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Research in the Age of AI – How to Plan? A Bibliometric Exploration of the Research Lifecycle

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Abstract
Artificial intelligence (AI), particularly generative AI and large language models (LLMs), is rapidly transforming research planning by enhancing literature synthesis, research problem formulation, methodology selection, and workflow management. Despite this rapid adoption, limited evidence exists regarding the intellectual structure, thematic evolution, and responsible integration of AI within research planning. Therefore, this study systematically maps the scientific landscape of AI-assisted research planning through a bibliometric analysis of publications indexed in the Scopus database between 2017 and 2026. Bibliographic data were analysed using Biblioshiny (Bibliometrix) and VOSviewer to examine publication trends, influential contributors, collaboration networks, intellectual structure, and thematic development. The findings reveal a rapidly expanding research domain, with an annual publication growth rate of 51.08%, reflecting the increasing integration of AI into research planning. Science mapping identifies research management, artificial intelligence, machine learning, and large language models as the dominant research themes, while thematic evolution demonstrates a shift from foundational AI technologies towards AI-enabled research management and workflows. However, the analysis also reveals a significant conceptual imbalance, with technological advancements outpacing the development of governance, trust,

ethics, and human–AI collaboration. To address this gap, the study proposes a five-phase framework comprising Strategic Conceptualisation, Systematic Literature Synthesis, Methodology Selection, Governance, Ethics and Trust, and Continuous Reflection and Feedback, positioning the human touch, curiosity, critical thinking, creativity, contextual expertise, and ethical judgement, as the foundation of responsible AI-assisted research planning. The study contributes both a comprehensive knowledge map and a human-centred conceptual framework that provide practical guidance for researchers, scholars, and policymakers seeking to promote the responsible, transparent, and sustainable integration of AI throughout the research planning process.

Keywords: research lifecycle, artificial intelligence, generative AI, AI-enhanced research planning, five-phase framework, human touch, bibliometric analysis

1. Introduction

Artificial intelligence (AI) has rapidly transformed the landscape of scientific research, reshaping how knowledge is generated, synthesized, and disseminated (Xu et al., 2021; Zahra & Rautela, 2024). Recent advancements in generative AI, particularly large language models (LLMs) such as ChatGPT, Gemini, and Claude, have extended AI applications beyond data analysis and automation to support cognitive tasks traditionally performed by researchers (Lawaju et al., 2024; Sontake, 2025). These tools are increasingly employed for identifying research problems, conducting literature reviews, generating research questions, drafting proposals, managing references, and assisting in methodological decisions (Christou, 2023; Oyelude, 2024). Consequently, AI has become an integral component of the modern research ecosystem, offering opportunities to enhance efficiency, reduce repetitive tasks, and accelerate scientific discovery (Burger et al., 2023; Valencia-Coronel et al., 2026). However, alongside these transformative capabilities, growing concerns about preserving human intellectual agency, critical thinking, and ethical discernment in AI-augmented research environments have intensified scholarly debate (Grillo, 2023; Tawfik, 2024). As the adoption of AI-assisted research continues to expand across disciplines, understanding how these technologies influence the early stages of the research process has become a critical area of scholarly inquiry. According to Maris et al. (2017), the research planning phase represents one of the most important stages of the research lifecycle, as it establishes the conceptual and methodological foundation upon which the entire study depends. Activities such as identifying research gaps, formulating objectives and hypotheses, selecting appropriate methodologies, and designing research workflows require extensive critical thinking and evidence synthesis (Khalifa & Albadawy, 2024; Valencia-Coronel et al., 2026). Emerging AI tools have demonstrated considerable potential to support these planning activities by rapidly retrieving relevant information, summarizing literature, generating alternative perspectives, and facilitating idea development (Maris et al., 2017; Filetti et al., 2024: Sontake, 2025). Despite these advantages, concerns regarding transparency, reliability, bias, ethical use, and overreliance on AI continue to shape academic debates (Carobene et al., 2024; Zhai et al., 2024; Nguyen, 2025). These concerns are particularly salient given that the rapid pace of AI adoption risks outpacing the development of governance frameworks, training programs, and theoretical understanding necessary for effective human-AI collaboration in research settings (Farid, 2024; Doğan et al., 2025; Siddique et al., 2026). Consequently, research on AI-assisted planning has grown substantially in recent years, reflecting increasing scholarly interest in understanding both the opportunities and challenges associated with integrating AI into the research lifecycle.

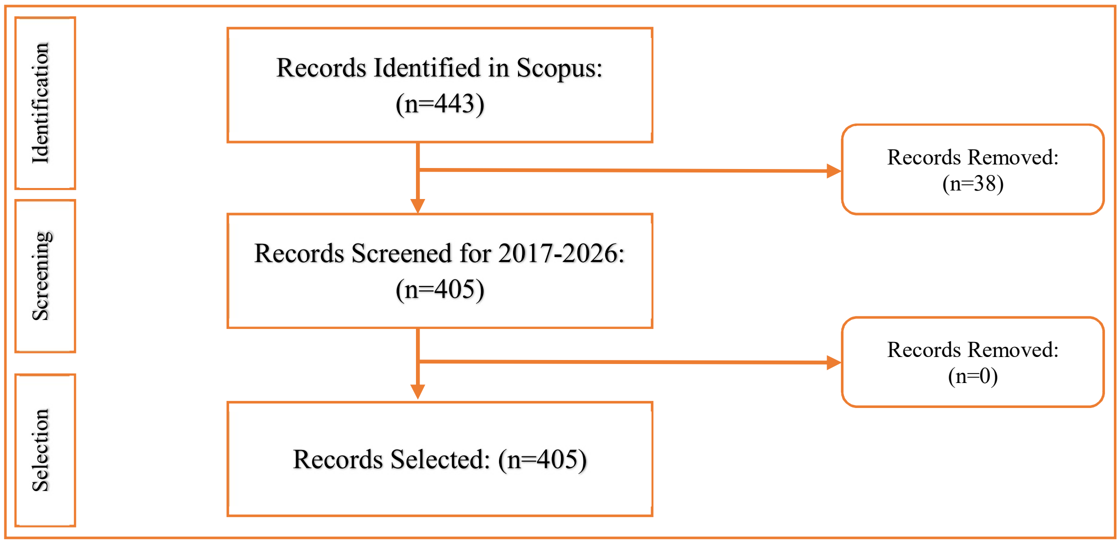
Although the literature on artificial intelligence in academic research has expanded considerably, existing studies such as Maris et al. (2017), Lawaju et al. (2024), Burger et al., (2023), Valencia-Coronel et al. (2026), Khalifa & Albadawy (2024) remain fragmented across multiple disciplines and primarily focus on specific applications such as academic writing, literature reviews, or research productivity. Current evidence lacks a comprehensive understanding of how AI has been investigated within the broader context of research planning and the research lifecycle. Furthermore, there is limited knowledge regarding the intellectual structure, thematic evolution, collaboration networks, influential contributors, and emerging research directions in this rapidly developing domain. Critically, existing scholarship has paid insufficient attention to the conceptual and governance dimensions of AI integration, including human-AI collaboration, trust, ethical frameworks, and the preservation of human intellectual agency in increasingly automated research environments. To date, few bibliometric studies have systematically mapped the scientific landscape surrounding AI-assisted research planning using comprehensive bibliographic databases. This fragmentation limits the ability of researchers, institutions, and policymakers to identify knowledge clusters, research frontiers, and future opportunities for responsible AI integration into research practices.

To address this gap, the present study conducts a bibliometric exploration of the literature on artificial intelligence and research planning using publications retrieved from the Scopus database. By applying bibliometric techniques, the study aims to provide a comprehensive overview of publication trends, influential authors, countries, institutions, journals, and collaboration patterns while identifying dominant research themes and emerging topics through keyword and citation analyses. Specifically, the objectives of this study are to: (1) examine the growth and publication trends of research on AI-assisted research planning; (2) identify the most influential authors, institutions, countries, journals, and collaborative networks; and (3) explore the intellectual and conceptual structure of the field through citation and keyword analyses. By synthesizing the existing body of knowledge, this study contributes a structured understanding of the evolving research landscape while revealing the conceptual imbalances between technological advancement and the development of governance, ethical, and human-AI collaboration frameworks. The findings provide a foundation for future investigations into the responsible and effective integration of artificial intelligence in academic research planning that preserves human creativity, critical thinking, and ethical responsibility at the center of scholarly practice. The findings also provide a clearer understanding of the role of the human touch in research planning, highlighting that AI should enhance rather than replace human creativity, critical thinking, contextual judgment, and ethical decision-making.

2. Methodology

To address the study objectives, this research employed a bibliometric analysis. Bibliometric analysis is a quantitative approach that systematically evaluates and maps the structure, evolution, and intellectual landscape of a research field through bibliographic data (Donthu et al., 2021; Lowar et al., 2025; Sahar & Munawaroh, 2025). The bibliographic data were retrieved exclusively from the Scopus database due to its extensive coverage of peer-reviewed literature and its suitability for bibliometric studies. The data collection process comprised three stages: identification, screening, and selection (Figure 1). During the identification stage, the following search string was applied to the title, abstract, and keywords: *("generative ai" OR "AI" OR "Artificial Intelligence" OR "ChatGPT" OR "AI tools" OR "OpenAI" OR "Gemini" OR "ClaudeAI") AND ("research planning" OR "research problem identification" OR "research lifecycle" OR "research workflow" OR "research management")*. This search yielded 443 publications. In the screening stage, the results were restricted to publications published between 2017 and 2026. *Records were further screened to include only journal articles, conference papers, and book chapters written in English; duplicates and non-peer-reviewed items (e.g., editorials) were excluded*, resulting in 405 eligible records. Following the screening process, all 405 publications were retained for the final analysis as summarised in the PRISMA flow diagram (Figure 1). The selected dataset was analysed in two complementary stages, namely performance analysis and science mapping, as recommended by Donthu et al. (2021). Performance analysis was conducted using Biblioshiny® (Bibliometrix) Version 5.0 while science mapping was subsequently performed in both Biblioshiny® and VOSviewer Version 1.6.20.

