technologies is reshaping global industries (Smith et al., 2019), economies (Nayak & Walton, 2024), and societies (Kwon, 2023). As humanity enters the era of the Fourth Industrial Revolution, AI is becoming a pivotal force in transforming traditional production and decision-making processes (Michulek & Gajanova, 2023). Simultaneously, the concept of sustainable development, which seeks to balance economic growth (Castro & Pinho, 2021), environmental protection (Lemons, 1995), and social equity (Trudeau, 2018), has gained increasing global attention. The intersection of AI and sustainable development, therefore, represents both a critical opportunity and a complex challenge.

In recent years, a growing body of literature has explored the role of AI in promoting sustainability across various sectors, including energy (Lee & Yan, 2024), healthcare (Jain et al., 2024), agriculture (Sachithra & Subhashini, 2023), transportation (Hosseini et al., 2024), and urban governance (Bibri et al., 2024). However, despite this expanding interest, there remains a lack of systematic understanding regarding the thematic evolution, intellectual structure, and future directions of this interdisciplinary research domain. In response to this research gap, the study applies bibliometric methods to examine the current body of literature on AI and sustainable development. This approach identifies major thematic developments, high-impact studies, patterns of scholarly collaboration, and potential areas of future inquiry. The goal is to assist researchers, industry professionals, and policymakers in better understanding the role of AI in advancing sustainable development goals (SDGs) (Singh et al., 2024), while also outlining possible directions for continued exploration in this field.

This study uses the keywords “sustainab\*”, “artificial intelligence”, and “industrial revolution” to collect relevant literature from the Web of Science database. A bibliometric method is adopted in conjunction with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework to trace the development and transformation of AI research (Pham & Le, 2024). Visualisation tools, including VOSviewer and Scimago Graphica, are employed to perform co-occurrence and

clustering analyses, with the objective of revealing key research focuses, conceptual frameworks, and evolving trends within this interdisciplinary domain.

This study pursues three research objectives. First, it aims to systematically identify the thematic structure and core research domains within the overlapping area of AI technologies and sustainable practices using bibliometric techniques. Second, it seeks to visualise and interpret collaboration networks, keyword co-occurrence patterns, and emerging research clusters in order to reveal knowledge architecture and regional distribution. Finally, the study intends to propose a future research agenda aligned with the SDGs, drawing on insights from current hotspots and evolving research trends. This paper is structured as follows. The first part explains the research background. The second describes the methods and data sources. The third discusses the visual analysis results. The last part summarises the main findings and suggests directions for future research.

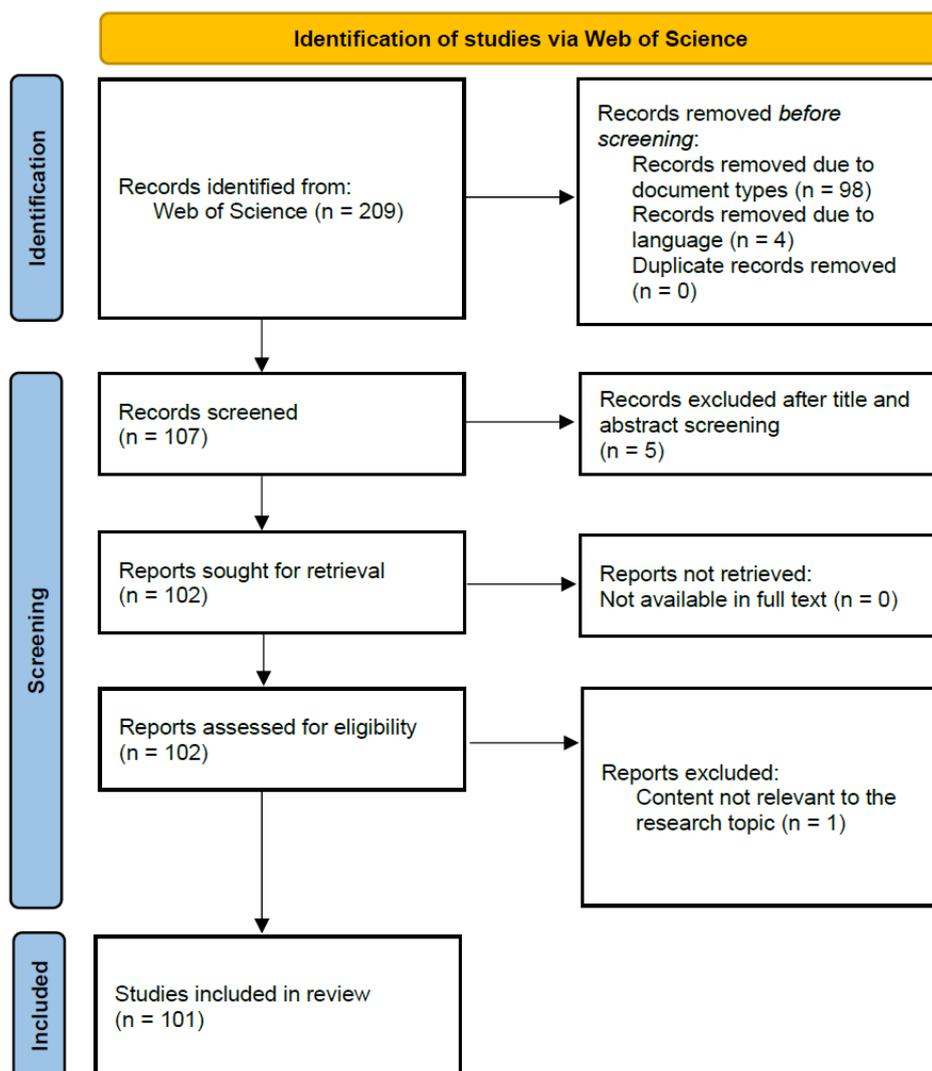
## **2.0 Research Methods and Data Source**

