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UTILIZATION OF ARTIFICIAL INTELLIGENCE IN ORGANIZATIONAL SUSTAINABLE DEVELOPMENT: BIBLIOMETRIC ANALYSIS AND FUTURE RESEARCH DIRECTIONS

Piotr PIETRZAK

Management Institute, Warsaw University of Life Sciences; piotr_pietrzak1@sggw.edu.pl,
ORCID: 0000-0002-1319-4815

Purpose: The paper aims to conduct a bibliometric analysis to investigate the utilization of artificial intelligence in organizational sustainable development.
Design/methodology/approach: This study uses bibliometric analysis to evaluate literature on artificial intelligence in organizational sustainable development. By applying quantitative and qualitative methods, it identifies key trends, influential works, and research gaps. Data were collected from the Scopus database using keywords like "artificial intelligence", "sustainability", and "organization" resulting in a dataset of 217 relevant journal articles and conference papers published up to March 11, 2025.
Findings: The study highlights increasing scholarly interest in artificial intelligence's role in organizational sustainable development, with a significant rise in publications over the last decade. Geographical analysis shows the United States, China, and Germany as leading contributors. Keyword co-occurrence reveals prominent themes like AI-driven decision-making and predictive analytics, but also points to a lack of empirical studies on AI's long-term impacts. A conceptual model linking AI adoption factors to sustainability outcomes is proposed to guide future research.
Research limitations/implications: This study exclusively utilizes the Scopus database, which, despite its comprehensiveness, excludes other significant sources such as Web of Science, Google Scholar, and specialized databases focused on sustainability and technology. This limitation may result in the omission of pertinent research. Furthermore, the search strategy's reliance on the specific keywords "artificial intelligence", "sustainability", and "organization" could have inadvertently excluded relevant studies addressing AI's role in sustainability that do not explicitly use these terms.
Practical implications: The findings highlight the need for organizations to develop strategic approaches for integrating AI into sustainability initiatives, ensuring that technological advancements align with environmental, social, and economic goals.
Social implications: AI-driven sustainability initiatives have the potential to enhance social well-being by promoting ethical labor practices, improving resource distribution, and fostering inclusive economic growth. However, the uneven adoption of AI across industries and regions may deepen existing inequalities, particularly for small businesses and developing economies with limited access to advanced technologies.

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Originality/value: This study provides a comprehensive bibliometric analysis of AI's role in organizational sustainable development, offering a structured overview of key research trends, influential studies, and emerging thematic areas.
Keywords: bibliometric analysis, artificial intelligence, sustainability, organization.
Category of the paper: Literature review.

1. Introduction

The increasing acknowledgment of sustainability as a fundamental element for organizational success has prompted businesses across diverse industries to adopt sustainable practices within their operations (Mariani et al., 2022). At the same time, the rapid development of artificial intelligence (AI) technologies has introduced new possibilities for advancing sustainability efforts (Al-Raeei, 2024). With its capacity to analyze large datasets, enhance decision-making processes, and foster innovation, AI presents a powerful tool for driving sustainable development. Despite the growing interest in how AI intersects with sustainability (e.g. Khakurel et al., 2018; Nishant et al., 2020, Goralski, Tan, 2020; Bracarense et al., 2022) there is still a limited understanding of its full potential in supporting organizational sustainability initiatives. Especially, research in this field has been conducted to a limited extent by Polish researchers. Among the few studies, the following can be indicated: Siuta-Tokarska, 2021; Makowski, 2023; Czemiel-Grzybowska, 2024.

The research problem addressed by the author is: What is the current state of knowledge regarding the use of AI in facilitating sustainable development in organizations? That is why, the primary objective of this paper is to perform a bibliometric analysis (BA) examining the role of AI in facilitating sustainable development in organizations. Moreover, the author aims to: (1) analyze the distribution of publications by year regarding the role of AI in organizational sustainable development; (2) identify the most cited papers in this area; (3) determine which countries have made the most significant contributions to the field through their research outputs; (4) highlight the keyword co-occurrence in publications on the use of AI in organizational sustainable development; (5) suggest potential future research directions in this domain. It is crucial to emphasize that the research tasks involved will encompass both quantitative and qualitative approaches (what is consistent with the methodology of BA).

This study offers two key contributions. First, it delivers a clear overview of the current state of knowledge regarding the utilization of AI in organizational sustainable development. While numerous publications exist on this topic, there is a noticeable gap in comprehensive analyses. In response to this, the study provides a comprehensive and current BA of 217 journal and conference papers from the Scopus database. The author anticipates that this research will be a valuable resource for a range of audiences. Researchers and academics studying AI applications, sustainability, and organizational development can benefit from the BA and

identified research gaps. Business leaders and managers looking to integrate AI into sustainability strategies can gain insights into trends and best practices. Policy makers and government officials shaping regulations on AI and sustainability may find the findings useful in developing informed policies and supporting innovation.

This study adopts the IMRAD (Introduction, Methods, Results, and Discussion) structure, ensuring a clear and organized presentation of the research findings. This format allows for a seamless progression from the formulation of research questions and objectives to a thorough explanation of the chosen methodology, the presentation of results, and their analysis in relation to the existing body of literature.

2. Methods

A literature review can be approached through different methodologies. But in recent years, BA has gained significant traction in business research (Donthu et al., 2021). This growing interest can be attributed to two key factors. Firstly, advancements in technology and improved accessibility to bibliometric tools such as VOSviewer have facilitated its application. Secondly, the increased availability of extensive research databases like Scopus has enabled scholars to explore large datasets efficiently. BA allows researchers to visualize the evolution of a research domain, assess influential publications, trace author collaborations, and uncover structural patterns within a given academic discipline (Verma, Gustafsson, 2020).

BA techniques can be broadly classified into two main categories: (1) performance evaluation and (2) scientific mapping. Performance evaluation is concerned with assessing the impact and contributions of various research elements, such as authors, institutions, and journals, within a specific field (Cobo et al., 2011). On the other hand, scientific mapping aims to explore and visualize the connections and interrelationships among different research components, offering insights into the structural patterns and intellectual landscape of a given domain (Baker et al., 2021).

