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Artificial Intelligence-Driven Leadership in Higher Education: A Bibliometric Analysis of Research Trends and Development

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Abstract. This study aimed to map AI-driven leadership research in higher education published between 2014 and 2025. This study adopts a bibliometric analysis approach to map publication trends and productivity of studies on Artificial intelligence-driven leadership in the Scopus database over 11 years. A total of 2,097 publications were retrieved using a comprehensive search string executed on March 1, 2025. The analysis was conducted using Microsoft Excel and VOSviewer, focusing on publication trends, influential authors, collaboration networks, and thematic clusters. The results of the bibliometric analysis revealed that there has been a consistent increase in the publication trends in AI-driven leadership research in higher education between 2014-2025. It was found that the highest research output was recorded in 2024 with 604 publications. While the United States produced the highest document (f=462), the Sustainability Journal is the most impactful. This study also found that some authored documents individually attracted high citations, and no authors exhibited significant link in co-authorship networks. While the dominant theme is machine learning, Improta emerged as the most influential author in AI-driven leadership research in higher education. The outcome of this study indicates the growing academic interest in AI-driven leadership research in higher education, owing to the benefits of AI in effective school administration. The outcome of this study can guide policymakers and the direction of the future in the field of artificial intelligence in order to pursue higher education leadership. Bibliometric analysis provides information regarding the trends of AI-driven leadership studies.

Keywords: artificial intelligence; leader; higher education; bibliometric analysis

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1. Introduction

In recent time, Artificial Intelligence (AI) has rapidly emerged as a transformative force across multiple sectors, including education. Global reports such as the 2019 Horizon Report forecast a substantial acceleration in AI integration into teaching, learning, and institutional management (Educause, 2019). Higher education institutions, driven by global digitalization trends and the pressure to enhance efficiency, have become fertile ground for the deployment of AI-enabled solutions. These range from administrative automation and student analytics to adaptive learning platforms and predictive modelling (Aoun, 2018; Zawacki-Richter et al., 2019). As a result, AI is no longer seen merely as a support tool but as a catalyst reshaping leadership dynamics and institutional governance structures (Maphosa & Maphosa, 2023).

However, while AI adoption in higher education promises enhanced efficiency, personalized services, and data-driven decision-making, it also raises significant concerns. Foundational works such as Luckin et al. (2016) and Holmes et al. (2019) highlight the potential of AI to augment human capacities in education. These studies emphasize how AI applications, like intelligent tutoring systems and administrative chatbots, can reduce faculty workload and improve student engagement (Mashilo & Shekgola, 2024; Thottoli et al., 2024). Yet, counterbalancing this optimism, scholars like Selwyn (2019) and Williamson et al. (2020) caution against the uncritical adoption of AI, warning of embedded algorithmic biases, data surveillance, ethical dilemmas, and the risk of dehumanizing educational leadership.

At the heart of this debate is the evolving role of leadership in higher education. AI-driven leadership is no longer confined to the operational realm; it now involves strategic planning, ethical governance, digital equity, and the stewardship of institutional values amid technological disruption. Leaders are expected to navigate complex decisions about the integration of machine learning, natural language processing, and predictive analytics, while also considering data ethics, staff capacity, and long-term sustainability (Dissanayake & Keppetipola, 2024; Tegmark, 2018). In this light, the role of leadership becomes a balancing act between innovation and responsibility.

To theoretically contextualise AI adoption in higher education leadership, this study integrates Rogers' (2003) Diffusion of Innovations Theory and the Technological Leadership Framework developed by Anderson and Dexter (2005). Rogers' theory explains how innovations are communicated over time among the members of a social system, progressing through stages of knowledge, persuasion, decision, implementation, and confirmation. This framework is particularly useful in understanding institutional hesitations, early adoption patterns, and diffusion bottlenecks. The Technological Leadership Framework, meanwhile, foregrounds the pivotal role of institutional leaders in setting digital visions, supporting infrastructure, and driving cultural change. By integrating these frameworks, the study examines both macro- and micro-level drivers and constraints in the global diffusion of AI-driven leadership in higher education.

Despite growing enthusiasm, significant research gaps persist. While there is increasing attention to AI applications in tasks such as automated grading and student support (Labadze et al., 2023), limited research has examined how AI influences strategic decision-making, policy formulation, and change management among academic leaders (Molnár & Szűts, 2018). Moreover, the literature has largely under-addressed ethical and governance challenges in low- and middle-income countries, where infrastructure and capacity constraints intersect with global AI trends. As Selwyn (2019) notes, the optimism surrounding AI often overlooks the socio-political contexts in which technology is implemented, resulting in skewed benefits and new forms of digital exclusion.

Additionally, while bibliometric and systematic reviews have mapped the broad landscape of AI in education (Zawacki-Richter et al., 2019), few have focused on the **research** trajectory, collaboration networks, and emerging conceptual clusters specifically within AI-driven leadership in higher education. There remains a need for comprehensive synthesis that moves beyond keyword frequency to uncover deeper structural insights — such as geographical disparities in research output, fragmented co-authorship patterns, and underexplored interdisciplinary linkages.

Therefore, this study undertakes a bibliometric analysis to explore the global trends and scholarly patterns related to AI-driven leadership in higher education between 2014 and 2025. Specifically, it examines growth trajectories, geographic distribution of publications, co-authorship collaborations, and emerging research themes. In doing so, it seeks to illuminate both the opportunities and silences within the current discourse, offering a data-driven foundation for future research and policy interventions.

1.1 Research Questions

The specific research questions that guided this study were:

1) What is the growth trajectory of AI-driven leadership publications in higher education between 2014 and 2025?
2) What is the geographic distribution of research output on AI-driven leadership publications in higher education between 2014 and 2025?
3) What are the leading journals and subject areas in AI-driven leadership research in higher education between 2014 and 2025?
4) What are the authorship and collaboration networks on AI-driven leadership publications in higher education between 2014 and 2025?
5) What are the primary research themes in AI-driven leadership publications in higher education between 2014 and 2025?