### **2.1 Research Methods**

Bibliometric analysis is a structured method used widely in many academic fields. Analysing large amounts of literature data helps researchers understand how a research area has developed and changed over time. It can reveal research gaps, problems that remain unsolved, and topics that need more attention. This method also helps identify common keywords, influential authors and institutions, and patterns of collaboration. In addition, it shows how research is connected and how academic influence spreads. As a tool for looking ahead, bibliometric analysis supports the discovery of new research directions and helps track changes in research themes, especially across different disciplines.

## 2.2 Data Source

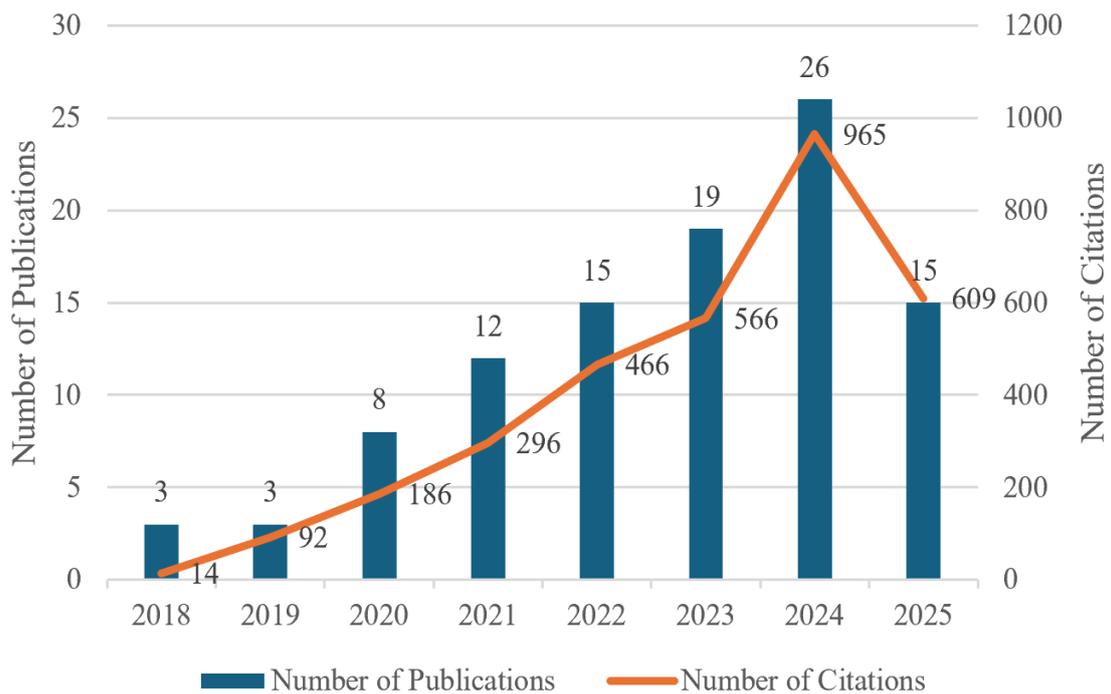
The accuracy of bibliometric analysis relies on using a reliable and high-quality data source. This study chose the Web of Science Core Collection because it offers trusted content, wide subject coverage, clear indexing, and strong citation tracking. These features provide a solid foundation for ensuring the reliability and validity of bibliometric results. To ensure the scientific rigour and transparency of the literature selection process, this study adopts the PRISMA framework as a guiding protocol to standardise and formalise the literature screening procedure. Figure 1 systematically presents the entire process of literature identification, screening, eligibility assessment, and final inclusion.