BA was used across a wide range of research areas. Examples of some prominent areas where BA is commonly utilized include: computer sciences (e.g. Cancino et al., 2017; Shukla et al., 2019), social sciences (e.g. Wang, Yang, 2019; Ye et al., 2021), environmental sciences (e.g. Zhang et al., 2017; Mao et al., 2018), as well as business sciences (Albort-Morant, Ribeiro-Soriano, 2016; Tandon et al., 2021).

As an initial step, the author conducted a search in the Scopus database to determine whether any studies had employed BA to examine the utilization of AI in organizational sustainable development. To achieve this, the author utilized the following search query: (TITLE-ABS-KEY (“sustainability”) AND TITLE-ABS-KEY (“artificial intelligence”) AND TITLE-ABS-KEY (“organization”) AND TITLE (“bibliometric analysis”)).

This search yielded seven articles that met the specified criteria (Qaiser et al., 2017; Alrawashdeh et al., 2022; Kuang et al., 2023; Gorski, Dumitraşcu, 2023; Campoverde et al., 2024; Kumar et al., 2024; Solaz et al., 2025). Nevertheless, none of the analyses provided a comprehensive overview of the body of literature concerning the application of AI tools in the implementation of the sustainable development concept within organizations. While some studies may have touched upon related topics, there is a lack of a detailed BA that systematically explores the role of AI technologies in shaping sustainability strategies in organizations. This represents a significant research gap, highlighting the need for further studies in this area to better understand the impact of AI on achieving sustainable development goals in an organizational context.

Before conducting the BA, the author formulated four research questions:

RQ1. In which publications (journals/conference papers) does information on the use of AI in organizational sustainable development appear?

RQ2. Which articles on the use of AI in organizational sustainable development are most frequently cited?

RQ3. Which countries have contributed the most to the development of AI applications in organizational sustainable development through publication activities?

RQ4. What is the keyword co-occurrence in publications on the use of AI in organizational sustainable development?

The data retrieval process was conducted on March 11, 2025, with Scopus serving as the primary data source. This database was chosen to ensure both scientific credibility and thorough coverage of the research field. The selection was primarily influenced by Scopus's accessibility and its reputation as a leading repository of high-impact academic publications. Furthermore, Scopus's robust indexing system and comprehensive abstract database provided a solid foundation for conducting a rigorous bibliometric examination of the selected research area. Other researchers have also chosen Scopus for BAs, recognizing its reliability and inclusiveness (e.g. Mirek et al., 2016; Glińska, Siemieniako, 2018; Balkan Akan, 2025).

The author began the research by defining inclusion criteria, which involved identifying publications that contained the terms "sustainability", "artificial intelligence", and "organization" within their titles, abstracts, or keywords. This was executed using the search query: (TITLE-ABS-KEY ("sustainability") AND TITLE-ABS-KEY ("artificial intelligence") AND TITLE-ABS-KEY ("organization")). To ensure the relevance of the results, the author selected the "topic" category rather than the broader "text" category.

Similar to other studies employing BA (e.g. Di Vaio et al., 2021), the search for relevant articles was conducted without any specific time constraints. However, it was strictly limited to journal and conference papers. To ensure transparency and the ability to assess research methodologies, all selected publications had to be openly accessible and officially published. Additionally, the alignment between each publication's title and its actual content was a key selection criterion. To avoid potential misinterpretations, only papers written entirely in English

were considered. Consequently, the final search formula used to identify publications for analysis was structured as follows: (TITLE-ABS-KEY (“sustainability”) AND TITLE-ABS-KEY (“artificial intelligence”) AND TITLE-ABS-KEY (“organization”)) AND (LIMIT-TO (DOCTYPE , “ar”) OR LIMIT-TO (DOCTYPE , “cp”)) AND (LIMIT-TO (PUBSTAGE , “final”)) AND (LIMIT-TO (LANGUAGE , “English”)) AND (LIMIT-TO (OA , “all”)).

As a result of the exclusion process, a total of 217 journal and conference papers were identified and selected from the Scopus database. These publications served as the primary dataset for the author's analysis, providing the basis for addressing the four research questions (RQ1, RQ2, RQ3, RQ4) previously established in the study.

3. Results

3.1. Distribution of publications by year

The Figure 1. illustrates the number of journal articles and conference papers published between 2012 and 2025, focusing on the application of AI in implementing sustainable initiatives within organizations. The overall trend shows minimal research activity from 2012 to 2018, followed by a significant increase starting in 2019. The highest number of publications is recorded in 2024, with 71 journal articles and 1 conference paper. The decline in 2025 is likely due to incomplete data rather than a decrease in research interest.

Journal articles, represented by black bars, dominate the publication trend. A noticeable rise in AI-driven sustainability research begins in 2019, with a significant increase in 2020 and continued growth through 2024. Conference papers, depicted in gray bars, are published intermittently, with peaks in 2020, 2022, and 2023, though their numbers remain considerably lower than journal articles.

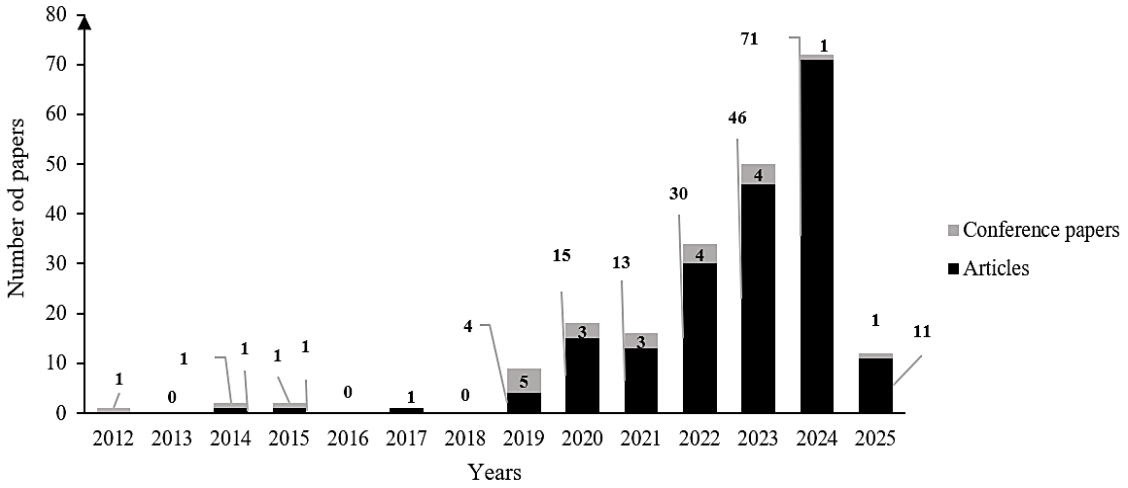

Figure 1. Distribution of conference papers and articles by year.