Figure 1: *Document Selection Process*



Subsequently, the five-phase framework presented in Section 5 was developed through an iterative synthesis of the bibliometric findings. The framework integrates (1) dominant research themes identified through co-occurrence and thematic mapping analyses, (2) conceptual gaps revealed by comparative thematic evolution and mapping, and (3) established research lifecycle models, resulting in a novel human-centred contribution that directly addresses the imbalance between technological advancement and governance development.

3. Results

As mentioned previously, this section comprises performance analysis and science mapping, as these complementary approaches provide a comprehensive understanding of the research landscape.

3.1 Performance Analysis

As defined by Lowar et al. (2025), performance analysis evaluates the scientific productivity and impact of a research field by examining its key bibliometric indicators. It provides an evidence-based understanding of the development, influence, and productivity of scholarly research, enabling the identification of major contributors and research trends (Passas, 2024; Sahar & Munawaroh, 2025). In this study, the performance analysis includes annual scientific production, the most relevant and influential authors, leading publication sources, and the most cited countries.

Main Information of Data

The bibliometric dataset comprises 405 publications published between 2017 and 2026, retrieved from 311 sources (Table 1). This indicates broad scholarly interest in the application of AI to research planning (Maris et al., 2017; Filetti et al., 2024). The field has exhibited a remarkable annual growth rate of 51.08%, reflecting its rapid emergence and increasing academic attention. The publications have an average age of 1.58 years and an average of 10.17 citations per document, based on a total of 15,940 references. The dataset contains 2,354 Keywords Plus and 1,210 author keywords, demonstrating considerable thematic diversity. Furthermore, 1,650 authors contributed to the publications, with an average of 4.4 co-authors per document. 73 documents were single-authored *(contributed by 69 distinct authors).* 22.96% involved international collaboration, highlighting the collaborative and global nature of this emerging research domain. Collectively, these indicators suggest that the field is expanding rapidly through interdisciplinary collaboration and diversified research themes, consistent with the findings of Siddique et al. (2026). However, the relatively young average publication age indicates that the intellectual structure is still evolving, presenting significant opportunities for future theoretical development and empirical investigation.

Table 1: *Main Information of Data*

Description	Results
Main information about data	
Timespan	2017:2026
Sources (Journals, Books, etc)	311
Documents	405
Annual Growth Rate %	51.08
Document Average Age	1.58
Average citations per doc	10.17
References	15940
Document contents	
Keywords Plus (ID)	2354
Author's Keywords (DE)	1210
Authors	
Authors	1650
Authors of single-authored docs	69
Authors collaboration	
Single-authored docs	73
Co-Authors per Doc	4.4
International co-authorships %	22.96

Annual Publication Growth

According to Donthu et al. (2021), performance analysis typically begins with an examination of annual scientific production, as it provides insight into the growth trajectory and maturity of a research field. Annual publication growth illustrates the evolution and research maturity of a scientific field by tracking changes in publication output over time (Hassan & Duarte, 2024; Basnet et al., 2024). As shown in Figure 2, research on artificial intelligence in research planning has expanded substantially between 2017 and 2026. The field began with only three publications in 2017, followed by a gradual increase to five in 2018, seven in 2019, nine in 2020, 13 in 2021, and 12 in 2022. From 2023 onwards, publication output accelerated markedly, rising to 33 articles in 2023, 58 in 2024, and reaching a peak of 142 publications in 2025. Although 2026 records 123 publications, indicating a slight decline compared with 2025, this should be interpreted cautiously because the year was still in progress when the data were collected. Moreover, the moving average trend (dotted line) continues to exhibit a strong upward trajectory, confirming sustained long-term growth and increasing scholarly interest in the application of generative AI throughout the research planning process and the broader research lifecycle. This rapid growth also suggests that the field is transitioning from an emerging research area to a rapidly consolidating domain, with increasing opportunities for theoretical refinement and interdisciplinary collaboration (Sahar & Munawaroh, 2025).

Most Relevant and Impactful Sources

Another important performance metric is source analysis, which identifies the most productive and influential publication outlets within a research field, thereby revealing the primary channels through which knowledge is disseminated (Donthu et al., 2021; Passas, 2024; Budathoki et al., 2026). As illustrated in Figure 3, the most relevant sources represent the journals and conference proceedings that have published the highest number of studies on artificial intelligence in research planning. Nature emerged as the leading publication outlet with 34 articles, substantially exceeding all other sources. It was followed by Lecture Notes in Computer Science (8 articles), CEUR Workshop Proceedings (6), Chinese Journal of Medical Science Research Management (5), NTT Technical Review (5), and IEEE Access (4). The presence of multidisciplinary journals alongside computer science and healthcare-oriented outlets demonstrates the interdisciplinary nature of AI-assisted research planning and its applications across diverse scientific domains. The dominance of Nature further suggests that AI-assisted research planning is increasingly recognized as a strategically important research area with broad scientific relevance, while the diversity of publication outlets reflects the field's expanding integration across disciplinary boundaries (Lendvai, 2025).

Figure 2: *Annual Publication Growth*

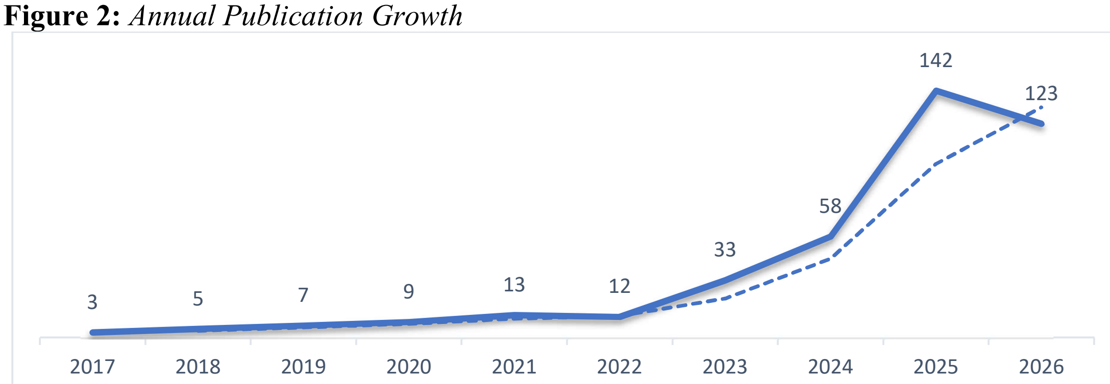


Figure 3: *Most Relevant Sources*

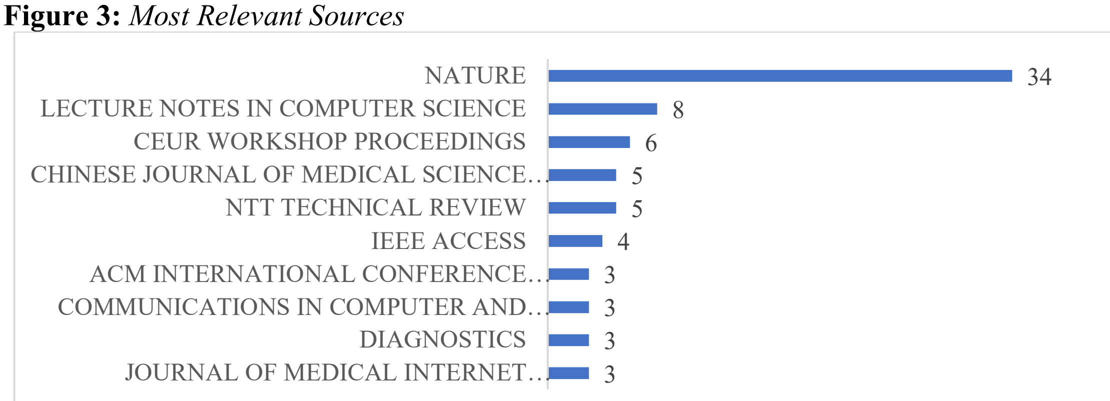
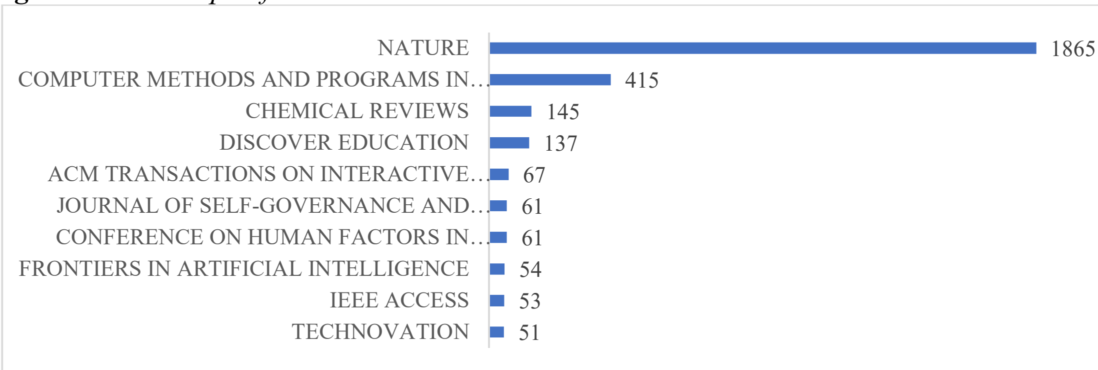