2. Method

2.1 Research Design

This study adopts bibliometric analysis to explore bibliographic information and map the research trends and the citation relationship of literature in artificial Intelligence leadership in higher education. Bibliometric, being an aspect of scientometrics, is a form of quantitative analysis of research results meant to appraisal (Mingers & Leydesdorff, 2015). Through bibliometric analysis,

researchers can give a picture of research history in a specific field on a particular topic. It enables researchers to determine the relationship between sources, authors' influence, and other qualities of publications (Adeleye et al., 2024; Demiray & Ünüvar ünlüoğlu, 2023).

2.2 Inclusion and Exclusion Criteria

This study set some criteria before the choice of articles included in the study to be evidence-based. The publications included span between 2014-2025. The bibliometric data used in this study were retrieved from the Scopus database on March 1, 2025, to ensure consistency in analysis and reproducibility of results. Our search was limited to title, abstract and keywords. Similarly, only articles published in peer-reviewed journals in the English language on artificial intelligence-driven leadership in higher education. This search was also limited to journals indexed in the Scopus database.

Conversely, documents written and published in other languages, conference papers, reviews, editorials, letters, books, book chapters and unrelated journal articles to artificial intelligence, leadership and higher education. Also, we excluded papers published before January 1st, 2014.

2.3 Data collection

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Page et al., 2021) guided our data collection process for this study. PRISMA was used as a guide because it enables researchers to conduct reviews and meta-analyses in a credible, accurate, and transparent manner for the reproducibility of the research. The guidelines specify the stages that ought to be followed, including identification of sources, screening for eligibility and the stage for data extraction and analysis (Adams et al., 2025; Adewale & Potokri, 2023; Haddaway et al., 2022).

Researchers are open to numerous databases which can be searched to generate data for bibliometric analysis. The famous databases among these research databases include the Web of Science (WoS), Scopus, Google Scholar, and ISI (Ayan et al., 2023; Martín-Martín et al., 2018). Researchers conduct bibliometric analysis to gain comprehensive insight into the research trend in a specific field. For this study, we sourced the bibliometric analysis from the Scopus database. Our choice of Scopus over the Web of Science to search for literature is because it provides more exhaustive coverage of more indexed quality journals from many publishers. (Kumara & Patil, 2024; Pranckutė, 2021). This database provides superior information for social sciences. (Falagas et al., 2008).

Furthermore, a query set with the keywords ("artificial intelligence" OR "ai" OR "machine learning" OR "data analytics") AND ("leadership" OR "management" OR "governance" OR "administration") AND ("higher education" OR "university" OR "tertiary education") and with the title filter was established. The outcome of the first query conducted on the 1st of March 2025 identified 6039 documents. We removed 3343 documents that are not empirical journal articles before screening for eligibility. Afterwards, 2696 documents from Scopus were assessed for eligibility. We Excluded 599 studies for failing inclusion criteria,

which include Reports in other languages=165, Reports published before 2014= 343, and articles in press=91. The remaining 2097 documents were included in this bibliometric analysis (See Fig. 1).

2.4 Data Cleaning and Preparation

To ensure the validity and reliability of the bibliometric analysis, the dataset retrieved from Scopus was subjected to a meticulous cleaning and preparation process. Initially, we normalised author names and institutional affiliations to address discrepancies. This involved merging variants of author names to ensure accurate attribution and avoid fragmentation of authorship networks, following best practices in scientometric research (Moed, 2005; Van Eck & Waltman, 2010). Similarly, keyword harmonization was carried out by standardizing synonymous or semantically overlapping terms. For instance, terms such as "AI," "machine learning," and "artificial intelligence" were consolidated under the unified label "Artificial Intelligence" to improve thematic coherence (Zupic & Čater, 2015).

In addition, the dataset was purged of duplicates by removing records with identical titles and Digital Object Identifiers (DOIs), ensuring that the analysis reflected unique scholarly contributions. To enhance the interpretability and clarity of network visualizations, specific thresholds were applied. For co-authorship mapping, a minimum of five publications per author was established, enabling the identification of influential scholars while maintaining a manageable network size (Donthu et al., 2021). In institutional and national co-authorship networks, thresholds were set at ten publications per institution and fifteen per country to highlight significant patterns of collaboration. For keyword co-occurrence analysis, only terms appearing at least five times were retained to emphasize dominant research themes and reduce analytical noise (Aria & Cuccurullo, 2017).

2.5 Data Visualisation

This study used two data visualisation tools to explore the data exported from the Scopus database. These visualisation tools were the VOS viewer and the Microsoft Excel. The VOS viewer tool, developed by Van Eck and Waltman (Van Eck & Waltman, 2010) was used for bibliometric analysis. VOSviewer tool is used because it enables researchers to visualise and generate unambiguous graphs that can be used to understand the relationship among variables in the literature network (You et al., 2024). Similarly, we employed Microsoft Excel to plot the charts. We used these tools to visualise bibliometric analyses such as co-authorship, co-citation, and co-occurrence (Kumara & Patil, 2024).

2.6 Data Analysis

The Scopus database provides access to data for this bibliometric analysis. The data gathered from this source was initially exported into MS Word for data cleaning and validation and used for descriptive and bibliometric analysis. The descriptive statistical analyses using frequency count were performed to display the demographic information of the documents included in this study. VOSviewer software was used to visualise and conduct the bibliometric

analysis. The analysis was guided by four research questions for a detailed understanding of AI-driven leadership in higher education.

2.7 Ethical Considerations

This study did not require formal ethical approval from any institutional ethical committee because the research documents are publicly available via the Scopus database. Similarly, there is no need for informed consent of any participant. However, we adhered to all the fundamental principles of using intellectual property. All relevant information authors and documents were duly acknowledged. This study also ensures that the information provided is accurately represented. Therefore, any potential violation related to the interpretation of any specific detail of any article is the responsibility of the authors.