Source: Own elaboration based on Scopus.

The early years from 2012 to 2018 indicate limited attention to this research area, suggesting that AI-driven sustainability initiatives were not yet a major focus. A turning point occurs in 2019 and 2020, likely due to the increasing recognition of AI's potential in optimizing sustainability efforts within organizations. The period between 2022 and 2024 marks the highest research activity, indicating a strong and growing academic interest in this field. The apparent decline in 2025 may be attributed to incomplete data rather than a decrease in research output.

The surge in publications could be driven by several factors, including the growing urgency for organizations to adopt sustainable practices, advancements in AI technologies, increased funding for sustainability research, and the expansion of open-access publication platforms. The preference for journal articles over conference papers suggests that researchers in this field prioritize peer-reviewed, in-depth studies for disseminating their findings.

3.2. Most frequently cited publications

The most frequently cited papers are given in Table 1. Overall, the most cited paper (328 citations) was a study by Feroz et al. entitled "Digital transformation and environmental sustainability: A review and research agenda" (2021). That paper was printed in the Sustainability (Switzerland). This study examined the impact of digital transformation on environmental sustainability by conducting a systematic review of the existing literature. The findings introduced a comprehensive framework that categorized the transformative effects into four main domains: pollution control, waste management, sustainable production, and urban sustainability. Each of these domains was further broken down into specific subcategories, providing a detailed analysis of the changes that occurred within them.

Table 1.
Most frequently cited publications

Citation count	Publication year	Authors	"Document title"	"Source" (volume, pages)
328	2021	Feroz et al.	"Digital transformation and environmental sustainability: A review and research agenda"	"Sustainability (Switzerland)" (13(3), 1-120)
267	2020	Kamble et al.	"A performance measurement system for industry 4.0 enabled smart manufacturing system in SMMEs - A review and empirical investigation"	"International Journal of Production Economics" (229, 107853)
252	2020	Bednar, Welch	"Socio-Technical Perspectives on Smart Working: Creating Meaningful and Sustainable Systems"	"Information Systems Frontiers" (22(2), 281-298)
202	2021	Wang, Huang	"The impact of COVID-19 pandemic on sustainable development goals - A survey"	"Environmental Research" (202, 111637)
163	2020	Strohm et al.	"Implementation of artificial intelligence (AI) applications in radiology: hindering and facilitating factors"	"European Radiology" (30(10), 5525-5532)

Cont. table 1.

163	2019	Allaoui et al.	"Decision support for collaboration planning in sustainable supply chains"	"Journal of Cleaner Production" (229, 761-774)
128	2022	Dora et al.	"Critical success factors influencing artificial intelligence adoption in food supply chains"	"International Journal of Production Research" (60(14), 4621-4640)
118	2022	Hughes et al.	"Perspectives on the future of manufacturing within the Industry 4.0 era"	"Production Planning and Control" (33(2-3), 138-158)
115	2020	Alami et al.	"Artificial intelligence in health care: Laying the Foundation for Responsible, sustainable, and inclusive innovation in low - and middle-income countries"	"Globalization and Health" (16(1), 52)
114	2014	Shin et al.	"Predictive analytics model for power consumption in manufacturing"	"Procedia CIRP" (15, 153-158)
113	2021	Ogbeibu et al.	"Leveraging STARA competencies and green creativity to boost green organisational innovative evidence: A praxis for sustainable development"	"Business Strategy and the Environment" (30(5), 2421-2440)
111	2023	Song, Song	"Enhancing academic writing skills and motivation: assessing the efficacy of ChatGPT in AI-assisted language learning for EFL students"	"Frontiers in Psychology" (14, 1260843)

Note. The table includes publications with a total citation count of 100 or more.

Source: Own elaboration based on Scopus.

Another highly cited publication is the work of Kamble et al. (2020). This study examined the adoption of Smart Manufacturing Systems (SMS) in Small, Medium, and Micro Enterprises (SMMEs) within India's auto-component manufacturing sector. While SMS provided significant advantages over traditional manufacturing systems by integrating technologies such as automation, cyber-physical systems, AI, and the Internet of Things, their implementation was complex and costly. Given the resource constraints of SMMEs, businesses sought tangible benefits before committing to SMS investments.

Using a combination of exploratory and empirical research, the study identified and validated key performance measures for evaluating SMS investments. The findings revealed that Industry 4.0-enabled SMS offered superior competitiveness compared to traditional systems. Investment evaluation was structured around ten performance dimensions: cost, quality, flexibility, time, integration, optimized productivity, real-time diagnosis and prognosis, computing, social sustainability, and ecological sustainability.

The paper ranked as the third most frequently cited is authored by Bednar & Welch and titled "Socio-Technical Perspectives on Smart Working: Creating Meaningful and Sustainable Systems". It was published in 2020 in Information Systems Frontiers. This paper examined the impact of technological advancements on industrial and commercial applications, particularly in AI, virtual reality, and integrated manufacturing systems. These developments enabled remote business operations through information and communication technologies, leading researchers to identify a phenomenon known as "smart" working.

Focusing on unique perspectives of work roles and sustainability, the paper raised critical questions: Who defined "smart" systems? Did they contribute to sustainable organizations? How should their design be approached? The study argued that contemporary socio-technical systems approaches provided the most effective framework for analyzing and integrating smart technologies within organizations to maximize their benefits.

The absence of extensively cited publications focusing on the role of AI in organizational sustainable development suggests that this research area remains underexplored and lacks a strong foundational framework. This gap indicates that while AI has gained significant traction in various fields, including automation, decision-making, and process optimization, its direct application in sustainability-related organizational transformations has not yet been comprehensively analyzed or widely acknowledged within academic discourse.

