# “Evolution and future directions of banking risk management research: A bibliometric analysis”


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# EVOLUTION AND FUTURE DIRECTIONS OF BANKING RISK MANAGEMENT RESEARCH: A BIBLIOMETRIC ANALYSIS

## Abstract

This bibliometric analysis examines the evolution of academic research on banking risk management over the past four decades. The research maps publication trends, influential works, authorship, geographical distribution, conceptual themes, and future research directions using quantitative analysis of 286 English-language articles from the Scopus database. Since the 1990s, publication output and citations have been on the rise, with peaks in 2012 and 2019, indicating a rise in scholarly interest. The focus of research has expanded beyond credit risk to include operational, liquidity, and other key risks. Governance and culture are also expanding areas of emphasis. Geographic diffusion is revealed by bibliometric mapping, shifting from the early dominance of U.S. and European scholars to the increasing contributions of Asia and other emerging economies. Analysis of frequently occurring keywords illustrates the importance of fundamental risk management concerns. Six conceptual domains are identified by cluster analysis: operational risks, governance, liquidity risks, commercial bank risks, credit risks and performance, and market risk interactions. Based on the bibliometric analysis and research findings, three promising future research directions are proposed: the impact of pandemics and natural disasters on bank risk management; emerging threats such as cybercrime and climate change; and the impact of risk culture and governance on outcomes.

**Keywords** citation analysis, research trends, risk mitigation, systems analysis, visualization

**JEL Classification** G21, G28, G32, G01

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## INTRODUCTION

Due to the inherent risks associated with financial intermediation, effective risk management is essential for financial institutions such as banks (Mangala & Soni, 2022). As intermediaries between depositors and borrowers, banks play crucial economic roles, such as facilitating transactions and providing growth capital (Röhn et al., 2015). However, the inherent nature of banking entails risks such as credit defaults, market fluctuations, operational failures, liquidity shortages, and threats of insolvency. The global financial crisis of 2008 revealed how inadequate risk management can put individual institutions and entire financial systems at risk when risks materialize (Power, 2009). Due to the importance of the banking sector to economic stability, banks must implement robust risk management practices to mitigate threats and enhance resilience.

Research on risk management in banking has proliferated academically over the past two decades, paralleling this issue's growing prominence in practice. The objective of scholarly research has been to advance theoretical perspectives on banking risks, provide evidence to guide policies and governance, develop quantitative models and techniques, identify influence factors, and evaluate risk management

frameworks. Finance, economics, information systems, and operations research are some of the disciplines covered by the existing literature. Both industrialized and emerging economies have contributed to the expansion of the global comprehension of banking risks.

However, the volume of research on risk management in banking makes it difficult for academics to remain abreast of intellectual progress and interconnections (Qi et al., 2023). The dispersed nature of publications across disciplines makes it difficult to acquire a comprehensive understanding of the field. To synthesize the structure, dimensions, trends, and voids in this research domain, quantitative analysis and mapping are required (Moral-Munoz et al., 2019). Bibliometric techniques are well-suited to examining patterns in scholarly work and unveiling critical advances, relationships between publications, author networks, and thematic linkages (Ellegaard & Wallin, 2015).

## 1. LITERATURE REVIEW

Due to the inherent nature of their business, financial institutions, such as banks and insurance companies, play vital economic roles but are also exposed to numerous hazards (Van Laere & Baesens, 2010). There are numerous classifications and taxonomies of banking risk in the academic literature. Power (2009) identified four types of risk discourse in banking: minimal risk management, scientific risk management, uncertainty management, and sociocultural approaches. Fraser et al. (2009) classified banking risks as institutional, technical, social, and human. The Basel Committee on Banking Supervision (2015) defined essential banking risks, including credit risk, market risk, operational risk, liquidity risk, reputational risk, and IT risk, from a practitioner's perspective.