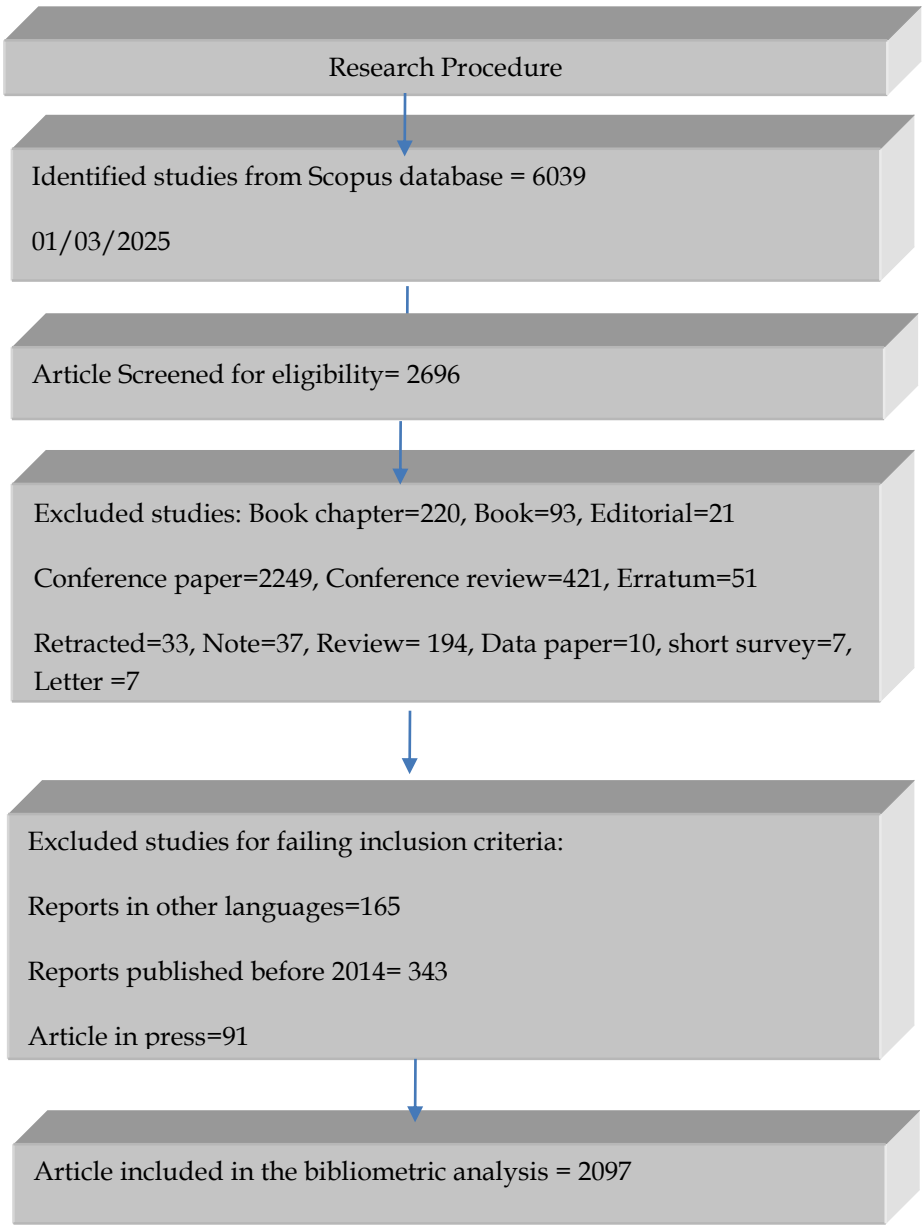

Figure 1: Flow chart of the included studies in the bibliometric analysis

Having outlined the methodological framework and tools used for data collection and analysis, the next section presents the results of the bibliometric mapping, focusing on publication trends, key contributors, and thematic structures within the field.

3. Results

Table 1: Characteristics of the Dataset Used for Bibliometric Analysis

Parameters	Results
Time frame	2014-2025
Sources	1107
Documents	2097
Countries	144
Authors	10568
Average age of document	6.87 years
Publication growth rate per year	174.7
Organisation	6664
Citations	28,542
Average citation per document	13.61
All Keywords	15485
Index keywords	11416
Authors' keywords	6185

Table 1 presents the descriptive features of the dataset used for bibliometric analysis of AI-driven leadership in global higher education. The study covers 2,097 documents from 1 107 journals and 10,568 authors. The coverage is between 2014 and 2025, which cut across 144 countries with a publication growth rate of 174.7% per year, indicating a rapidly steady academic interest in AI-driven leadership research. Similarly, the dataset covers 6664 organisations.

Furthermore, the scholarly impact of the publications is measured with the total citations of 28,542, with an average of 13.61 citations per document. Also, the average age of the papers is 6.87 years, suggesting they are relatively recent and mature enough to be cited. The last part of the data set centred on keyword analysis. With 15,485 total keywords, 11,416 index keywords, and 6,185 authors' keywords, the dataset shows thematic diversity within artificial intelligence and globally distributed research bodies.

Research Question One: What is the growth trajectory of AI-driven leadership publications in higher education between 2014 and 2025?

Figure 2: Publication Trends

Figure 2 illustrates the annual growth of publications on AI in education from 2014 to 2025. This upward trend reflects increasing scholarly interest in the subject, particularly post-2020, coinciding with the global acceleration of digital transformation in education. The growth pattern supports the research objective of mapping the temporal evolution of AI scholarship within educational contexts. The bibliometric analysis reveals a steady rise in research interest in recent years. Notably, the early years of 2014 to 2016 recorded low research output. The publications were 2014 (f=39), 2015 (f=23) and 2016 (f=27), revealing that artificial intelligence-driven leadership research was still at the evolution stage.