A closer examination of the existing body of work reveals that most of the highly cited studies emphasize empirical findings, often detailing specific AI applications within organizations without addressing the broader implications for long-term sustainability. These works primarily focus on AI's role in enhancing efficiency, reducing costs, or improving workflow automation. While these aspects indirectly contribute to sustainability, they do not explicitly frame AI as a transformative force for achieving sustainable organizational development.

Furthermore, only a limited number of publications engage in a critical discussion regarding the potential benefits and risks associated with AI-driven sustainability initiatives. The lack of theoretical discourse and conceptual models leaves several fundamental questions unanswered. For instance, how can AI-driven solutions be effectively aligned with sustainability goals? What ethical and operational challenges arise when implementing AI in sustainability strategies? How can organizations ensure that AI applications do not inadvertently lead to negative environmental or social consequences, such as increased energy consumption or biased decision-making?

3.3. Contributing countries

The Figure 2. illustrates the global distribution of authors contributing to research on the use of AI to support sustainable initiatives within organizations. Countries are shaded in varying intensities of gray, with darker shades representing a higher number of contributing authors.

The United States (the leading research centers are: Brigham Young University, Pennsylvania State University), China (the leading research centers are: Central South University, Hohai University), and India (the leading research centers are: JIS College of Engineering, O.P. Jindal Global University) appear to have the highest number of authors, as indicated by their dark shading, with the maximum recorded being 41. These countries are recognized as major hubs for AI and sustainability research, reflecting their strong technological advancements and industrial focus.

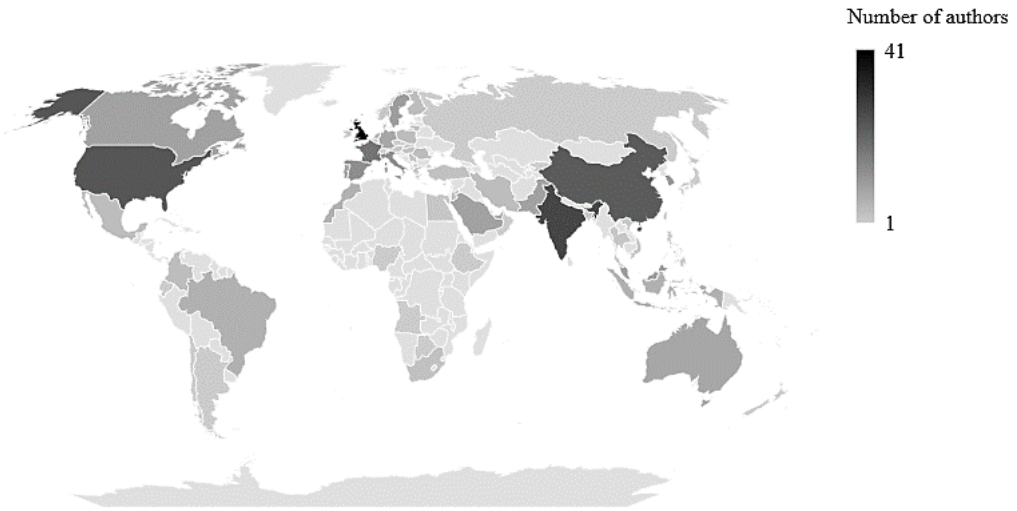

Figure 2. Publishing activity by country.

Source: Own elaboration based on Scopus.

European countries, such as the United Kingdom and Germany, also demonstrate significant contributions, though to a lesser extent than the leading nations. Latin America, Africa, and some parts of Southeast Asia show lighter shades, suggesting a lower number of authors contributing to this research field. Australia also appears to have a moderate number of contributions.

The overall distribution suggests that AI-driven sustainability research is primarily concentrated in technologically advanced and industrialized nations, while developing regions have a comparatively lower presence in this domain.

3.4. Keyword co-occurrence

Analysis of keyword co-occurrence using the full counting method with minimum number of 8 occurrences of a keyword at the level of 3 identified 6 clusters (Figure 3).

A significant theme within the network is decision-making and strategy, represented by a blue cluster. Keywords such as “decision”, “strategy”, “quality”, “manufacturing”, and “machine learning” indicate a focus on how AI is leveraged to enhance decision-making processes in industrial and corporate environments. This cluster signifies an intersection between technology and human-centered decision-making, where AI tools contribute to optimizing complex processes.

Another dominant cluster, shown in red, revolves around relationships, tools, and economic applications. Words such as “relationship”, “tool”, “insight”, “agriculture”, and “economy” suggest that AI is increasingly being integrated into agricultural and economic processes. The connection between “researcher” and “literature” implies that this cluster is heavily influenced by academic research investigating AI’s role in industry-specific challenges.

