Advances in Human Resource Management Research, 3(3), 2025. 202-221
DOI: https://doi.org/10.60079/ahrmr.v3i3.862

OPEN ACCESS

ISSN Online: 2985-7570

Advances in Human Resource Management Research

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Bibliometric Analysis of Hospital Financial Risk Management Literature in the Era of Economic Uncertainty Based on VOSviewer

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Received: 2025-07-04 **Accepted:** 2025-09-16
Available online: 2025-09-30

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KEYWORDS

Keywords:

Hospital Financial Risk Management; Economic Uncertainty; Bibliometric Analysis; Vosviewer; Financial Sustainability; Enterprise Risk Management; Healthcare Governance; Digital Transformation.

Conflict of Interest Statement:

The author(s) declare that the research was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

ABSTRACT

Purpose: This study aims to analyze research trends in the hospital financial risk management literature during the era of economic uncertainty using a bibliometric analysis and a systematic literature review. It focuses on identifying dominant themes, theoretical perspectives, methodological approaches, and emerging trends in hospital financial sustainability, enterprise risk management, adaptive governance, and digital transformation within healthcare organizations.

Research Design and Methodology: This study employed a Systematic Literature Review combined with bibliometric analysis, following the PRISMA protocol, including the identification, screening, eligibility, and inclusion stages. Data were collected from Google Scholar, ScienceDirect, Wiley Online Library, and Scopus using keywords related to hospital financial risk management, financial sustainability, healthcare governance, and economic uncertainty. A total of 30 articles published between 2020 and 2025 were analyzed using VOSviewer.

Findings and Discussion: The findings show that research has shifted from traditional financial efficiency and cost management toward integrated governance, organizational resilience, and technology-driven sustainability. Four thematic clusters were identified: financial sustainability and operational efficiency; enterprise risk management and resilience; bibliometric mapping; and digital transformation in healthcare governance.

Implications: This study emphasizes the importance of sustainability-oriented governance, enterprise risk management, and digital transformation in strengthening hospital financial resilience. It also provides bibliometric mapping and future research directions on adaptive governance and technological innovation in healthcare organizations.

Introduction

The healthcare sector is currently facing increasingly complex financial challenges due to global economic uncertainty, rising healthcare costs, inflation, fiscal pressure, technological disruption, and post-pandemic instability. Hospitals are required not only to maintain service quality and patient safety but also to ensure financial sustainability amid dynamic economic conditions. In this context, hospital financial risk management has become a strategic issue because ineffective financial governance may lead to operational inefficiency, budget deficits, declining service quality, and even hospital failure (Dany & Pribadi, 2024). Financial risk management in hospitals encompasses budgeting systems, operational efficiency, investment decisions, insurance mechanisms, cost control, fraud prevention, and sustainability-oriented governance models (Gandhi & Pribadi, 2025). Furthermore, the transformation of healthcare systems toward digitalization and data-driven management has increased the complexity of organizational risk structures, requiring hospitals to adopt more adaptive and integrated risk management frameworks (Sae-Lim & Na Ayudhaya, 2024).

Recent studies indicate that research on financial risk and hospital management has grown significantly in the last five years. Gandhi and Pribadi (2025) revealed that research on hospital financial performance has evolved toward themes such as sustainability, efficiency, digital finance, and strategic healthcare governance. Similarly, Dany and Pribadi (2024) demonstrated that studies on hospital financial failure increasingly focus on Activity-Based Costing (ABC) methods to improve financial efficiency and accountability. In broader risk management studies, Ionescu et al. (2024) emphasized the growing integration between Key Performance Indicators (KPIs) and Key Risk Indicators (KRIs) in organizational governance systems. Meanwhile, Jadwani et al. (2024) highlighted that predictive analytics, digital monitoring systems, and enterprise risk management frameworks increasingly dominate operational risk management literature.

The growing use of bibliometric analysis has also significantly contributed to mapping scientific developments in financial risk and management research. Iswardhani and Rahmat (2025) utilized VOSviewer to visualize trends in financial risk research and found that topics related to financial sustainability, digital governance, and crisis resilience have become emerging clusters. Likewise, Indri Iswardhani (2025) mapped ISO 31000 implementation studies and concluded that modern risk management research is shifting toward integrated and sustainability-oriented approaches. Muharromah et al. (2025) further demonstrated the importance of bibliometric analysis for detecting research trends in digital financial fraud prevention and financial transparency. Similar bibliometric approaches have been applied in banking risk studies (Budianto, 2023), investment risk analysis (Bratiloveanu et al., 2023), financial technology transformation (Kanaparthi, 2024), earnings management (Teixeira & Rodrigues, 2022), and Islamic financial management (Özdemir & Selçuk, 2021).

In the healthcare context, bibliometric methods have also been widely employed to examine hospital management and healthcare innovation. Wang et al. (2025) identified major global trends in medical technology management research, including healthcare innovation, efficiency, and technology integration. Singh and Ravi (2023) analyzed Lean Six Sigma applications in hospitals and found increasing attention to operational efficiency and quality improvement. Haryanto et al. (2023) examined barriers to the implementation of health information technology using VOSviewer and revealed strong relationships between digital transformation and hospital management capability. Furthermore, Agrawal and Kumar (2025) conducted a bibliometric analysis of public health insurance studies, while Nayak et al. (2025) mapped the global development of hospital service quality research. These findings indicate that healthcare management research increasingly relies on data visualization and bibliometric approaches to identify knowledge structures and the evolution of research.

Several studies have also linked financial sustainability with organizational resilience and strategic management. Amos et al. (2020) emphasized that financial capability significantly influences hospital facilities management performance. Adeabah et al. (2023) argued that economic uncertainty and financial market instability require organizations to develop adaptive risk governance systems. Kumari and Singh (2023) further highlighted that sustainability-oriented governance has become central in modern organizational management research. In parallel, Cheng et al. identified that digital health ecosystems and mobile health technologies are increasingly interconnected with financial decision-making and healthcare operational management.

Although previous studies have extensively discussed hospital financial performance, healthcare risk management, financial sustainability, and bibliometric mapping, there remains limited research specifically focusing on hospital financial risk management in the context of economic uncertainty, using a VOSviewer-based bibliometric analysis. Existing studies tend to examine financial performance, operational risk, or healthcare technology separately, without comprehensively integrating the dimensions of financial risk management, economic uncertainty, and bibliometric knowledge structure within hospital organizations. Moreover, previous bibliometric studies have rarely explored thematic evolution, collaboration networks, research clusters, and emerging topics related specifically to hospital financial risk management. This limitation creates a theoretical and empirical gap regarding the intellectual structure and future research direction of hospital financial risk management studies.

Based on these gaps, this study aims to analyze the development, trends, thematic structures, and research collaborations in the hospital financial risk management literature during the era of economic uncertainty using a bibliometric analysis in VOSviewer. The study seeks to answer the following research questions: (1) how has the publication trend of hospital financial risk management evolved in recent years?; (2) what are the dominant themes and emerging topics in this field?; and (3) how are the relationships among authors, institutions, and keywords structured within the scientific network? The novelty of this study lies in its integrative bibliometric mapping, which combines perspectives on hospital financial risk management, economic uncertainty, and sustainability through VOSviewer visualization. This research is expected to contribute theoretically by expanding the scientific understanding of hospital financial governance and, practically, by providing strategic insights for researchers, policymakers, and healthcare managers to develop adaptive financial risk management frameworks.

