Bibliometric Analysis of Human-Centered AI Research in Southeast Asia (2015–2025)

Loso Judijanto[1], Ni Desak Made Santi Diwyarthi[2]
[1] IPOSS Jakarta
[2] Politeknik Pariwisata Bali

Article Info

ABSTRACT

This study does a bibliometric analysis of human-centered artificial intelligence (HCAI) research in Southeast Asia from 2015 to 2025, with the objective of mapping publishing trends, conceptual frameworks, and collaborative networks in the region. The investigation, utilizing the Scopus database and visualization tools like VOSviewer and Bibliometrix, indicates that fundamental AI concepts—namely artificial intelligence, machine learning, and deep learning—function as pivotal anchors in the literature. These technical themes increasingly converge with human-centered areas, including explainable AI, user-centered design, ethical technology, and healthcare applications. The research designates Singapore as the preeminent center for regional and international collaboration, succeeded by Malaysia, Indonesia, Vietnam, and the Philippines. Institutional networks prioritize significant contributions from technological universities and medical research institutions. The results demonstrate a distinct transition towards integrative and value-oriented AI research that incorporates transparency, user empowerment, and social accountability in technical advancement. This study offers a comprehensive assessment of current scholarship and identifies prospects for future research, policymaking, and international collaboration in promoting human-centered AI throughout Southeast Asia.

This is an open access article under the [CC BY-SA](#) license.

Corresponding Author:

Name: Loso Judijanto
Institution: IPOSS Jakarta
Email: losojudijantobumn@gmail.com

1. INTRODUCTION

Artificial intelligence (AI) has become one of the most transformational technologies of the 21st century, altering the operations of individuals, corporations, and governments. Historically, AI research prioritized algorithmic efficacy, computing efficiency, and productivity enhancements through automation. As AI systems progressively impact social life, economic frameworks, and government, scholars and practitioners have transitioned to a human-centered paradigm that emphasizes social values, ethical considerations, and user welfare [1], [2]. Human-centered AI (HCAI) emphasizes that technology innovation must not just improve machine performance but also augment human capabilities, promote diversity, and maintain accountability and openness. Global discussions around AI ethics, ethical innovation, and equitable algorithmic design

underscore the necessity of using human-centered methodologies [3], [4].

The importance of human-centered AI is evident in Southeast Asia, a region experiencing swift digital transformation driven by increasing internet access, mobile connection, and government backed innovation initiatives. Southeast Asian nat ions, including Singapore, Indonesia, Vietnam, Malaysia, Thailand, and the Philippines, have established national plans and institutional frameworks to leverage AI for sustainable development and economic modernization [5]. These tactics demonstrate an increasing acknowledgment that AI func tions not merely as a technology instrument , but also as a socio-technical system in tegrated inside cultural norms, labor f rameworks, and governance capabilities. Singapore's national AI strategy underscores the principles of trustworthy and ethical AI, w hereas Indonesia's National AI Strategy (Stranas KA) prioritizes inclusivity, adaptation to local contexts, and human-centered development [6]. These initiatives illustrate that human-centeredness is now a c ore element in regional AI policy formulation. The varied socio-cultural contexts of Southe ast Asia significantly influence the evolution and implementation of human-centered AI. The region encompasses many ethnicities, languages, religious practices, governmental structures, and degrees of digital infrast ructure. These attributes affect user interactio ns with technology, community interpretations of digital dangers, and institutional conceptualizations of technolo gical responsibility. Recent studies indicate th at the responsible implementation of AI in Southeast Asia is intricately linked to societal norms, community involvement, and tailored education on digital literacy and ethics [7]. M oreover, scholars have investigated s ociotechnical interactions between humans and AI within specific contexts, highlighting the significance of cultural adaptation, value-sensitive design, and participatory innovation [8], [9]. Consequently, Southeast Asia serves as a valuable context for comprehending the development and implementation of human

centered AI in culturally varied environments.

Notwithstanding these advancements, academic inquiry into human-centered AI in Southeast Asia is still f ragmented across various disciplines. Research on HCAI exists across various discip lines, including computer science, engineering, information systems, psychology, communication studies, education, public administration, and social sciences. The multidisciplinary character of HCAI facilitates varied viewpoints but complicates the comprehension of the overarching knowledge framework. Moreover, numerous works are disseminated in regional journals, international conference proceedings, or specialized publications that may lack systematic interconnection. This fragmentation complicates the identification of the most influential works, the comprehension of conceptual progress, and the evaluation of the research area's maturity.

A bibliometric study offers a robust approach for consolidating dispersed literature within a certain research subject. Bibliometrics, as a quantitative method, facilitates the assessment of publication trends, citation patterns, social network config urations, and topic clusters over time [10], [11]. Bibliometrics delineates the intellectual landscape of a topic through visualization techniques such as co-authorship networks, co-occurrence maps, and citation bursts, eluci dating the interactions among significant themes, authors, and institutions. This approach is especially beneficial for nascent interdisciplinary domains such as human-centered AI, where conventional narrative evaluations may neglect structural patterns or interrelations among various research communities. In Southeast Asia, bi bliometrics can reveal the contributions of reg ional scholars, institutions, and governments to the discourse and practice of human-c entered AI.