**Figure 1: PRISMA Flow Diagram**

The study initially retrieved a total of 209 publications from the Web of Science Core Collection using the keywords “sustainab\*”, “artificial intelligence” and “industrial revolution”. Subsequently, 98 records were excluded based on document type requirements (such as review articles, book chapters, proceeding papers, and editorial materials). Following this step, 4 additional records were excluded because they did not meet the language criterion (non-English). These exclusions were conducted sequentially, first by document type and then by language, ensuring that no records were counted twice or removed redundantly. As a result, 107 publications were retained for the title and abstract screening stage. Importantly, verification confirmed that these 107 records contained no duplicates. Based on the preliminary review of titles and abstracts, 5 articles with low relevance to the research topic were further excluded, resulting in 102 articles being retained for full-text review. All 102 articles were available in full text. During the subsequent in-depth review, one article that did not align with the core research topic was excluded. Ultimately, a total of 101 articles were formally included in the sample for bibliometric analysis. This structured screening process effectively ensured the quality and thematic relevance of the included literature, providing a reliable and systematic foundation for the subsequent bibliometric analysis.

Figure 2 presents the trends in the number of publications and citations from 2018 to July 2025. Since 2018, the number of publications has shown a continuous upward trajectory, increasing from 3 articles in both 2018 and 2019 to a peak of 26 articles in 2024. Although the number decreased to 15 in 2025, this decline is primarily due to the fact that the data for 2025 only covers the period up to July and therefore should not be interpreted as a sign of reduced research interest. Citation counts have also shown a steady increase, rising from 14 in 2018 to 965 in 2024, with 609 citations recorded in 2025. The parallel growth in publication output and citation frequency between 2020 and 2024 reflects the increasing academic interest and growing influence of research at the intersection of AI and sustainable development. This trend clearly demonstrates the growing attention and recognition that this field has received within the ongoing process of industrial revolutions.



**Figure 2: Annual Publications and Citations (2018–2025)**

Table 1 presents the number of records and the corresponding percentage of the 101 documents categorised under each Web of Science index. Some journals may be indexed in more than one category. The Science Citation Index Expanded (SCI-EXPANDED) contains 54 records, accounting for 53.47% of the total. The Social Sciences Citation Index (SSCI) includes 36 records (35.64%), while the Emerging Sources Citation Index (ESCI) covers 34 records, or 33.66% of the dataset. This distribution reflects the interdisciplinary nature of research at the intersection of AI and sustainable development. It is important to emphasise that these classifications are not mutually exclusive, as individual journals may simultaneously appear in multiple Web of Science categories. Consequently, the aggregate category counts exceed the total number of documents without indicating any inconsistency in the dataset.

**Table 1: Web of Science Index**

<b>Web of Science Index</b>	<b>Record Count</b>	<b>% of included articles (n=101)</b>
Science Citation Index Expanded (SCI-EXPANDED)	54	53.47
Social Sciences Citation Index (SSCI)	36	35.64
Emerging Sources Citation Index (ESCI)	34	33.66

Table 2 presents the top 10 research categories represented in the Web of Science among the 101 selected records. The leading categories are “Environmental Sciences” and “Green Sustainable Science Technology”, each contributing 20 records, accounting for 19.80% of the total. “Environmental Studies” follows closely with 19 records (18.81%). Other notable categories include “Computer Science Information Systems” (14 records, 13.86%) and “Engineering Electrical Electronic” (12 records, 11.88%). “Telecommunications” accounts for 9 records (8.91%), while “Management” has 8 records (7.92%). Both “Business” and “Computer Science Interdisciplinary Applications” contribute 6 records each (5.94%). Finally, “Engineering Industrial” is represented by 5 records (4.95%). The distribution reveals a clear focus on environmental sustainability, computer science, and engineering-related disciplines.