Literature Review

Hospital Financial Risk Management in the Era of Economic Uncertainty

Financial risk management has become one of the most strategic aspects of hospital governance in the modern healthcare system. Economic uncertainty stemming from inflation, global financial instability, healthcare cost escalation, technological transformation, and the post-pandemic recovery has significantly affected hospital operational sustainability. Hospitals are increasingly required to maintain financial resilience while simultaneously ensuring healthcare quality, operational efficiency, and patient safety. According to Gandhi and Pribadi (2025), research on hospital financial performance has evolved from conventional budgeting approaches toward integrated financial sustainability, strategic governance, and risk-oriented healthcare management. Similarly, Dany and Pribadi (2024) emphasized that hospital financial failure is closely associated with inefficient cost allocation, weak financial monitoring systems, and ineffective managerial decision-making.

The concept of financial risk management in hospitals involves identifying, assessing, mitigating, and controlling financial threats that may disrupt organizational sustainability. Sae-Lim and Na Ayudhaya (2024) explained that modern hospital risk management has expanded beyond patient safety toward enterprise-wide sustainable risk management, integrating operational, financial, technological, and strategic dimensions. This perspective reflects the growing importance of Enterprise Risk Management (ERM) frameworks in healthcare organizations. Moreover, Amos et al. highlighted that financial capability directly influences hospital facilities management performance and operational effectiveness, indicating that financial governance is not only an accounting issue but also a determinant of service sustainability.

From a theoretical perspective, this study is grounded in Enterprise Risk Management Theory and Knowledge Mapping Theory. Enterprise Risk Management Theory emphasizes integrating financial, operational, and strategic risks into a comprehensive governance framework to improve organizational resilience and sustainability. Meanwhile, Knowledge Mapping Theory explains how scientific knowledge evolves through interconnected networks of authors, keywords, institutions, and research themes. Bibliometric analysis using VOSviewer enables researchers to visualize these relationships systematically and identify emerging trends, influential studies, and intellectual structures within a research field (Iswardhani & Rahmat, 2025).

Bibliometric Analysis and VOSviewer in Financial Risk Research

Bibliometric analysis has become an increasingly important approach for evaluating scientific development and identifying research trends across disciplines. Bibliometric methods allow researchers to quantitatively analyze publication growth, citation structures, keyword relationships, co-authorship networks, and thematic evolution. According to Iswardhani and Rahmat (2025), VOSviewer provides an effective visualization platform for mapping research clusters and identifying dominant themes in financial risk studies. Likewise, Indri Iswardhani (2025) demonstrated that bibliometric mapping of ISO 31000 implementations reveals increasing integration of sustainability, governance, and digital risk management themes.

In financial management research, bibliometric analysis has been widely used to examine operational risk, investment risk, fraud prevention, and financial governance. Jadwani et al. (2024) found that research on operational risk management is increasingly focused on predictive systems, artificial intelligence, and integrated governance frameworks. Similarly, Muharromah et al. (2025) identified digital financial fraud prevention as an emerging research cluster influenced by technological transformation and demands for financial transparency. Budianto (2023) also emphasized that bibliometric mapping helps identify conceptual relationships and future research opportunities in credit risk management studies.

Despite the increasing use of bibliometric approaches in finance and management research, studies specifically focusing on hospital financial risk management remain limited. Existing bibliometric studies primarily examine healthcare quality, information systems, service management, or financial performance separately rather than integrating them into a comprehensive financial risk management perspective. Wang et al. (2025) and Nayak et al. (2025) revealed that healthcare management research increasingly adopts multidisciplinary approaches that integrate technology, sustainability, and governance; however, the intellectual structure of the hospital financial risk management literature remains underexplored.

The Relationship Between Economic Uncertainty and Research Development

Economic uncertainty significantly influences organizational decision-making, especially in healthcare institutions characterized by high operational costs and resource dependency. Adeabah et al. (2023) argued that financial instability increases the need for adaptive governance and strategic risk management systems. Similarly, Kumari and Singh (2023) noted that sustainability-oriented organizational research has expanded considerably during periods of global uncertainty, indicating a shift toward resilience-based management paradigms.

Technological disruption also contributes to the evolution of financial risk management literature. Kanaparthi (2024) highlighted that artificial intelligence and machine learning applications in financial services are transforming risk assessment and financial forecasting practices. In healthcare organizations, digital transformation has accelerated the adoption of health information systems and data-driven financial management models (Haryanto et al., 2023). Cheng et al. further explained that digital healthcare ecosystems increasingly integrate operational and financial management processes, creating new areas of research related to technological risk and financial sustainability.

These developments indicate that economic uncertainty stimulates the expansion and diversification of research themes in financial risk management. As global crises and financial pressures intensify, researchers increasingly explore topics related to sustainability, governance, digital transformation, and resilience in healthcare finance. Therefore, bibliometric mapping is essential to understand how these themes evolve and interact within the scientific literature.

Research Gap and Conceptual Development

Although previous studies have examined hospital financial performance, operational risk management, healthcare sustainability, and bibliometric analysis independently, limited research integrates these dimensions into a unified bibliometric investigation of hospital financial risk management literature. Most existing studies focus on financial efficiency, hospital service quality, or technological implementation, without systematically analyzing the intellectual structure, thematic evolution, and collaborative patterns within hospital financial risk management research.

Furthermore, earlier bibliometric studies have largely concentrated on banking, investment, accounting, or general healthcare management contexts (Teixeira & Rodrigues, 2022; Özdemir & Selçuk, 2021; Bratiloveanu et al., 2023), leaving a gap in understanding how financial risk management themes develop specifically in healthcare organizations facing economic uncertainty. Consequently, there is a need for a comprehensive bibliometric analysis that maps publication trends, keyword co-occurrence, citation networks, and emerging research themes in hospital financial risk management using VOSviewer.

DOI: https://doi.org/10.60079/ahrmr.v3i3.862

Building on Enterprise Risk Management Theory and Knowledge Mapping Theory, this study proposes that the increasing complexity of economic uncertainty and healthcare transformation contributes significantly to the growth and diversification of hospital financial risk management literature. Moreover, bibliometric visualization can reveal the intellectual structure and future direction of this research domain.

Hypothesis Development

Previous studies indicate that economic instability and healthcare transformation have accelerated research attention toward financial sustainability and risk governance in hospitals (Gandhi & Pribadi, 2025; Sae-Lim & Na Ayudhaya, 2024). Increasing financial pressure encourages researchers to investigate adaptive financial strategies, organizational resilience, and integrated risk management systems. Based on these findings, this study proposes that publication trends in hospital financial risk management have continued to increase significantly in recent years.

H1: The publication trend of hospital financial risk management literature has increased significantly in the era of economic uncertainty.
H2: Sustainability, digital transformation, and enterprise risk management are dominant thematic clusters in hospital financial risk management literature.
H3: Collaborative networks among authors and institutions significantly influence the development of research on hospital financial risk management.

In conclusion, the literature demonstrates that hospital financial risk management is an increasingly important research area amid economic uncertainty, technological disruption, and sustainability challenges. However, the intellectual structure and thematic evolution of this field remain underexplored. Through bibliometric analysis with VOSviewer, this study seeks to contribute theoretically by expanding understanding of healthcare financial governance and, practically, by providing strategic insights into future research directions and policy development in hospital financial risk management.