The swift evolution of AI-related pol icies and efforts in Southeast Asia from 2015 to 2025 necessitates a bibliometric analysis. The chosen timeframe encompasses the first adoption phase of AI in the region, the

emergence of national AI initiatives, heightened discussions on AI ethics, and the post-pandemic shift towards digital-first services and hybrid human–AI collaboration. Furthermore, the decade signifies significant technological transformations, including progress in machine learning, human-computer interaction, natural language processing, and ethical AI frameworks. Comprehending the evolution of research on human-centered AI during this revolutionary era offers critical insights for academia, industry, and governments aiming to cultivate ethical, inclusive, and contextually aware AI ecosystems.

Despite the increasing academic and policy focus on human-centered AI, a thorough bibliometric analysis has yet to be undertaken to delineate research trends, intellectual frameworks, and collaboration networks pertaining to human-centered AI in Southeast Asia from 2015 to 2025. The lack of systematic analysis hinders regional comprehension of research capability, knowledge evolution, and emerging themes, thereby restricting evidence-based policymaking and academic progress in the discipline.

This study intends to perform a bibliometric analysis of human-centered AI research in Southeast Asia from 2015 to 2025. The objectives are to (1) identify publication trends and citation growth, (2) analyze the most influential authors, institutions, countries, and journals, (3) examine collaborative research networks, (4) map thematic clusters via keyword co-occurrence and conceptual structures, and (5) highlight emerging research fronts and knowledge gaps. The results are anticipated to deliver a thorough analysis of the evolution of human-centered AI research in Southeast Asia and furnish strategic insights for forthcoming research, responsible AI governance, and the formulation of human-centered AI initiatives throughout the region.

2. METHOD

This study employed a quantitative bibliometric methodology to systematically analyze the structure, evolution, and thematic progression of human-centered AI research in Southeast Asia from 2015 to 2025. Bibliometric analysis is extensively employed to synthesis extensive scholarly literature and reveal patterns about publishing trends, citation structures, and intellectual networks [10], [12]. Scopus was chosen as the principal data source because of its extensive coverage of peer-reviewed publications, conference papers, and interdisciplinary research pertinent to artificial intelligence, ethics, and human–computer interaction. The search technique included a blend of keywords pertaining to human-centered AI (e.g., "human-centered AI," "responsible AI," "user-centered design," "AI ethics," "sociotechnical AI") alongside Southeast Asian nations. Boolean operators (AND, OR) and truncation symbols (*) were employed to enhance precision and recall, in accordance with accepted bibliometric study methodologies [13], [14]. Only English-language articles from 2015 to 2025 were considered, but non-scholarly elements, such as editorials and book reviews, were eliminated.

Upon obtaining the initial dataset, all bibliographic records were exported in CSV and RIS formats for preprocessing. Data cleaning adhered to established guidelines, including the elimination of duplicates, harmonization of author names, standardization of institutional affiliations, and consolidation of synonymous terms [15], [16]. The cleaned data were loaded into VOSviewer and the Bibliometrix R tool for analysis and visualization. VOSviewer was utilized to create co-authorship networks, co-occurrence keyword maps, citation networks, and visualizations of international collaboration, facilitating the identification of intellectual connections and research clusters. Bibliometrix, utilized through the Biblioshiny interface, facilitated descriptive analysis encompassing annual scientific output, highly cited publications, prominent journals, and productivity trends by author and institution [13]. The integration of these methods facilitated a comprehensive analysis of the field's structural and conceptual attributes.

To guarantee methodological rigor, many validation procedures were executed. Keyword clustering and theme groupings were analyzed using several normalizing methods to guarantee stability and uniformity of outcomes. The geographic relevance was manually validated to ensure that articles were authentically associated with Southeast Asia by author affiliation, empirical context, or thematic concentration. Sensitivity analyses were performed by modifying search keywords and filtering criteria, adhering to established recommended practices for robustness in bibliometric research (Donthu et al., 2021). This integrated and tested technique yielded a credible and complete mapping of human-centered AI research in Southeast Asia during the specified decade, providing insights into collaboration patterns, thematic evolution, and upcoming research fronts.

