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Online Hospital Registration Systems and Public Service Transparency:

A Bibliometric Analysis

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ABSTRACT

Online hospital registration systems have become an integral component of digital healthcare transformation by improving service accessibility, administrative efficiency, and transparency in public healthcare delivery. Despite the increasing adoption of digital registration platforms, the scientific development and intellectual structure of this research area have not been comprehensively examined. Therefore, this study aims to analyze global research trends on online hospital registration systems and public service transparency through a bibliometric approach. Bibliographic data were retrieved from the Scopus database using Publish or Perish (PoP), while bibliometric mapping and network visualization were performed using VOSviewer. The analysis examined publication trends, citation performance, leading authors, journals, countries, institutional collaboration, co-authorship networks, co-citation relationships, bibliographic coupling, and keyword co-occurrence. The findings indicate a substantial increase in scientific publications since 2020, reflecting the acceleration of digital transformation in healthcare services. The dominant research themes include digital health, hospital information systems, electronic patient registration, healthcare governance, service quality, patient satisfaction, transparency, and e-government. Emerging research topics identified through overlay visualization include artificial intelligence, interoperability, cybersecurity, and patient-centered digital healthcare services. The keyword network demonstrates that online hospital registration systems are increasingly associated with transparency, accountability, healthcare accessibility, and governance innovation. These findings provide a comprehensive overview of the intellectual landscape of this research field and offer valuable insights for researchers, healthcare practitioners, and policymakers in designing transparent, efficient, and sustainable digital healthcare services.

Keywords: bibliometric analysis; online hospital registration; digital health; healthcare governance; public service transparency; VOSviewer.

A.INTRODUCTION

The rapid advancement of digital technologies has fundamentally transformed healthcare systems worldwide, encouraging hospitals to modernize administrative processes and improve the accessibility of public health services. Among these innovations, online hospital registration systems have become an essential component of digital healthcare, enabling patients to schedule appointments remotely, reduce waiting times, and access healthcare services more efficiently. These systems improve operational efficiency while strengthening transparency and accountability by providing standardized and traceable service processes. The implementation of digital registration systems is also consistent with the broader digital transformation agenda promoted by governments and international health organizations to achieve patient-centered healthcare services and sustainable health systems (World Health Organization [WHO], 2021; Agarwal et al., 2010).

Healthcare digitalization extends beyond technological adoption to include organizational transformation, administrative modernization, and improvements in governance practices. Hospital Information Systems (HIS), Electronic Medical Records (EMRs), telemedicine, and online registration platforms have become key infrastructures supporting efficient healthcare management. Previous studies have demonstrated that digital registration systems significantly reduce patient waiting times, improve resource allocation, and enhance service quality by simplifying administrative procedures (Kruse et al., 2018; Zhao et al., 2017). Consequently, healthcare institutions increasingly recognize online registration systems as strategic tools for improving operational performance while ensuring equitable access to healthcare services.

Transparency has become one of the fundamental principles of public administration and healthcare governance. Public healthcare organizations are expected to provide services that are not only effective and efficient but also transparent, accountable, and accessible. Online hospital registration systems facilitate transparency by recording administrative transactions electronically, minimizing procedural errors, and allowing patients to monitor their registration status in real time. Furthermore, digital platforms improve institutional accountability by generating reliable administrative data that support policy evaluation and managerial decision-making (Janssen & van den Hoven, 2015; Mergel et al., 2019). These developments illustrate the close relationship between digital innovation and transparent public service delivery.

The COVID 19 pandemic significantly accelerated the implementation of digital healthcare technologies worldwide. Hospitals rapidly adopted online registration systems to minimize physical contact, maintain service continuity, and improve healthcare accessibility during public health emergencies. This transformation stimulated substantial growth in scientific publications related to digital health, e-health, hospital information systems, and online patient registration. Recent studies indicate that digital healthcare technologies have become central components of resilient healthcare systems, supporting efficient healthcare delivery and enhancing patient satisfaction (Keesara et al., 2020; WHO, 2021). Consequently, research concerning online registration systems has expanded considerably during the past five years.