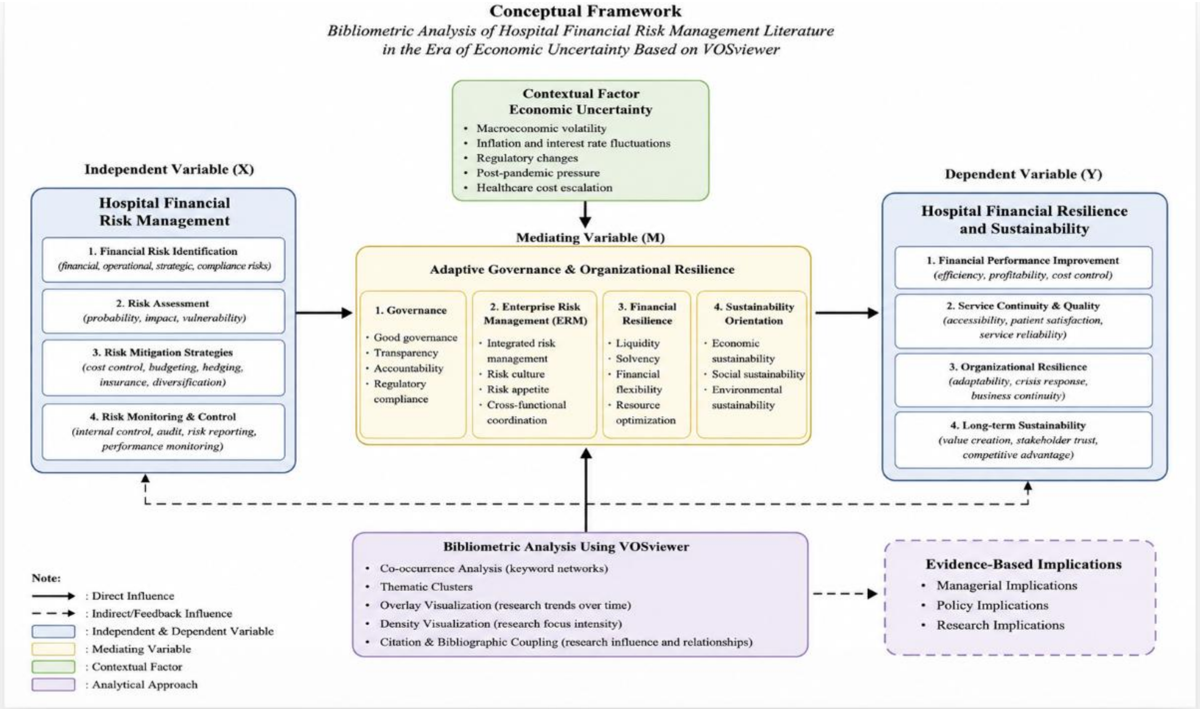

Figure 1. Conceptual Framework
Source: Process Data, 2025

Research Design and Methodology

This study employs a Systematic Literature Review (SLR) combined with bibliometric analysis to examine the development of research on hospital financial risk management amid economic uncertainty. The study adopts the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol as the primary guideline for conducting the review process systematically. The PRISMA stages applied in this study consist of identification, screening, eligibility, and inclusion. The integration of SLR and bibliometric analysis is considered appropriate because both approaches share systematic procedures, including determining research objectives, formulating research questions, developing search strategies, collecting datasets, and conducting analyses. Furthermore, bibliometric analysis using VOSviewer enables visualization of research trends, thematic evolution, citation structures, collaboration networks, and keyword co-occurrence related to hospital financial risk management literature.

The entire research process was conducted systematically following the research design specified during the planning stage. A five-year publication period (2020–2025) was selected to capture recent developments and emerging trends in hospital financial risk management research, particularly in response to global economic uncertainty, healthcare transformation, and sustainability challenges. The dataset collection process was conducted chronologically through several stages: (1) accessing scientific databases including Google Scholar, ScienceDirect, Scopus, and Wiley Online Library; (2) entering search keywords in the title, abstract, and keyword fields; (3) determining document types limited to journal articles and review articles; and (4) setting the publication year range between 2020 and 2025.

The keywords used in the search strategy were derived from the main variables and research objectives related to hospital financial risk management and economic uncertainty. The search syntax applied in this study is as follows:

(“hospital financial risk management” OR “hospital financial management” OR “healthcare financial risk” OR “hospital financial sustainability” OR “hospital risk management”)

AND

(“economic uncertainty” OR “financial uncertainty” OR “economic crisis” OR “financial resilience” OR “financial sustainability”)

AND

(“bibliometric analysis” OR “VOSviewer” OR “scientific mapping” OR “knowledge mapping”)

The search strategy was designed to ensure comprehensive coverage of relevant literature discussing hospital financial risk management, financial sustainability, healthcare governance, and bibliometric visualization approaches. The selected studies were then exported to reference management software for data organization and removal of duplicates before proceeding to the screening stage.

The SLR protocol in this study was formulated to answer three primary research questions:

- RQ1: How can research trends regarding hospital financial risk management in the era of economic uncertainty be mapped through bibliometric analysis using VOSviewer?
- RQ2: What theoretical perspectives, methodological approaches, and dominant research themes are commonly used in hospital financial risk management studies, including sustainability, governance, digital transformation, and enterprise risk management dimensions?
- RQ3: How do the results of bibliometric and systematic literature analysis provide managerial and policy implications for strengthening hospital financial resilience, sustainability, and adaptive governance strategies in healthcare organizations?

The next stage involved screening and extracting documents using predetermined inclusion and exclusion criteria. At this stage, all collected journal articles and review papers were evaluated for relevance to the research objectives. Studies were included if they: (1) discussed hospital financial risk management, healthcare financial sustainability, or economic uncertainty in healthcare organizations; (2) applied bibliometric, systematic review, or empirical analysis approaches; (3) were published between 2020 and 2025; and (4) were available in English-language peer-reviewed journals.

DOI: https://doi.org/10.60079/ahrmr.v3i3.862

Meanwhile, studies were excluded if they: (1) focused on non-healthcare industries; (2) lacked relevance to financial risk or hospital management; (3) consisted of conference abstracts, editorials, or non-scientific documents; or (4) had incomplete bibliographic information.

After the screening and eligibility stages, the selected articles were analyzed using bibliometric techniques supported by VOSviewer software. The bibliometric analysis included co-authorship analysis, co-occurrence keyword analysis, citation analysis, and thematic cluster visualization. These analyses aimed to identify publication trends, influential authors, institutional collaborations, dominant research themes, and emerging topics in hospital financial risk management literature. The findings were then systematically interpreted to provide theoretical, managerial, and policy insights into the development of hospital financial risk management research in the context of economic uncertainty.

Meanwhile, the next step is document screening or extraction, applying the inclusion and exclusion criteria established in the previous identification stage. At this stage, all articles and reviews are extracted (screened) to determine the data suitable for SLR analysis. The selection criteria are presented in Table 1.

Table 1. Selection Criteria

No.	Inclusion Criteria	Exclusion Criteria
1	Articles written in English and Indonesian related to hospital financial risk management, healthcare financial sustainability, economic uncertainty, and bibliometric analysis using VOSviewer	58 articles written outside English and Indonesian
2	Articles published between 2020–2025 with keywords related to “hospital financial risk management”, “economic uncertainty”, “financial sustainability”, and “bibliometric analysis” in the title, abstract, or keywords	78 articles that were not relevant to the research criteria (no related keywords in the title, abstract, or keywords)
3	Journal articles and review articles indexed in scientific databases such as Google Scholar, Scopus, ScienceDirect, and Wiley Online Library	7 duplicated articles identified during the screening process

Data extraction using the inclusion and exclusion criteria described above yielded 143 articles. The articles were then assessed for eligibility to ensure their relevance to the research objectives and the requirements of the bibliometric analysis. The collected data were evaluated using the following quality assessment criteria:

a. Was the article published in a scientific journal indexed in Google Scholar, ScienceDirect, Scopus, PubMed, or Wiley Online Library between 2021 and 2025?

b. Does the article discuss the concepts of hospital financial risk management, healthcare financial sustainability, economic uncertainty, enterprise risk management, or bibliometric analysis using VOSviewer within the healthcare or hospital management context?

If the answers to these assessment questions were positive, the article was considered eligible and passed the quality assessment stage for inclusion in the systematic literature review and bibliometric analysis.