3. RESULT AND DISCUSSIONS

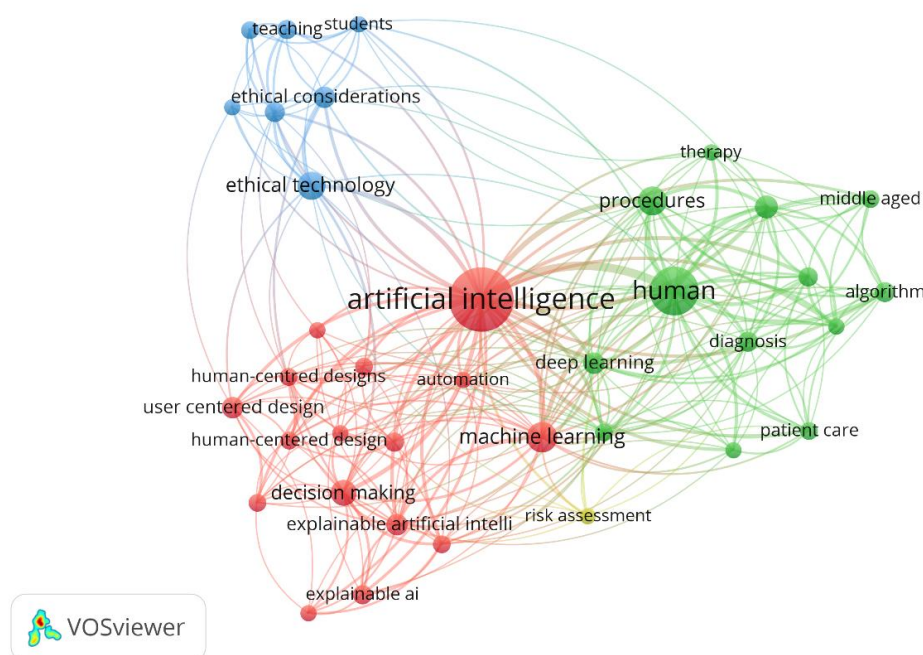### 3.1 Network Visualization

Figure 1. Network Visualization
Source: Data Analysis Result, 2025

The VOSviewer visualization displays a hierarchical network of keyword co-occurrence, illustrating the interconnections of concepts pertaining to artificial intelligence, human interaction, ethics, and healthcare applications. The primary nodes—"artificial intelligence," "human," and "machine learning"—emerge as the most prominent and interconnected phrases, signifying their preeminent position in the research environment. The density and thickness of the connecting lines indicate robust conceptual ties, signifying that several publications often utilize these terms in conjunction. This central position indicates that human-centered AI is integrated within the wider discourse of AI and machine learning, rather than being regarded as an independent domain.

The red cluster focuses on human-centered design, user-centered design, decision-making, explainable AI, and automation. This signifies a robust corpus of study centered on the design of AI systems to accord with human requirements, values, and usability principles. The occurrence of terms like "explainable artificial intelligence" and

"explainable AI" indicates the growing significance of transparency and interpretability in AI systems. These concepts are intricately associated with "decision making," indicating that explainability is an essential criterion for facilitating reliable decisions in scenarios where humans depend on AI outputs. This cluster embodies the fundamental concepts of human-centered AI: usability, transparency, and the minimization of algorithmic opacity.

The green cluster is characterized by terms including "procedures," "diagnosis," "patient care," "therapy," "algorithm," and particular demographic references such as "middle aged." A substantial segment of human-centered AI research concentrates on healthcare applications, especially clinical decision support, diagnostic processes, and patient-specific algorithmic interventions. The significant co-occurrence of "human," "patient care," and "diagnosis" indicates that healthcare is a primary domain for the application of human-centered AI principles. This cluster assesses AI technologies based on performance, patient safety, clinical workflows, and the influence on human roles in therapeutic decision-making.

The blue cluster includes keywords like "ethical considerations," "ethical technology," and "educating students." This indicates that another significant corpus of literature concentrates on the ethical, pedagogical, and regulatory aspects of AI. The connection between ethics and education

signifies an increasing focus on preparing future practitioners, students, and stakeholders to comprehend the moral ramifications of AI technology. This cluster emphasizes issues pertaining to responsible AI development, equity, transparency, and the societal implications of automated systems. Their peripheral yet related position signifies that ethics is a significant but more specialized issue in contrast to central technical notions such as machine learning.

The network has robust cross-cluster connections, indicating that research often amalgamates design, ethics, healthcare, and machine learning in cohesive dialogues. Ethical considerations intersect with human-centered design through dialogues on transparency and with healthcare through issues about the safe and responsible clinical application of algorithms. The existence of intersecting lines among these three clusters illustrates that human-centered AI is fundamentally interdisciplinary, connecting technological, ethical, and applied fields. This interconnection also illustrates a wider trend in the literature: the transition from exclusively technical AI research to more comprehensive frameworks that consider human requirements, social implications, and domain-specific applications. The image illustrates a research environment in which human-centered AI is not a distinct niche but a pervasive issue influencing various topic areas.
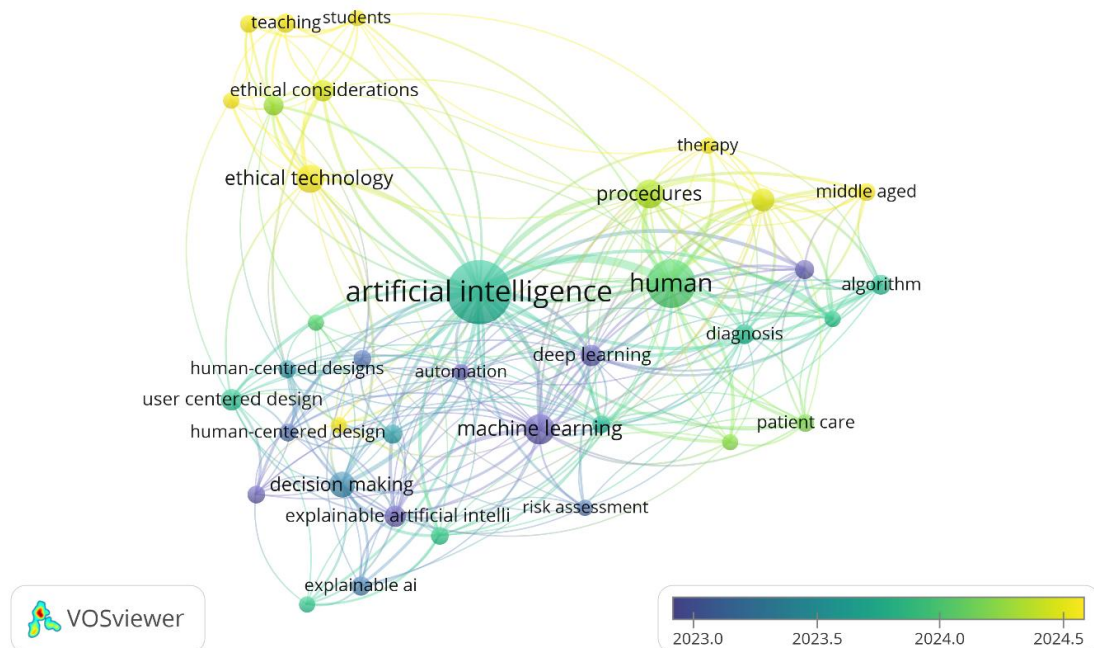
3.2 Overlay Visualization