Despite the increasing number of empirical studies investigating online hospital registration systems, existing research remains fragmented across multiple scientific disciplines, including health informatics, healthcare management, public administration, and information systems. Most previous investigations have focused primarily on system implementation, technology acceptance, service quality, and patient satisfaction, whereas relatively few studies have comprehensively examined the intellectual development of this research field from a global perspective. As a result, limited evidence exists regarding publication trends, influential authors, institutional collaboration, thematic evolution, and emerging research topics that characterize the scientific landscape of online hospital registration systems (Donthu et al., 2021).

Bibliometric analysis has become one of the most widely adopted quantitative approaches for evaluating scientific productivity and mapping knowledge development across research fields. Unlike conventional literature reviews, bibliometric methods systematically analyze publication performance, citation impact, collaboration networks, and thematic structures using quantitative indicators. Software such as Publish or Perish and VOSviewer enables researchers to visualize co-authorship networks, keyword co-occurrence, citation relationships, bibliographic coupling, and co-citation structures, thereby providing comprehensive insights into research dynamics and intellectual evolution (Aria & Cuccurullo, 2017; van Eck & Waltman, 2010). Consequently, bibliometric analysis has become an important methodological approach for identifying research trends and future scientific opportunities.

The growing importance of digital governance, healthcare accessibility, and public service transparency further strengthens the need for bibliometric investigations focusing on online hospital registration systems. Understanding global publication trends and collaboration patterns is essential for identifying research gaps and supporting evidence-based policymaking in healthcare digitalization. Moreover, bibliometric findings provide valuable information regarding leading countries, productive institutions, influential journals, and emerging research themes, thereby facilitating international collaboration and innovation in digital healthcare services (Donthu et al., 2021; Mergel et al., 2019).

Based on these considerations, this study aims to conduct a comprehensive bibliometric analysis of scientific publications concerning online hospital registration systems and public service transparency indexed in the Scopus database. Using Publish or Perish for bibliographic retrieval and VOSviewer for network visualization, this study analyzes publication growth, citation performance, leading authors, productive institutions, influential journals, country collaboration, keyword co-occurrence, bibliographic coupling, and thematic evolution. The findings are expected to provide a comprehensive overview of the intellectual structure of this rapidly developing field while identifying emerging research opportunities that contribute to transparent, efficient, and sustainable digital healthcare governance (Aria & Cuccurullo, 2017; Donthu et al., 2021).

B.RESEARCH METHOD

This study employed a quantitative bibliometric research design to examine the global development of research on online hospital registration systems and public service transparency. Bibliographic data were retrieved from the Scopus database using Publish or Perish (PoP) software with the following search query: ("online hospital registration" OR "electronic hospital registration" OR "online patient registration" OR "hospital appointment system") AND ("public service transparency" OR transparency OR accountability OR "digital health"). The search was limited to English-language journal articles, while conference papers, book chapters, editorials, notes, and duplicate records were excluded to ensure the consistency and quality of the dataset. The retrieved bibliographic metadata included publication titles, authors, publication years, journals, affiliations, abstracts, author keywords, citations, and references. Subsequently, the metadata were screened and exported in RIS and CSV formats for bibliometric analysis.

The bibliometric analysis was conducted using two complementary software applications: Publish or Perish and VOSviewer version 1.6.20. Publish or Perish was used to calculate bibliometric performance indicators, including the total number of publications, total citations, citations per year, citations per paper, h-index, and g-index. Meanwhile, VOSviewer was employed to construct and visualize bibliometric networks through network visualization, overlay visualization, and density visualization. The analysis included citation analysis, co-authorship analysis, co-citation analysis, bibliographic coupling, and keyword co-occurrence analysis to identify publication trends, influential authors, collaborative networks, and emerging research themes. This integrated bibliometric approach provides a comprehensive overview of the intellectual structure and scientific development of online hospital registration systems and public service transparency.