Moreover, a moderate growth in research activity in this field was recorded between 2017 and 2019. Figure 2 shows that published articles in 2017 were (f=54), 2018 (f=63) and 2019 (f=104). The increasing research output within this period presupposes that research was beginning to explore AI's impact on education leadership. Possibly, this was influenced by AI applications like machine learning, education analytics and data-driven decision-making.

Incredibly, the outbreak of the COVID-19 pandemic contributed to rapid growth in AI-driven leadership research in higher education from 2020 onward. During this period, higher education institutions perceived the adoption of AI-enabled solutions as a last resort for administration, leadership and learning management. The research output in 2020 was 131), 2021 (f=239) and 2022 (f=365). Similarly, the momentum was maintained in 2023 with 344 publications. However, a remarkable research output was recorded in 2024 with 604 publications, indicating sustained scholarly engagement with the topic. The first

two months of 2025 have produced 104 publications, indicating that the final output may be much higher at the end of the year.

Research Question Two: What is the geographic distribution of research output on AI-driven leadership publications in higher education between 2014 and 2025?

Table 2: The most productive countries on AI-driven leadership in Higher Education

Rank	Country	Documents
1	United States	462
2	China	432
3.	United Kingdom	159
4.	India	110
5.	Saudi Arabia	85
6.	Germany	82
7.	Australia	81
8.	Spain	80
9.	South Korea	68
10.	Italy	65

The result of the topmost countries in AI-driven leadership research in higher education. The United States has 462 publications indicating massive investment in AI-driven leadership research. China, the United Kingdom, India, and Saudi Arabia occupy second, third and fourth influential positions, with 432, 159,110 and 85 publications focusing on AI in higher education possibly influenced by national digital transformation initiatives. Furthermore, Germany, Spain, Australia, South Korea, and Italy have 82, 80, 81, 68, and 65 publications, respectively. This attests to the global interest in the field of AI-driven leadership research.

Research Question Three: What are the leading journals and subject areas in AI-driven leadership research in higher education between 2014 and 2025?

Table 3: Topmost journals on AI-driven leadership in higher education

S/N	Journal Publisher	TP	TC	SJR
1.	IEEE Access Institute of Electrical and electronic Engineers Inc.	37	634	Q1
2.	BMJ Open BMJ publishing group	37	471	Q1
3.	Sustainability (Switzerland) Multidisciplinary Digital Publishing Institute (MDPI)	35	979	Q1
4.	Applied Mathematics and Nonlinear Sciences Sciendo	29	13	Q3
5.	Scientific Reports Nature Publishing Group	21	154	Q1
6.	PLOS One Public Library of Science (PLoS)	20	279	Q1
7.	Journal of Medical Internet Research JMIR Publications Inc.	19	296	Q1
8.	Applied Sciences (Switzerland) Multidisciplinary Digital Publishing Institute (MDPI)	19	282	Q2

9.	Mobile Information Systems Ranked Hindawi LTD	19	88	Not
10.	Wireless Communications and Mobile Computing Ranked Hindawi Ltd	18	221	Not

Note: TP= total publications; TC = total citation; SJR quartile = SCImago Journal Rank

The result of the topmost journals publishing research on AI-driven leadership in higher education is presented in Table 3. Most of the Journals have high-quality research output as they fall within the Q1 category except for "Applied Mathematics and Nonlinear Science, ranked Q3, and two Hindawi journals, which are unranked. Also, the interdisciplinary nature of AI-driven leadership research across technology, medicine, sustainability, and applied sciences is reflected in the dominance of major publishers, MDPI, IEEE, and Nature Publishing Group. Regarding journal research influencing sustainability, IEEE and BMJ Open stand out with 979, 634 and 471 citations respectively.

Table 4: The most productive organisations

S/N	Affiliation	Documents	Rank
1.	Inserm	18	1st
2.	The University of Utah	17	2nd
3.	King Saud University	16	3rd
4.	University of Utah School of Medicine	16	3rd
5.	University of Washington School of Medicine	16	3rd
6.	Harvard Medical School	15	6th
7.	University of Florida	15	6th
8.	University of Washington	15	6th
9.	University of Oxford	15	6th
10.	CNRS Centre National de la Recherche Scientifique	14	10th

Table 4 provides comprehensive information on ranking the most productive organisations in terms of AI-driven leadership research in higher education. Table 4 shows that Inserm tops the list of most productive organisations with 18 publications, especially in the intersection of education and health. Next in rank is the University of Utah, which has 17 publications confirming its effort in AI-driven leadership research. Meanwhile, three institutions shared the third position with 16 publications each.

This meant the 4th and 5th positions were empty, and the following was the 6th, occupied by another four institutions with 15 publications each. The 10th position is occupied by CNRS Centre National de la Recherche Scientifique, with 14 publications. One important message here is that a significant contribution came from medical and technically advanced institutions indicating the involvement of globally reputable universities in AI cum leadership research.

Research Question Four: What are the authorship and collaboration networks on AI-driven leadership publications in higher education between 2014 and 2025?

Table 5: The most productive authors in AI-driven leadership research in higher education

S/N	Authorship	Documents	Citations	Total link strength
1	Improta, G	7	224	0
2	Luo, G	6	53	0
3	Wang Y	5	66	0
4	Zhang, J	5	656	0
5	Chen, Y	4	122	0
6	Wang, R	4	507	0
7	Liu, J	4	624	0
8	Nuankaew, P	4	36	0
9	Salas-Rueda, R. A	4	12	0
10	Tong, Y	4	52	0
11	Trunfio, T. A	4	76	0
12	Wu, L	4	624	0
13	Al-Emran, M	3	78	0

Table 5 presents the analysis of influential authors in AI-driven leadership research in higher education. The result revealed that Improta, G leads the list of the most productive researchers with seven publications and 224 citations. On the other hand, Luo, G has the next highest research with six publications but with a lower impact of 53 citations.