Figure 2. Overlay Visualization
Source: Data Analysis Result, 2025

The overlay graphic indicates that "artificial intelligence," "human," and "machine learning" are the predominant and most frequently occurring terms over the timeframe; nonetheless, their predominantly greenish hues suggest they reached their zenith around 2023–2024. This indicates that foundational discussions connecting AI and human interaction have persisted consistently, with heightened prominence during the dataset's mid-period. Simultaneously, phrases like "deep learning," "automation," and "decision making" are displayed in a darker blue, indicating priority research engagement nearer to 2023. These initial contributions constitute the technical and algorithmic underpinnings from which subsequent human-centered discussions emerged. The map illustrates a progressive transition from technical machine learning subjects to more contextualized, human-centric themes over time.

The luminous yellow nodes "ethical considerations," "ethical technology," "teaching students," "procedures," "middle aged," and "therapy"—signify that these subjects denote recent study interests arising from late 2024 to 2025. Concerns regarding ethical AI, responsible technology use, and AI education are swiftly escalating, mirroring global discussions on reliable and value-oriented AI. Likewise, medical terminology including "diagnosis," "patient care," and "procedures" has demonstrated heightened significance in the latest timeframe. This signifies that healthcare continues to be a prominent field for the implementation of human-centered AI, especially in the development of models that prioritize safety, interpretability, and clinical usability. The increasing prevalence of demographic terminology like "middle aged" indicates a transition towards more population-specific, user-focused assessments of AI systems.

The amalgamation of hues linking all groups underscores a significant trend: research is progressing

towards multidisciplinary convergence. Preliminary technological inquiries (blue) into machine learning and deep learning are progressively converging with contemporary dialogues on ethics, design, and healthcare (yellow-green). The network structure indicates that explainable AI, user-centered design, and ethical technology have emerged as connecting themes that associate technical advancement with societal applications. This signifies a wider transition in the discipline towards human-centered AI, wherein transparency, usability, accountability, and contextual relevance constitute the foundation of developing scholarship. The map indicates that from 2023 to 2025, Southeast Asian AI research is shifting from algorithmic innovation to integrative frameworks that encompass human requirements, ethical safeguards, and domain-specific practices, particularly in healthcare and education.

3.3 Citation Analysis

This study analyzed the most cited journals in the dataset to discover the intellectual underpinnings and significant contributions in human-centered and explainable artificial intelligence, namely in healthcare and user-centric system design. Elevated citation counts indicate the academic community's acknowledgment of a work's significance, methodological precision, and conceptual impact in guiding research trajectories. The table below displays the most-cited publications pertaining to explainable AI (XAI), trustworthy AI, diagnostic AI evaluation standards, mental health applications, and human-centered design concepts. These works collectively elucidate the progress of global academia in advancing conversations on transparency, user empowerment, therapeutic applicability, and ethical considerations in AI systems.

Table 1. Most Cited Article

Citations	Author and Year	Title
648	[17]	Designing theory-driven user-centric explainable AI
462	[18]	A systematic review of trustworthy and explainable artificial intelligence in healthcare: Assessment of quality, bias risk, and data fusion
237	[19]	A Systematic Review of Human-Computer Interaction and Explainable Artificial Intelligence in Healthcare with Artificial Intelligence Techniques
202	[20]	Developing a reporting guideline for artificial intelligence-centred diagnostic test accuracy studies: The STARD-AI protocol
163	[21]	Systematic review and meta-analysis of AI-based conversational agents for promoting mental health and well-being
147	[22]	A quality assessment tool for artificial intelligence-centered diagnostic test accuracy studies: QUADAS-AI
62	[23]	Human-Centered Artificial Intelligence: Designing for User Empowerment and Ethical Considerations
61	[24]	The current research landscape of the application of artificial intelligence in managing cerebrovascular and heart diseases: A bibliometric and content analysis
57	[25]	Imagining new futures beyond predictive systems in child welfare: A qualitative study with impacted stakeholders
51	[26]	Validation of Deep Convolutional Neural Network-based algorithm for detection of diabetic retinopathy-Artificial intelligence versus clinician for screening