Figure 1. Research Framework for Bibliometric Analysis of Online Hospital Registration and Public Service Transparency

Figure 1 illustrates the conceptual framework of this bibliometric study, which focuses on the relationship between *Online Hospital Registration* and *Public Service Transparency*. The framework demonstrates that these two research domains serve as the primary focus of the study and are analyzed using three complementary bibliometric tools. *Google Scholar* functions as the

primary source for retrieving scientific publications, ensuring comprehensive coverage of relevant literature. The retrieved publications are subsequently processed using *Publish or Perish* to extract bibliographic metadata and calculate key bibliometric indicators, including publication counts, citation metrics, h-index, and g-index. Finally, the processed metadata are analyzed using *VOSviewer* to visualize the intellectual structure of the research through network, overlay, and density visualizations. This integrated methodological framework enables a systematic exploration of publication trends, thematic evolution, knowledge structures, and research hotspots, thereby providing a comprehensive understanding of the development of research on online hospital registration systems and public service transparency.

C. RESULTS AND DISCUSSION

- Results

The research findings are presented based on a bibliometric analysis of scientific publications concerning online hospital registration systems and public service transparency retrieved from the Scopus database. The analysis was conducted systematically using two primary bibliometric tools, namely Publish or Perish (PoP) and VOSviewer. Publish or Perish was employed to retrieve scientific publications, extract bibliographic metadata, and analyze key bibliometric indicators, including the number of publications, total citations, average citations per year, h-index, g-index, and other scientific impact metrics. Subsequently, the extracted metadata were processed using VOSviewer to visualize the intellectual structure of the research field through network visualization, overlay visualization, and density visualization. The integration of these analytical tools enables a comprehensive assessment of the evolution, scientific influence, and knowledge structure of research related to online hospital registration systems and transparency in public healthcare services.

Furthermore, the bibliometric analysis identifies publication trends over time, the most productive authors, leading journals, influential institutions, and countries that have significantly contributed to the development of research on digital hospital registration and transparent public service delivery. The study also examines patterns of scientific collaboration through co-authorship networks, citation analysis, bibliographic coupling, co-citation analysis, and keyword

co-occurrence to reveal the dominant research themes shaping this field. Particular attention is given to emerging topics such as digital health, hospital information systems, electronic patient registration, e-government, healthcare governance, service quality, patient satisfaction, interoperability, artificial intelligence, cybersecurity, and public service transparency. The findings are presented through bibliometric performance indicators, publication trend analyses, citation statistics, thematic evolution, and network visualizations to facilitate the interpretation of research dynamics and the intellectual structure of this rapidly growing area. These results provide valuable insights for researchers, healthcare practitioners, hospital administrators, and policymakers in advancing digital transformation, improving healthcare accessibility, strengthening transparency and accountability, and enhancing the quality of public healthcare services through innovative online hospital registration systems.