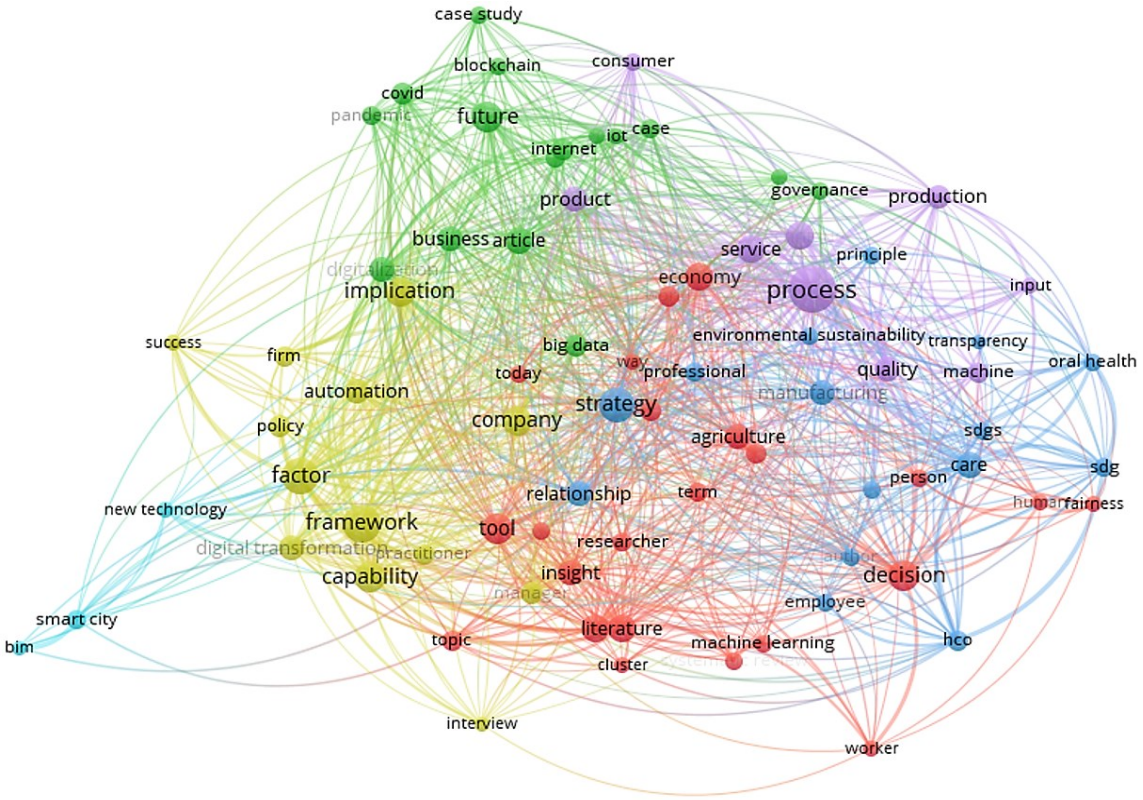

Figure 3. Keyword co-occurrence.

Source: Own elaboration based on Scopus.

The green cluster highlights the implications of AI in digital transformation and business applications. Terms like "future", "implication", "consumer", "blockchain", and "internet" reflect an emphasis on emerging AI-driven trends that influence both corporate strategies and consumer behavior. Blockchain, as a keyword, suggests ongoing discussions about how AI can be integrated with decentralized systems to improve transparency and efficiency. The presence of "pandemic" in this cluster hints at research exploring how AI has been utilized to manage crises and adapt business operations to disruptions.

Automation and organizational capabilities emerge as another focal point within the network, represented by a yellow cluster. The terms "framework", "capability", "automation", "factor", and "policy" indicate a research direction focused on AI-driven organizational transformations. The interconnection with "firm" and "success" suggests that AI's impact on business performance is a critical area of investigation. Discussions in this cluster likely explore how organizations can adopt AI frameworks, the policies needed for smooth integration, and the factors influencing AI adoption in corporate settings.

Governance, production, and sustainability form the foundation of the purple cluster, which includes keywords such as "process", "governance", "production", "service", and "environmental sustainability". This cluster suggests a research focus on the regulatory and ethical aspects of AI, particularly in the context of sustainable production. The emphasis on

"principle" and "transparency" implies an ongoing discussion about AI's role in ethical governance and responsible innovation.

Lastly, the light blue cluster centers on smart technologies and urban applications. Words like "smart city", "new technology", "BIM", and "digital transformation" indicate research on AI's role in reshaping urban environments and technological advancements. The inclusion of "BIM" (Building Information Modeling) suggests that AI is being utilized in smart infrastructure planning, sustainable construction, and urban management. This cluster underscores the transformative impact of AI on city planning and public services.

The keyword co-occurrence network reveals that while AI is widely studied in various domains, only a small portion of publications explicitly focus on its role in supporting organizational sustainable development. The dominant clusters center around decision-making, automation, digital transformation, and industrial applications, with significant emphasis on efficiency, productivity, and technological integration. While sustainability-related terms such as "environmental sustainability" and "SDG" appear in the network, they are not the central focus of the most densely connected clusters. Instead, they are linked more peripherally, suggesting that AI's contribution to sustainable organizational practices is still an emerging or secondary research area. This highlights a gap in the literature, indicating the need for further exploration of AI-driven strategies specifically aimed at enhancing long-term sustainability within organizations.

4. Discussion

4.1. Contributions

This study bridged a critical gap across several key areas. By conducting a BA, multiple research objectives were achieved: first, it mapped the yearly distribution of scholarly articles and conference proceedings addressing the role of AI in fostering organizational sustainable development. Second, it identified the most frequently cited works in this domain. Third, it determined the countries that have made the most substantial research contributions to AI-driven sustainability initiatives within organizations. Fourth, it examined the primary subject areas most frequently associated with AI's application in sustainability efforts.

Additionally, this paper serves as a methodological reference for conducting BA. It presents a structured, step-by-step approach, beginning with the formulation of research objectives and the development of a systematic review plan, followed by an exhaustive literature search based on predefined selection criteria.

4.2. Limitations

A primary constraint lies in the exclusive reliance on the Scopus database, which, while comprehensive, excludes other valuable sources such as the Web of Science (Institute for Scientific Information), Google Scholar, and specialized databases focused on sustainability and technology.

Another limitation stems from the specific search terms used, namely "artificial intelligence", "sustainability", and "organization". These terms directly influenced the selection of publications, meaning that studies discussing AI's efficiency, economic impact, or indirect contributions to sustainability may have been excluded if they did not explicitly include these keywords in their titles, abstracts, or keywords. Consequently, this review overlooked publications that explored AI applications in sustainable business practices, such as its role in optimizing resource efficiency and supporting environmentally responsible strategies (e.g. Vinuesa et al., 2020; Ramos et al., 2024). While these studies could provide valuable insights, they did not meet the methodological inclusion criteria set for this analysis.