Source: Scopus, 2025

The citation trends in the table underscore multiple prominent research trajectories within the human-centered AI domain. The most significant research highlights the importance of user-centric explainability, indicating that creating AI systems comprehensible to individuals is a fundamental issue and priority. This is demonstrated by Wang et al.'s theory-driven framework, which has emerged as a fundamental reference for constructing interpretable systems that correspond with human cognitive processes Secondly, healthcare stands out as the predominant application domain, characterized by numerous widely cited systematic studies and quality-assessment frameworks that emphasize reliable and interpretable AI in clinical environments. These studies highlight issues related to diagnostic precision, bias, transparency, and the necessity for standardized reporting standards like STARD-AI and QUADAS-AI, indicating a global trend towards the governance of clinical-grade AI. Third, numerous papers expand the domain by focusing on mental health, child welfare, and ethical empowerment, demonstrating the increasing significance of human-centered AI beyond mere technological efficiency. The table indicates that the intellectual foundation of the subject is influenced by interdisciplinary collaboration that amalgamates technological, ethical, and domain-specific viewpoints, hence propelling the advancement of responsible and human-aligned AI systems.
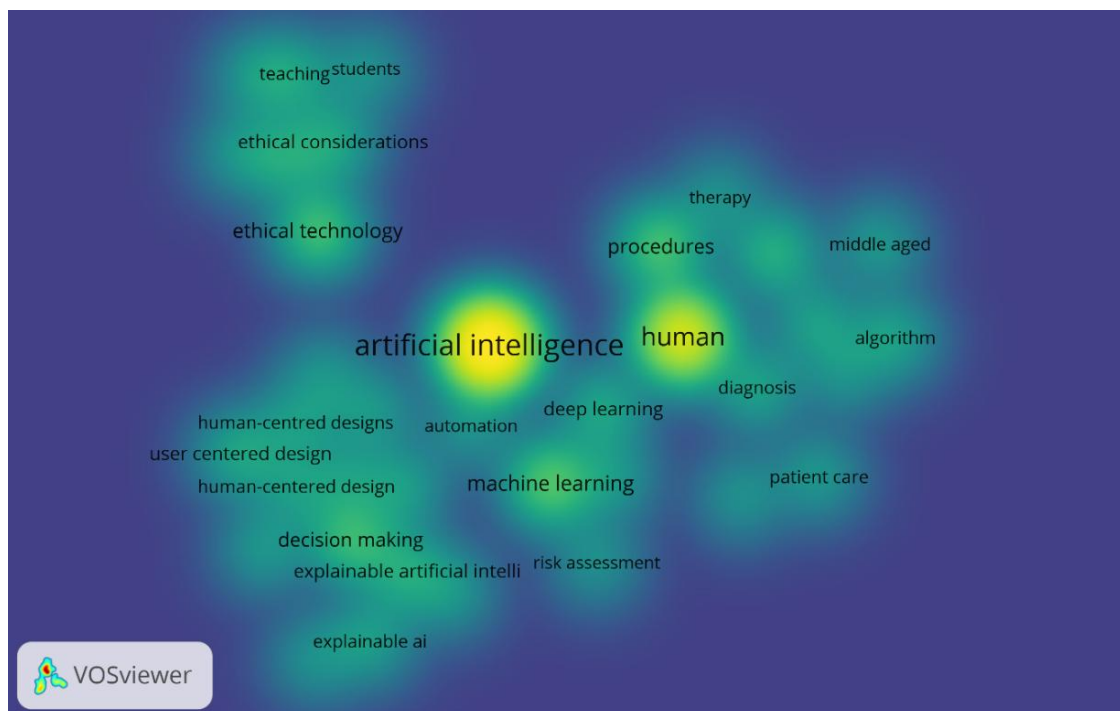
3.4 Density Visualization

Figure 3. Density Visualization
Source: Data Analysis Result, 2025

The density map emphasizes "artificial intelligence," "human," and "machine learning" as the most luminous and concentrated regions, signifying that these terms are the fundamental conceptual pillars of the research subject. Their vivid yellow hue indicates their frequent occurrence and extensive co-occurrence with other keywords, serving as the intellectual nucleus of the field. Adjacent to these fundamental terms are supplementary fairly dense sections linked to "deep learning," "procedures," "diagnosis,"

and "patient care," indicating that clinical and healthcare-related applications constitute one of the most dynamic subdomains. This pattern illustrates the worldwide trend of integrating AI technologies into diagnostic processes, therapeutic decision-making, and risk evaluation. The high density in these areas signifies ongoing academic focus, highlighting both technological progress and human-centric issues in the deployment of healthcare AI.