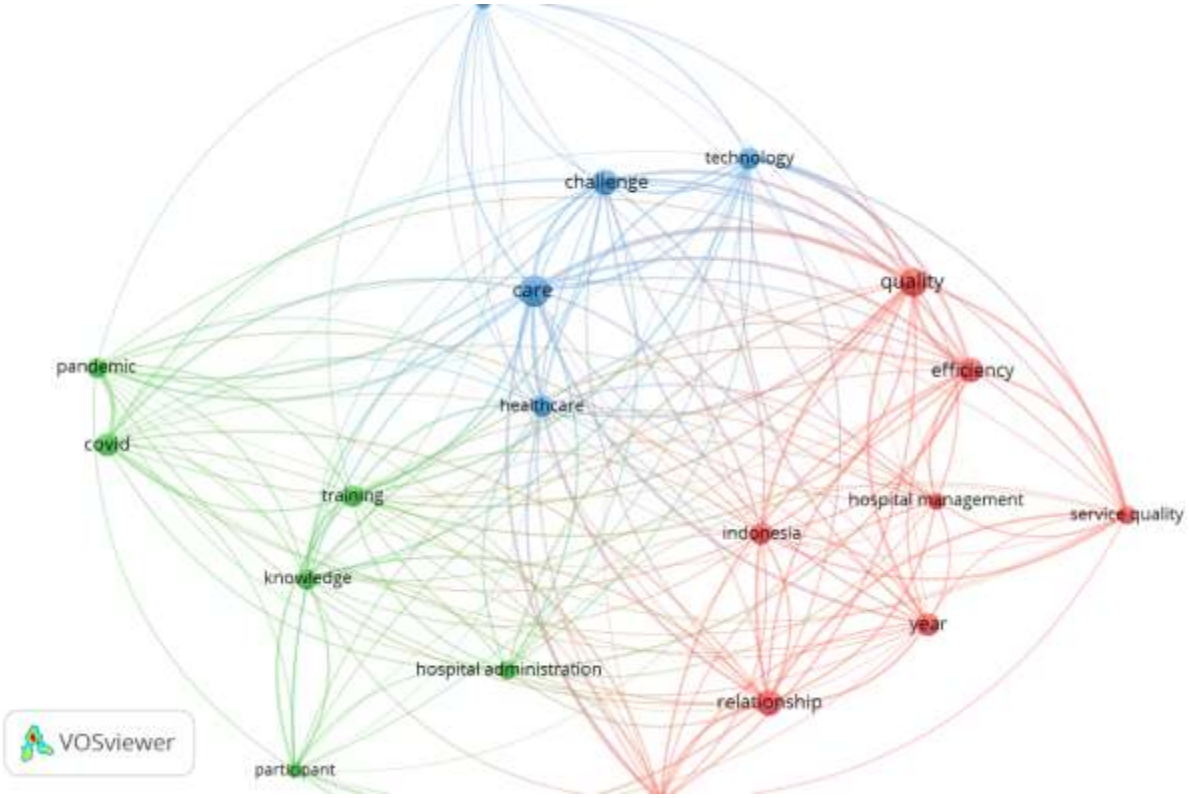

Figure 2. Network Visualization of Keyword Co-occurrence in Hospital Management Research Using VOSviewer

Figure 2 presents the results of a network visualization analysis generated using VOSviewer, illustrating the co-occurrence relationships among keywords in scientific publications related to hospital management and healthcare services. Each circle (node) represents a keyword, while the size of the node reflects the frequency with which the keyword appears in the analyzed documents. The connecting lines (links) indicate the strength of the relationships between keywords, whereas different colors represent clusters of research themes with strong conceptual similarities. Thicker links and shorter distances between nodes indicate stronger associations or more frequent co-occurrences of the corresponding keywords within the literature.

Based on the visualization, three major research clusters can be identified. The red cluster is centered on the keyword quality, which is closely associated with service quality, efficiency, hospital management, relationship, Indonesia, and year. This cluster indicates that a substantial proportion of the literature focuses on improving hospital service quality through operational efficiency, strengthening relationships between healthcare providers and patients, and evaluating healthcare performance, particularly within the Indonesian context. The prominence of the keyword quality suggests that service quality continues to be a primary concern in the advancement of hospital management systems.

The blue cluster emphasizes healthcare services and technological transformation. Keywords such as care, healthcare, challenge, and technology form a densely connected network, indicating that digital technologies have become a critical factor in enhancing the quality of healthcare delivery. Furthermore, the presence of the keyword challenge suggests that the implementation of healthcare technologies continues to encounter various obstacles, including workforce readiness, health information system integration, data security, and organizational adaptation to digital innovation.

Meanwhile, the green cluster represents the organizational capacity development dimension of hospitals, encompassing the keywords pandemic, COVID, training, knowledge, participant, and hospital administration. The strong connections among these keywords indicate that the COVID-19 pandemic served as a catalyst for strengthening healthcare workforce competencies, improving hospital administrative systems, and expanding organizational knowledge in responding to crisis situations. This cluster also demonstrates that organizational

learning and human resource capacity development have emerged as rapidly growing research themes in the post-pandemic period.

Overall, the network exhibits a high degree of connectivity among all clusters, demonstrating that hospital management research is inherently multidisciplinary. Issues related to service quality are not confined to managerial perspectives alone but are also influenced by the adoption of healthcare technologies, workforce capacity development, and organizational experiences in managing the COVID-19 pandemic. The strong interrelationships among these keywords indicate that the current direction of research is moving toward an integrated framework that combines service quality, technological innovation, hospital governance, and human resource development as the foundation for achieving effective, efficient, and patient-centered healthcare services.