4.3. Research gaps and future research directions

Based on the identified limitations and the assessment of selected articles, the author was able to identify several research gaps. One significant gap is the absence of comprehensive frameworks that integrate AI applications across all dimensions of sustainability, including environmental, social, and economic aspects (Research gap 1). Existing studies tend to focus on specific AI applications, such as energy efficiency or waste management, rather than presenting a holistic perspective on how AI can drive sustainability across various organizational functions (Research gap 2). Additionally, while many studies explore the theoretical potential of AI in sustainable business practices, there is a lack of empirical evidence demonstrating AI's long-term impact (Research gap 3). Short-term case studies provide valuable insights, but they fail to capture the broader consequences, challenges, and unintended effects of AI-driven sustainability initiatives over extended periods. Finally, small and medium-sized enterprises (SMEs) encounter significant challenges in adopting artificial intelligence for sustainability efforts. In contrast to large corporations, which possess substantial financial resources and advanced technological capabilities to seamlessly integrate AI into their sustainability frameworks, SMEs frequently grapple with financial constraints, a shortage of specialized expertise, and insufficient infrastructure to support AI implementation. The high costs associated with acquiring and maintaining AI-driven technologies further exacerbate these difficulties, making it challenging for smaller organizations to leverage AI effectively. SMEs often lack the internal knowledge and skilled workforce necessary to manage AI applications, leading to further disparities in technological adoption between large and small enterprises. Given these obstacles, there is a pressing need for further research aimed at designing AI solutions that are not only scalable but also financially and technically accessible to SMEs (Research gap 4). By developing AI-driven sustainability models tailored to the unique

needs and constraints of smaller organizations, researchers can help bridge the gap and ensure that AI-driven sustainability practices are not exclusively confined to large corporations but are also accessible to SMEs, thereby fostering broader, more inclusive progress in sustainable development.

To address these gaps, a research model can be proposed that examines the relationship between AI adoption and sustainable organizational outcomes (Figure 4). It was prepared based on previous studies such as: Kurup, Gupta, 2022; Parasad Agrawal, 2023; Li, Jin, 2024; Chen et al., 2024. The left side of the model (Figure 4) identifies key enablers of AI adoption, which include: (1) change capability, (2) leadership, (4) AI readiness, and (5) AI adoption by trading partners.

Change capability reflects an organization's ability to adapt to technological transformations, while leadership signifies the role of decision-makers in facilitating AI-driven innovations. AI readiness encompasses the preparedness of an entity in terms of infrastructure, human resources, and technical capabilities, whereas AI adoption by trading partners indicates the influence of external business networks in encouraging AI integration.

The right side of the model represents the broader sustainability outcomes associated with AI adoption, which are categorized into economic, social, and environmental sustainability. Economic sustainability denotes the potential for AI to enhance productivity, efficiency, and long-term financial viability. Social sustainability encompasses the societal implications of AI, including workforce transformation, equity, and ethical considerations. Environmental sustainability addresses the role of AI in optimizing resource use, reducing waste, and mitigating negative ecological impacts. The model suggests a causal relationship where AI adoption is contingent upon a set of organizational and external factors, ultimately shaping sustainability outcomes across multiple dimensions.

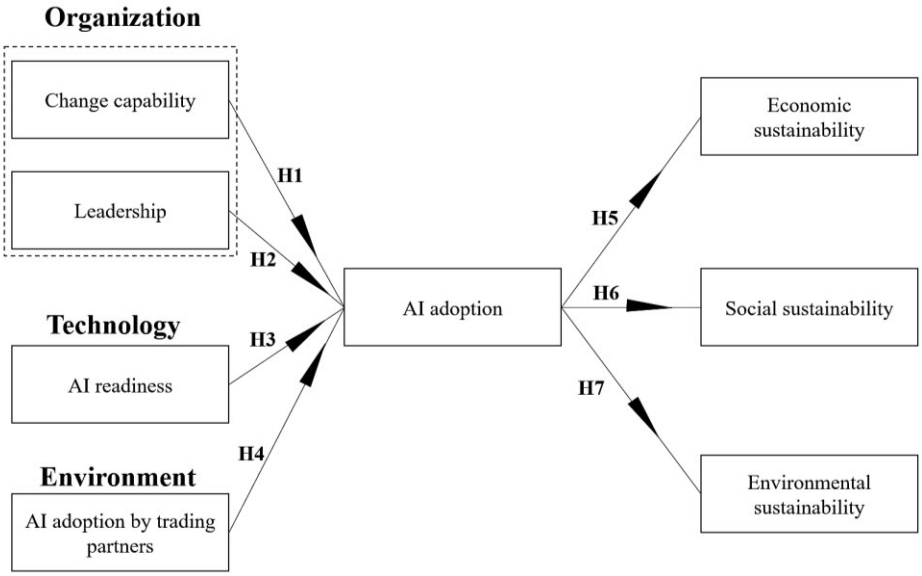

Figure 4. Research model.

Source: Own elaboration.

As a result, the author proposes that future research should explore and empirically validate the following hypotheses:

H1: Change capability has a positive influence on AI adoption.

H2: Leadership has a positive influence on AI adoption.

H3: AI readiness has a positive influence on AI adoption.

H4: AI adoption by trading partners has a positive influence on AI adoption.

H5: AI adoption has a positive influence on economic sustainability.

H6: AI adoption has a positive influence on social sustainability.

H7: AI adoption has a positive influence on environmental sustainability.

These hypotheses suggest that organizational, technological, and environmental factors drive AI adoption, which in turn contributes to various dimensions of sustainability.

5. Conclusions

This study provides a comprehensive BA of the utilization of AI in organizational sustainable development. By examining the distribution of scholarly publications, identifying the most frequently cited works, and analyzing contributions from different countries, the research offers a structured overview of existing knowledge in this field. Additionally, the study highlights key thematic areas associated with AI-driven sustainability initiatives, contributing to a clearer understanding of how AI supports environmental, social, and economic sustainability efforts within organizations.

A key contribution of this research lies in its methodological approach, which establishes a structured and reproducible framework for conducting bibliometric analyses in related fields. Through a systematic examination of existing literature, the study not only highlights prevailing research trends but also uncovers critical gaps in knowledge. One of the most urgent gaps is the lack of comprehensive frameworks that encompass AI applications across various aspects of sustainability. Additionally, although numerous studies discuss the theoretical possibilities of AI, there remains a significant shortage of empirical investigations that assess its sustained impact on organizational sustainable development over time. That is why, the author suggests validating the conceptual model outlined in this paper. This approach will enable them to address questions such as: (1) Does change capability positively influence AI adoption?; (2) Does leadership have a positive impact on AI adoption?; (3) Does AI readiness contribute positively to AI adoption?; (4) Does AI adoption by trading partners positively affect AI adoption?; (5) Does AI adoption enhance economic sustainability?; (6) Does AI adoption positively influence social sustainability?; (7) Does AI adoption contribute to environmental sustainability?