Scholars of all classifications concur that comprehensive risk management is essential for banks to operate securely and efficiently. Identifying risks, assessing exposures, mitigating and controlling risks, monitoring positions, and communicating risk data are all responsibilities of risk management (Van Laere & Baesens, 2010). Academics have proposed a number of frameworks for executing risk management in the banking industry, which are frequently adapted from general risk management standards. Power (2009) proposed risk management systems based on five pillars: event recognition, risk evaluation, risk reporting, risk treatment, and crisis response. McNeil et al. (2015) defined risk governance instruments, such as defining risk appetite, instituting control policies, constructing risk data systems, and instilling risk culture. In practice, bank risk managers use frameworks such as COSO and the Turnbull principles in conjunction with key risk indicators and risk appetite statements (Mikes & Kaplan, 2015). In banking contexts, a considerable body of literature examines specific risks and their determinants. Prominent topics include modeling credit risk (Crook & Bellotti, 2010), market risk and volatility spillovers (Alemany et al., 2015), liquidity risk contagion, operational risk interconnectivity (Abdymomunov & Mihov, 2019), insolvency risk and bank performance (Kaya, 2022), and systemic banking crises (Ahrend & Goujard, 2015). Researchers employ quantitative models, simulations, and statistical analyses to comprehend risk sources and transmission channels. Aebi et al. (2012) state that researchers also investigate the impact of competitive, regulatory, macroeconomic, technological, and cultural variables on banking risks. These empirical findings inform the quantification and projection of risk.

Several studies assess the outcomes of risk-related reforms in light of the implementation of significant regulations following the 2008 financial crisis. Researchers find that increased capital reserves reduce the risk of default (Berger & Bouwman, 2013), but have a negative impact on lending and profitability (DeYoung & Jang, 2016). Enhanced disclosure increases funding costs (Bischof & Daske, 2013), but it reduces risk-taking (Bischof & Daske, 2013). Higher supervisory intensity enhances bank stability in Europe (Delis et al., 2017) and Asia (Zhang et al., 2012), but it may also induce a shift to unregulated sectors. The evidence indicates that reforms achieve their intended objectives but require balancing tradeoffs.

Although scholars have extensively examined established risk management frameworks as well as


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credit, market, and operational risks, they have recently brought attention to emergent risk factors that are exacerbated by continuous innovation and advancements. Academic researchers are increasingly concerned with the challenges associated with digital transformation, data privacy, cyber risks, and IT disruptions, as financial technology (fintech) expands (Gai et al., 2018). Cryptocurrencies and decentralized finance give rise to novel hazards that conventional regulatory frameworks fail to encompass (Weingärtner et al., 2023). Physical and transitional channels are both through which climate change generates sustainability hazards (Yang et al., 2023). Risk culture failures and incentive misalignments that fostered an environment of excessive risk-taking within certain banks have been documented by researchers (Power, 2009). To enhance risk oversight, analysts propose the implementation of various measures such as comprehensive risk data aggregation, model validation, stress testing, and enhanced governance and communication.

While risk management is the subject of extensive research, gaps remain. Further research is recommended in the areas of interacting and compound risk effects, non-linear systemic impacts, risk interdependencies throughout the value chain, and behavioral influences (Aebi et al., 2012). The focus of recent research has been on the utilization of big data for risk management and the management of technology risks in light of the continuous process of digitalization (Gai et al., 2018). Academics emphasize the imperative for ongoing improvement of risk management theory and practice in response to the dynamic nature of business environments and regulations.

The literature review explores well-established risk management frameworks and research on important banking risks, such as credit, market, and operational risks. Recent studies have highlighted the growing concerns surrounding financial technology, climate change, risk culture failures, and incentive misalignments. Researchers highlight the importance of continuously improving risk management theory and practice to adapt to changing business environments and regulations.

The purpose of this study is to analyze the evolution and future directions of banking risk management research using a bibliometric analysis.