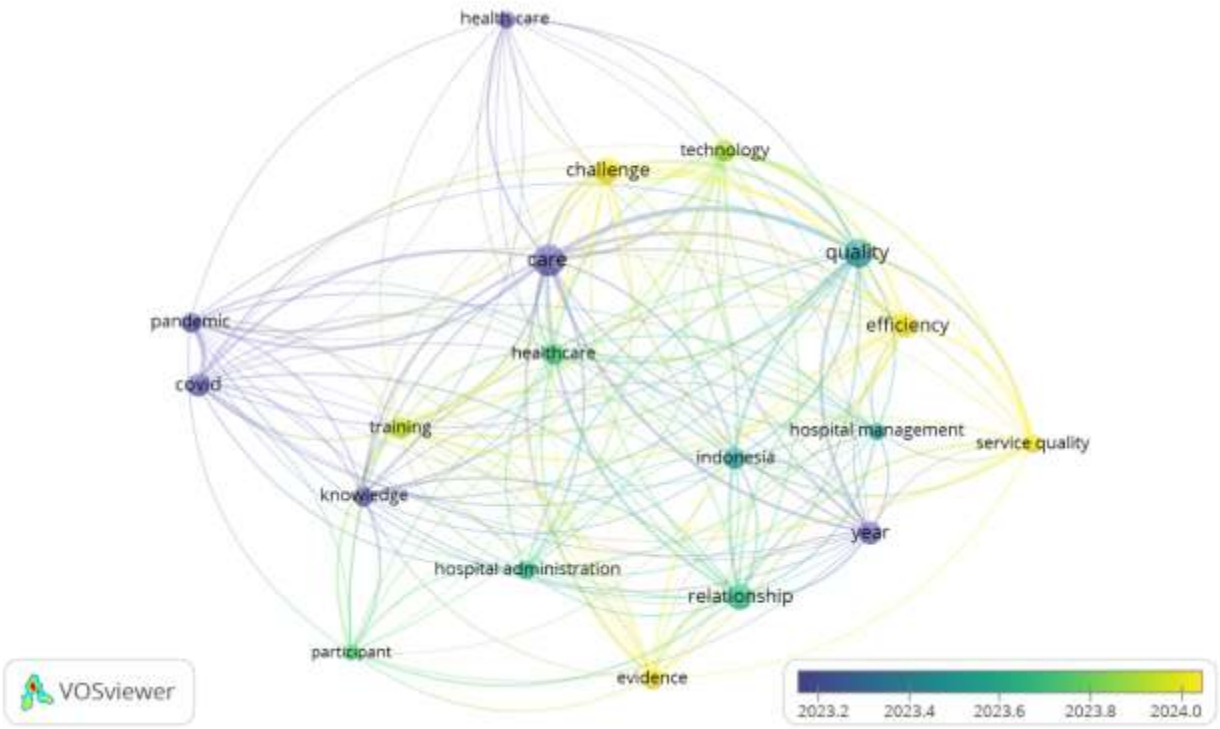

Figure 3. Overlay Visualization of Keyword Co-occurrence Trends in Hospital Management Research Using VOSviewer

Figure 3 presents the overlay visualization generated using VOSviewer, illustrating the temporal evolution of keyword co-occurrence in hospital management and healthcare research. Unlike the network visualization, the overlay visualization incorporates a chronological dimension by assigning colors to keywords based on their average year of occurrence. Keywords displayed in dark blue and purple represent topics that appeared earlier in the study period (approximately 2023.2–2023.4), whereas green and yellow nodes indicate more recent research topics (approximately 2023.8–2024.0). This visualization provides valuable insights into the progression of research themes and highlights emerging areas of scholarly interest over time.

The visualization demonstrates that earlier studies primarily focused on pandemic-related issues, represented by keywords such as pandemic, COVID, healthcare, care, knowledge, and year. These topics dominated the literature during the initial phase of the observed period, reflecting the significant impact of the COVID-19 pandemic on healthcare systems worldwide. Research during this stage emphasized crisis management, continuity of healthcare services, organizational resilience, and knowledge dissemination to support healthcare professionals in responding effectively to public health emergencies.

As research progressed, attention gradually shifted toward organizational development and healthcare management. Keywords including hospital administration, hospital management, relationship, Indonesia, quality, and technology appear in intermediate colors (green to turquoise), indicating that these topics became increasingly prominent after the pandemic. This transition suggests that scholars expanded their focus beyond emergency response toward improving organizational governance, integrating digital technologies, strengthening administrative capacity, and enhancing healthcare service management within hospital settings.