**Table 2: Top 10 Categories of the Study**

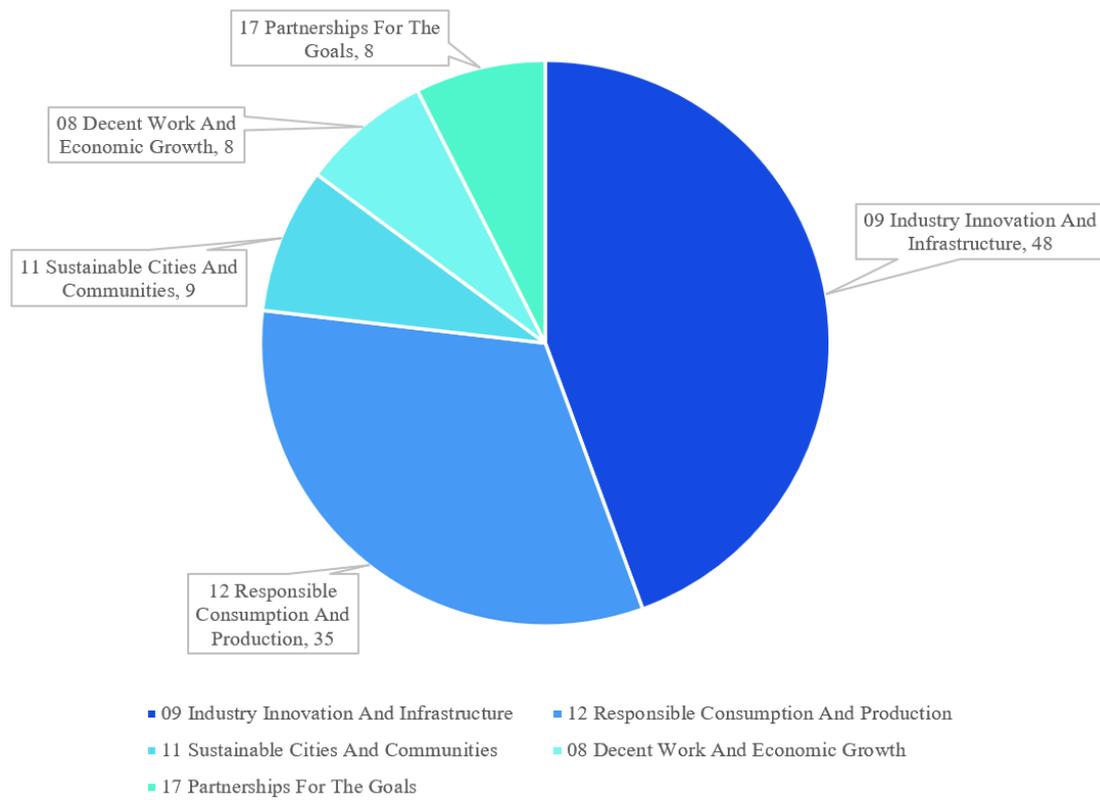
<b>Web of Science Categories</b>	<b>Record Count</b>	<b>% of included articles (n=101)</b>
Environmental Sciences	20	19.80
Green Sustainable Science Technology	20	19.80
Environmental Studies	19	18.81
Computer Science Information Systems	14	13.86
Engineering Electrical Electronic	12	11.88
Telecommunications	9	8.91
Management	8	7.92
Business	6	5.94
Computer Science Interdisciplinary Applications	6	5.94
Engineering Industrial	5	4.95

Table 3 lists the top 6 publication titles based on the number of records among the 101 selected articles. Sustainability ranks first with 17 records, accounting for 16.83% of the total. IEEE Internet of Things Journal comes next with 4 records (3.96%). Four journals are tied with 2 records each (1.98%), including Applied Sciences Basel, Buildings, Computers Industrial Engineering, and IEEE Industrial Electronics Magazine. These results show a strong presence of sustainability and engineering-related journals in the field.

**Table 3: Top 6 Publication Titles**

<b>Publication Titles</b>	<b>Record Count</b>	<b>% of included articles (n=101)</b>
Sustainability	17	16.83
IEEE Internet of Things Journal	4	3.96
Applied Sciences Basel	2	1.98
Buildings	2	1.98
Computers Industrial Engineering	2	1.98
IEEE Industrial Electronics Magazine	2	1.98

Figure 3 illustrates the distribution of the top five SDGs addressed in the selected research articles. The most dominant theme is SDG 9: Industry, Innovation and Infrastructure, accounting for 48 out of 101 publications (47.53%). This is followed by SDG 12: Responsible Consumption and Production, with 35 publications (34.65%). SDG 11: Sustainable Cities and Communities ranks third with 9 records (8.91%). Both SDG 8: Decent Work and Economic Growth and SDG 17: Partnerships for the Goals have equal representation, each contributing 8 publications (7.92%). This concentration indicates that current research is primarily focused on industrial transformation, sustainable production, and urban resilience, reflecting core concerns in the field of sustainable development and emerging technologies. It is important to note that individual articles may be associated with more than one SDG, and therefore, the category counts are not mutually exclusive. This overlap reflects the inherently cross-cutting nature of AI applications in advancing sustainability objectives.



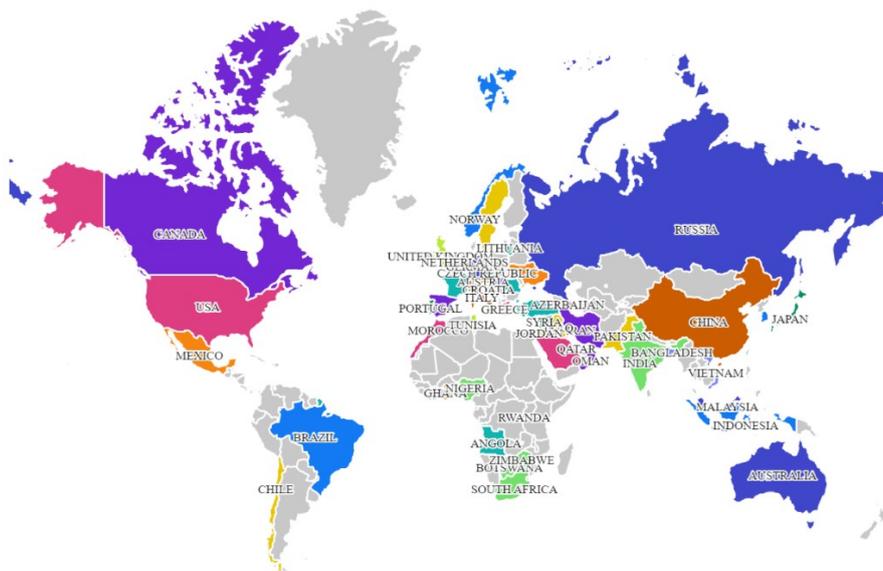
**Figure 3: Distribution of Research Publications by SDGs**