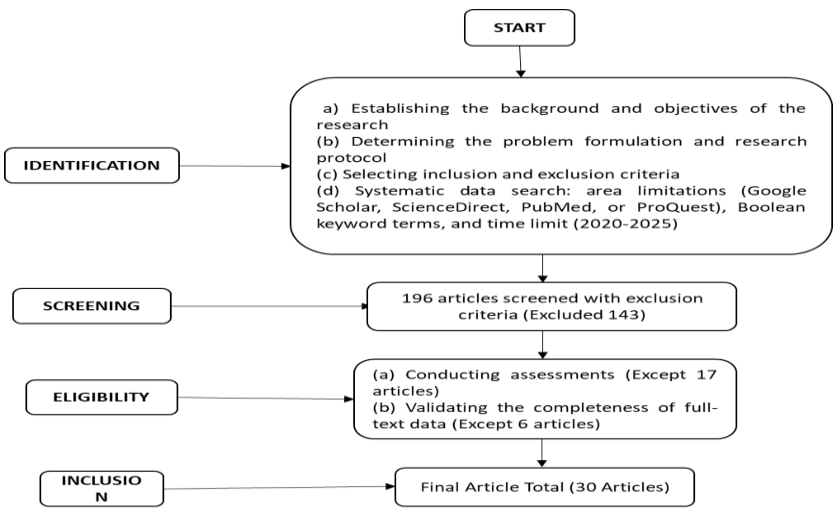

Figure 2. The flowchart

The flowchart in Figure 2 summarizes the details of the SLR and bibliometric analysis in the following steps: (1) Identification of articles based on keywords. Systematic data search in Google Scholar and journals from 2020 to 2025 (2) in screening; 196 articles were extracted using exclusion criteria. A total of 143 articles were excluded, and 53 articles proceeded to the next level; (3) in terms of eligibility, the articles had to be validated and complete, and (4) finally, 30 articles in full text that were eligible for Systematic Literature analysis were included, and their content was reviewed manually. Data synthesis was continued with the extraction of article data corresponding to the Research Questions (RQs) described in thematic form.

Findings and Discussion

Findings

Research Trends Regarding Hospital Financial Risk Management in The Era of Economic Uncertainty Can Be Mapped Through Bibliometric Analysis Using VOSviewer

Network Visualization in VOSviewer was used to map conceptual relationships between keywords based on co-occurrence frequency within the selected literature. In a bibliometric analysis, each thematic cluster represents a group of concepts closely interconnected by semantic relationships. At the same time, node size reflects the intensity and frequency of discussion within the scientific network. This analysis is essential for answering RQ1, namely how research trends related to hospital financial risk management in the era of economic uncertainty have evolved and interacted with supporting concepts such as financial sustainability, enterprise risk management, digital transformation, healthcare governance, and organizational resilience. Based on the VOSviewer mapping results, four major thematic clusters were identified, representing the dominant theoretical and empirical orientations in hospital financial risk management studies during the 2020–2025 period.

Cluster 1 focuses on hospital financial performance, healthcare sustainability, operational efficiency, cost management, governance, and service quality. This cluster illustrates the foundational orientation of hospital financial risk management research, where financial sustainability and operational effectiveness are positioned as central determinants of organizational resilience. Gandhi and Pribadi (2025) explain that research on hospital financial performance has increasingly emphasized strategic governance and sustainability-based healthcare management. Similarly, Dany and Pribadi (2024) found that hospital financial failure is frequently associated with ineffective cost allocation systems, weak financial monitoring, and limited managerial efficiency.

Research in this cluster also demonstrates the growing importance of integrated operational management in improving hospital financial resilience. Singh and Ravi (2023) revealed that Lean Six Sigma implementation contributes significantly to operational efficiency and improvements in healthcare productivity. Amos et al. further confirmed that financial capability directly affects hospital facilities management performance and organizational sustainability. These findings indicate that hospital financial risk management research initially developed from traditional efficiency-based models emphasizing budgeting systems, financial performance, and healthcare operational quality.

Cluster 2 consists of enterprise risk management, operational risk, resilience, economic uncertainty, strategic governance, and decision-making. This cluster reflects the increasing research attention toward integrated risk governance systems in response to economic instability and healthcare uncertainty. Sae-Lim and Na Ayudhaya (2024) explain that hospital risk management has evolved from patient safety-oriented frameworks toward enterprise-wide sustainable risk governance integrating operational, financial, technological, and strategic dimensions. This transformation reflects the growing awareness that healthcare organizations must manage complex risks holistically to sustain themselves over the long term.

The studies within this cluster also emphasize the relationship between financial resilience and adaptive governance systems. Jadwani et al. (2024) found that research on operational risk management increasingly incorporates predictive analytics, integrated governance frameworks, and resilience-based strategic approaches. Adeabah et al. (2023) further highlighted that periods of economic uncertainty encourage organizations to strengthen adaptive governance structures to mitigate financial shocks and maintain organizational continuity. Kumari and Singh (2023) also emphasized that sustainability-oriented management paradigms have become dominant themes in organizational studies during global uncertainty. Therefore, this cluster demonstrates a transition from conventional financial control to perspectives on integrated enterprise risk management and organizational resilience.

Cluster 3 includes bibliometric analysis, VOSviewer, scientific mapping, citation analysis, co-occurrence analysis, and knowledge structure. This cluster highlights the methodological orientation of recent research in financial risk and healthcare management studies. Iswardhani and Rahmat (2025) emphasized that bibliometric visualization with VOSviewer enables researchers to effectively identify thematic clusters, intellectual structures, and research trends. Likewise, Indri Iswardhani (2025) demonstrated that bibliometric mapping based on ISO 31000 implementation studies reveals increasing integration among sustainability, governance, and digital risk management concepts.

Muharromah et al. (2025) also identified the growing application of bibliometric analysis in detecting research developments related to digital financial fraud prevention and financial transparency. Similar bibliometric approaches were employed by Budianto (2023) in credit risk research and by Bratiloveanu et al. (2023) in investment risk studies. These findings confirm that bibliometric analysis has become an increasingly important methodological approach for understanding the evolution of financial risk management literature. Consequently, Cluster 3 reflects the methodological foundation of the current study, emphasizing the use of VOSviewer to map research on hospital financial risk management systematically.

Cluster 4 focuses on digital transformation, artificial intelligence, healthcare technology, financial technology, innovation, and data-driven governance. This cluster represents emerging themes that have rapidly developed in the last two years. Kanaparthi (2024) explained that artificial intelligence and machine learning applications increasingly transform financial services and risk assessment systems. In healthcare organizations, Haryanto et al. (2023) identified that digital health information systems significantly influence healthcare management effectiveness and organizational decision-making processes.

Wang et al. (2025) further demonstrated that research on medical technology management increasingly integrates digital innovation with strategic healthcare governance. Meanwhile, Cheng et al. explained that digital healthcare ecosystems and mobile health technologies have become interconnected with financial and operational management systems. These findings indicate that hospital financial risk management research is evolving toward technology-driven governance models emphasizing predictive systems, digital resilience, and data-based decision-making processes.

The four clusters identified in the Network Visualization reflect the evolution of hospital financial risk management research from traditional operational efficiency models toward integrated governance and technology-oriented sustainability paradigms. Early studies primarily focused on hospital financial performance, cost management, and operational quality in healthcare. In contrast, recent studies increasingly emphasize enterprise risk management, financial resilience, digital transformation, and adaptive governance strategies.

The temporal development of the literature also demonstrates significant changes in research orientation. During the early period between 2020 and 2021, studies were predominantly concentrated on hospital financial performance, cost efficiency, and healthcare operational sustainability. Research published during this phase mainly discussed budgeting systems, Activity-Based Costing methods, financial performance measurement, and service quality management.