The most recent research trends are represented by yellow-colored keywords, including service quality, efficiency, challenge, evidence, and training. The prominence of these keywords indicates that current studies are increasingly directed toward evaluating healthcare quality, improving operational efficiency, generating evidence-based management practices, and strengthening workforce competencies through continuous training. At the same time, the persistence of the keyword challenge suggests that healthcare organizations continue to encounter

barriers related to technological implementation, organizational adaptation, workforce preparedness, and the delivery of sustainable, high-quality healthcare services.

Overall, the overlay visualization illustrates a clear evolution in hospital management research. The scholarly focus has shifted from pandemic response and healthcare resilience toward long-term organizational improvement, digital transformation, service quality enhancement, and evidence-based hospital management. The strong interconnections among both earlier and more recent keywords indicate that contemporary hospital management research has become increasingly comprehensive and multidisciplinary. This progression demonstrates that future research is likely to emphasize the integration of technological innovation, organizational governance, service quality, operational efficiency, and human resource development as essential components for achieving resilient, patient-centered, and sustainable healthcare systems.

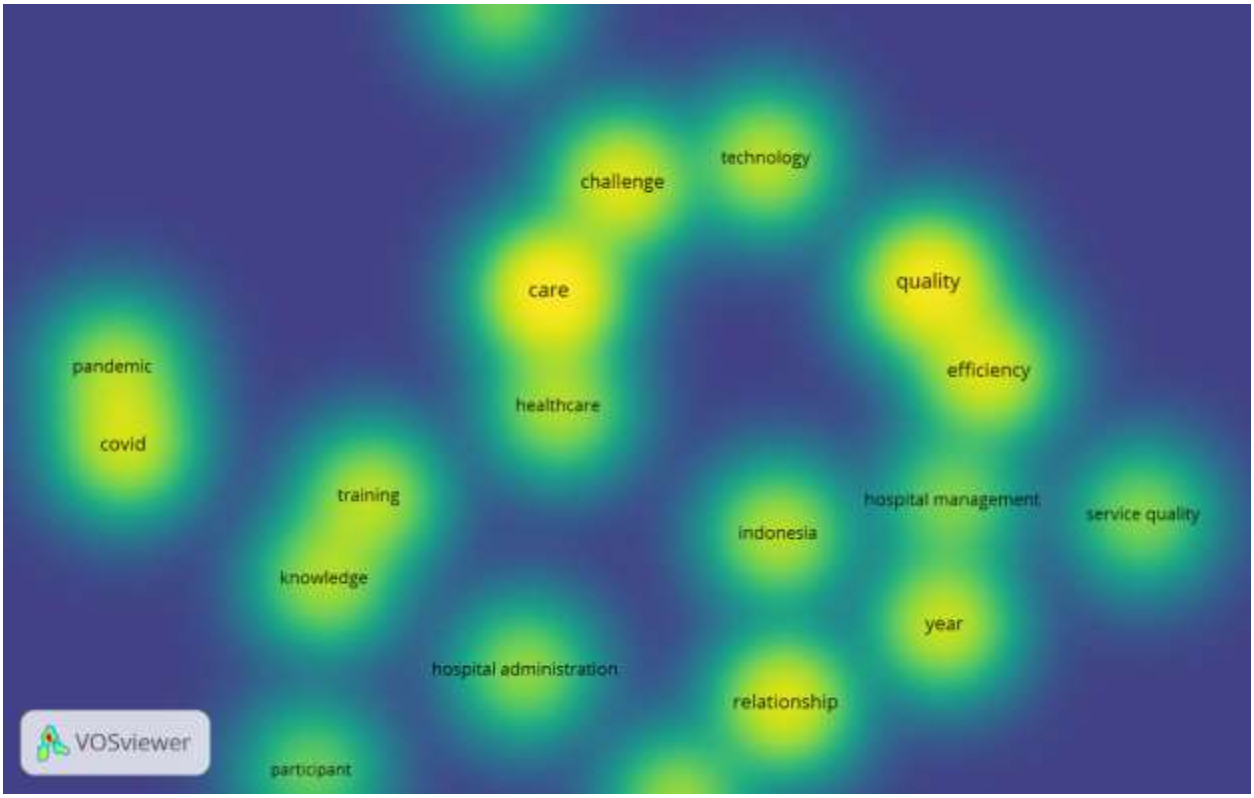

Figure 4. Density Visualization of Keyword Co-occurrence in Hospital Management Research Using VOSviewer