Table 4 and Figure 4 present the distribution of research publications across countries. India ranks first with 21 publications, accounting for 20.79% of the total. It is followed by South Africa (15 publications, 14.85%) and the United States (11 publications, 10.89%). China and Saudi Arabia are tied in fourth place, each with 9 publications (8.91%). Spain ranks sixth with 8 publications (7.92%). France and South Korea both contributed 6 publications (5.94%), while Australia and Italy are each represented by 5 publications (4.95%).

**Table 4: Top 10 Publication Countries**

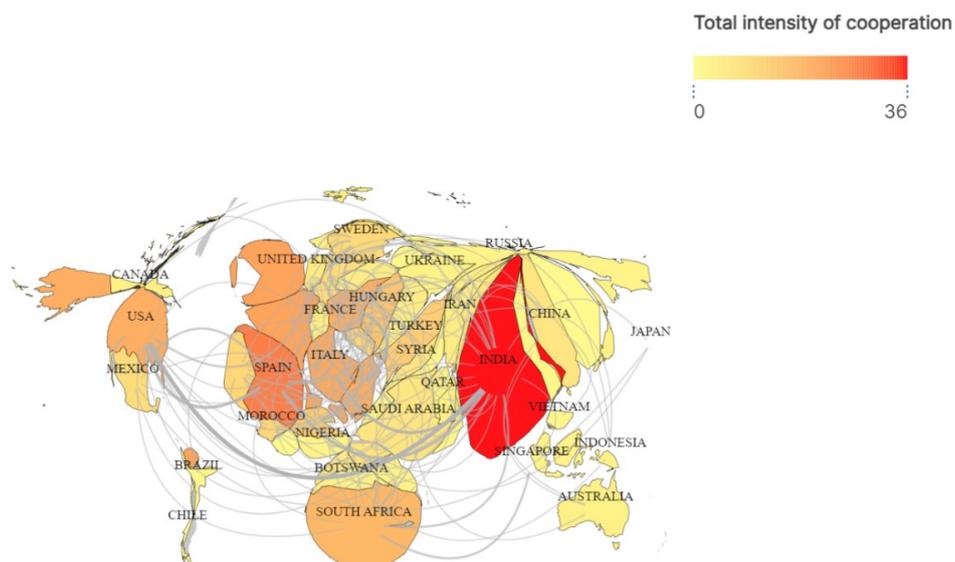
Countries	Record Count	% of included articles (n=101)
India	21	20.79
South Africa	15	14.85
USA	11	10.89
People's Republic of China	9	8.91
Saudi Arabia	9	8.91
Spain	8	7.92
France	6	5.94
South Korea	6	5.94
Australia	5	4.95
Italy	5	4.95

This geographical distribution suggests that emerging economies, such as India and South Africa, are demonstrating increasing research activity in the field of AI and sustainable development. In contrast, developed countries like the United States, France, and South Korea maintain steady contributions, particularly in high-tech research. The map also reveals significant regional disparities, with many countries in Africa, Latin America, and Southeast Asia showing relatively low levels of participation in scientific research.



**Figure 4: The Publication Countries**

Figure 5 presents the global network structure of research collaboration intensity among countries based on co-authorship relationships. The colours in the figure range from light yellow to deep red, representing the frequency of a country's participation in international collaboration. The darker the colour, the more frequently the country engages in cooperation with others. The grey curved lines represent the collaborative links between countries. India occupies a central position in the collaboration network and is shown in the darkest red, indicating the highest frequency of international research cooperation. Countries such as France, Spain, South Africa, and the United Kingdom are also shown in orange or red, indicating their significant roles in international research collaboration. China, Singapore, and Vietnam from Asia show a certain level of international collaboration. Italy, Turkey, and Hungary in Europe also participate actively. However, the intensity of cooperation differs among these countries. While multiple collaboration hubs are present in the network, the overall structure still exhibits a clear imbalance. Most countries in Latin America, Africa, and parts of Southeast Asia are shaded light yellow, indicating relatively low levels of participation in global research collaboration. The overall network is dominated by a small number of countries that serve as key connectors and bridges within the international academic system.



**Figure 5: Total Intensity of Country Cooperation Based on Number of Articles Published**

### 3.0 Results

This section presents cutting-edge research trends in the field of AI and sustainable development using the visualisation tools VOSviewer 1.6.20 and Scimago Graphica. A co-occurrence analysis of all relevant keywords was conducted to identify the main research themes and emerging hotspots.