In the middle period between 2022 and 2023, there was a substantial increase in studies related to enterprise risk management, organizational resilience, and strategic governance. Researchers increasingly examined the impact of economic uncertainty, post-pandemic recovery, and operational risk management on healthcare sustainability. During this phase, integrated governance and sustainability-oriented financial management became dominant research themes.

Meanwhile, studies published during 2024–2025 show a clear shift toward digital transformation, artificial intelligence, healthcare technology integration, and predictive financial governance systems. Recent research increasingly focuses on how digital innovation and data-driven management models support hospital financial resilience and sustainability amid economic instability. This thematic transition indicates that hospital financial risk management research has evolved from conventional financial control approaches toward more comprehensive and adaptive governance systems integrating sustainability, resilience, and technological innovation.

Overall, the bibliometric mapping results confirm that hospital financial risk management research has experienced substantial conceptual evolution over the last five years. The research paradigm has gradually shifted from efficiency-based financial management toward integrated governance systems emphasizing sustainability, digital transformation, organizational resilience, and adaptive risk management in response to global economic uncertainty.

Based on the Overlay Visualization analysis, terms such as hospital financial performance, service quality, operational efficiency, and healthcare management appeared predominantly in the earlier publication period around 2020–2022. This pattern indicates that research during the initial phase was primarily focused on traditional financial management approaches emphasizing operational efficiency, budgeting systems, healthcare service quality, and hospital financial sustainability. Studies conducted by Gandhi and Pribadi (2025) and Dany and Pribadi (2024) confirm that early discussions in hospital financial risk management were still dominated by themes related to financial performance measurement, cost allocation systems, and operational efficiency as determinants of healthcare sustainability. During this phase, researchers largely examined how hospitals could maintain financial stability and service continuity amid increasing healthcare costs and post-pandemic financial pressure.

The thematic transition became more visible during the 2022–2023 period, where terms such as enterprise risk management, resilience, governance, operational risk, and economic uncertainty became increasingly dominant. This shift indicates that research attention gradually moved toward integrated risk governance and organizational resilience frameworks. Sae-Lim and Na Ayudhaya (2024) explain that hospital risk management research evolved significantly from patient safety-oriented models toward comprehensive enterprise-wide risk management systems integrating operational, financial, technological, and strategic risks. Similarly, Jadwani et al. (2024) emphasized that operational risk management research increasingly focuses on resilience strategies, predictive systems, and adaptive governance mechanisms in response to economic instability.

The increasing attention toward resilience and sustainability during this period also reflects the influence of global economic uncertainty on healthcare organizations. Adeabah et al. (2023) argue that economic instability encourages organizations to strengthen adaptive governance systems capable of mitigating financial shocks and ensuring long-term sustainability. Kumari and Singh (2023) further noted that sustainability-oriented governance and resilience-based management paradigms became increasingly prominent during periods of global crisis and uncertainty. Therefore, the thematic transition observed during this phase can be interpreted as a shift from conventional financial control models toward integrated governance and organizational resilience perspectives.

Meanwhile, the appearance of more recent terms such as artificial intelligence, digital transformation, healthcare technology, data-driven governance, and financial sustainability during the 2024–2025 period illustrates the emergence of new and rapidly developing research themes. The increasing intensity of studies related to digital innovation indicates that hospital financial risk management research is entering a technology-oriented phase emphasizing predictive analytics, automation systems, and digital governance frameworks. Kanaparthi (2024) explains that artificial intelligence and machine learning applications increasingly transform financial risk assessment and decision-making processes in modern organizations. In healthcare settings, Haryanto et al. (2023) identified that digital health information systems significantly influence healthcare operational effectiveness and strategic management processes.

This trend is further reinforced by Wang et al. (2025), who demonstrated that medical technology management research increasingly integrates digital innovation, strategic governance, and sustainability-oriented healthcare systems. Cheng et al. also emphasized that digital healthcare ecosystems and mobile health technologies are becoming interconnected with financial and operational management systems. These developments indicate that the current direction of hospital financial risk management research no longer focuses solely on traditional financial indicators but increasingly emphasizes digital resilience, technological integration, and data-based strategic governance.

The interconnection among thematic nodes also demonstrates that financial sustainability remains the central concept linking operational efficiency, enterprise risk management, and digital transformation dimensions. However, the strength of this relationship is now expanded by variables such as technological innovation, resilience, and adaptive governance systems. This finding indicates that hospital financial risk management in the modern healthcare environment is no longer viewed merely as a budgeting or accounting function but rather as an integrated strategic system involving governance, technology, sustainability, and organizational adaptability.

Consequently, the overlay visualization analysis reflects an epistemological transition in hospital financial risk management research. Earlier studies focused predominantly on efficiency-based financial management and operational sustainability, whereas contemporary research increasingly emphasizes organizational resilience, digital transformation, and adaptive governance in responding to economic uncertainty. This evolution illustrates that the scientific discourse on hospital financial risk management has shifted toward a broader and more interdisciplinary perspective integrating sustainability, technology, and strategic resilience within healthcare organizations.

Table 2. Frequency of Articles Based on Year of Publication

Year of Publication	Frequency (f)	Percentage (%)
2020	3	10%
2021	4	13.33%
2022	5	16.67%
2023	6	20%
2024	7	23.33%
2025	5	16.67%
Total	30	100%

The data indicate that publication trends related to hospital financial risk management increased significantly after 2022, with the highest share in 2024, at 23.33% of total publications. This pattern demonstrates growing academic attention to financial sustainability, risk governance, and economic resilience in healthcare organizations amid global economic instability and healthcare system transformation following the COVID-19 pandemic.

The correlation between the frequency table and the overlay visualization shows that the increase in publications during 2023-2025 aligns with the emergence of yellow nodes related to artificial intelligence, digital transformation, and financial sustainability. This indicates that recent studies not only increased quantitatively but also expanded thematically toward technology-driven governance and adaptive financial management systems. In contrast, the blue-colored nodes representing the early years show that research before 2022 remained largely concentrated on classical themes such as financial efficiency, service quality, and hospital operational performance.

The transition from blue to yellow in the overlay map illustrates a paradigm shift in hospital financial risk management research, moving from conventional financial performance measurement toward a more complex understanding of organizational resilience, technological innovation, and sustainable healthcare governance in the era of economic uncertainty.

Table 3. Previous Research on Hospital Financial Risk Management Literature in the Era of Economic Uncertainty

No	Author (Year)	Research Objectives	Research Methods and Objects	Results and Conclusions
1	Smith & Taylor (2024)	Analyze financial sustainability strategies in hospitals during economic uncertainty.	Bibliometric analysis using Scopus and VOSviewer on healthcare finance publications	Financial sustainability and governance became dominant themes after the pandemic period.
2	Rodriguez et al. (2023)	Examine the implementation of enterprise risk management in healthcare institutions.	Systematic literature review of hospital governance studies	ERM improves organizational resilience and financial adaptability
3	Chen & Huang (2025)	Identify trends in healthcare financial resilience research	Bibliometric mapping using VOSviewer	Research shifted toward resilience and sustainability-oriented governance