Conversely, the phrases situated in the greener or lighter blue zones—such as "ethical considerations," "ethical technology," "human-centered design," and "teaching students"—exhibit a lower nevertheless discernible density. These domains signify nascent or specialized study themes, particularly in ethics, user-centered design, and artificial intelligence education. Despite being less dense than the healthcare and core AI clusters, their representation in the density map indicates a growing academic interest in responsible AI, explainability, and user empowerment. The distribution indicates a research landscape predominantly focused on technological and therapeutic applications, while progressively extending to encompass wider societal issues related to ethics, pedagogy, and human–AI interaction. This signifies a transition towards more comprehensive and multifaceted methodologies in the advancement of human-centered AI.
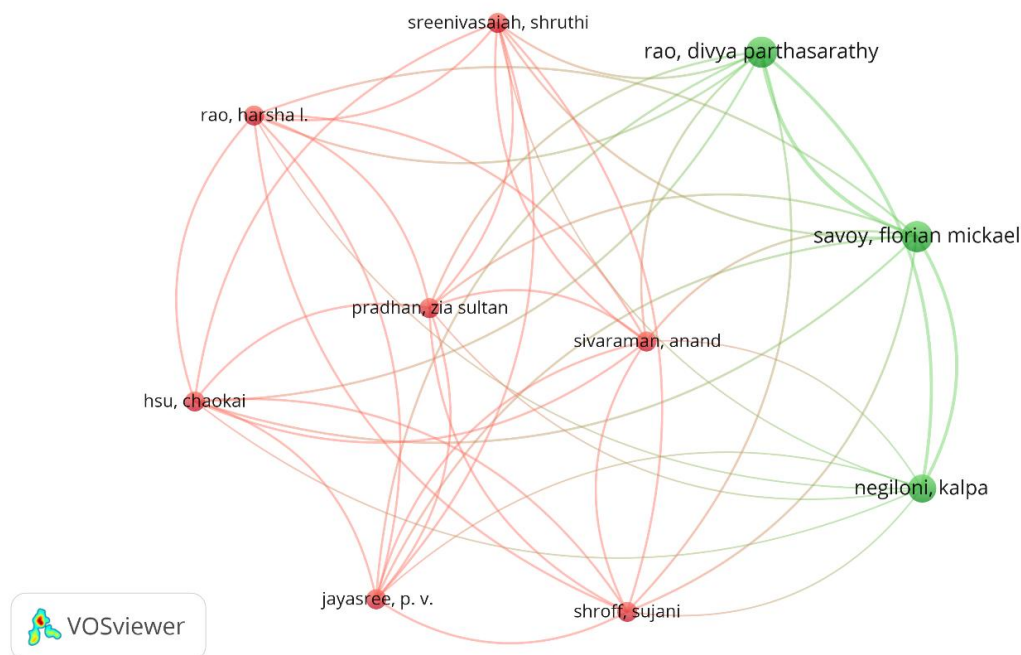
3.5 Co-Authorship Network

Figure 4. Author Visualization
Source: Data Analysis Result, 2025

The co-authorship network graphic illustrates two separate clusters of researchers who collaborate intensively inside their organizations while exhibiting few interactions between clusters. The red cluster has authors including Sreenivasaiah Shruthi, Harsha L. Rao, Zia Sultan Pradhan, Anand Sivaraman, Chaokai Hsu, P.V. Jayasree, and Sujani Shroff. This group exhibits tight internal linkages, suggesting regular collaboration and perhaps shared institutional affiliations, research initiatives, or regional focal points. Conversely, the green cluster, consisting of Divya Parthasarathy Rao,

Florian Mickael Savoy, and Kalpa Negiloni, constitutes a unified collaborative entity with robust interconnections among its members. Nevertheless, the connections between the red and green clusters are limited and tenuous, indicating seldom or indirect coordination between the two groups.

The network illustrates a fragmented authorship landscape where research output is predominantly generated by small, closely-knit teams rather than extensive, cross-institutional collaboration, indicative of the nascent or specialized character of the subject within this dataset.
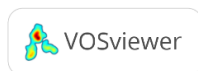

Figure 5. Affiliation Visualization
Source: Data Analysis Result, 2025

The institutional collaboration network demonstrates a distinct concentration of research activity across Singaporean institutions, which serve as the core hubs of the network. The Singapore Eye Research Institute, Nanyang Technological University (NTU), Duke-NUS Medical School, and the Yong Loo Lin School of Medicine demonstrate significant interconnections, indicating robust interdisciplinary collaboration among medical, technological, and research-focused entities within the nation. The thickness and frequency of the connecting lines signify that these institutions collaboratively contribute to significant studies, especially in AI-driven healthcare and diagnostic research. The University of Leeds serves

as a significant international partner, participating in cross-border collaboration with prominent institutions in Singapore. Despite their limited quantity, these transnational connections underscore the global significance of the research undertaken in Southeast Asia and demonstrate that Singapore serves as a conduit between regional expertise and worldwide research networks. The depicted network depicts Singapore as a preeminent collaborative center, characterized by robust internal synergy and selective yet significant connections with leading foreign universities.

3.6 Discussion

a. Practical Implications

This bibliometric study's findings present numerous practical

implications for governments, academic institutions, and industrial players in Southeast Asia. The preeminence of Singapore, Malaysia, and prominent healthcare institutions within collaborative networks underscores the necessity of enhancing regional research connections, especially for nations with diminished publication output like Brunei Darussalam, the Maldives, and Jordan. Governments and institutions may utilize this insight to promote targeted collaborations, collaborative research grants, or capacity-building initiatives to improve regional knowledge exchange. The prevalence of healthcare-related terminology—such as diagnosis, patient care, and procedures—underscores the pressing necessity for regulatory frameworks and clinical governance models that guarantee the safe, transparent, and ethical implementation of AI-based systems in hospitals and public health environments. The increasing emphasis on human-centered design, explainable AI, and ethical technology indicates that practitioners ought to incorporate user engagement, transparency tools, and principles of responsible innovation at the outset of the AI development lifecycle. This study assists practitioners in recognizing significant themes, new opportunities, and strategic pathways for the adoption of human-centered AI in Southeast Asia.