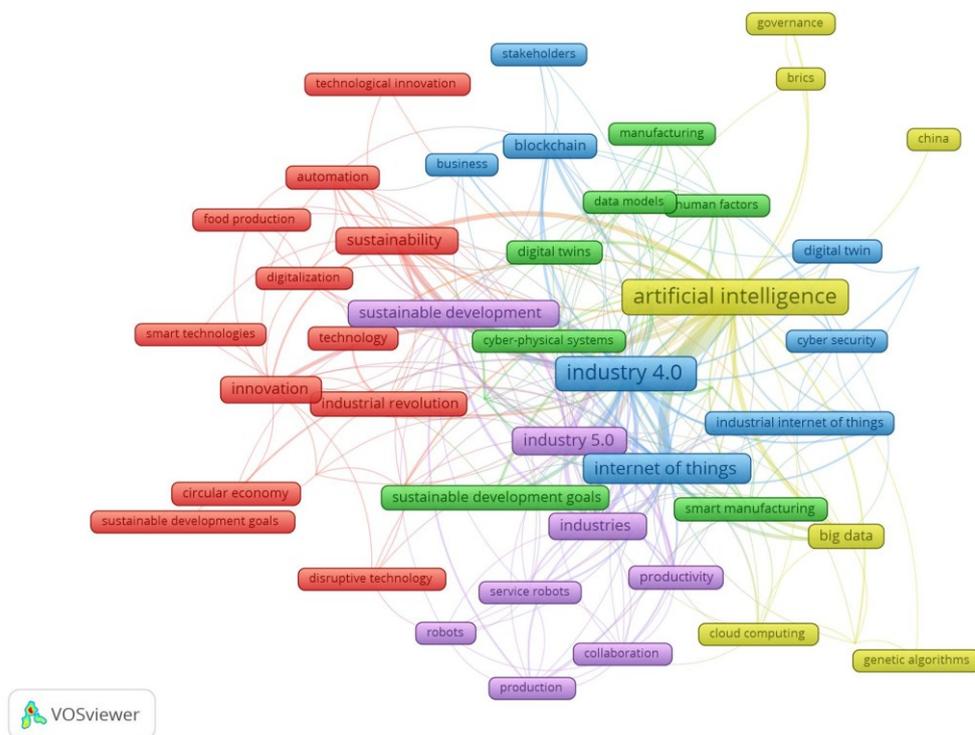
#### 3.1 Keyword Co-occurrence Analysis

This section employs VOSviewer 1.6.20 to conduct a co-occurrence analysis of research keywords in the field of AI and sustainable development. As shown in Figure 6, among a total of 415 author keywords, 50 keywords appeared at least twice, resulting in a co-occurrence network comprising 255 links and a total link strength of 429, which were categorised into five distinct clusters. The yellow cluster takes “artificial intelligence” as its core node, making it the most frequent term across the dataset. This underlines its dominant position within the research area. Related terms such as “cloud computing”, “genetic algorithms”, and “governance” indicate a strong concentration on digital infrastructure and algorithm-based tools that contribute to sustainable development. In the purple cluster, “sustainable development” serves as the primary theme. It is closely associated with keywords like “circular economy”, “service robots”, and “collaboration”, which reflect a growing scholarly interest in linking sustainability with automation and cooperative technologies.

The red cluster groups together key concepts such as “innovation”, “technological innovation”, “digitalisation”, and “industrial revolution”. These reflect essential transformations occurring in industry and society through advancements in technology and supportive policy measures. “Smart manufacturing” is the focal point of the green cluster. It is surrounded by terms like “human factors”, “data models”, and “digital twins”, showing how intelligent technologies are being incorporated into production systems and organisational design. The blue cluster contains terms including “industry 4.0”, “internet of things”, “cyber-physical systems”, and “blockchain”. This

cluster highlights work that focuses on interconnected digital environments and emerging approaches to digital governance.

In conclusion, the clustering results point to five major interconnected areas: intelligent technologies, sustainability-focused innovation, industrial transformation, digital integration, and collaborative ecosystems.