Figure 4: *Most Impactful Sources*

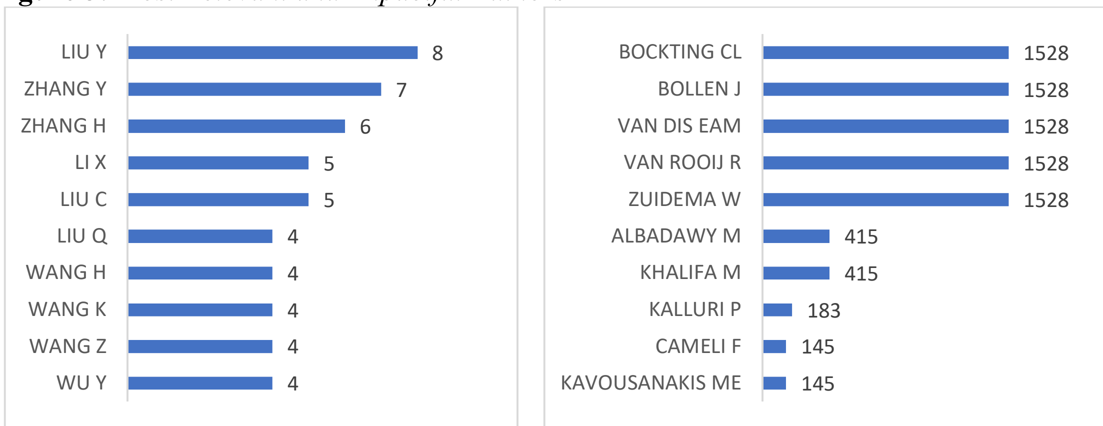


In contrast, Figure 4 presents the most impactful sources based on total citations, reflecting their intellectual influence rather than publication volume. Nature again dominated the field with 1,865 citations, confirming its role as the primary knowledge source in this emerging domain. It was followed by Computer Methods and Programs in Biomedicine (415 citations), Chemical Reviews (145), and Discover Education (137). Other influential outlets include ACM Transactions on Interactive Intelligent Systems (67 citations), the Journal of Self-Governance and Management Economics (61), the Conference on Human Factors in Computing Systems (61), Frontiers in Artificial Intelligence (54), IEEE Access (53), and Technovation (51). Comparing Figures 3 and 4 reveals that publication productivity does not necessarily correspond to scholarly impact. While several outlets contribute a relatively high number of publications, only a few generate substantial citation influence. This suggests that the field is shaped primarily by high-quality, widely cited studies published in leading multidisciplinary and domain-specific journals (Lendvai, 2025; Mangubat & Saeedi, 2025).

Most Relevant and Impactful Authors

In a similar way, author-level analysis identifies the leading contributors to a research field by evaluating both publication productivity and scholarly influence (Donthu et al., 2021; Lowar et al., 2025). As illustrated in Figure 5, the left panel presents the most relevant authors based on publication output. Liu Y emerged as the most prolific author with eight publications, followed by Zhang Y (7) and Zhang H (6). Li X and Liu C each contributed five publications, while Liu Q, Wang H, Wang K, Wang Z, and Wu Y each published four articles. The predominance of Chinese authors among the most productive contributors' underscores China's significant role in advancing research on artificial intelligence and its application to research planning and management. Likewise, the right panel of Figure 5 evaluates author influence based on total citations. Bockting C.L., Bollen J., Van Dis E.A.M., Van Rooij R., and Zuidema W. each received 1,528 citations, reflecting the exceptional impact of their collaborative work in shaping the discourse on AI in academic research. They were followed by Albadawy M. and Khalifa M., each with 415 citations, while Kalluri P. (183 citations), Cameli F. (145 citations), and Kavousanakis M.E. (145 citations) also ranked among the most influential scholars. A comparison of publication productivity and citation impact reveals that scientific influence is not solely determined by publication volume. While Chinese researchers dominate in terms of research output, the highest citation impact is concentrated among a smaller group of scholars whose pioneering contributions have substantially shaped the field's intellectual development. This finding suggests that the field continues to rely on a limited number of highly influential studies that serve as foundational references for subsequent research (Mangubat & Saeedi, 2025; Panthi et al., 2025).

Figure 5: *Most Relevant and Impactful Authors*



Most Cited Country

Another important performance metric is country citation analysis, which evaluates the scholarly influence of nations by examining the total citations received by publications affiliated with each country (Basnet et al., 2024; Passas, 2024). As illustrated in Table 2, Australia emerged as the most influential country, accumulating 449 total citations with an impressive average of 44.9 citations per article, indicating both high research quality and strong scholarly impact. The United States ranked second with 329 citations, followed by China with 243 citations. Although China is among the leading contributors in publication volume, its relatively low average citation per article (3.7) suggests that high research productivity does not necessarily translate into greater scientific influence. Belgium (145 citations) and Finland (137 citations) recorded exceptionally high average citations per article (145 and 137, respectively), indicating that a small number of seminal publications have exerted substantial influence on the field. Germany (118 citations), the United Kingdom (79), Spain (65), India (46), and Ukraine (42) also ranked among the top-cited countries. Consistent with Donthu et al. (2021), citation-based performance reflects the scientific impact and knowledge contribution of a country rather than merely its research output. These findings demonstrate that national research influence is driven by the quality, originality, and visibility of scholarly contributions, with countries producing fewer but highly cited studies exerting a disproportionate influence on the intellectual development of AI-assisted research planning.

Table 2: *Most Cited Country*

Country	Total Citations	Average Article Citations
Australia	449	44.9
USA	329	6
China	243	3.7
Belgium	145	145
Finland	137	137
Germany	118	6.9
United Kingdom	79	8.8
Spain	65	13
India	46	5.8
Ukraine	42	10.5

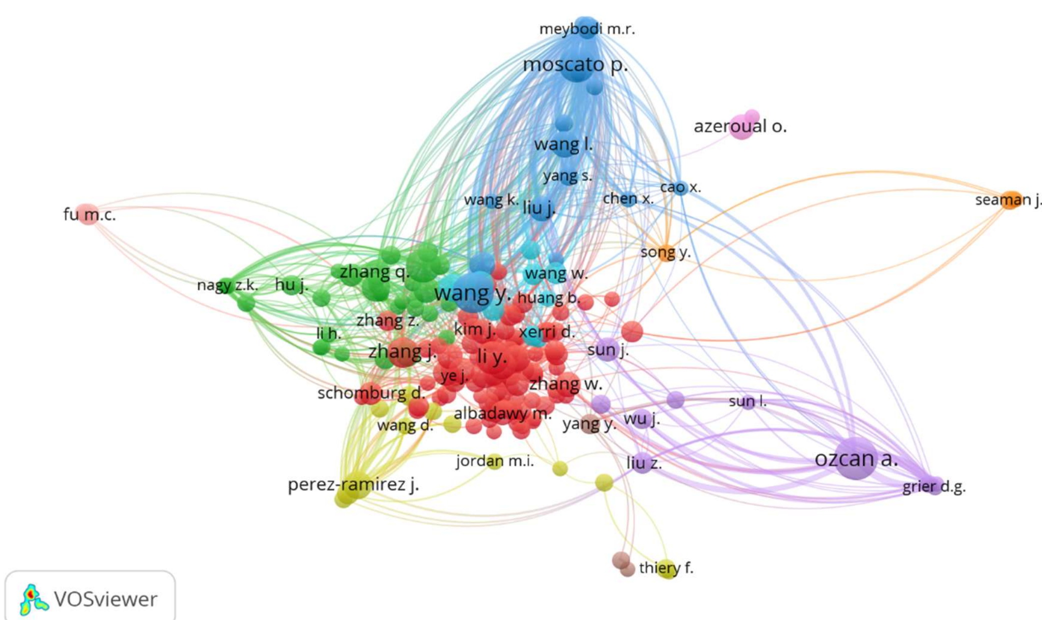
3.2 Science Mapping

As defined by Khanal et al. (2025), science mapping examines the intellectual, conceptual, and social structure of a research field by analysing relationships among publications, authors, and keywords. It provides insights into knowledge development, thematic evolution, and collaboration patterns (Donthu et al., 2021; Basnet et al., 2024). In this study, science mapping includes co-citation analysis, bibliographic coupling, co-occurrence analysis, tree-map analysis, thematic mapping, and thematic evolution.

Co-citation Analysis

Co-citation analysis represents the starting point of science mapping in VOSviewer, as it uncovers the intellectual structure of a research field by identifying authors who are frequently cited together (Passas, 2024; Lowar et al., 2025). In this study, co-citation analysis was conducted to identify the foundational scholars and knowledge base underpinning research on AI-assisted research planning. Using a minimum threshold of five citations per author, the author co-citation network shown in Figure 6 reveals several closely connected clusters, indicating a well-integrated and interdisciplinary intellectual structure. Moscato P. recorded the highest total link strength (2,106), occupying a central position in the network and demonstrating the strongest intellectual connections with other authors. This was followed by Ozcan A. (1,178) and Wang Y. (981), whose extensive co-citation links highlight their significant influence on the field. Other prominent contributors include Meybodi M.R. (686), Cotta C. (594), Glover F. (594), Hao J. (594), Wang J. (578), and Perez-Ramirez J. (512). The absence of isolated clusters suggests that knowledge development has largely occurred through cumulative and interconnected research rather than fragmented disciplinary streams. Moreover, the strong link strengths among leading authors indicate that the field is increasingly converging around a shared intellectual foundation, despite its multidisciplinary nature. Therefore, the dense interconnections among the coloured clusters demonstrate that research on AI-assisted research planning has evolved through extensive interdisciplinary collaboration and common theoretical and methodological foundations rather than independent lines of inquiry.