Figure 4 presents the density visualization generated using VOSviewer, illustrating the concentration and research intensity of keyword co-occurrences in the field of hospital management. In this visualization, color intensity represents the relative frequency and interconnectedness of keywords within the bibliometric dataset. Bright yellow areas indicate keywords with high occurrence frequencies and strong co-occurrence relationships, while green areas represent moderately studied topics. Blue regions correspond to keywords with lower occurrence frequencies or less developed research themes. Consequently, the density map provides an overview of the most extensively investigated topics as well as areas that remain relatively underexplored.

The visualization reveals that the highest research density is concentrated around the keywords quality, care, efficiency, healthcare, and challenge. These keywords form the brightest regions on the map, indicating that they constitute the core themes of contemporary hospital management research. Their prominence suggests that improving healthcare quality, enhancing operational efficiency, delivering patient centered care, and addressing organizational challenges have become the principal priorities in the literature. The strong density surrounding these keywords also reflects their central role in connecting various research domains within healthcare management.

Another area of relatively high density is represented by the keywords technology, relationship, Indonesia, COVID, pandemic, knowledge, and training. These topics have gained considerable scholarly attention due to the increasing integration of digital technologies into healthcare systems and the organizational transformations that emerged during and after the COVID-19 pandemic. Research associated with these keywords primarily examines technological innovation, workforce competency development, knowledge management, and organizational adaptation to evolving healthcare environments. Their proximity to the central themes indicates that these topics have become integral components of modern hospital management research.

In contrast, keywords such as service quality, hospital administration, participant, and hospital management exhibit moderate density levels. Although these topics remain significant within the literature, they appear to be more specialized or context-specific compared with the dominant research themes. Their relatively lower density suggests that these areas have not yet

achieved the same level of research concentration as quality improvement, healthcare delivery, and operational efficiency. Nevertheless, their connections with highly dense keywords indicate that they continue to play important supporting roles within the broader research landscape.

Overall, the density visualization demonstrates that hospital management research is increasingly centered on quality improvement, healthcare delivery, operational efficiency, and technological advancement. The distribution of research density further suggests that the field has evolved from addressing immediate pandemic-related challenges toward developing sustainable, technology-enabled, and patient-centered healthcare systems. At the same time, the presence of several moderately dense keywords highlights potential opportunities for future research, particularly in strengthening hospital governance, advancing evidence-based management practices, improving service quality, and fostering interdisciplinary approaches that integrate organizational management, digital innovation, and healthcare service excellence.

- Discussion

Figure 4 presents the density visualization generated using VOSviewer, illustrating the concentration and intensity of keyword co-occurrences in the field of hospital management research. In this visualization, the color gradient represents the frequency and interconnectedness of keywords across the bibliometric dataset. Bright yellow areas indicate research themes with the highest occurrence frequencies and strongest relationships with other keywords, whereas green areas represent moderately developed topics. Blue regions correspond to keywords with relatively lower frequencies or emerging themes that have not yet become dominant in the literature. Consequently, the density visualization provides a comprehensive overview of the maturity and prominence of research topics while simultaneously identifying areas that offer opportunities for future scholarly investigation.

The visualization demonstrates that the highest density is concentrated around the keywords *quality*, *care*, *healthcare*, *efficiency*, and *challenge*. These keywords occupy the brightest regions of the map, indicating that they represent the core intellectual foundation of contemporary hospital management research. Their strong co-occurrence suggests that improving healthcare quality and operational efficiency remains the primary objective of hospital

management studies. Moreover, the close relationship among these themes reflects the growing emphasis on patient-centered healthcare, continuous quality improvement, organizational performance, and the ability of healthcare institutions to respond effectively to increasingly complex operational and clinical challenges.