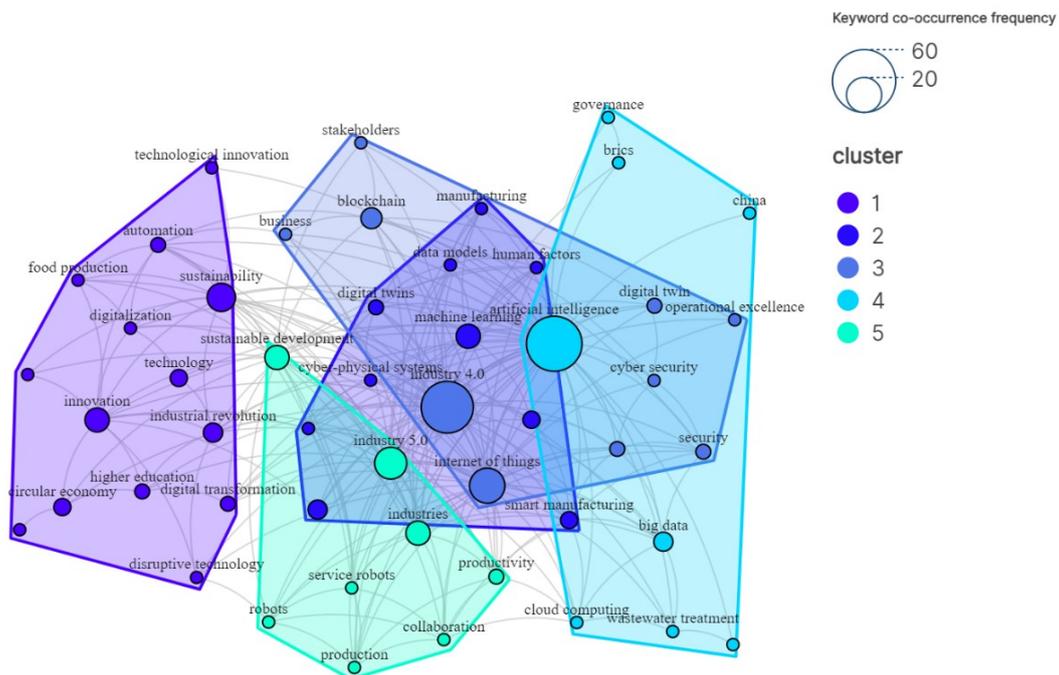
**Figure 6: Keyword Co-Occurrence Network**

### 3.2 Keyword Co-occurrence Frequency Analysis

Figure 7 displays the frequency of keyword co-occurrence and the clustering pattern of author-defined terms within AI and sustainable development research. In total, 50 keywords were extracted and categorised into five distinct groups according to their co-occurrence patterns. Each node shown in the figure stands for a keyword, where its size

reflects how often it appears in the dataset, and the connections between nodes represent the strength of their co-occurrence.

The two concentric circles in the top-right legend represent nodes with frequencies of 60 and 20. They serve as a visual guide for assessing the relative importance of keywords. Higher frequency results in a larger node size and indicates greater thematic centrality. The keyword “artificial intelligence” appears 42 times, with 41 links and a total link strength of 118. This highlights its central and influential role in the network. “Industry 4.0” occurs 37 times and has a total link strength of 103. It also holds a prominent position in the co-occurrence structure. Overall, the co-occurrence network demonstrates a high density of inter-keyword connections, indicating strong thematic integration and interdisciplinary convergence within the field of AI and sustainable development. This pattern reflects the structural characteristics of research hotspots and the domain's evolving knowledge architecture.



**Figure 7: Keyword Co-Occurrence Frequency**





The figure shows several new research topics. Keywords like “digitalisation”, “food production”, and “stakeholders” appear in bright yellow, showing that they have received more attention in recent years. “Digitalisation” shows a shift toward smart systems and data-based methods. “Food production” shows how AI is used in sustainable farming and related fields. “Stakeholders” points to the role of group cooperation and policy support in driving sustainable progress. On the other hand, terms like “genetic algorithms”, “technological innovation”, and “innovation” appear in purple or blue, which means they were more popular in earlier studies. These concepts have provided essential theoretical and methodological foundations for later interdisciplinary studies. In summary, the overlay visualisation reveals a transition pathway in the research on AI and sustainable development, shifting from foundational technological innovation to application-oriented, interdisciplinary, and governance-driven directions.

#### **4.0 Conclusion**

This study conducted a comprehensive bibliometric analysis of 101 articles retrieved from the Web of Science Core Collection, employing VOSviewer and Scimago Graphica as core analytical tools. The research was guided by three primary objectives: to identify the thematic structure and core domains of AI and sustainable development research, to visualise collaboration and keyword co-occurrence networks, and to propose a future research agenda aligned with the SDGs. First, the analysis revealed a growing scholarly interest in the intersection of AI and sustainable development. The steady increase in both publication and citation counts since 2018 reflects the expanding influence and relevance of this interdisciplinary field within the broader context of ongoing industrial revolutions.

Second, the visualisation of co-authorship networks and keyword clusters uncovered five major thematic domains: intelligent technologies, sustainability-focused innovation, industrial transformation, digital integration, and collaborative ecosystems. These clusters highlight the centrality of emerging technologies—such as AI, IoT, blockchain, and cyber-physical systems—in addressing sustainability challenges. Third, the keyword overlay and density visualisations traced a clear evolutionary trajectory in

the literature—from early-stage focus on technological innovation to a growing emphasis on governance mechanisms, stakeholder engagement, and real-world applications. These findings provide a knowledge base for future research directions that are more responsive to the practical demands of sustainable development.