Figure 6: *Co-citation Analysis based on Authors*



Bibliographic Coupling

Following co-citation analysis, bibliographic coupling is employed in VOSviewer to identify the conceptual similarity among publication sources by examining the extent to which they cite the same references (Donthu et al., 2021; Lowar et al., 2025). In this study, bibliographic coupling was conducted to reveal the relationships among the major publication outlets and to identify journals that share common intellectual foundations in AI-assisted research planning. Using a minimum threshold of one document and one citation per source, the bibliographic coupling network presented in Figure 7 demonstrates the interconnectedness of the major publication outlets in the field. Although Nature received the highest number of citations (1,865), its total link strength of only 3 indicates relatively limited bibliographic connections with other sources, suggesting that its highly influential publications are comparatively distinct from the mainstream knowledge base. In contrast, Frontiers in Artificial Intelligence and Accountability in Research exhibited the strongest coupling (total link strength = 22 each), followed by IEEE Access (total link strength = 15), indicating that these journals share a substantial common reference base and publish conceptually related research. Chemical Reviews (total link strength = 8) and the International Journal of Applied Earth Observation and Geoinformation (total link strength = 6) also demonstrated notable connectivity. The variation in link strength suggests that while some journals function as central platforms for cumulative knowledge development, others contribute influential yet more specialized research with limited integration into the broader literature. Conversely, journals such as Journal of Self-Governance and Management Economics, Nature Communications, and Buildings recorded zero link strength, indicating weak bibliographic integration within the shared intellectual structure of this emerging research field.

Figure 7: *Bibliographic Coupling based on Sources*

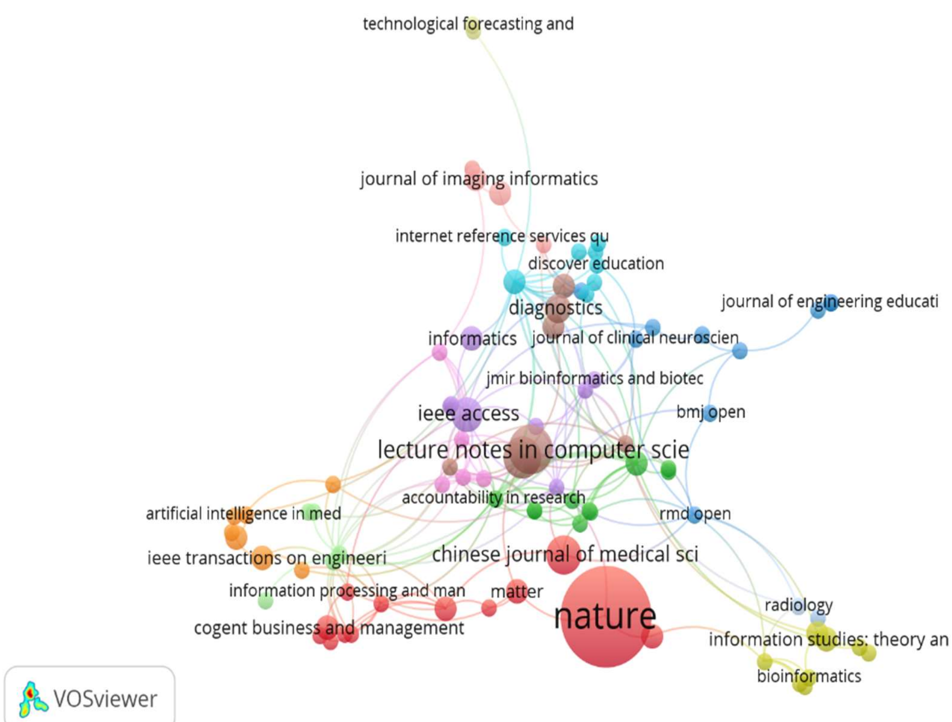
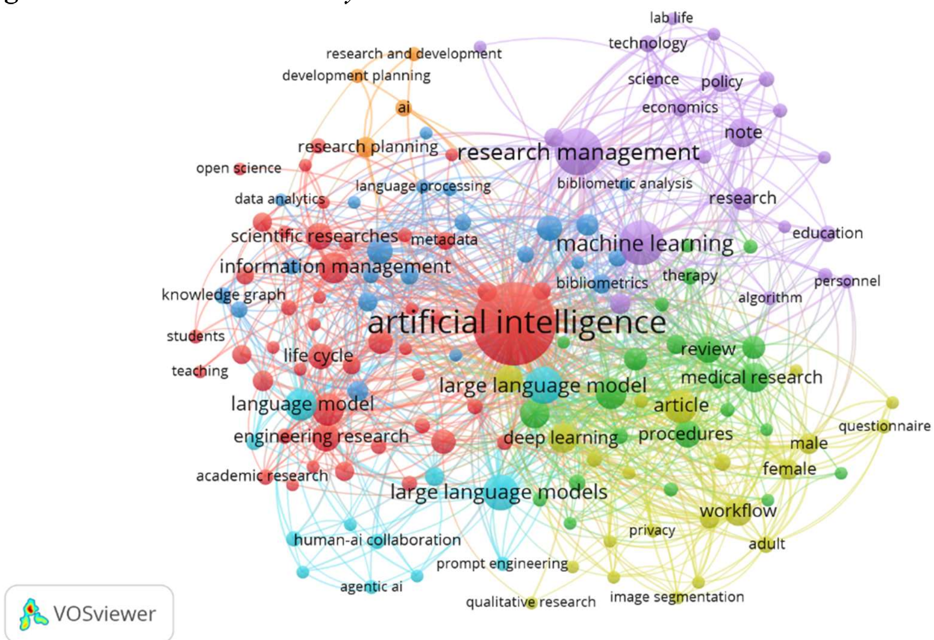


Figure 8: *Co-occurrence Analysis*



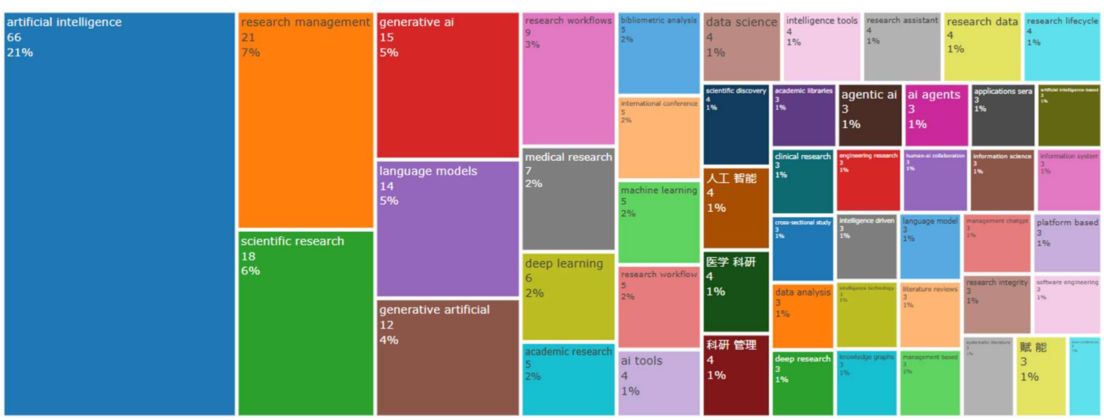
Co-occurrence Analysis

Following bibliographic coupling, keyword co-occurrence analysis is performed in VOSviewer to identify the conceptual structure of a research field by examining the frequency with which keywords appear together across publications (Hassan & Duarte, 2024; Sahar & Munawaroh, 2025). In this study, co-occurrence analysis was conducted to identify the dominant research themes and conceptual relationships underpinning AI-assisted research planning. The analysis was performed using a minimum occurrence threshold of five, meaning that only keywords appearing at least five times across the dataset were included in the visualization. As illustrated in Figure 8, artificial intelligence emerged as the dominant keyword, recording the highest occurrence (212) and total link strength (1,096), confirming its central role in connecting multiple research themes. Closely associated keywords include research management (68 occurrences; TLS = 363), machine learning (61; TLS = 327), and large language model (43; TLS = 342), demonstrating the growing integration of AI technologies into research management practices. Additional clusters comprising workflow, review, engineering research, clinical research, and scientific researches indicate that AI applications extend across diverse stages of the research lifecycle, including evidence synthesis, research automation, and domain-specific investigations. The emergence of keywords such as ethics, policy, research data, behavioural research, and methodology further suggests that scholarly attention is expanding beyond technological capabilities toward responsible AI governance and preserving the human touch in research planning through human oversight, critical thinking, ethical judgement, and contextual decision-making (Wang & Luo, 2026). This shift indicates that AI is increasingly viewed as a complementary tool that augments, rather than replaces, human expertise throughout the research planning process. Overall, the co-occurrence network demonstrates that AI-assisted research planning is evolving from a technology-driven domain into a more balanced research agenda that integrates technological innovation with ethical governance and the preservation of the human touch in scholarly practice.