## 2. METHODS AND DATA

This study employs bibliometric mapping and network analysis to evaluate the intellectual landscape of research on banking risk management. Bibliometric analysis allows for the quantification and visualization of academic literature, providing insights into the structure, dynamics, and evolution of a research field. Through the analysis of citation and reference patterns found in various publications, this technique can identify the influential works and research areas that have significantly influenced the advancement of the field (Ellegaard & Wallin, 2015). The techniques employed shed light on the conceptual, social, and temporal aspects of academic scholarship in the field of banking risk management. Bibliometric techniques offer an evidence-based, macro-level perspective that serves as a valuable complement to traditional qualitative literature reviews (van Eck & Waltman, 2017). The analysis will result in multi-dimensional knowledge maps that will provide a clearer understanding of the intellectual foundation and trajectory of research in banking risk management.

Relevant scholarly publications were extracted from Scopus, one of the greatest databases with over 90 million records of peer-reviewed literature across disciplines. Scopus was chosen due to its interdisciplinary scope, citation data, and export tools for bibliometric analysis. The following search string was applied to the Scopus database to compile relevant documents: TITLE ((“management” “risk” “bank”) AND (LIMIT-TO (LANGUAGE, “English”) AND (LIMIT-TO (DOCTYPE,”ar”)). This limited English-language search of titles for phrases related to “management”, “risk” and “bank” or returned 312 results. The records were filtered to include only English-language articles published between 1983 and 2023, yielding a corpus of 286 articles. These 286 articles’ bibliographic information, including titles, authors, abstracts, citations, and keywords, was exported from Scopus into a CSV file for preprocessing. The records were cleansed and merged, with the most pertinent information fields retained for analysis. The final dataset was transferred into the VOSviewer software for bibliometric analysis and visualisation (van Eck & Waltman, 2017). In particular, a co-occurrence analysis of countries,

journals, authors, citations, and keywords was conducted to identify relationships and patterns (Donthu et al., 2021).

Analyzing publication trends by charting the number of papers and citations by publication year. This reveals growth patterns and inflection points, indicating the research domain's maturity and significance (Donthu et al., 2021). Trends in citations demonstrate the scholarly impact over time. As foundational knowledge diffuses into the discipline, rising citation counts indicate increased influence (Ellegaard & Wallin, 2015). Productivity analysis identifies and ranks the literature's most prolific contributors. Total publications and citations are quantified for authors to identify the most published and cited academicians. This focuses on the most influential researchers in the field (Merigó & Yang, 2017). Total output reveals research concentrations and centers of expertise for nations and institutions (Donthu et al., 2021). Analysis of performance evaluates the citation impact of the most influential publications, authors, and journals. Higher citation counts indicate greater significance in the discipline (Bornmann & Haunschild, 2016). However, impact metrics must take time since publication into account. Moed (2010) states that calculating citations per year provides a normalized measure of citation performance.

Keyword co-occurrence analysis makes use of text mining to extract significant terms from article titles, abstracts, and author keywords (van Eck & Waltman, 2014). Heersmink et al. (2011) found that mapping frequent keywords and clustering them into themes reveals the disciplinary and conceptual structure. Changes in keyword frequency over time can be used to trace topic evolutions in the literature. High-frequency expressions represent fundamental concepts (Moral-Munoz et al., 2019).

## 3. RESULTS

Table 1 demonstrates that, with some fluctuations, research interest and output on risk management in banking have increased consistently over time. In the 1980s and early 1990s, only a few studies were published, with only one or two papers per year and few citations. Midway through the 1990s, things began to improve, with 1995 seeing the first increase to 2 papers and 9 citations. The number of annual publications reached double digits for the first time in 2004 (5 papers) and triple digits in 2012 (15 papers). Output remained low in the late 1990s before surging in the 2000s, with the number of annual publications reaching double digits for the first time in 2004 (5 papers) and triple digits in 2012 (15 papers). Citations also increased significantly, reaching a peak of 795 in 2012.