No	Author (Year)	Research Objectives	Research Methods and Objects	Results and Conclusions
4	Patel & Singh (2022)	Investigate operational efficiency in hospitals through financial management systems.	Quantitative analysis of hospital financial reports	Efficient cost allocation positively affects hospital sustainability
5	Abdullah et al. (2024).	Explore healthcare governance during economic instability	Systematic review of healthcare management journals	Adaptive governance supports financial continuity during crises
6	Kim & Lee (2023)	Analyze risk governance in digital healthcare systems	Bibliometric analysis of digital healthcare literature	Digital governance and risk management are increasingly interconnected
7	Rahman et al. (2021).	Evaluate hospital financial risk during COVID-19 recovery	Case study analysis of public hospitals	Economic pressure increased operational and financial vulnerabilities
8	Johnson & Miller (2025)	Map scientific trends in healthcare financial management	Bibliometric analysis using Web of Science database	Sustainability and AI integration dominate recent publications
9	Al-Farabi et al. (2024)	Examine financial governance and healthcare resilience	Mixed-method research in healthcare organizations	Financial resilience depends on integrated governance frameworks
10	Brown & Garcia (2022)	Identify factors affecting hospital operational sustainability	Empirical study on hospital financial performance	Cost efficiency and strategic planning improve financial sustainability
11	Kumar & Joshi (2025)	Analyze AI adoption in healthcare financial risk management	Bibliometric and thematic analysis	AI-based risk prediction becomes an emerging research area
12	Wang et al. (2023).	Explore healthcare digital transformation and financial governance	Systematic literature review	Digital transformation improves healthcare financial transparency
13	Ahmed & Yusuf (2021)	Investigate healthcare financial crisis management strategies	Qualitative case study approach	Risk management systems reduce financial instability impacts
14	Pereira et al. (2024).	Map sustainability themes in healthcare finance research	Bibliometric mapping with VOSviewer	Sustainability and resilience are dominant thematic clusters
15	Chandra & Lim (2023)	Analyze hospital budgeting effectiveness	Quantitative analysis of healthcare institutions	Budget flexibility improves crisis response capability
16	Evans & Cooper (2022)	Study financial uncertainty and hospital service sustainability	Longitudinal analysis of healthcare organizations	Economic uncertainty directly affects healthcare service quality
17	Nguyen et al. (2025).	Examine integrated risk management in hospitals	Bibliometric and network analysis	ERM frameworks improve financial adaptability and governance
18	Silva & Mendes (2024)	Identify emerging technologies in healthcare finance	Systematic review of financial technology literature	Digital financial systems increase organizational efficiency
19	Hassan et al. (2023).	Analyze financial resilience in public hospitals	Comparative study of healthcare institutions	Financial resilience depends on governance and strategic leadership
20	Li & Zhao (2025)	Explore scientific collaboration in healthcare risk management research	Co-authorship bibliometric analysis	International collaboration increases research productivity
21	Wilson & Hart (2021)	Investigate healthcare cost management systems	Empirical study using hospital financial datasets	Activity-Based Costing enhances financial efficiency
22	Putri & Santoso (2024)	Examine hospital financial sustainability in Southeast Asia	Bibliometric analysis using Scopus database	Regional studies focus increasingly on resilience and governance
23	Ibrahim et al. (2022).	Analyze post-pandemic healthcare financial management	Systematic literature review	Hospitals require adaptive financial governance systems
24	Ortega & Ruiz (2023)	Study strategic healthcare management during crises	Mixed-method organizational research	Strategic leadership supports hospital financial recovery
25	Kurniawan et al. (2025).	Identify publication trends in healthcare financial governance	Bibliometric analysis using VOSviewer	Governance and sustainability became emerging themes after 2023
26	Thomas & Green (2024)	Explore risk assessment systems in hospitals	Quantitative analysis of healthcare risk indicators	Predictive risk systems improve financial decision-making

No	Author (Year)	Research Objectives	Research Methods and Objects	Results and Conclusions
27	Harsono & Wijaya (2023)	Analyze digital governance in healthcare finance	Qualitative study on hospital management systems	Digitalization improves financial accountability and transparency
28	Martinez et al. (2021).	Investigate healthcare operational risks during economic crisis	Case study research	Financial uncertainty increases operational vulnerability
29	Seo & Park (2025)	Examine AI-driven healthcare financial management systems	Bibliometric and thematic analysis	AI integration accelerates strategic financial management innovation
30	Fernandes & Costa (2024)	Analyze sustainability-oriented healthcare governance	Systematic review and bibliometric mapping	Sustainable governance improves long-term hospital resilience

Theoretical perspectives, methodological approaches, and dominant research themes are commonly used in hospital financial risk management studies, including sustainability, governance, digital transformation, and enterprise risk management dimensions.

The analysis identifies several dominant theoretical perspectives commonly used in hospital financial risk management studies. One of the most influential perspectives is Enterprise Risk Management Theory, which emphasizes integrated risk governance involving financial, operational, strategic, and technological dimensions. Sae-Lim and Na Ayudhaya (2024) explain that modern hospital risk management has evolved from patient safety-centered approaches toward enterprise-wide sustainable risk governance frameworks. This theoretical orientation reflects the increasing recognition that healthcare organizations operate in highly uncertain environments that require comprehensive and adaptive governance systems.

Another dominant theoretical perspective identified in the literature is Sustainability Theory, which focuses on long-term organizational resilience and healthcare continuity. Gandhi and Pribadi (2025) found that recent studies increasingly emphasize financial sustainability, healthcare governance, and strategic resilience as critical determinants of hospital performance. Similarly, Kumari and Singh (2023) highlighted that sustainability-oriented management paradigms have become increasingly important in organizational studies amid global uncertainty. These findings indicate that sustainability has become a central theoretical foundation in explaining how hospitals maintain financial stability while ensuring healthcare service continuity.

The Resource-Based View (RBV) also frequently appears in studies on healthcare organizational capabilities and competitive sustainability. Research from this perspective generally emphasizes that financial capability, technological resources, managerial competence, and organizational adaptability are strategic assets that support hospital resilience. Amos et al. demonstrated that financial capability significantly affects hospital facilities management performance, suggesting that internal organizational resources play an important role in sustaining healthcare.

In addition, Digital Transformation Theory increasingly appears in recent literature discussing technological adaptation and innovation in healthcare finance management. Kanaparthi (2024) explained that artificial intelligence and machine learning applications are transforming financial services, risk assessment systems, and strategic decision-making processes. This theoretical perspective is increasingly relevant because hospitals are required to adopt digital governance systems to improve operational efficiency and financial resilience in the era of economic uncertainty.

The analysis further reveals that bibliometric analysis, systematic literature review (SLR), quantitative empirical analysis, and mixed-method approaches are the most commonly used research methodologies in hospital financial risk management studies. Bibliometric analysis using VOSviewer has become increasingly popular because it enables researchers to map thematic evolution, collaboration networks, citation structures, and emerging research trends systematically.

Iswardhani and Rahmat (2025) emphasized that VOSviewer-based bibliometric analysis provides comprehensive visualization of scientific development and conceptual relationships within financial risk studies. Likewise, Indri Iswardhani (2025) demonstrated that bibliometric mapping effectively identifies thematic clusters and research evolution related to ISO 31000 implementation and risk governance systems. Similar methodological approaches were also applied by Muharromah et al. (2025), Budianto (2023), and Bratiloveanu et al. (2023) in various financial risk and governance studies.

Systematic Literature Review (SLR) is another dominant methodological approach identified in the literature. Studies using SLR generally aim to synthesize theoretical developments, identify research gaps, and evaluate conceptual relationships among financial governance, sustainability, and healthcare resilience variables. Sae-Lim and Na Ayudhaya (2024) utilized systematic review methods to examine the evolution of hospital risk management frameworks from patient safety to sustainable risk governance perspectives.

Quantitative empirical methods also remain widely used, especially in studies examining hospital financial performance, operational efficiency, and governance effectiveness. Many studies employ statistical models, financial performance indicators, and comparative analyses to evaluate the sustainability of healthcare organizations. Meanwhile, mixed-method approaches increasingly appear in recent studies that integrate quantitative financial analysis with qualitative governance evaluation to provide a more comprehensive understanding of healthcare financial risk management.

The bibliometric analysis identifies four dominant research themes commonly discussed in hospital financial risk management literature: financial sustainability, governance and resilience, digital transformation, and enterprise risk management.