In response to the need for more actionable guidance, it is recommended that future research emphasizes the development of interdisciplinary teams integrating expertise from AI, sustainability science, organizational studies, and strategic management. Additionally, incorporating sustainability-specific key performance indicators (KPIs) into AI implementation strategies is essential for both assessing the effectiveness of AI initiatives and ensuring their alignment with long-term sustainability goals. These directions aim to bridge the gap between theoretical insights and practical applications, thereby enhancing the strategic integration of AI within sustainable development efforts.

References

1. Alami, H., Rivard, L., Lehoux, P., Hoffman, S.J., Cadeddu, S.B.M., Samri, M.A., Ahmed, M.A.A., Fleet, R., Fortin, J.-P. (2020). Artificial intelligence in health care: Laying the Foundation for Responsible, sustainable, and inclusive innovation in low - and middle-income countries. *Globalization and Health*, *16*, *1*, pp. 52.
2. Al-Raeei, M. (2024). Artificial intelligence for climate resilience: advancing sustainable goals in SDGs 11 and 13 and its relationship to pandemics. *Discover Sustainability*, *5*, *1*, p. 513.
3. Albort-Morant, G., Ribeiro-Soriano, D. (2016). A bibliometric analysis of international impact of business incubators. *Journal of Business Research*, *69*, *5*, pp. 1775-1779.
4. Allaoui, H., Guo, Y., Sarkis, J. (2019). Decision support for collaboration planning in sustainable supply chains. *Journal of Cleaner Production*, *229*, pp. 761-774.
5. Alrawashdeh, N., Alsmadi, A.A., Al-Gasaymeh, A. (2022). FinTech: A Bibliometric Analysis for the Period of 2014-2021. *Quality - Access to Success*, *23*, *188*, pp. 176-188.
6. Baker, H.K., Kumar, S., Pandey, N. (2021). Forty years of the Journal of Futures Markets: A bibliometric overview. *Journal of Futures Markets*, *41*, *7*, pp. 1027-1054.
7. Balkan Akan, B. (2025). A bibliometric analysis of organizational creativity research. *International Journal of Innovation Science*, *17*, *2*, pp. 296-318.
8. Bednar, P.M., Welch, C. (2020). Socio-Technical Perspectives on Smart Working: Creating Meaningful and Sustainable Systems. *Information Systems Frontiers*, *22*, *2*, pp. 281-298.
9. Bracarense, N., Bawack, R.E., Wamba, S.F., Carillo, K.D.A. (2022). Artificial Intelligence and Sustainability: A Bibliometric Analysis and Future Research Directions. *Pacific Asia Journal of the Association for Information Systems*, *14*, *2*, pp. 136-159.
10. Campoverde, J.C., Coronel-Pangol, K., Tigre, D.H., Sánchez, G.F., Yumbla, J.J. (2024). How does artificial intelligence affect the business context? A bibliometric analysis. *Edelweiss Applied Science and Technology*, *8, 4*, pp. 358-389.

11. Cancino, C., Merigó, J.M., Coronado, F., Dessouky, Y., Dessouky, M. (2017). Forty years of Computers & Industrial Engineering: A bibliometric analysis. *Computers and Industrial Engineering*, *113*, pp. 614-629.
12. Chen, P., Chu, Z., Zhao, M. (2024). The Road to corporate sustainability: The importance of artificial intelligence. *Technology in Society*, *76*, pp. 102440.
13. Cobo, M.J., López-Herrera, A.G., Herrera-Viedma, E., Herrera, F. (2011). An approach for detecting, quantifying, and visualizing the evolution of a research field: A practical application to the Fuzzy Sets Theory field. *Journal of Informetrics*, *5*, *1*, pp. 146-166.
14. Czemiel-Grzybowska, W. (2024). Trendy rozwoju zrównoważonej przedsiębiorczości technologicznej opartej na sztucznej inteligencji. *Academy of Management*, *7*, *4*, pp. 126-138.
15. Di Vaio, A., Palladino, R., Pezzi, A., Kalisz, D.E. (2021). The role of digital innovation in knowledge management systems: A systematic literature review. *Journal of Business Research*, *123*, pp. 220-231.
16. Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., Lim, W.M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, *133*, pp. 285-296.
17. Dora, M., Kumar, A., Mangla, S.K., Pant, A., Kamal, M.M. (2022). Critical success factors influencing artificial intelligence adoption in food supply chains. *International Journal of Production Research*, *60*, *14*, pp. 4621-4640.
18. Feroz, A.K., Zo, H., Chiravuri, A. (2021). Digital transformation and environmental sustainability: A review and research agenda. *Sustainability (Switzerland)*, *13*, *3*, 1-20.
19. Glińska, E., Siemieniako, D. (2018). Binge drinking in relation to services - Bibliometric analysis of scientific research directions. *Engineering Management in Production and Services*, *10*, *1*, pp. 45-54.
20. Goralski, M.A., Tan, T.K. (2020). Artificial intelligence and sustainable development. *International Journal of Management Education*, *18*, *1*, p. 100330.
21. Gorski, A.-T., Dumitraşcu, D.D. (2023). Exploring the Dynamic Landscape of Performance Management: A Bibliometric Analysis of Emerging Trends. *Studies in Business and Economics*, *18*, *1*, pp. 342-366.
22. Hughes, L., Dwivedi, Y.K., Rana, N.P., Williams, M.D., Raghavan, V. (2022). Perspectives on the future of manufacturing within the Industry 4.0 era. *Production Planning and Control*, *33*, *2-3*, pp. 138-158.
23. Kamble, S.S., Gunasekaran, A., Ghadge, A., Raut, R. (2020). A performance measurement system for industry 4.0 enabled smart manufacturing system in SMMEs- A review and empirical investigation. *International Journal of Production Economics*, *229*, p. 107853.
24. Khakurel, J., Penzenstadler, B., Porras, J., Knutas, A., Zhang, W. (2018). The Rise of Artificial Intelligence under the Lens of Sustainability. *Technologies*, *6*, *4*, p. 100.