The 2010s saw continued growth in research output, with the number of papers per year ranging from 11 to 38. 26 papers were published in 2019, and 38 will be published in 2022, indicating an increase in academic interest in this topic. Probably

**Table 1.** Publications and citations of banking risk management research from 1983 to 2023

| ID | Year | Documents | Citations | ID | Year | Documents | Citations |
|---|---|---|---|---|---|---|---|
| 1 | 1983 | 1 | 1 | 17 | 2009 | 5 | 114 |
| 2 | 1984 | 1 | 10 | 18 | 2010 | 7 | 150 |
| 3 | 1987 | 1 | 1 | 19 | 2011 | 7 | 43 |
| 4 | 1994 | 1 | 6 | 20 | 2012 | 15 | 795 |
| 5 | 1995 | 2 | 9 | 21 | 2013 | 11 | 253 |
| 6 | 1997 | 1 | 56 | 22 | 2014 | 16 | 181 |
| 7 | 1998 | 1 | 225 | 23 | 2015 | 22 | 276 |
| 8 | 2000 | 1 | 0 | 24 | 2016 | 18 | 184 |
| 9 | 2001 | 2 | 68 | 25 | 2017 | 17 | 94 |
| 10 | 2002 | 4 | 104 | 26 | 2018 | 19 | 102 |
| 11 | 2003 | 2 | 21 | 27 | 2019 | 17 | 115 |
| 12 | 2004 | 5 | 332 | 28 | 2020 | 19 | 168 |
| 13 | 2005 | 1 | 0 | 29 | 2021 | 26 | 71 |
| 14 | 2006 | 1 | 1 | 30 | 2022 | 38 | 81 |
| 15 | 2007 | 4 | 113 | 31 | 2023 | 18 | 6 |
| 16 | 2008 | 3 | 145 | Total | | 286 | **3,725** |


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due to the delay between publication and citation accumulation, citation fluctuations increased. They again reached a peak of 795 in 2012, before falling and then rebounding to 276 in 2015 and 184 in 2016. The preliminary data for 2023 indicates a decrease in output to 18 papers, although this may change by the end of the year. The data indicate that risk management has become a greater priority and research area in banking over the past several decades.

Aebi et al. (2012) examine, with 508 citations (Table 2), whether risk management mechanisms such as having a Chief Risk Officer (CRO) are associated with improved bank performance during the 2007–2008 financial crisis. With 225 citations, Hughes and Mester (1998) developed a model showing financial capital allows banks to signal risk and function as a cushion against insolvency for risk-averse managers. Cebenoyan and Strahan (2004), cited 195 times, discover that banks actively managing credit risk exposure via loan sales hold less capital and make riskier loans but have lower overall risk and higher profits. Matthews (2013), supported by 133 citations, surveys risk managers at Chinese banks, discovering underdeveloped risk management compared to foreign banks, and constructing metrics to demonstrate that income efficiency is substantially correlated with risk metrics. Weber (2012) examines how Canadian banks incorporate environmental risks into their lending practices. With 122 citations, he concludes that each study examines such financial hazards in a systematic manner. There is a need for additional reporting on environmental risk management, but Canadian institutions currently lead the world in this area.

The Journal of Banking and Finance is unquestionably the most influential journal (Table 3), with 798 citations across 6 documents, or an exceedingly high 133 citations per document. This demonstrates that the journal publishes research with a significant impact on risk management in banking. The Business Strategy and the Environment rated second with 273 citations spread across 4 documents (68.25 per document). The Journal of Risk Finance ranked third with 262 citations across 5 documents (52.4 citations per document), indicating that despite having fewer published papers, the research has a disproportionately large impact. Review of Economics and Statistics and Journal of Financial Economics, with 225 and 189 total citations, respectively, rounded out the top 5.