Tree Map Analysis

Tree map analysis complements keyword co-occurrence analysis by visualising the relative frequency and prominence of keywords within a research field, with larger rectangles representing more frequently occurring terms (Basnet et al., 2024; Hassan & Duarte, 2024). In this study, the tree map analysis was conducted to identify the dominant themes characterising research on AI-assisted research planning. As illustrated in Figure 9, artificial intelligence emerged as the most prominent keyword, accounting for 66 occurrences (21%), confirming its central role in contemporary research management studies. Other major themes include research management (21 occurrences; 7%), scientific research (18; 6%), generative AI (15; 5%), and language models (14; 5%), indicating a strong emphasis on the integration of advanced AI technologies into research activities. Emerging concepts such as generative artificial intelligence, research workflows, medical research, deep learning, machine learning, and academic research further demonstrate that AI applications extend across research planning, knowledge generation, data analysis, literature reviews, and decision support. The presence of themes such as research integrity, research data, AI agents, and human-AI collaboration suggests that the field is progressively recognising the importance of preserving the human touch in AI-assisted research planning through human oversight, ethical judgement, critical thinking, and collaborative decision-making (Mahajan, 2025; Wang & Luo, 2026). This indicates a shift from viewing AI solely as a productivity-enhancing technology toward positioning it as a tool that augments rather than replaces human expertise (Camilleri, 2024). Thus, the tree map reinforces the study objective by demonstrating that while artificial intelligence, particularly generative AI and large language models, has become a dominant driver of modern research planning, increasing attention is being directed toward responsible AI adoption and maintaining the human touch throughout the research process. *This progression is corroborated by a two-period comparison (2017–2021 vs 2022–2026), which shows research themes converging from foundational AI/ML topics toward research management and research-workflow applications.*

Figure 9: *Tree Map Analysis*

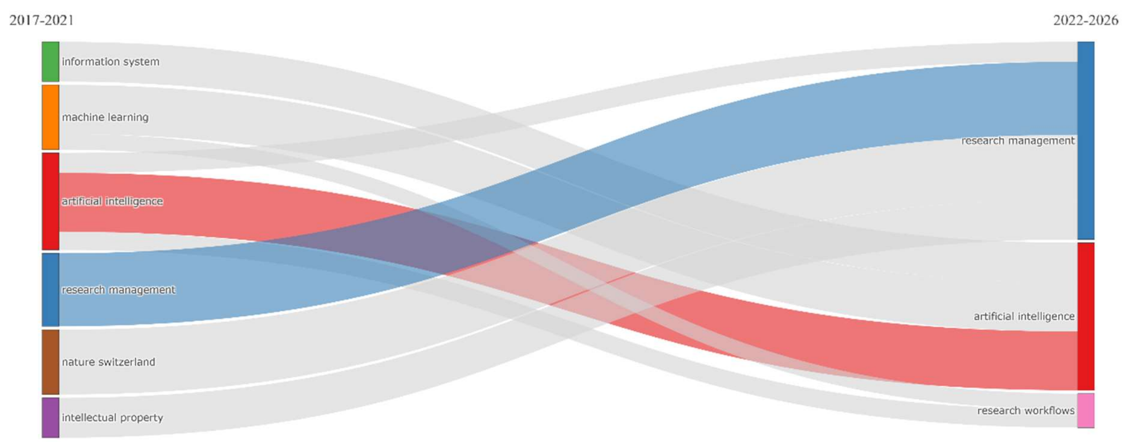


Thematic Evolution

Thematic evolution analysis provides insights into how research themes emerge, evolve, and transform over time, thereby revealing the developmental trajectory of a research field (Passas, 2024; Lowar et al., 2025). In this study, thematic evolution analysis was conducted to examine the progression of research themes in AI-assisted research planning across two periods: 2017–2021 and 2022–2026. As illustrated in Figure 10, the connecting flows depict the continuity and transformation of dominant research themes over time. During

2017–2021, the literature primarily focused on research management, artificial intelligence, machine learning, information systems, and intellectual property, reflecting an emphasis on the technological foundations and supporting digital infrastructure of AI. In the subsequent period (2022–2026), these themes converged into three dominant areas: research management, artificial intelligence, and research workflows. The strongest thematic flow towards research management indicates that it has remained the most stable and influential research stream, while artificial intelligence has broadened by incorporating concepts previously associated with machine learning and information systems. The emergence of research workflows as a distinct theme further demonstrates a growing focus on integrating AI into planning, coordination, and decision-making throughout the research lifecycle. This thematic transition suggests that the field is moving beyond the development of AI technologies toward their practical and responsible application in research environments. Moreover, the consolidation of workflow-oriented themes implies increasing recognition that effective AI adoption should preserve the human touch by supporting, rather than replacing, human creativity, critical thinking, contextual judgement, and ethical decision-making (Camilleri, 2024; Mahajan, 2025). The thematic evolution therefore highlights a clear progression from foundational AI technologies to their strategic application in research planning, reinforcing the importance of balancing technological innovation with human-centred research practices.

Figure 10: *Thematic Evolution*

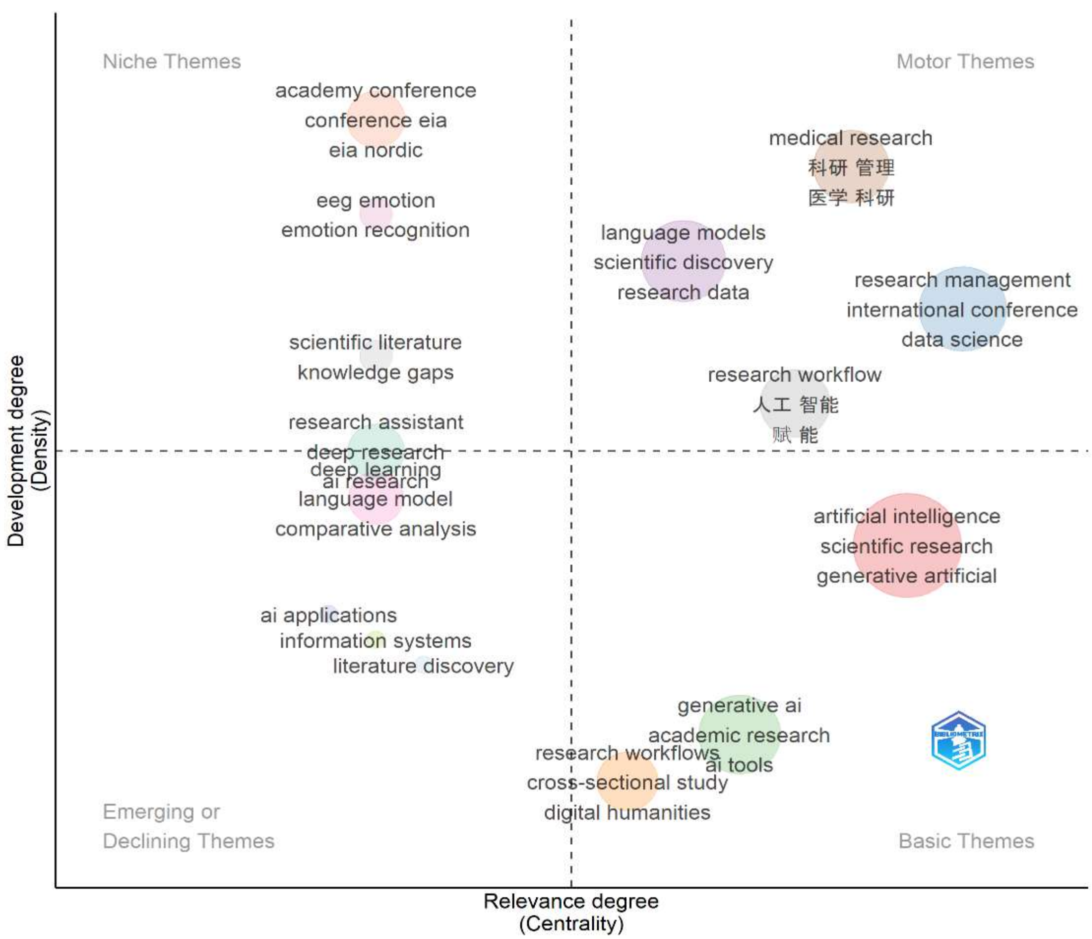


Thematic Mapping

Thematic mapping is a strategic science mapping technique that classifies research themes according to their centrality (relevance to the field) and density (level of development), thereby identifying the maturity and importance of different research topics within a knowledge domain (Donthu et al., 2021; Lowar et al., 2025). In this study, thematic mapping was performed to evaluate the maturity, relevance, and future research directions of AI-assisted research planning. As illustrated in Figure 11, the thematic map categorises research themes into four quadrants: motor themes, basic themes, niche themes, and emerging or declining themes. The motor themes, including research management, medical research, data science, research data, scientific discovery, and language models, occupy the upper-right quadrant, indicating high centrality and high density (Donthu et al., 2021). Their position demonstrates that AI-driven research management has become the dominant direction of scholarly inquiry, with language models and data-driven approaches increasingly embedded in research planning, knowledge generation, scientific discovery, and decision-making. This finding is consistent with Siddique et al. (2026) and suggests that the field has progressed beyond conceptual discussions toward practical implementation across multiple research domains.

In contrast, the basic themes, comprising artificial intelligence, scientific research, generative artificial intelligence, generative AI, research workflows, academic research, and AI tools, exhibit high centrality but relatively low density, indicating that they remain fundamental yet insufficiently developed. This presents significant opportunities for future research to strengthen theoretical foundations and investigate issues related to organisational adoption, ethical governance, trust, and preserving the human touch in AI-assisted research planning through human oversight, critical thinking, contextual judgement, and ethical decision-making (Camilleri, 2024; Mahajan, 2025; Wang & Luo, 2026). The emerging or declining themes, such as AI applications, information systems, literature discovery, digital humanities, and cross-sectional studies, represent promising avenues for future investigation, particularly in developing domain-specific AI applications, interdisciplinary collaborations, and longitudinal research designs. Meanwhile, niche themes, including emotion recognition, conference studies, and knowledge gaps, remain specialised with limited influence on the broader field. In this scene, the thematic map indicates that while AI has become the principal driver of contemporary research management, the relatively underdeveloped basic and emerging themes highlight the need to balance technological advancement with responsible governance and the preservation of the human touch, ensuring that AI complements rather than replaces human expertise in research planning.