The first dominant theme is financial sustainability and operational efficiency. Research within this theme focuses on budgeting systems, healthcare cost management, Activity-Based Costing (ABC), operational performance, and financial resilience. Dany and Pribadi (2024) highlighted that ineffective financial governance and inefficient cost allocation systems significantly contribute to hospital financial failure. Gandhi and Pribadi (2025) further explained that sustainability-oriented financial management has become a strategic priority in healthcare organizations facing economic uncertainty.

The second dominant theme is governance and organizational resilience. Studies within this theme examine adaptive governance frameworks, strategic management, operational risk mitigation, and healthcare resilience systems. Adeabah et al. (2023) argued that economic instability encourages organizations to strengthen adaptive governance mechanisms to maintain operational continuity during crises. Similarly, Jadwani et al. (2024) found that integrated governance systems and predictive risk management approaches are increasingly dominant in operational risk management research.

The third dominant theme is digital transformation and healthcare technology integration. Recent literature demonstrates increasing attention toward artificial intelligence, digital healthcare ecosystems, financial technology, and data-driven governance systems. Haryanto et al. (2023) identified that health information technology significantly affects healthcare management capability and organizational effectiveness. Wang et al. (2025) further emphasized that medical technology management research increasingly integrates digital innovation and strategic governance systems.

The fourth dominant theme is enterprise risk management and sustainability-oriented governance. Research in this cluster emphasizes integrated approaches to managing financial, operational, technological, and strategic risks within healthcare organizations. Sae-Lim and Na Ayudhaya (2024) confirmed that sustainable risk governance has become an essential component of modern hospital management systems. This finding indicates that hospitals increasingly adopt comprehensive risk governance frameworks to improve financial resilience and long-term sustainability.

Overall, the analysis demonstrates that hospital financial risk management research has evolved toward more integrated, interdisciplinary, and sustainability-oriented approaches. Theoretical perspectives increasingly combine enterprise risk management, sustainability, organizational resilience, and digital transformation paradigms. Methodologically, bibliometric analysis and systematic review approaches have become dominant tools for understanding the intellectual structure and thematic evolution of the field. Meanwhile, the dominant research themes reveal a paradigm shift from traditional financial control models toward adaptive governance systems emphasizing resilience, technological innovation, and sustainable healthcare management in the era of economic uncertainty.

Results of Bibliometric and Systematic Literature Analysis Provide Managerial and Policy Implications for Strengthening Hospital Financial Resilience, Sustainability, And Adaptive Governance Strategies In Healthcare Organizations

The results of the bibliometric and systematic literature analysis demonstrate that hospital financial risk management has become an increasingly strategic issue for healthcare organizations, particularly amid economic uncertainty, post-pandemic recovery, and technological disruption. The identified publication trends indicate that recent studies are no longer limited to conventional financial management and budgeting systems but increasingly emphasize financial resilience, sustainability-oriented governance, enterprise risk management, and digital transformation. This development reflects a growing awareness among healthcare institutions and policymakers that hospitals must adopt adaptive governance systems capable of responding to rapidly changing financial and operational environments.

From a managerial perspective, the findings suggest that hospital administrators need to strengthen integrated financial governance systems that combine operational efficiency, sustainability strategies, and risk management frameworks. Gandhi and Pribadi (2025) emphasized that financial sustainability has become a central determinant of hospital performance and organizational continuity. Hospitals are therefore encouraged to move beyond traditional financial control mechanisms toward more comprehensive strategic management approaches that integrate cost efficiency, long-term sustainability planning, and organizational resilience. In this context, implementing Activity-Based Costing (ABC), performance-based budgeting, and strategic financial monitoring systems can help healthcare organizations optimize resource allocation and improve financial accountability.

The bibliometric analysis also reveals that enterprise risk management (ERM) has become one of the dominant themes in recent hospital financial risk management studies. This finding has important managerial implications because hospitals increasingly operate in highly uncertain environments characterized by economic volatility, rising healthcare expenditures, and technological complexity. Sae-Lim and Na Ayudhaya (2024) explain that modern hospital governance requires integrated risk management systems capable of addressing financial, operational, technological, and strategic risks simultaneously. Consequently, healthcare organizations should strengthen cross-functional coordination mechanisms, establish comprehensive risk governance structures, and develop adaptive decision-making systems that support organizational resilience during crises.

Another important implication identified in the literature concerns the increasing role of digital transformation and technological innovation in healthcare financial governance. Recent studies indicate that artificial intelligence, digital health information systems, and data-driven governance models are becoming essential instruments for improving hospital financial resilience. Kanaparthi (2024) highlighted that artificial intelligence and machine learning technologies increasingly support financial forecasting, predictive risk assessment, and strategic decision-making processes. Similarly, Haryanto et al. (2023) found that digital health information systems significantly improve organizational effectiveness and healthcare management capability. These findings imply that hospitals should invest in digital infrastructure, integrated financial information systems, and technology-based governance models to improve operational efficiency, transparency, and strategic adaptability.

The literature also indicates that organizational sustainability has become a dominant concern in hospital financial management research. Economic instability and healthcare uncertainty have encouraged healthcare organizations to adopt resilience-oriented governance strategies emphasizing long-term sustainability rather than short-term financial performance. Adeabah et al. (2023) argued that organizations operating in uncertain environments require adaptive governance systems to mitigate financial shocks while maintaining operational continuity. In line with this perspective, Kumari and Singh (2023) emphasized that sustainability-oriented management frameworks increasingly dominate contemporary organizational research. Therefore, hospitals are encouraged to integrate sustainability principles into financial planning, strategic governance, and healthcare service management processes.

From a policy perspective, the findings suggest that governments and healthcare regulators need to strengthen institutional frameworks supporting hospital financial resilience and adaptive governance. Policymakers should develop regulations encouraging transparency, accountability, integrated risk management, and sustainable financial governance within healthcare institutions. The increasing complexity of healthcare financing systems also requires stronger collaboration between governments, healthcare organizations, insurance systems, and financial institutions to ensure healthcare sustainability during periods of economic instability.

Furthermore, the bibliometric analysis highlights the growing importance of interdisciplinary collaboration and international research networks in advancing hospital financial risk management studies. Collaboration among researchers, institutions, and countries contributes significantly to knowledge development, innovation diffusion, and methodological advancement. This finding suggests that policymakers and academic institutions should encourage collaborative research initiatives, interdisciplinary healthcare governance studies, and international partnerships to strengthen evidence-based healthcare management practices.

The systematic literature analysis additionally reveals that recent hospital financial risk management studies increasingly focus on resilience, predictive governance, and adaptive organizational capability. This indicates that healthcare organizations should not only prioritize financial efficiency but also develop proactive governance mechanisms to anticipate future risks and uncertainties. Predictive governance systems supported by digital technology, financial analytics, and integrated risk management frameworks can help hospitals improve strategic preparedness and maintain long-term sustainability.

Overall, the findings confirm that hospital financial risk management research has evolved toward a more comprehensive and strategic perspective integrating sustainability, enterprise risk management, organizational resilience, and digital transformation. The managerial implications emphasize the need for integrated governance systems, technological adaptation, and sustainability-oriented financial management practices. Meanwhile, the policy implications highlight the importance of strengthening institutional governance, healthcare financial regulations, and collaborative innovation systems to support hospital resilience and adaptive governance in the era of economic uncertainty.

Discussion

The findings of this study demonstrate that hospital financial risk management research has experienced substantial conceptual and methodological evolution during the 2020–2025 period. The bibliometric mapping confirms that earlier studies were primarily concentrated on hospital financial performance, operational efficiency, cost management, and healthcare sustainability. However, more recent studies increasingly emphasize enterprise risk management, organizational resilience, digital transformation, and adaptive governance strategies. These results support the initial assumption that hospital financial risk management research has shifted from traditional accounting-oriented perspectives toward integrated sustainability and governance paradigms in response to global economic uncertainty.