Other authors with fewer (4-5) publications had a high impact with high citations. These authors included Zhang, J, Liu, J and Wu, L with 656, 624 and 624 citations, respectively. However, Salas-Rueda, R.A and Nuankaew, P. have 12 and 36 citations, respectively. Conversely, all authors had zero link strength indicating limited co-authorship networks and weak collaboration in the field of AI-driven leadership research in higher education.

Co-Authorship Network based on Authors

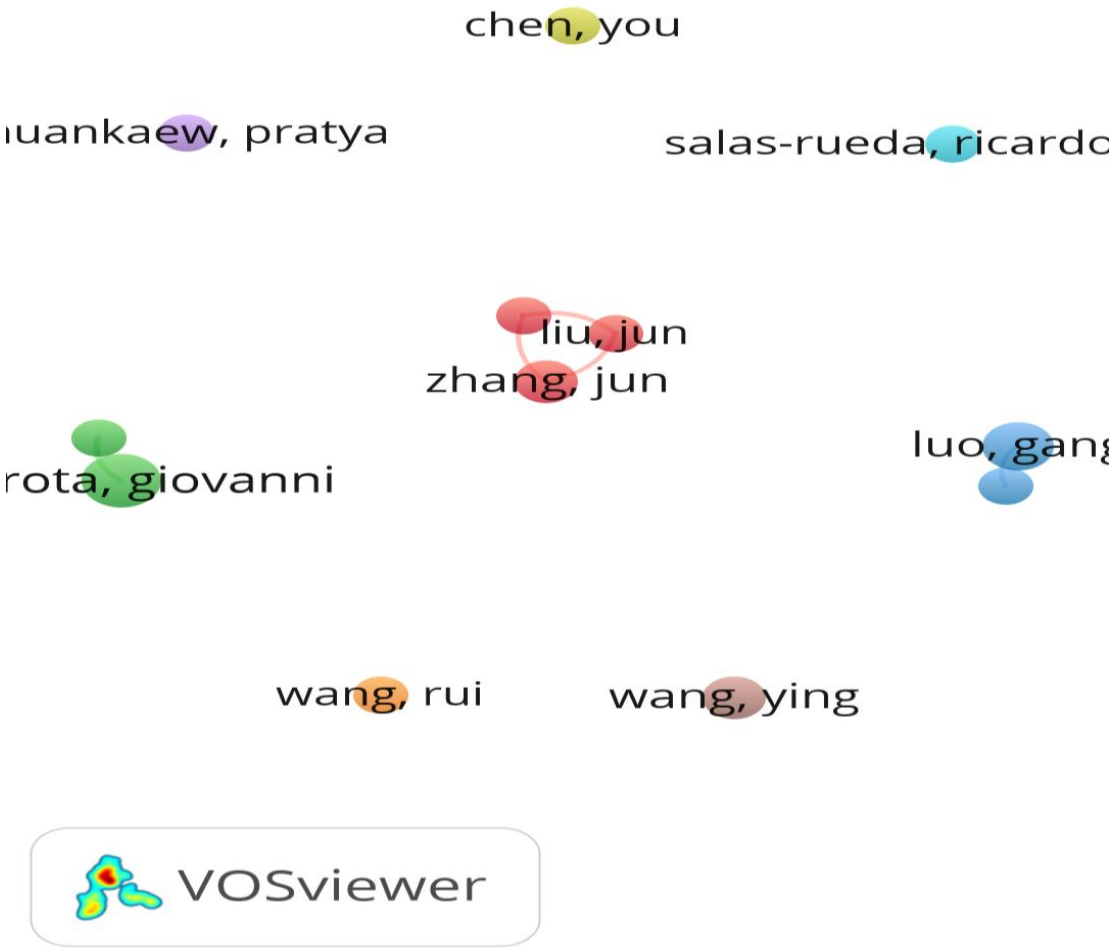

Figure 3: Co-Authorship network among top contributing on Authors

Figure 3 visualizes the co-authorship network among the most productive authors. The sparse connectivity and low link strength reflect a fragmented research community, highlighting limited collaboration across geographical and institutional lines. This fragmentation aligns with the discussion on knowledge diffusion challenges and the need for more cohesive research agendas in AI and education.

Co-authored network based on Countries

Figure 4: Co-authored network based on Countries

Figure 4 shows the international collaboration map based on co-authored publications. Strong clusters appear in North America, Europe, and parts of Asia, while African and South American countries are largely absent. This supports the study's finding on geographic disparities in AI research outputs and underscores the need for broader inclusion in global research initiatives.

Table 6: Published articles based on subject area

S/N	Subject Area	Documents	%
1	Decision Sciences	82	2.2
2	Energy	89	2.3
3	Engineering	464	12.2
4	Mathematics	164	4.3
5	Business, Management and Accounting	169	4.4
6	Medicine	602	15.8
7	Computer Science	703	18.4
8	Environmental Sciences	122	3.2
9	Social Sciences	538	14.1
10	Biochemistry, Genetics And Molecular Biology	126	3.3
11	Others	611	19.8

Table 6 and Figure 4 present the published articles based on the subject area. Computer science, medicine, social sciences, and engineering lead the research output at 18.4%, 15.8%, 14.1%, and 12.2%, respectively. In addition, Business and management, mathematics and environmental sciences show the application of AI in decision-making, data analysis and sustainability with 4.4%, 4.3% and 3.2%, respectively. Others, which account for 19.8%, include material science 0, health profession 79, multidisciplinary 79, agricultural and biological sciences 72, arts and humanities 59, physics and astronomy 56, psychology 56, chemical

engineering 47, neuroscience 46, nursing 44, and 7 other fields account for 19.8%. This attests to the interdisciplinary nature of AI-driven leadership research in higher education.