Figure 11: *Thematic Mapping*



4. Discussion

The findings demonstrate that artificial intelligence (AI) has rapidly evolved from a supporting technology into a central component of research planning within the broader research lifecycle. Consistent with the first objective of this study, the annual publication growth rate of 51.08% and the sharp increase in publications after 2023 indicate accelerating scholarly interest following the widespread adoption of generative AI tools such as ChatGPT, Gemini, and Claude. These trends suggest that researchers are increasingly integrating AI into key planning activities, including problem identification, literature exploration, methodology selection, and proposal development (Lawaju et al., 2024; Sontake, 2025). Similar growth patterns have been reported by recent bibliometric studies, which attribute this expansion to the transformative capabilities of large language models in improving research efficiency while simultaneously raising concerns regarding research integrity, transparency, and responsible AI use (Sontake, 2025). Collectively, these findings indicate that AI-assisted research planning has progressed from an emerging topic to a rapidly consolidating research domain with increasing interdisciplinary relevance (Hassan & Duarte, 2024; Sahar & Munawaroh, 2025).

The science mapping analyses further reveal that the intellectual structure of the field is converging around AI-enabled research management rather than isolated technological applications. The keyword co-occurrence analysis identified *artificial intelligence*, *research management*, *machine learning*, and *large language models* as the dominant conceptual nodes, while the thematic evolution analysis demonstrated a clear progression from foundational topics such as *machine learning* and *information systems* toward *research management* and *research workflows*. This transition suggests that scholarly attention has shifted from developing AI algorithms to understanding how AI can optimise planning activities across the research lifecycle (Oyelude, 2024). Likewise, the thematic map identified *research management*, *language models*, *research data*, and *scientific discovery* as well-developed motor themes, confirming that AI has become embedded in mainstream research practices. However, *artificial intelligence*, *generative AI*, *research workflows*, and *AI tools* remain basic themes, indicating that although these concepts underpin the field, they are still theoretically underdeveloped. This imbalance suggests that technological adoption has advanced more rapidly than the development of conceptual frameworks explaining AI implementation, organisational readiness, and sustainable integration (Carobene et al., 2024; Zhai et al., 2024). A particularly important finding emerging from the bibliometric evidence is the growing tension between technological advancement and the preservation of the human touch in research planning. While AI demonstrates considerable potential for automating literature synthesis, identifying research gaps, generating methodological alternatives, and supporting evidence-based decision-making, the analysis also reveals increasing scholarly concern regarding the implications of excessive reliance on AI for human intellectual agency. The prominence of keywords such as *ethics*, *policy*, *behavioural research*, *research integrity*, and *human–AI collaboration* indicates that researchers are increasingly recognising the importance of maintaining critical thinking, contextual judgement, creativity, and ethical reasoning alongside AI-assisted decision-making. This finding supports recent arguments that AI should function as an intelligent collaborator rather than an autonomous decision-maker capable of replacing researchers' intellectual contributions (Filetti et al., 2024; Lawaju et al., 2024). The rapid expansion of AI adoption identified in this study therefore necessitates parallel development of governance mechanisms that preserve human oversight while maximising technological benefits.

The findings also highlight several important knowledge gaps that should guide future research. Although research management has emerged as the dominant motor theme, concepts related to trust, governance, human–AI collaboration, and organisational implementation remain comparatively underdeveloped despite their high strategic relevance. This suggests that existing studies continue to prioritise technological performance over the institutional, behavioural, and ethical conditions necessary for responsible AI adoption. Furthermore, the emergence of themes such as *AI applications*, *literature discovery*, and *digital humanities* demonstrates considerable opportunities for interdisciplinary investigations capable of extending AI beyond traditional research management contexts. The collaborative nature of the field, reflected by the high proportion of internationally co-authored publications, further indicates growing recognition that responsible AI adoption requires collective efforts involving researchers, institutions, publishers, and policymakers (Mishra et al., 2024; Siddique et al., 2026). Consequently, future investigations should focus not only on improving AI capabilities but also on developing theoretical models, governance frameworks, and evaluation mechanisms that strengthen transparency, accountability, trust, and responsible human–AI collaboration throughout the research planning process (Farid, 2024; Nguyen, 2025).

In this regard, the bibliometric findings demonstrate that the future of AI-assisted research planning should not be defined solely by technological innovation but by achieving an appropriate balance between computational intelligence and human intellectual agency. Although AI has already transformed research planning by enhancing efficiency and supporting evidence synthesis, its long-term value will ultimately depend on the extent to which researchers preserve the human touch through curiosity, creativity, critical reflection, contextual understanding, and ethical responsibility. This study therefore argues that successful AI adoption requires moving beyond ad hoc technology use towards structured, human-centred approaches supported by governance, institutional capacity, and responsible implementation strategies (Khalifa & Albadawy, 2024; Valencia-Coronel et al., 2026). Building on these bibliometric insights, the following section proposes a five-phase framework for AI-enhanced research planning that directly addresses the identified conceptual gaps by integrating technological capabilities with governance, ethical safeguards, and the human touch, thereby providing practical guidance for the responsible and sustainable use of AI throughout the research planning process.

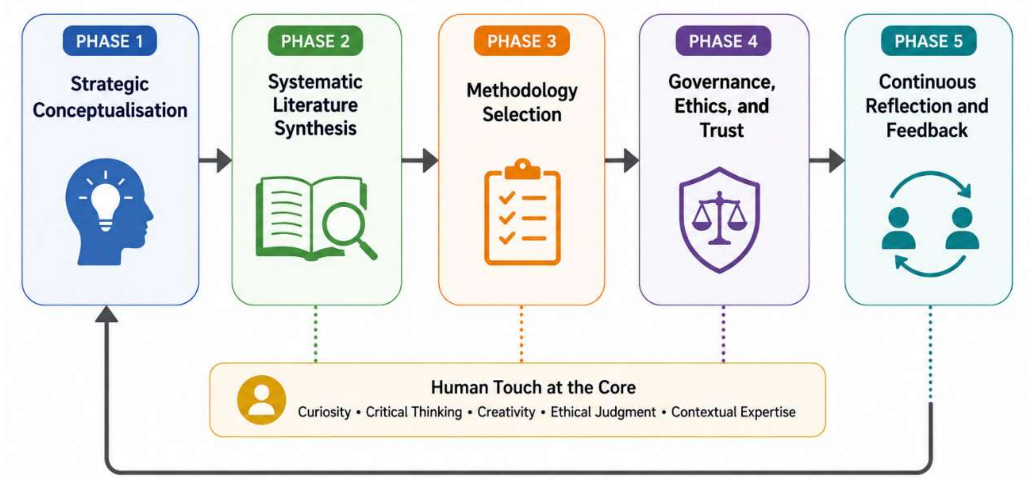
5. Five-Phase Framework for AI-Enhanced Research Planning

The bibliometric findings demonstrate that research on AI-assisted research planning has progressed rapidly, yet its conceptual development remains uneven. The bibliometric findings reveal a rapid expansion of AI-assisted research planning, accompanied by uneven conceptual development. While technological themes such as artificial intelligence, generative AI, research workflows, and AI tools have become increasingly central, governance, ethics, research integrity, and human–AI collaboration remain comparatively underdeveloped. This imbalance suggests that existing research has focused more on technological capabilities than on their responsible integration into research planning. To address this conceptual imbalance, this study proposes a five-phase framework for AI-enhanced research planning.

The framework was developed through an iterative synthesis of bibliometric evidence rather than direct derivation from any single analytical cluster. Specifically, the thematic clusters identified through co-occurrence analysis – research management, artificial intelligence, machine learning, large language models, and ethics – informed the identification of core planning activities reflected in Phases 1-3 (Strategic Conceptualisation, Systematic Literature Synthesis, and Methodology Selection). Simultaneously, the observed gap between rapid technological advancement and the comparatively slower development of governance, trust, ethics, and human–AI collaboration informed the human-centred orientation of Phases 4-5 (Governance, Ethics, and Trust, and Continuous Reflection and Feedback). Together, the five phases provide a structured pathway through which research ideas evolve from conceptualisation to continuous refinement. Phase 1 guides the formulation of research problems and questions; Phase 2 facilitates evidence identification and synthesis; Phase 3 supports methodological decision-making; Phase 4 embeds governance, ethics, and trust considerations across planning activities; and Phase 5 creates a feedback mechanism through which insights from earlier stages are continuously reviewed and refined. This interconnected process ensures that research planning remains iterative, transparent, and responsive to both technological opportunities and scholarly judgement.

Thus, the five phases represent a novel conceptual contribution that synthesizes empirical patterns from the bibliometric data, addresses identified research gaps, and integrates technological capability with critical thinking, ethical governance, and the human touch throughout the research planning process (See Figure 12). Grounded in the bibliometric evidence, the framework positions AI as an enabling technology that augments rather than replaces human intellectual agency (Doğan et al., 2025; Nguyen, 2025; Valencia-Coronel et al., 2026).