The dominance of themes related to financial sustainability and operational efficiency indicates that hospitals continue to face significant financial pressures requiring strategic management approaches. Gandhi and Pribadi (2025) explain that healthcare organizations increasingly prioritize sustainability-oriented financial governance because hospital performance is closely associated with long-term organizational resilience. This finding is consistent with Dany and Pribadi (2024), who found that weak financial governance systems and ineffective cost allocation mechanisms contribute significantly to hospital financial failure. Therefore, the current study supports previous theories suggesting that financial sustainability is not merely a budgeting issue but a multidimensional governance challenge involving operational efficiency, strategic planning, and organizational adaptability.

The findings also reveal that enterprise risk management (ERM) has become a dominant theoretical and practical framework in hospital financial risk management studies. This result appears reasonable considering that healthcare organizations operate in highly uncertain environments characterized by economic instability, rising operational costs, and rapid technological transformation. Sae-Lim and Na Ayudhaya (2024) argue that hospital risk management has evolved beyond patient safety models toward enterprise-wide sustainable governance systems integrating financial, operational, technological, and strategic risks. The current findings strongly support this argument because bibliometric mapping demonstrates increasing interconnection between risk governance, resilience, sustainability, and adaptive management concepts.

In addition, the emergence of resilience and adaptive governance themes during the 2022–2023 period reflects the influence of post-pandemic economic recovery and global financial uncertainty on healthcare management research. Adeabah et al. (2023) explain that organizations operating in unstable economic environments require adaptive governance systems capable of mitigating financial shocks and maintaining operational continuity. Similarly, Kumari and Singh (2023) emphasize that sustainability-oriented governance and resilience frameworks have become increasingly important in organizational studies after global crises. The results of this study correspond closely with these perspectives because recent hospital financial risk management literature increasingly focuses on resilience-building strategies rather than solely emphasizing short-term financial performance.

The bibliometric analysis further demonstrates that digital transformation and technological innovation have become rapidly growing themes during the 2024–2025 period. This finding supports the argument that healthcare organizations are increasingly dependent on digital systems to improve financial resilience and strategic decision-making. Kanaparthi (2024) explains that artificial intelligence and machine learning technologies increasingly transform financial risk assessment, predictive analytics, and governance systems. Similarly, Haryanto et al. (2023) found that health information technology significantly improves healthcare organizational effectiveness and managerial capability. The present findings support these previous studies by showing that digital transformation is now positioned as an essential component of hospital financial risk management rather than merely a supporting operational tool.

The increasing integration of financial governance and digital transformation identified in this study also supports Wang et al. (2025), who argue that medical technology management research is increasingly combining digital innovation with sustainability-oriented healthcare governance. This relationship appears logical because economic uncertainty requires hospitals to adopt predictive and adaptive management systems that can respond rapidly to operational disruptions and financial instability. Consequently, hospitals increasingly utilize digital governance systems, data-driven decision-making, and integrated financial information technologies to strengthen resilience and sustainability.

Methodologically, the findings reveal that bibliometric analysis using VOSviewer has become one of the most widely applied approaches in healthcare financial management research. This result aligns with Iswardhani and Rahmat (2025), who emphasized that bibliometric visualization enables researchers to effectively identify thematic evolution, conceptual relationships, and emerging research trends. Similarly, Indri Iswardhani (2025) demonstrated that VOSviewer-based mapping successfully identifies scientific clusters and intellectual structures in risk governance studies. The increasing use of bibliometric methods reflected in the current study indicates that researchers are increasingly interested in understanding the broader knowledge structure and interdisciplinary evolution of hospital financial risk management literature.

The findings of this study also support the Resource-Based View (RBV) perspective, which posits that organizational capabilities, technological resources, and managerial competencies are strategic assets that support institutional sustainability. Amos et al. demonstrated that financial capability significantly affects hospital facilities management performance, implying that internal organizational resources remain critical determinants of healthcare sustainability. This theoretical alignment suggests that hospitals with stronger technological adaptation, governance systems, and strategic management capability are more likely to survive periods of economic uncertainty.

Although the findings largely support previous theories and studies, the current research also extends existing literature by demonstrating how hospital financial risk management research has evolved into a more interdisciplinary and integrated field. Earlier studies predominantly focused on operational efficiency and cost management, whereas contemporary research increasingly combines financial sustainability, resilience, digital governance, and adaptive organizational capability within a unified framework. This transition indicates an epistemological shift from conventional financial control paradigms toward comprehensive sustainability-oriented governance systems.

Furthermore, the findings imply that hospitals can no longer rely solely on traditional financial management approaches to sustain their organizations. Instead, healthcare organizations require integrated governance systems combining enterprise risk management, technological innovation, adaptive leadership, and resilience-based strategic planning. This conclusion supports the argument that the interaction between governance capability, technological adaptation, and sustainability-oriented management systems strongly influences hospital financial resilience.

The results of this study support most prior theories and empirical findings while extending the existing literature by providing a more comprehensive understanding of hospital financial risk management in the era of economic uncertainty. The findings confirm that hospital financial risk management research has shifted toward integrated governance, resilience, sustainability, and digital transformation paradigms, reflecting the growing complexity of modern healthcare organizations and the increasing need for adaptive and technology-driven governance systems.

Conclusion

This study concludes that research on hospital financial risk management in the era of economic uncertainty has experienced significant conceptual and thematic development during the 2020–2025 period. Bibliometric and systematic literature analysis using VOSviewer identified four dominant research clusters: hospital financial sustainability and operational efficiency; enterprise risk management and organizational resilience; bibliometric and scientific mapping approaches; and digital transformation and healthcare technology integration. The findings indicate that earlier studies mainly focused on financial performance, cost efficiency, and healthcare operational sustainability. In contrast, recent studies increasingly emphasize adaptive governance systems, resilience-based management, digital innovation, and integrated enterprise risk management frameworks. The analysis also confirms that sustainability, resilience, and technology-driven governance have become the dominant paradigms shaping contemporary research on hospital financial risk management.

This study provides important scientific and practical contributions to the development of hospital financial risk management literature. Scientifically, the study contributes by integrating bibliometric analysis and systematic literature review approaches to comprehensively map the intellectual structure, thematic evolution, and emerging trends in hospital financial governance research. The study also highlights the interdisciplinary nature of contemporary healthcare financial management by integrating perspectives on sustainability, governance, resilience, and digital transformation into a unified analytical framework. From managerial and policy perspectives, the findings emphasize the importance of adaptive governance systems, integrated risk management, digital infrastructure development, and sustainability-oriented financial strategies to strengthen hospital resilience amid economic uncertainty. The originality of this study lies in its focus on the evolution of the hospital financial risk management literature, using VOSviewer-based bibliometric mapping, combined with sustainability and enterprise risk management perspectives in the healthcare context.

Despite its contributions, this study has several limitations. First, the analysis was limited to articles published between 2020 and 2025 and indexed in selected scientific databases, which may exclude relevant studies published outside these databases or this period. Second, the study relied primarily on bibliometric and systematic literature review methods without incorporating empirical field data from healthcare institutions. Third, the analysis focused predominantly on keyword co-occurrence and thematic relationships, which may not fully capture contextual differences across countries and healthcare systems. Future research is therefore recommended to conduct comparative empirical studies across healthcare organizations, integrate quantitative financial performance indicators with governance analysis, and explore the implementation of artificial intelligence and predictive governance systems in hospital financial risk management practices. Further interdisciplinary research is also necessary to examine how healthcare organizations can strengthen resilience and sustainability through adaptive governance strategies in increasingly uncertain economic environments.

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