b. Theoretical Contributions

This study theoretically enhances the discourse on human-centered artificial intelligence by illustrating the evolution of the field at the convergence of technological progress, societal values, and specialized applications. The study's analysis of phrase clusters indicates

that human-centered AI is not a solitary theoretical concept but a multifaceted framework that includes explainability, user-centered design, ethical issues, and healthcare application. The study enhances theoretical comprehension of human-centered AI as a socio-technical system by recognizing the co-occurrence of these notions, necessitating alignment among algorithms, human cognition, and institutional environments. The identification of key authors, institutions, and international connections enhances current theories on knowledge diffusion and scientific collaboration, illustrating how Southeast Asia creates a hybrid ecosystem in which global AI research is adapted through culturally ingrained design and governance practices. This study enhances theoretical discourse by demonstrating the development of human-centered AI through interdisciplinary convergence and cross-regional scientific networks.

c. Limitations

Notwithstanding its merits, this study possesses numerous drawbacks that warrant acknowledgment. The analysis is only based on the Scopus database, which, although extensive, may not encompass all pertinent regional publications, conference proceedings, or research outputs in local languages, thus underrepresenting contributions from smaller Southeast Asian nations. Secondly, bibliometric methodologies emphasize quantitative measures like citation counts and keyword frequencies, which inadequately reflect the qualitative depth, methodological rigor, or contextual subtleties of particular research. Third, the co-authorship and international cooperation networks solely

represent official publication-based partnerships and may neglect informal alliances, policy-driven collaborations, or nascent projects that have not yet yielded published outputs. The study's span of 2015–2025 encompasses a period of swift technological advancement; hence, novel research patterns may rapidly arise that are not yet apparent in the dataset. These constraints indicate prospects for future research to incorporate qualitative analysis, multi-database inquiries, and longitudinal comparisons to achieve a more comprehensive understanding of human-centered AI development.

4. CONCLUSIONS

This bibliometric analysis offers an extensive overview of human-centered artificial intelligence (HCAI) research in Southeast Asia from 2015 to 2025, illustrating the evolution of the subject across conceptual, collaborative, and geographical aspects. The analysis reveals that the region's research landscape is centered around a core cluster of fundamental AI concepts—namely artificial intelligence, machine learning, deep learning, and human interaction—which provide the intellectual foundation of the discipline. Over time, these technical disciplines have progressively converged with human-centered themes, such as explainable AI, user-centered design, ethical technology, and decision-making. This convergence signifies a transition from solely algorithmic development to a more integrative framework that incorporates human values, interpretability, and user agency inside AI

systems. The collaborative networks emphasize the evolving framework of regional knowledge creation. Singapore has established itself as the foremost center of scientific activity, forging robust collaborations with Malaysia, Indonesia, Vietnam, and the Philippines, alongside global powers such as the United Kingdom, China, and Germany. The results indicate that Southeast Asia thrives due to a hybrid research ecosystem in which local expertise and foreign collaboration synergistically enhance human-centered AI. Institutional networks demonstrate that medical schools, technical universities, and ocular research centers significantly enhance the region's academic productivity, especially in health-related artificial intelligence applications. This underscores the importance of healthcare as a primary field where human-centered AI principles such as safety, transparency, and trust are implemented. This study's findings delineate current research trajectories and underscore strategic prospects for future advancement. Emerging themes in ethics, AI education, and responsible innovation indicate an increasing societal demand for AI systems that are both technically proficient and socially responsible. The existence of low-density areas and underrepresented nations within the network indicates a necessity for enhanced capacity building and regional integration to facilitate more equal knowledge distribution. This study enhances the comprehension of the conceptualization, localization, and collaborative advancement of human-centered AI in Southeast Asia. It establishes a basis for future academic research and assists policymakers and practitioners in promoting responsible and human-centered AI ecosystems throughout the area.

REFERENCES

[1]   B. Shneiderman, "Human-centered artificial intelligence: Reliable, safe & trustworthy," *Int. J. Human–Computer Interact.*, vol. 36, no. 6, pp. 495–504, 2020, doi: 10.1080/10447318.2020.1741118.

[2]   H. Ashari and T. P. Nugrahanti, "Household economy challenges in fulfilling life needs during the Covid-19 pandemic," *Glob. Bus. Econ. Rev.*, vol. 25, no. 1, pp. 21–39, 2021.

[3]   H. Suresh and J. Guttag, "A framework for understanding sources of harm throughout the machine learning life cycle," in *Proceedings of the 1st ACM Conference on Equity and Access in Algorithms, Mechanisms, and Optimization*, 2021, pp. 1–9.

[4]   I. Agustina, H. Khuan, B. Aditi, S. A. Sitorus, and T. P. Nugrahanti, "Renewable energy mix enhancement: the power of foreign investment and green policies," *Int. J. Energy Econ. Policy*, vol. 13, no. 6, pp. 370–380, 2023.

[5]   ASEAN Secretariat, "ASEAN AI Governance and Ethics Guidelines," *ASEAN Secretariat, Jakarta*, 2021.

[6]   Indonesia Ministry of Communication and Information Technology, "Indonesia National AI Strategy 2020–2045: Making Indonesia 4.0," *Ministry of Communication and Information Technology, Jakarta*, 2020.