Another important concentration of research is observed around the keywords *technology*, *Indonesia*, *relationship*, *COVID*, *pandemic*, *knowledge*, and *training*. These topics indicate that recent studies increasingly recognize digital transformation and organizational learning as essential components of modern hospital management. The experience of the COVID-19 pandemic has accelerated the adoption of digital health technologies, electronic health information systems, telemedicine, and integrated hospital management systems. At the same time, hospitals have emphasized workforce competency development, knowledge management, and organizational resilience to improve preparedness for future public health emergencies. The relatively high density surrounding these keywords demonstrates that technological innovation and human resource development have become indispensable elements in strengthening healthcare governance and service delivery.

In contrast, keywords such as *service quality*, *hospital administration*, *hospital management*, and *participant* exhibit moderate density levels compared with the dominant themes. Although these topics remain highly relevant within the literature, they appear to represent more specialized research areas or supporting dimensions of hospital management. Their lower density suggests that these topics have received comparatively less scholarly attention or have been investigated within narrower research contexts. Nevertheless, their strong connections with highly dense keywords indicate that they continue to contribute significantly to the broader knowledge structure by linking organizational management, administrative performance, patient engagement, and healthcare service evaluation.

Overall, the density visualization confirms that hospital management research has evolved toward an integrated and multidisciplinary field that combines healthcare quality, operational efficiency, digital innovation, organizational governance, and workforce development. The concentration of high-density keywords demonstrates that the current research agenda prioritizes sustainable healthcare systems capable of delivering efficient, patient-centered, and technology-

enabled services. Meanwhile, the existence of moderately dense keywords highlights several promising research opportunities, particularly in strengthening hospital governance, advancing evidence-based management, improving digital service quality, optimizing administrative performance, and fostering interdisciplinary collaboration. These findings suggest that future hospital management research will increasingly focus on integrating technological innovation, strategic leadership, organizational resilience, and healthcare quality improvement to support sustainable health system transformation.

D.CONCLUSION AND RECOMMENDATIONS

- Conclusion

This bibliometric study provides a comprehensive overview of the intellectual structure and research trends in hospital management by analyzing keyword co-occurrence using VOSviewer. The network visualization demonstrates that hospital management research is characterized by strong interconnections among multiple themes, particularly healthcare quality, operational efficiency, healthcare services, technological innovation, organizational management, and pandemic-related issues. These findings indicate that hospital management has evolved into a multidisciplinary research field that integrates managerial, technological, and clinical perspectives to improve healthcare performance and patient outcomes.

The overlay visualization further reveals a clear thematic evolution over time. Earlier studies primarily concentrated on the impacts of the COVID-19 pandemic and healthcare resilience, whereas more recent publications increasingly emphasize service quality, efficiency, evidence-based management, technological innovation, and workforce capacity development. This transition reflects the growing importance of sustainable healthcare systems supported by digital transformation, organizational learning, and continuous quality improvement in hospital management.

The density visualization confirms that quality, care, healthcare, efficiency, and challenge constitute the dominant research themes within the existing literature. At the same time, emerging

topics such as digital technology, hospital governance, knowledge management, and organizational resilience present promising opportunities for future investigation. Overall, the findings suggest that future hospital management research should continue integrating technological innovation, strategic governance, patient-centered care, and evidence-based decision-making to strengthen healthcare quality and improve the sustainability of healthcare systems.

- Recommendations

Future research should expand bibliometric analyses by incorporating multiple international databases, including Web of Science, Dimensions, and PubMed, in addition to Scopus. Such an approach would provide broader coverage of the scientific literature and enable a more comprehensive understanding of global research developments in hospital management.

Researchers are also encouraged to investigate emerging topics identified in this study, particularly digital health technologies, artificial intelligence, hospital information systems, cybersecurity, organizational resilience, and evidence-based hospital management. Exploring these themes will contribute to the development of innovative strategies for improving healthcare quality, operational efficiency, and patient satisfaction.

For policymakers and hospital administrators, the findings highlight the importance of prioritizing digital transformation, strengthening hospital governance, investing in workforce competency development, and implementing continuous quality improvement programs. Integrating technological innovation with patient-centered management practices will enhance organizational performance and support the delivery of transparent, efficient, resilient, and sustainable healthcare services in the future.

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