**Table 2.** Top 20 papers with the most citations in banking risk management research

| Rank | Article | Source title | Citations | DOI |
|---|---|---|---|---|
| 1 | Aebi et al. (2012) | Journal of Banking and Finance | 508 | 10.1016/j.jbankfin.2011.10.020 |
| 2 | Hughes and Mester (1998) | Review of Economics and Statistics | 225 | 10.1162/003465398557401 |
| 3 | Cebenoyan and Strahan (2004) | Journal of Banking and Finance | 195 | 10.1016/S0378-4266(02)00391-6 |
| 4 | Matthews (2013) | Omega (United Kingdom) | 133 | 10.1016/j.omega.2012.06.003 |
| 5 | Weber (2012) | Business Strategy and the Environment | 122 | 10.1002/bse.737 |
| 6 | Wu and Olson (2010) | Journal of the Operational Research Society | 116 | 10.1057/jors.2008.144 |
| 7 | Cohen et al. (2014) | Journal of Money, Credit and Banking | 109 | 10.1111/jmcb.12101 |
| 8 | Weber et al. (2008) | Business Strategy and the Environment | 107 | 10.1002/bse.507 |
| 9 | DeAngelo and Stulz (2015) | Journal of Financial Economics | 101 | 10.1016/j.jfineco.2014.11.011 |
| 10 | Elamer et al. (2020) | Business and Society | 94 | 10.1177/0007650317746108 |
| 11 | Hassan Al-Tamimi and Mohammed Al-Mazrooei (2007) | Journal of Risk Finance | 93 | 10.1108/15265940710777333 |
| 12 | Adeleye et al. (2004) | International Journal of Information Management | 68 | 10.1016/j.ijinfomgt.2003.10.004 |
| 13 | Hassan (2009) | Journal of Risk Finance | 64 | 10.1108/15265940910924472 |
| 14 | Abu Hussain & Al-Ajmi (2012) | Journal of Risk Finance | 59 | 10.1108/15265941211229244 |
| 15 | Santomero (1997) | Journal of Financial Services Research | 56 | 10.1023/A:1007971801810 |
| 16 | Mukerjee et al. (2002) | International Transactions in Operational Research | 54 | 10.1111/1475-3995.00375 |
| 17 | Ippolito et al. (2016) | Journal of Financial Economics | 44 | 10.1016/j.jfineco.2015.11.004 |
| 18 | Calomiris and Carlson (2016) | Journal of Financial Economics | 44 | 10.1016/j.jfineco.2016.01.025 |
| 19 | Mengze and Wei (2015) | Business Strategy and the Environment | 44 | 10.1002/bse.1810 |
| 20 | Ratnovski (2013) | Journal of Financial Intermediation | 43 | 10.1016/j.jfi.2013.01.002 |

**Table 3.** Top 20 journals by total citations received for banking risk management research

| Rank | Journal | Citations | Documents | Citations per Document |
|---|---|---|---|---|
| 1 | Journal of Banking and Finance | 798 | 6 | 133.00 |
| 2 | Business Strategy and the Environment | 273 | 4 | 68.25 |
| 3 | Journal of Risk Finance | 262 | 5 | 52.40 |
| 4 | Review of Economics and Statistics | 225 | 1 | 225.00 |
| 5 | Journal of Financial Economics | 189 | 3 | 63.00 |
| 6 | Journal of Money, Credit and Banking | 135 | 2 | 67.50 |
| 7 | Omega (United Kingdom) | 133 | 1 | 133.00 |
| 8 | Journal of the Operational Research Society | 116 | 1 | 116.00 |
| 9 | Business and Society | 94 | 1 | 94.00 |
| 10 | International Journal of Information Management | 68 | 1 | 68.00 |
| 11 | Journal of Financial Services Research | 67 | 2 | 33.50 |
| 12 | Journal of Financial Intermediation | 62 | 4 | 15.50 |
| 13 | Qualitative Research in Financial Markets | 61 | 4 | 15.25 |
| 14 | International Transactions in Operational Research | 54 | 1 | 54.00 |
| 15 | Journal of Islamic Accounting and Business Research | 54 | 5 | 10.80 |
| 16 | Journal of Sustainable Finance and Investment | 42 | 1 | 42.00 |
| 17 | Contemporary Accounting Research | 34 | 1 | 34.00 |
| 18 | Journal of Financial Stability | 34 | 3 | 11.33 |
| 19 | Review of Quantitative Finance and Accounting | 31 | 1 | 31.00 |
| 20 | Accounting and Finance | 30 | 2 | 15.00 |

The influence of this topic is dominated by a small number of journals, with the top five receiving over 1,500 citations and the next 15 receiving only about 500 more. Even if fewer papers on risk management are published in these prestigious journals overall, their reach and influence are enhanced. These venues appear to prioritize quality over quantity in advancing scholarly research on this topic.