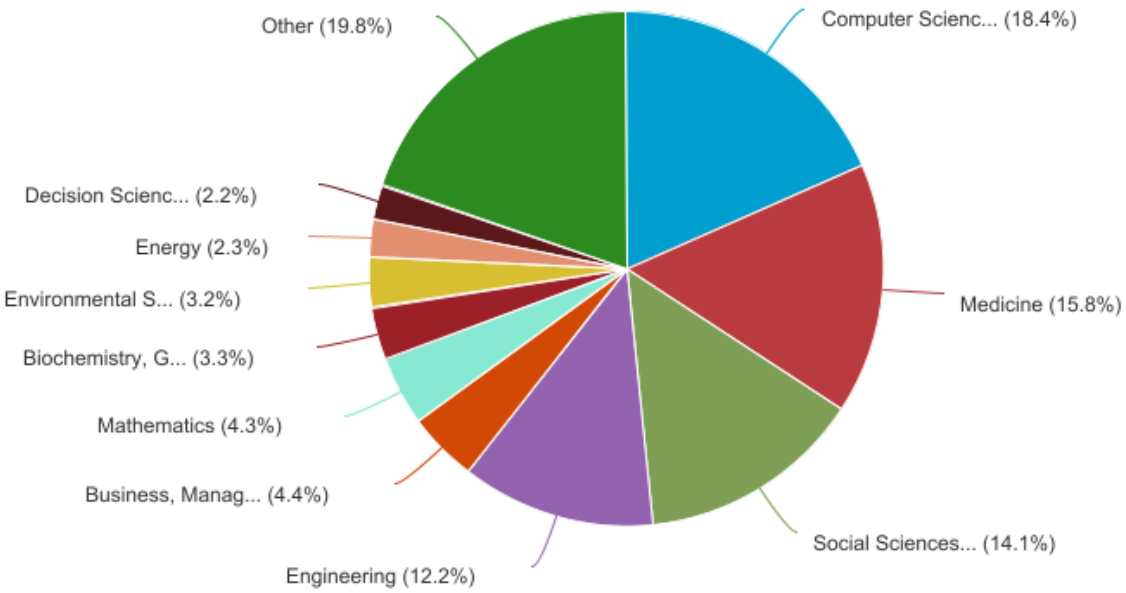

Figure 5: Publication by subject area

Research Question Five: What are the primary research themes in AI-driven leadership publications in higher education between 2014 and 2025?

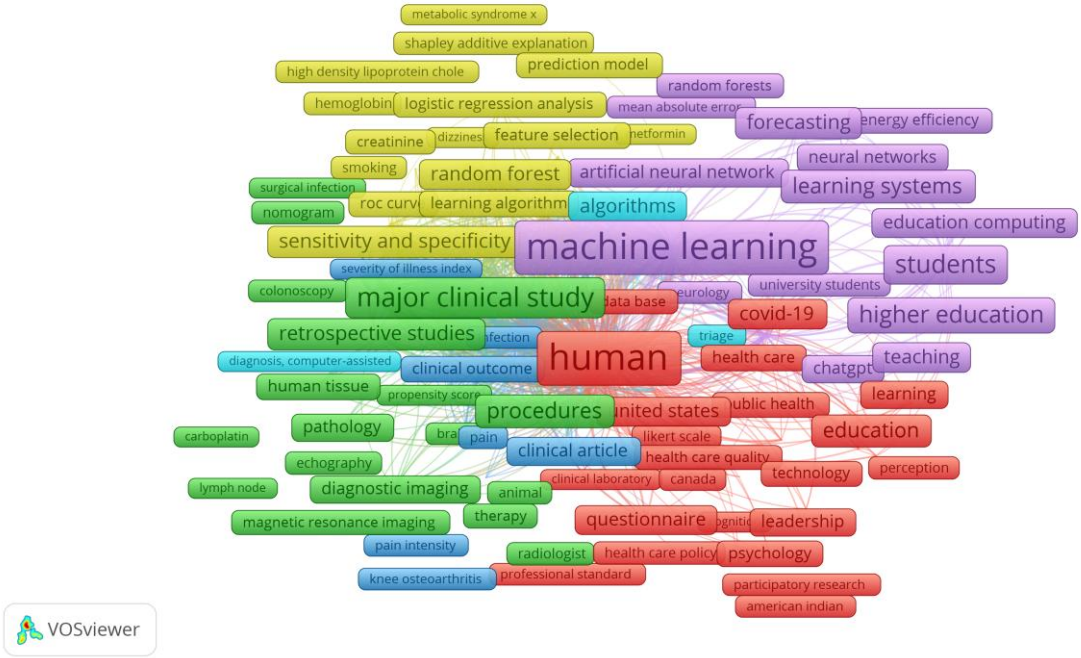

Figure 6: All keywords

Figure 6 displays the most frequently used keywords by authors. Prominent terms such as "machine learning," "personalized learning," and "education technology" signal the dominant thematic focuses in the literature. This visualization offers insight into prevailing research trends and helps identify gaps in underexplored areas like equity, ethics, and governance.