Figure 12: *Five-Phased Framework for AI-Enhanced Research Planning*



Phase 1: Strategic Conceptualisation

Strategic conceptualisation establishes the intellectual foundation of research planning by ensuring that research problems originate from human inquiry rather than algorithmic recommendation. The thematic map identified artificial intelligence, generative AI, and AI tools as highly central but theoretically underdeveloped themes, indicating that their application within the early stages of research planning remains insufficiently conceptualized (Filetti et al., 2024; Lawaju et al., 2024). Although AI technologies can facilitate horizon scanning through the identification of emerging topics, contradictory findings, and knowledge gaps (Filetti et al., 2024; Sontake, 2025), the selection and formulation of meaningful research questions require disciplinary expertise, contextual understanding, and scholarly judgement. Accordingly, this phase positions AI as a cognitive support mechanism that broadens knowledge exploration while preserving intellectual ownership and scientific originality. The continuous feedback embedded within the framework further enables researchers to revisit and refine research questions as new evidence emerges, thereby maintaining alignment between technological assistance and human curiosity throughout the research planning process (Carobene et al., 2024; Zhai et al., 2024).

Phase 2: Systematic Literature Synthesis

The second phase focuses on systematic literature synthesis, where AI enhances the efficiency of evidence identification, organisation, and knowledge mapping. The keyword co-occurrence analysis identified research management, large language models, and research data as dominant themes, demonstrating the growing integration of AI into evidence synthesis and research workflows. AI-assisted retrieval, clustering, and summarisation substantially improve researchers' ability to navigate rapidly expanding bodies of literature (Filetti et al., 2024; Sontake, 2025). Nevertheless, efficient information processing does not necessarily constitute rigorous knowledge synthesis. The interpretation of conflicting findings, evaluation of methodological quality, and integration of theoretical perspectives remain fundamentally dependent on human critical reasoning (Mahajan, 2025; Wang & Luo, 2026). Consequently, this phase emphasises that AI should facilitate evidence exploration while researchers retain responsibility for evaluating relevance, credibility, and theoretical coherence. Such an approach strengthens research integrity and prevents excessive reliance on automated summaries that may overlook methodological nuances or contextual complexity (Camilleri, 2024; Siddique et al., 2026).

Phase 3: Methodology Selection

Methodology selection represents the third phase, in which AI supports the evaluation of alternative research designs, analytical techniques, and research workflows. Consistent with the thematic evolution analysis, the increasing prominence of research workflows and the motor themes of research management and data science reflects the expanding role of AI in methodological planning (Oyelude, 2024; Filetti et al., 2024). While AI can efficiently compare analytical approaches and recommend suitable methodological options, these recommendations are typically generated from existing patterns within the literature and may therefore privilege dominant methodologies over contextually appropriate alternatives (Lendvai, 2025; Mangubat & Saeedi, 2025). Accordingly, methodological decisions should remain grounded in researchers' epistemological assumptions, research objectives, and practical considerations. This phase therefore promotes methodological reflexivity by encouraging critical evaluation of AI-generated recommendations, ensuring that technological efficiency complements rather than constrains methodological diversity, scientific rigour, and research validity (Doğan et al., 2025; Valencia-Coronel et al., 2026).

Phase 4: Governance, Ethics, and Trust

The fourth phase introduces governance, ethics, and trust as fundamental mechanisms for the responsible adoption of AI throughout research planning. The bibliometric findings identified ethics, policy, and research integrity as comparatively underdeveloped themes despite their increasing importance, suggesting that advances in AI capabilities have outpaced the development of governance frameworks (Khalifa & Albadawy, 2024; Siddique et al., 2026). Within this framework, governance extends beyond regulatory compliance to encompass transparency, accountability, data privacy, bias mitigation, and responsible human-AI collaboration across all preceding phases (Hassan & Duarte, 2024; Sahar & Munawaroh, 2025). By embedding governance within the planning process rather than treating it as a final evaluation stage, the framework promotes continuous ethical oversight throughout research design and implementation (Xu et al., 2021; Zahra & Rautela, 2024). Nevertheless, the effectiveness of governance mechanisms remains dependent upon institutional capacity, disciplinary standards, and organisational commitment, indicating that responsible AI adoption requires both technological advancement and supportive governance infrastructures.

To operationalise this phase, several governance mechanisms are recommended. First, transparency requirements should ensure disclosure of AI usage in research planning, including the tools employed, tasks performed, and levels of human oversight. Second, audit-trail protocols should enable AI-assisted decisions to be reviewed and evaluated, strengthening accountability and facilitating error correction. Third, institutional oversight mechanisms, including ethics committees, research integrity offices, and peer-review processes, should be adapted to evaluate AI-assisted research planning against established standards of rigour and responsibility. Fourth, researcher training initiatives should address both technical competencies and ethical reasoning, critical evaluation of AI outputs, and responsible human-AI collaboration. Finally, evaluation criteria should be established to assess the appropriateness, transparency, and quality of AI use in research planning, thereby supporting continuous organisational learning and improvement. Taken together, these mechanisms ensure that governance functions as an active layer of oversight rather than a passive compliance checklist.

Phase 5: Continuous Reflection and Feedback

Continuous reflection and feedback constitute the final phase of the framework, reinforcing the iterative nature of AI-enhanced research planning. The thematic evolution analysis demonstrated the increasing importance of research workflows, highlighting that research planning is characterised by continual refinement rather than sequential completion. Accordingly, this phase positions reflection as the mechanism through which researchers critically evaluate AI-generated outputs, identify conceptual or methodological limitations, and refine earlier planning decisions (Grillo, 2023; Tawfik, 2024). Feedback generated during this phase is intentionally directed back to strategic conceptualisation, ensuring that subsequent revisions remain grounded in human curiosity, ethical reasoning, and contextual expertise rather than algorithmic optimisation alone (Sontake, 2025; Valencia-Coronel et al., 2026). Through this recursive process, AI functions as a collaborative partner that supports iterative learning, while the Human Touch remains the overarching principle governing creativity, critical thinking, intellectual independence, and responsible scholarly decision-making (Mahajan, 2025; Wang & Luo, 2026).

To strengthen reflective practice, researchers are encouraged to document AI-assisted decisions and the rationale underlying the acceptance, modification, or rejection of AI-generated recommendations. Reflection may occur through individual review, collaborative discussion, mentoring relationships, or peer feedback, allowing researchers to evaluate the appropriateness and quality of AI contributions and identify emerging concerns. By embedding such practices within the research planning process, reflection becomes a continuous mechanism for ensuring that AI use remains intentional, critically evaluated, and aligned with scholarly values.

Collectively, the proposed framework integrates two complementary dimensions of AI-enhanced research planning. The first comprises a sequential set of five interconnected phases that structure the planning process, while the second consists of a continuous Human Touch foundation that underpins every phase through curiosity, critical thinking, creativity, ethical judgement, and contextual expertise. The five phases are neither prescriptive nor exhaustive; rather, they represent a novel synthesis that emerged from the intersection of three sources: (1) the dominant research themes identified through co-occurrence and thematic mapping analyses (Phases 1-3), (2) the persistent conceptual gaps highlighted through comparative analysis of thematic evolution and mapping (Phases 4-5), and (3) established research lifecycle models that conceptualise research planning as a structured yet iterative process. Importantly, the framework's contribution lies not in introducing completely novel phases but in its explicit integration of governance, ethics, and continuous reflection – dimensions that the bibliometric analysis identified as critically underdeveloped despite their growing importance. By combining technological capability with sustained human oversight, the framework provides a structured and theoretically grounded approach to responsible AI adoption, ensuring that AI enhances research quality without diminishing the intellectual agency that remains central to meaningful scientific inquiry.

6. Conclusion

This study mapped the intellectual landscape of AI in research planning using a bibliometric analysis of Scopus-indexed publications from 2017 to 2026. The findings demonstrate that AI has evolved from a supporting technology into a strategic enabler of research planning, as evidenced by rapid growth in publications and the emergence of research management, language models, and research workflows as dominant themes. However, the science mapping analyses also revealed a clear conceptual imbalance, whereby technological advancements have progressed more rapidly than research on governance, trust, ethics, and human-AI collaboration. These findings indicate that the future development of AI-assisted research planning should extend beyond technological capability towards responsible and human-centred implementation. To address this gap, the study proposed a five-phase framework comprising Strategic Conceptualisation, Systematic Literature Synthesis, Methodology Selection, Governance, Ethics and Trust, and Continuous Reflection and Feedback. The framework conceptualises research planning as a recursive process in which AI enhances efficiency across each phase while the human touch, curiosity, critical thinking, creativity, contextual expertise, and ethical judgement, remains the guiding foundation for scholarly decision-making.

The study makes several important theoretical and practical contributions. Theoretically, it extends the emerging literature on AI-assisted research planning by integrating bibliometric evidence with a structured conceptual framework that bridges the gap between technological advancement and responsible AI adoption. Unlike previous studies that primarily describe publication trends or AI applications, this research offers a human-centred framework that explicitly positions human judgement as the governing mechanism throughout the research planning process. Practically, the framework provides actionable guidance for researchers, supervisors, universities, and research institutions seeking to integrate AI into research planning without compromising research integrity, transparency, or intellectual independence. It also offers policymakers and higher education institutions a foundation for developing governance policies, ethical guidelines, and researcher training programmes that foster responsible human-AI collaboration. By aligning technological innovation with human creativity and ethical responsibility, the proposed framework supports the sustainable adoption of AI while preserving the intellectual rigour and originality that underpin meaningful scientific research.