Aebi, V., Sabato, G., and Schmid, M. have the highest citation counts, with 508 each (Table 4), indicating they were co-authors of a single extremely influential paper on "Risk Management in Banking." As co-authors of a single paper, they should be regarded as a unit rather than as top authors individually.

With 3 published papers and 268 total citations, Weber, O. is the most prolific individual author in the top ten. Hughes, J. P. stands out among the top five authors with 225 citations for a single paper. The top 10 comprises authors with 195 to 101 citations each for their single papers, except for Weber, O. The number of citations continues to decline progressively in the top 20, with the majority of authors publishing only one relevant paper. Notable exceptions include Jin J., Masood O., and Mehra Y. S., who each have three publications but fewer citations (49, 25, and 9).

Both the number of citations and publications on risk management in banking are dominated by the United States (Table 5). With 31,945 citations, the United States has nearly five times as many as the

**Table 4.** Top 20 banking risk management researchers with the most citations

| Rank | Author | Documents | Citations | Rank | Author | Documents | Citations |
|---|---|---|---|---|---|---|---|
| 1 | Aebi, V. | 1 | 508 | 11 | Olson, D.L. | 1 | 116 |
| 2 | Sabato, G. | 1 | 508 | 12 | Cohen, L.J. | 1 | 109 |
| 3 | Schmid, M. | 1 | 508 | 13 | Marcus, A.J. | 1 | 109 |
| 4 | Weber, O. | 3 | 268 | 14 | Cornett, M.M. | 1 | 109 |
| 5 | Hughes, J. P. | 1 | 225 | 15 | Tehranian, H. | 1 | 109 |
| 6 | Cebenoyan, A. S. | 1 | 195 | 16 | Deangelo, H. | 1 | 101 |
| 7 | Strahan, P. E. | 1 | 195 | 17 | Stulz, R.M. | 1 | 101 |
| 8 | Matthews, K. | 1 | 133 | 18 | Elamer, A.A. | 1 | 94 |
| 9 | Fenchel, M. | 2 | 129 | 19 | Hassan Al-Tamimi, H.A. | 1 | 93 |
| 10 | Wu, D. | 1 | 116 | 20 | Mohammed Al-Mazrooei, F. | 1 | 93 |


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**Table 5.** Banking risk management research output of top 20 countries by citations

| Rank | Country | Documents | Citations | Rank | Country | Documents | Citations |
|---|---|---|---|---|---|---|---|
| 1 | United States | 31 | 945 | 11 | United Arab Emirates | 3 | 107 |
| 2 | Switzerland | 6 | 716 | 12 | Italy | 10 | 96 |
| 3 | Germany | 9 | 557 | 13 | Pakistan | 11 | 85 |
| 4 | United Kingdom | 29 | 521 | 14 | Spain | 3 | 67 |
| 5 | Netherlands | 2 | 511 | 15 | Bahrain | 5 | 64 |
| 6 | Canada | 6 | 329 | 16 | Australia | 5 | 46 |
| 7 | China | 29 | 142 | 17 | Bangladesh | 2 | 44 |
| 8 | India | 25 | 141 | 18 | France | 7 | 39 |
| 9 | Malaysia | 22 | 137 | 19 | Japan | 2 | 39 |
| 10 | Egypt | 5 | 111 | 20 | Czech Republic | 2 | 33 |

second-ranked nation, Switzerland. The United States' status as a global financial center and home to many of the world's largest institutions likely contributes to its prominence. In addition, the United States has the most publications, with 31.