25. Kuang, X., Zhong, Z., Liang, W., Huang, S., Luo, R., Luo, H., Li, Y. (2023). Bibliometric analysis of 100 top cited articles of heart failure–associated diseases in combination with machine learning. *Frontiers in Cardiovascular Medicine*, *10*, p. 1158509.
26. Kumar, A., Singh, R.K., Singh, D. (2024). Supply chain resilience in developing countries: a bibliometric analysis and future research directions. *Benchmarking*, *31*, *7*, pp. 2217-2238.
27. Kurup, S., Gupta, V. (2022). Factors Influencing the AI Adoption in Organizations. *Metamorphosis: A Journal of Management Research*, *21*, *2*, pp. 129-139.
28. Li, J., Jin, X. (2024). The Impact of Artificial Intelligence Adoption Intensity on Corporate Sustainability Performance: The Moderated Mediation Effect of Organizational Change. *Sustainability (Switzerland)*, *16*, *21*, p. 9350.
29. Makowski, Ł. (2023). Sztuczna inteligencja – nowe narzędzie w strategii społecznej odpowiedzialności biznesu. *Zeszyty Naukowe Wyższej Szkoły Bankowej w Poznaniu*, *102*, *3*, pp. 35-49.
30. Mao, G., Huang, N., Chen, L., Wang, H. (2018). Research on biomass energy and environment from the past to the future: A bibliometric analysis. *Science of the Total Environment*, *635*, pp. 1081-1090.
31. Mariani, L., Trivellato, B., Martini, M., Marafioti, E. (2022). Achieving Sustainable Development Goals Through Collaborative Innovation: Evidence from Four European Initiatives. *Journal of Business Ethics*, *180*, *4*, pp. 1075-1095.
32. Mirek, Z.M., Rodrigues, L.A., Schadeck, M. (2016). The evolution of sustainability studies in Brazil: A bibliometric analysis the last decade. *Espacios*, *37*, *1*, p. 1.
33. Nishant, R., Kennedy, M., Corbett, J. (2020). Artificial intelligence for sustainability: Challenges, opportunities, and a research agenda. *International Journal of Information Management*, *53*, p. 102104.
34. Ogbeibu, S., Jabbour, C.J.C., Gaskin, J., Senadjki, A., Hughes, M. (2021). Leveraging STARA competencies and green creativity to boost green organisational innovative evidence: A praxis for sustainable development. *Business Strategy and the Environment*, *30*, *5*, pp. 2421-2440.
35. Qaiser, F.H., Ahmed, K., Sykora, M., Choudhary, A., Simpson, M. (2017). Decision support systems for sustainable logistics: A review & bibliometric analysis. *Industrial Management and Data Systems*, *117*, *7*, pp. 1376-1388.
36. Parasad Agrawal, K. (2023). Organizational Sustainability of Generative AI-Driven Optimization Intelligence. *Journal of Computer Information Systems*, *34*, pp. 1-15.
37. Ramos, E., Lopes, A.G., Mendonça, F. (2024). Application of Machine Learning in Plastic Waste Detection and Classification: A Systematic Review. *Processes*, *12*, *8*, pp. 1632.
38. *Scopus*. Retrieved from: https://www.scopus.com/search/form.uri?display=basic&zone=header&origin=#basic, 11.03.2025.
39. Shin, S.-J., Woo, J., Rachuri, S. (2014). Predictive analytics model for power consumption in manufacturing. *Procedia CIRP*, *15*, pp. 153-158.

40. Shukla, A.K., Janmaijaya, M., Abraham, A., Muhuri, P.K. (2019). Engineering applications of artificial intelligence: A bibliometric analysis of 30 years (1988-2018). *Engineering Applications of Artificial Intelligence*, *85*, pp. 517-532.
41. Siuta-Tokarska, B. (2021). Przemysł 4.0 i sztuczna inteligencja: szansa czy zagrożenie dla realizacji koncepcji zrównoważonego i trwałego rozwoju? *Nierówności Społeczne a Wzrost Gospodarczy*, *65*, *1*, pp. 7-26.
42. Solaz, F.C., Moya, V.S., Navarrete, S.R. (2025). The digital divide in social entrepreneurship: A bibliometric analysis. *Sustainable Technology and Entrepreneurship*, *4, 1*, p. 100095.
43. Song, C., Song, Y. (2023). Enhancing academic writing skills and motivation: assessing the efficacy of ChatGPT in AI-assisted language learning for EFL students. *Frontiers in Psychology*, *14*, p. 1260843.
44. Strohm, L., Hehakaya, C., Ranschaert, E.R., Boon, W.P.C., Moors, E.H.M. (2020). Implementation of artificial intelligence (AI) applications in radiology: hindering and facilitating factors. *European Radiology*, *30*, *10*, pp. 5525-5532.
45. Tandon, A., Kaur, P., Mäntymäki, M., Dhir, A. (2021). Blockchain applications in management: A bibliometric analysis and literature review. *Technological Forecasting and Social Change*, *166*, p. 120649.
46. Verma, S., Gustafsson, A. (2020). Investigating the emerging COVID-19 research trends in the field of business and management: A bibliometric analysis approach. *Journal of Business Research*, *118*, pp. 253-261.
47. Vinuesa, R., Azizpour, H., Leite, I., Balaam, M., Dignum, V., Domisch, S., Felländer, A., Langhans, S.D., Tegmark, M., Fuso Nerini, F. (2020). The role of artificial intelligence in achieving the Sustainable Development Goals. *Nature Communications*, *11*, *1*, p. 233.
48. Wang, H., Yang, Y. (2019). Neighbourhood walkability: A review and bibliometric analysis. *Cities*, *93*, pp. 43-61.
49. Wang, Q., Huang, R. (2021). The impact of COVID-19 pandemic on sustainable development goals - A survey. *Environmental Research*, *202*, p. 111637.
50. Ye, G., Hudders, L., De Jans, S., De Veirman, M. (2021). The Value of Influencer Marketing for Business: A Bibliometric Analysis and Managerial Implications. *Journal of Advertising*, *50*, *2*, pp. 160-178.
51. Zhang, S., Mao, G., Crittenden, J., Liu, X., Du, H. (2017). Groundwater remediation from the past to the future: A bibliometric analysis. *Water Research*, *119*, pp. 114-125.