Despite its contributions, this study has several limitations that provide opportunities for future research. First, the bibliometric analysis relied exclusively on the Scopus database, which may have omitted relevant publications indexed in other databases, such as Web of Science. Second, the analysis was based on bibliographic metadata rather than full-text articles, limiting deeper examination of the contextual and theoretical dimensions of AI-assisted research planning, particularly regarding human–AI collaboration and governance. Third, given the rapid pace of AI development, the identified research themes and trends are likely to evolve, necessitating periodic bibliometric updates using multiple databases and broader datasets. Future research should therefore validate the proposed five-phase framework through empirical studies across different disciplines, institutional settings, and geographical contexts to assess its applicability and refine its components. In addition, longitudinal investigations examining the long-term effects of AI adoption on research quality, creativity, critical thinking, scholarly identity, and responsible human-AI collaboration would further strengthen understanding of sustainable AI integration throughout the research planning process.

7. Declaration of AI Use

This study used Biblioshiny® and VOSviewer for bibliometric analysis. Generative AI (ChatGPT) assisted with preliminary keyword identification and proofreading. All intellectual contributions are the original work of the authors. No AI was used to generate, interpret, or synthesize research findings. The authors accept full responsibility.

References

1. Basnet, P., Devkota, N., Chapagain, R. K., & Mahapatra, S. K. (2024). Paving the Way to the Gig Economy: A Bibliometric Analysis of Workers' Decade-Long Involvement. *Economic Journal of Nepal*, *47*(1-2), 43-64. https://doi.org/10.3126/ejon.v47i1-2.80899
2. Budhathoki, S., Devkota, N., & Lawaju, P. (2026). Agricultural Transformation 2.0: A Bibliometric Study. *Himalayan Global Researchers' Network (HGRN)*, *1*(1), 4-16. https://doi.org/10.66562/hjmr.1.1.002
3. Burger, B., Kanbach, D. K., Kraus, S., Breier, M., & Corvello, V. (2023). On the use of AI-based tools like ChatGPT to support management research. *European journal of innovation management*, *26*(7), 233-241. https://www.emerald.com/ejim/article-pdf/26/7/233/147158/ejim-02-2023-0156.pdf
4. Camilleri, M. A. (2024). Artificial intelligence governance: Ethical considerations and implications for social responsibility. *Expert systems*, *41*(7), e13406. https://doi.org/10.1111/exsy.13406
5. Carobene, A., Padoan, A., Cabitza, F., Banfi, G., & Plebani, M. (2024). Rising adoption of artificial intelligence in scientific publishing: evaluating the role, risks, and ethical implications in paper drafting and review process. *Clinical Chemistry and Laboratory Medicine (CCLM)*, *62*(5), 835-843. https://doi.org/10.1515/cclm-2023-1136
6. Christou, P. A. (2023). How to use artificial intelligence (AI) as a resource, methodological and analysis tool in qualitative research?. *Qualitative Report*, *28*(7). https://doi.org/10.46743/2160-3715/2023.6406
7. Doğan, M., Celik, A., & Arslan, H. (2025). AI in higher education: risks and opportunities from the academician perspective. *European Journal of Education*, *60*(1), e12863. https://doi.org/10.1111/ejed.12863
8. 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*, 285-296. https://doi.org/10.1016/j.jbusres.2021.04.070
9. Farid, G. (2024). Ethical considerations regarding the use of artificial intelligence tools in research and publication. *Kurdish Studies*. DOI: 10.53555/ks.v12i4.3133
10. Filetti, S., Fenza, G., & Gallo, A. (2024). Research design and writing of scholarly articles: New artificial intelligence tools available for researchers. *Endocrine*, *85*(3), 1104-1116. https://link.springer.com/article/10.1007/s12020-024-03977-z
11. Grillo, R. (2023). The rising tide of artificial intelligence in scientific journals: A profound shift in research landscape. https://doi.org/10.58600/eurjther1735
12. Hassan, W., & Duarte, A. E. (2024). Bibliometric analysis: a few suggestions. *Current problems in cardiology*, *49*(8), 102640. https://doi.org/10.1016/j.cpcardiol.2024.102640
13. Khalifa, M., & Albadawy, M. (2024). Using artificial intelligence in academic writing and research: An essential productivity tool. *Computer methods and programs in biomedicine update*, *5*, 100145. https://doi.org/10.1016/j.cmpbup.2024.100145
14. Khanal, G., Devkota, N., Chapagain, R., & Khanal, C. K. (2025). The Evolution of Carbon Market: A Systematic Review and Bibliometric Study. *Green and Low-Carbon Economy*. https://doi.org/10.47852/bonviewGLCE52026119
15. Lawaju, P., Adhikari, S. U., & Devkota, J. (2024). Impact of AI in education: An evidence from use of ChatGPT in management education in Nepal. *Quest Journal of Management and Social Sciences*, *6*(3), 621-642. https://doi.org/10.3126/qjmss.v6i3.72875

16. Lendvai, G. F. (2025). ChatGPT in academic writing: A scientometric analysis of literature published between 2022 and 2023. *Journal of Empirical Research on Human Research Ethics*, *20*(3), 131-148. https://doi.org/10.1177/15562646251350203
17. Lowar, D. B., Devkota, N., & Siddique, M. R. (2025). Mapping the Global Research on Environmental, Social, Governance (ESG): A Bibliometric Analysis. *NCC Journal*, *10*(1), 69-88. https://doi.org/10.3126/nccj.v10i1.95031
18. Mahajan, P. (2025). The Soul of the AI: Governance, Ethics, and the Future of Human–AI Integration. https://hal.science/hal-05140138/
19. Mangubat, F. M., & Saeedi, K. H. (2025). A bibliometric analysis of research trends in the application of artificial intelligence by college students in research writing. *Discover Education*. https://doi.org/10.1007/s44217-025-01067-4
20. Maris, S., Slavici, T., Nenu, P., & Baciu, L. (2017). Artificial Intelligence as a Decision-making Tool in Planning the Research. *BRAIN. Broad Research in Artificial Intelligence and Neuroscience*, *8*(3), 69-76. https://www.edusoft.ro/brain/index.php/brain/article/view/710
21. Mishra, N., Bhandari, N., Maraseni, T., Devkota, N., Khanal, G., Bhusal, B., ... & Danuwar, R. K. (2024). Technology in farming: Unleashing farmers' behavioral intention for the adoption of agriculture 5.0. *Plos one*, *19*(8), e0308883. https://doi.org/10.1371/journal.pone.0308883
22. Nguyen, K. V. (2025). The use of generative AI tools in higher education: Ethical and pedagogical principles. *Journal of Academic Ethics*, *23*(3), 1435-1455. https://link.springer.com/article/10.1007/s10805-025-09607-1
23. Oyelude, A. A. (2024). Artificial intelligence (AI) tools for academic research. *Library Hi Tech News*, *41*(8), 18-20. https://doi.org/10.1108/LHTN-08-2024-0131
24. Panthi, H., Devkota, N., Koirala, P., & Danuwar, R. K. (2025). Social Protection in Shaping Labor Migration Decisions among Youth in South Asia: A Bibliometric Analysis. *Quest Journal of Management and Social Sciences*, *7*(2), 524-537. https://doi.org/10.3126/qjmss.v7i2.87817
25. Passas, I. (2024). Bibliometric analysis: the main steps. *Encyclopedia*, *4*(2). https://doi.org/10.3390/encyclopedia4020065
26. Sahar, R., & Munawaroh, M. (2025). Artificial intelligence in higher education with bibliometric and content analysis for future research agenda. *Discover Sustainability*, *6*(1), 401. https://link.springer.com/article/10.1007/s43621-025-01086-z
27. Siddique, M. R., Devkota, N., Lowar, D. B., Paudel, U. R., Kunwar, R., & Lawaju, P. (2026). Responsible Generative Artificial Intelligence for Sustainable Pedagogy Systems: A Conceptual Framework for the Global South. *International Journal of Emerging Technologies in Learning*, *21*(2), 4. https://doi.org/10.3991/ijet.v21i02.60809
28. Sontake, P. (2025). A review on artificial intelligence (AI) tools in research writing. *International journal of scientific research and technology*, *2*(5), 85-102. https://www.ijsrtjournal.com/article/A+Review+on+Artificial+Intelligence+AI+Tools+in+Research+Writing
29. Tawfik, W. (2024). A strategic review of the impact of modern technologies on scientific research: AI, lasers, and nanotechnology. *Journal of Laser Science and Applications*, *1*(2), 38-48. https://journals.ekb.eg/article_409335.html
30. Valencia-Coronel, B., Marescaux, J. F., & Gimenez, M. (2026). Artificial intelligence-based tools for optimizing surgical research publications. *Artificial Intelligence Surgery*, *6*(1), 36-60. https://doi.org/10.20517/ais.2025.112
31. Wang, D., & Luo, T. (2026). From object to instrument: a perspective on AI as a governance enabler for responsible research and innovation. *Journal of Responsible Innovation*, *13*(1), 2675074. https://doi.org/10.1080/23299460.2026.2675074

32. Xu, Y., Liu, X., Cao, X., Huang, C., Liu, E., Qian, S., ... & Zhang, J. (2021). Artificial intelligence: A powerful paradigm for scientific research. *The innovation*, *2*(4). https://www.cell.com/article/S2666-6758(21)00104-1/fulltext
33. Zahra, W., & Rautela, G. (2024). Revolutionizing learning landscapes: Unleashing the potential of AI in the realm of academic research. In *Artificial intelligence: A multidisciplinary approach towards teaching and learning* (pp. 242-264). Bentham Science Publishers. https://doi.org/10.2174/9789815305180124010l
34. Zhai, C., Wibowo, S., & Li, L. D. (2024). The effects of over-reliance on AI dialogue systems on students' cognitive abilities: a systematic review. *Smart learning environments*, *11*(1), 28. https://doi.org/10.1186/s40561-024-00316-7