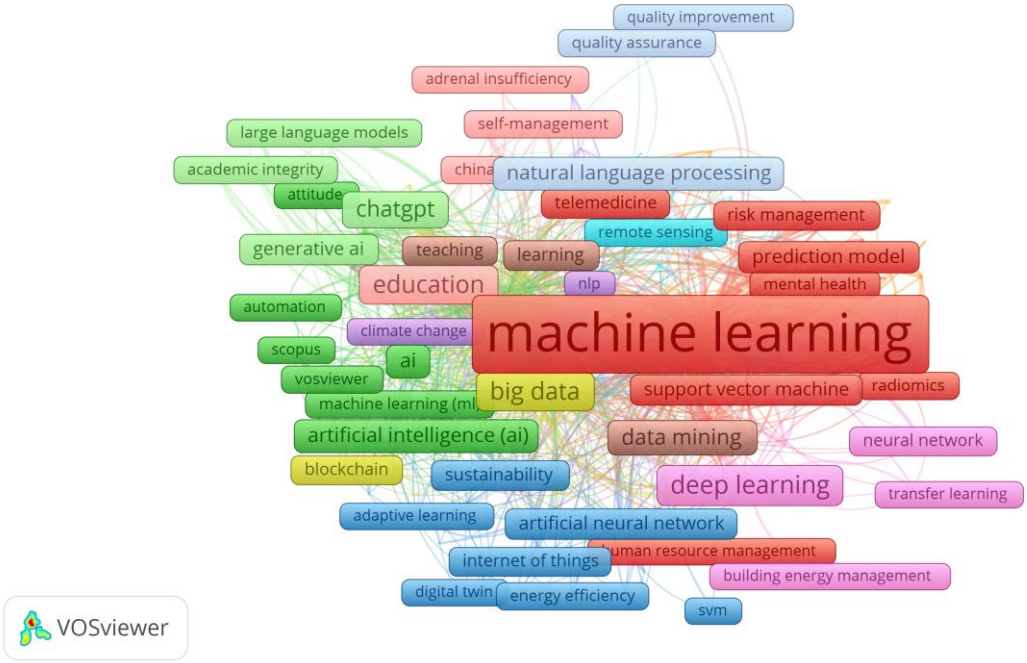

Figure 7: Authors keywords

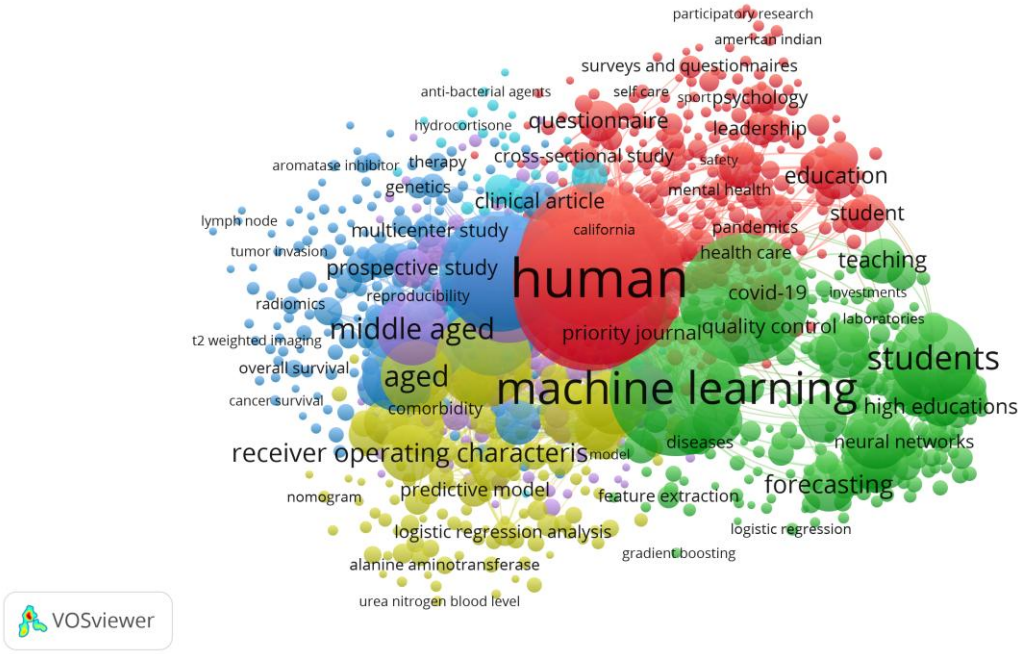

Figure 8: Index keywords

Figure 7 and 8 revealed the intersection of AI and human-centred decision-making with the dominance of two index keywords, human and machine learning. The red cluster emphasised education-related themes like leadership, students, teaching and psychology, while the blue and yellow clusters emphasised clinical research, health care and preventive modelling. On the other hand, the green cluster links AI to forecasting, neural networks and higher education.

4. Discussion

The results provide valuable insights into the development and diffusion of AI-related research in educational contexts. In this section, we interpret the implications of these findings through conceptual and empirical lenses, including innovation diffusion theory and technological leadership, while also discussing ethical, structural, and regional considerations. This bibliometric analysis reveals significant structural and thematic trends in AI-driven leadership research within higher education.

Most notably, The surge in publications post-2020 likely reflects accelerated AI adoption during the COVID-19 pandemic, positioning AI as critical to institutional resilience (Kakungulu, 2025; Maphosa & Maphosa, 2023) However, a closer inspection suggests that many of these publications remain conceptual or policy-oriented, indicating a gap in empirically-grounded studies. The disciplinary distribution is diverse, encompassing fields like philosophy, governance, electronic engineering, and cognitive science (Wu et al., 2024). Such interdisciplinary breadth enriches the discourse but also risks fragmenting it into

isolated clusters, as thematic cohesion across these domains has not fully matured.

Geographically, research output is heavily concentrated in the United States and China, followed by select European and Asian countries. This dominance reflects disparities in research funding and infrastructure, but the most critical finding is the almost total absence of African nations among top co-authorship networks. This contrasts sharply with bibliometric studies on Africa's AI development in broader domains, which do show emerging internal collaborations (Azaroual, 2024; Ezugwu et al., 2023; Pelonomi, 2024). In our specific domain of AI leadership in higher education, however, African contributions are minimal, likely due to persistent infrastructural gaps, publication biases, and limited integration into global scholarly networks (Aria & Cuccurullo, 2017).

This regional silence signals not just quantitative absence but epistemic inequity. When African voices are absent from substantive international discourse, knowledge systems may fail to address region-specific leadership challenges or leverage locally informed innovation. While initiatives like the African Virtual University signal growing capacity, their representation in global co-authorship networks remains limited, suggesting persistent barriers to inclusion.

Journal quality analysis shows that 60% of publications are in Q1 journals, evidence of scholarly rigor. Yet 20% remain in unranked outlets, which may reflect emergent voices from underrepresented regions. Further investigation is required to understand whether these publications amplify new perspectives or struggle against the established gatekeeping of academic publishing.