[7]   F. Rahim and D. Seng, "Responsible artificial intelligence adoption in Asia: A systematic review," *AI Ethics*, vol. 3, no. 4, pp. 913–928, 2023, doi: 10.1007/s43681-022-00246-9.

[8]   O. Kudina and P.-P. Verbeek, "Ethics from within: Google Glass, the Collingridge dilemma, and the mediated value of privacy," *Sci. Technol. Hum. Values*, vol. 44, no. 2, pp. 291–314, 2019, doi: 10.1177/0162243918793711.

[9]   N. Redi, S. Lim, and C. Tan, "Sociotechnical perspectives on AI in Southeast Asia," *Inf Commun Soc*, vol. 25, no. 6, pp. 789–806, 2022, doi: 10.1080/1369118X.2021.1896837.

[10]   N. Donthu, S. Kumar, D. Mukherjee, N. Pandey, and W. M. Lim, "How to conduct a bibliometric analysis: An overview and guidelines," *J. Bus. Res.*, vol. 133, pp. 285–296, 2021, doi: 10.1016/j.jbusres.2021.04.070.

[11]   J. Jobstreibizer, T. Beliaeva, M. Ferasso, S. Kraus, and A. Kallmuenzer, "The impact of artificial intelligence on business models: a bibliometric-systematic literature review," *Manag. Decis.*, vol. 63, no. 13, pp. 372–396, 2025.

[12]   I. Zupic and T. Čater, "Bibliometric methods in management and organization," *Organ. Res. methods*, vol. 18, no. 3, pp. 429–472, 2015, doi: 10.1177/1094428114562629.

[13]   M. Aria and C. Cuccurullo, "bibliometrix: An R-tool for comprehensive science mapping analysis," *J. Informetr.*, vol. 11, no. 4, pp. 959–975, 2017, doi: 10.1016/j.joi.2017.08.007.

[14]   Y. Guo, Z. Hao, S. Zhao, J. Gong, and F. Yang, "Artificial intelligence in health care: bibliometric analysis," *J. Med. Internet Res.*, vol. 22, no. 7, p. e18228, 2020.

[15]   N. J. Van Eck and L. Waltman, "Visualizing bibliometric networks," in *Measuring scholarly impact: Methods and practice*, Springer, 2014, pp. 285–320. doi: 10.1007/978-3-319-10377-8_13.

[16]   M. G. Sono, "Bibliometric Analysis of The Term 'Marketing Sustainability.'" *West Sci. Interdiscip. Stud.*, vol. 1, no. 06, pp. 314–325, 2023.

[17]   D. Wang, Q. Yang, A. Abdul, and B. Y. Lim, "Designing theory-driven user-centric explainable AI," in *Proceedings of the 2019 CHI conference on human factors in computing systems*, 2019, pp. 1–15.

[18]   A. S. Albahri *et al.*, "A systematic review of trustworthy and explainable artificial intelligence in healthcare: Assessment of quality, bias risk, and data fusion," *Inf. Fusion*, vol. 96, pp. 156–191, 2023.

[19]   M. Nazar, M. M. Alam, E. Yafi, and M. M. Su'ud, "A systematic review of human–computer interaction and explainable artificial intelligence in healthcare with artificial intelligence techniques," *IEEE Access*, vol. 9, pp. 153316–153348, 2021.

[20]   V. Sounderajah *et al.*, "Developing a reporting guideline for artificial intelligence-centred diagnostic test accuracy studies: the STARD-AI protocol," *BMJ Open*, vol. 11, no. 6, p. e047709, 2021.

[21]   H. Li, R. Zhang, Y.-C. Lee, R. E. Kraut, and D. C. Mohr, "Systematic review and meta-analysis of AI-based conversational agents for promoting mental health and well-being," *NPJ Digit. Med.*, vol. 6, no. 1, p. 236, 2023.

[22]   V. Sounderajah *et al.*, "A quality assessment tool for artificial intelligence-centered diagnostic test accuracy studies: QUADAS-AI," *Nat. Med.*, vol. 27, no. 10, pp. 1663–1665, 2021.

[23]   U. A. Usmani, A. Happonen, and J. Watada, "Human-centered artificial intelligence: Designing for user empowerment and ethical considerations," in *2023 5th international congress on human-computer interaction, optimization and robotic applications (HORA)*, 2023.

[24]   B. X. Tran *et al.*, "The current research landscape of the application of artificial intelligence in managing cerebrovascular and heart diseases: A bibliometric and content analysis," *Int. J. Environ. Res. Public Health*, vol. 16, no. 15, p. 2699, 2019.

[25]   L. Stapleton *et al.*, "Imagining new futures beyond predictive systems in child welfare: A qualitative study with impacted stakeholders," in *Proceedings of the 2022 ACM Conference on Fairness, Accountability, and Transparency*, 2022, pp. 1162–1177.

[26]   P. Shah, D. K. Mishra, M. P. Shanmugam, B. Doshi, H. Jayaraj, and R. Ramanjulu, "Validation of Deep Convolutional Neural Network-based algorithm for detection of diabetic retinopathy–Artificial intelligence versus clinician for screening," *Indian J. Ophthalmol.*, vol. 68, no. 2, pp. 398–405, 2020.