Nevertheless, this study is subject to certain limitations. The dataset was confined to English-language articles indexed in the Web of Science, which may result in the exclusion of relevant studies from other databases or languages. To improve comprehensiveness and representativeness, future research should consider integrating multiple data sources and adopting mixed-method approaches to validate and extend the findings. Building upon these insights, several avenues for future research can be highlighted. From a theoretical perspective, stronger integration between AI and sustainability frameworks, such as circular economy, ecological modernisation, and socio-technical transition theories, is needed to advance conceptual development. From a methodological perspective, the adoption of advanced bibliometric tools, longitudinal network analysis, and mixed-methods approaches can enhance both rigour and depth. From an application perspective, future studies should investigate cross-industry practices in energy, manufacturing, and urban systems. They should also address governance mechanisms, ethical considerations, and policy instruments that ensure the responsible deployment of AI. By pursuing these directions, scholars can deepen theoretical foundations, enrich methodological diversity, and generate actionable insights that accelerate the role of AI in advancing sustainable development goals in the era of industrial revolutions.

**Author Contributions Statement:** Conceptualisation, Methodology, Formal analysis and investigation, Writing - original draft preparation: X.B; Writing - review and editing, Supervision: T.S.Y; Writing - review and editing, Supervision: S.S. All authors read and approved the final manuscript.

**Funding Statement:** No funding was received to assist with the preparation of this manuscript.

**Informed Consent Statement:** Informed consent was obtained from all individual participants included in this study.

**Data Availability Statement:** The data are available from the first author upon request.

**Acknowledgement:** The authors are grateful for the help from Universiti Sains Malaysia, International University of Business Agriculture and Technology, China, and the editors and reviewers of International Journal of Management, Finance and Accounting.

**Conflict of Interest Statement:** The authors have no competing interests to declare that are relevant to the content of this study.

**References**

- Bibri, S. E., Huang, J., & Krogstie, J. (2024). Artificial intelligence of things for synergizing smarter eco-city brain, metabolism, and platform: Pioneering data-driven environmental governance. *Sustainable Cities and Society*, 108. <https://doi.org/10.1016/j.scs.2024.105516>
- Castro, C., & Pinho, C. (2021). Corruption, economic growth and sustainable development – a conditional quantile analysis. *International Journal of Sustainable Development*, 24(3–4), 220–244. <https://doi.org/10.1504/IJSD.2021.122714>
- Hosseini, S., Yassine, A., & Hossain, M. S. (2024). Optimizing electric vehicle charging through an artificial intelligence mechanism for smart transportation. *IEEE Internet of Things Journal*, 11(24), 39069–39083. <https://doi.org/10.1109/JIOT.2024.3446863>
- Jain, A., Vishwakarma, A., & Bhakta, D. (2025). Assessing the impact of artificial intelligence and circular economy on the healthcare sector: An empirical evidence from the Indian context. *Journal of Cleaner Production*, 486. <https://doi.org/10.1016/j.jclepro.2024.144315>
- Kwon, J. (2023). A study on ethical awareness changes and education in artificial intelligence society. *Revue d'Intelligence Artificielle*, 37(2), 341–345. <https://doi.org/10.18280/ria.370212>
- Lee, C.-C., & Yan, J. (2024). Will artificial intelligence make energy cleaner? Evidence of nonlinearity. *Applied Energy*, 363. <https://doi.org/10.1016/j.apenergy.2024.123081>
- Lemons, J. (1995). Sustainable development and environmental protection: A perspective on current trends and future options for universities. *Environmental Management*, 19(2), 157–165. <https://doi.org/10.1007/BF02471987>
- Michulek, J., & Gajanova, L. (2023). Is the concept of industry 4.0 still interesting for scientists due to the emergence of industry 5.0? Bibliometric analysis. *Economics and Culture*, 20(1), 1–16. <https://doi.org/10.2478/jec-2023-0001>

- Nayak, B. S., & Walton, N. (2024). *Political economy of artificial intelligence: Critical reflections on big data market, economic development and data society* (p. 192). <https://doi.org/10.1007/978-3-031-62308-0>
- Pham, X.-L., & Le, T. T. (2024). Bibliometric analysis and systematic review of research on expert finding: A PRISMA-guided approach. *International Arab Journal of Information Technology*, 21(4), 661–674. <https://doi.org/10.34028/iajit/21/4/9>
- Sachithra, V., & Subhashini, L. D. C. S. (2023). How artificial intelligence uses to achieve the agriculture sustainability: Systematic review. *Artificial Intelligence in Agriculture*, 8, 46–59. <https://doi.org/10.1016/j.aiia.2023.04.002>
- Singh, A., Kanaujia, A., Singh, V. K., & Vinuesa, R. (2024). Artificial intelligence for sustainable development goals: Bibliometric patterns and concept evolution trajectories. *Sustainable Development*, 32(1), 724–754. <https://doi.org/10.1002/sd.2706>
- Smith, J., Fishman, E. K., Chu, L. C., Rowe, S. P., & Crawford, C. K. (2025). From automation to innovation: How artificial intelligence is reshaping global industries. *Journal of the American College of Radiology*. <https://doi.org/10.1016/j.jacr.2025.06.030>
- Trudeau, D. (2018). Integrating social equity in sustainable development practice: Institutional commitments and patient capital. *Sustainable Cities and Society*, 41, 601–610. <https://doi.org/10.1016/j.scs.2018.05.007>