Co-authorship mapping further reinforces global North dominance in research leadership. That leading collaborations exclude African institutions suggests persistent structural barriers and siloed elite networks, hindering inclusive knowledge development and innovation diffusion. The co-authorship analysis reveals a low degree of link strength among leading authors, indicating a fragmented scholarly network. This lack of cohesive collaboration may hinder knowledge diffusion and the formation of unified research agendas. The observed fragmentation suggests that research on AI in education is still in a relatively emergent stage, with siloed contributions across disciplines and regions.

Strengthening international and interdisciplinary collaboration could enhance the robustness and impact of future research efforts. The findings align with Rogers' (2003) Diffusion of Innovations Theory, where early adopters, mainly developed nations, show rapid uptake, while lagging regions face structural barriers. The Technological Leadership Framework further explains how national and institutional leadership capacities shape the pace and scope of AI adoption in schools and universities.

The dominance of 'machine learning' and 'human' keywords underscores the tension between technical innovation and human-centered leadership, a gap requiring deeper ethical inquiry(Ali et al., 2024; Alotaibi et al., 2021; Makarenko et al., 2024). Themes like governance, academic management, and adaptive decision-making reflect leadership's evolving role but may also signify increasing managerialism masked as technological progress. While AI promises transformative change in educational systems, its integration raises critical ethical questions.

Furthermore, ethical considerations such as algorithmic bias, data privacy, and transparency in educational AI tools must be addressed. These challenges are particularly salient in underrepresented regions and call for equitable governance strategies in AI deployment. Furthermore, the governance of student data, including consent, storage, and third-party access, demands clear regulatory frameworks. These ethical concerns are particularly pronounced in regions with weak data protection laws, further exacerbating global disparities in AI adoption. Addressing these issues is essential for building stakeholder trust and ensuring responsible innovation.

In sum, while AI-driven leadership in higher education is gaining scholarly attention, its development is uneven, empirical evidence is limited, and key regional voices, especially from Africa, are largely silenced. Addressing these gaps demands broader inclusion in global research alliances, stronger empirical inquiry, and intentional pathways for underrepresented regions to shape the theory and practice of AI leadership in education.

5. Limitations and Future Research

The generalizability of the findings is limited by the exclusion of studies published in languages other than English, as well as non-journal publications such as conference proceedings and book chapters. Additionally, restricting the dataset to articles published from 2014 onward may have led to the omission of earlier foundational work. A further limitation stems from the temporal boundary of data collection: the search was conducted on March 1, 2025, which may have excluded recently published or in-press articles that could contribute to ongoing scholarly debates on AI in education. While this cut-off was necessary to ensure methodological consistency, it inevitably restricts the contemporaneity of the dataset.

Moreover, our selection of search terms, while guided by the study's focus, may have unintentionally excluded relevant keywords, thereby affecting the comprehensiveness of the corpus. Limiting the search to the Scopus database, although chosen for its robust indexing and metadata quality, may have excluded important literature indexed in other repositories such as Web of Science, ERIC, or Google Scholar. We also acknowledge that additional relevant studies may have emerged after the completion of our search.

To address these limitations, Future studies should investigate AI ethics frameworks tailored to low-resource contexts and longitudinal impacts of AI on

leadership efficacy. Furthermore, more attention should be given to the ethical dimensions of AI tools, particularly in identifying and mitigating algorithmic biases to promote fairness and inclusivity in educational environments.

6. Implications

The outcomes of this study point to several important implications, particularly for higher education systems in Africa. One of the key findings was the limited contribution of African scholars and institutions to the global body of literature on AI-driven leadership. The analysis showed that most of the leading publications, authors, and institutional collaborations originate from North America, Europe, and Asia. This imbalance signals a pressing need for policy action.

Calls for increased investment in research from African governments and institutions are therefore not made in isolation but rather arise directly from the evidence of underrepresentation revealed in this study. Without deliberate funding and support, African voices and contexts will continue to be marginal in conversations about the future of leadership in education, especially as AI becomes more central to decision-making and governance processes.

To address this, policies should focus on building research infrastructure, supporting early-career researchers, and encouraging regional and international collaborations. Strengthening research capacity in this area will help universities in Africa to better understand and respond to the challenges and opportunities presented by AI. Moreover, supporting studies that combine local insights with global trends will ensure that the development and application of AI in leadership are both inclusive and relevant across diverse context.

7. Conclusion

This analysis confirms AI's transformative role in redefining leadership paradigms, demanding critical engagement with equity, ethics, and collaborative governance to ensure inclusive digitisation. These bibliometric indicators provided valuable insights into the intellectual structure of the discipline and the emerging scholarly conversations shaping its direction. The analysis revealed a growing body of literature that reflects increasing interest in the integration of artificial intelligence into leadership practices. Notably, machine learning, algorithms, and data analytics have emerged as central tools that are influencing how decisions are made in organizational and institutional settings. These technologies are not only enhancing efficiency but are also transforming leadership roles, competencies, and models.

Co-authorship and citation patterns indicated a steadily expanding network of interdisciplinary collaboration, suggesting that the field is being enriched by contributions from scholars across computer science, management, education, psychology, and other related disciplines. The co-occurrence of keywords further identified thematic clusters around decision-making, predictive analytics, ethics, and leadership effectiveness, pointing to the multidimensional nature of AI-driven leadership research. The study confirms that artificial

intelligence is significantly reshaping the theoretical and practical frameworks within leadership studies. It is shifting the focus from traditional leadership traits and behaviours to more dynamic, data-informed, and technology-enhanced decision-making processes. This paradigm shift demands continuous scholarly engagement to evaluate both the potential and limitations of AI in leadership contexts. In conclusion, this bibliometric investigation has highlighted the critical role of AI in redefining the contours of leadership research. As AI technologies continue to evolve, future studies must not only track these developments but also critically reflect on their implications for human agency, ethical considerations, and the future of leadership in a rapidly digitising world.

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