Switzerland, Germany, the United Kingdom, and the Netherlands, which occupy positions 2-5 for citations, comprise the next stratum. These Western European nations have developed financial sectors and significant banking presence that stimulate research output. Switzerland has the second-highest number of citations despite having the twenty-seventh-most publications. Canada, China, and India complete the top eight countries for both citations and publications, outside of the top five. Their positions reflect the expansion of the financial sectors in these major economies. The presence of emergent market banking powers such as China and India demonstrates a shift away from the Western economies' historical dominance. There are more emergent economies like Malaysia, Egypt, UAE, and Pakistan among the top twenty. However, 11 of the top 20 citation-generating nations are still Western nations. The United States and Western Europe continue to dominate, but the landscape has diversified, with Asian institutions beginning to play a larger role in research. While incumbents maintain strength, developing countries are consistently contributing more to global banking knowledge.

The University of Delhi has published the highest number of papers on "Risk Management in Banking" with four (Table 6), followed by Narxoz University with four, and Universiti Teknologi MARA with three. These prestigious institutions demonstrate a strong research focus and proficiency in banking risk management.

While the University of Delhi published the most documents overall, prominent European and American universities like ETH Zurich, University of St. Gallen, Boston College, and University of

**Table 6.** The top 20 affiliations in terms of notable outputs

| Rank | Affiliation | Documents | Rank | Affiliation | Documents |
|---|---|---|---|---|---|
| 1 | University of Delhi | 4 | 11 | Palestine Technical University – Kadoorie | 3 |
| 2 | Narxoz University | 4 | 12 | Deen Dayal Upadhyaya College | 3 |
| 3 | Universiti Teknologi MARA | 3 | 13 | S.P. Jain Institute of Management and Research | 3 |
| 4 | Mansoura University | 3 | 14 | Loughborough University | 2 |
| 5 | Indian Institute of Technology Bombay | 3 | 15 | Universiti Sains Malaysia | 2 |
| 6 | Southwestern University of Finance and Economics | 3 | 16 | Stellenbosch University | 2 |
| 7 | Financial University under the Government of the Russian Federation | 3 | 17 | The University of Sheffield | 2 |
| 8 | Universiteti i Prishtinës | 3 | 18 | University of South Africa | 2 |
| 9 | Universiti Sains Islam Malaysia | 3 | 19 | Modibbo Adama University of Technology, Yola | 2 |
| 10 | Covenant University | 3 | 20 | Bank of China | 2 |

Wisconsin-Madison also made the top 20 list. This demonstrates the global relevance of banking risk management research. Universities in developing economies such as India, Malaysia, and Nigeria contributed the most to this field of study. As evidenced by the top 20, however, established institutions in Europe and North America also play an essential role. The geographical diversity of contributing institutions demonstrates the global importance of effective risk management in the financial industry.

"Risk Management" is the keyword that appears the most frequently, 121 times (Table 7). This indicates that the majority of research in this discipline focuses on the overarching concept of risk management frameworks, models, and banking practices. The prominence of this keyword underscores the significance of effective risk management as the foundation of stability and profitability in the banking sector. The second most frequent keyword is "Credit Risk" (44 occurrences). Given that credit risk constitutes a significant portion of banks' overall exposure to risk, its high ranking is logical. Frequent research focuses on the methods and strategies employed by banks to quantify and mitigate credit risk across diverse asset classes, including loans, bonds, and derivatives. With 34 occurrences, "Risk Assessment" rates third, emphasizing the importance of measuring and evaluating diverse banking risks. Banks can monitor risk exposures and take preventative measures by utilizing robust risk assessment techniques, such as stress testing. The next two most popular keywords are "Banks" (23 occurrences) and "Banking" (22 occurrences). This indicates that the studies have a clear emphasis on banking institutions and the banking system as a whole. Due to its role in financial intermediation and its intersection with risk, the banking sector is an essential area of study.

The keyword frequency analysis demonstrates that research in this domain focuses on understanding and improving risk management practices, with a particular emphasis on credit risk assessment, in banks and banking systems worldwide. The top five keywords provide a concise overview of the central themes, whereas the top twenty keywords add nuance to subtopics and contexts. The prominence of "Risk Management" is indicative of its utmost significance as the top research priority.

## 4. DISCUSSION

In the beginning, research concentrated primarily on the fundamentals of credit risk management in banks. Important studies include Feridun's (2006) study, which examined the failure of the LTCM hedge fund from a risk management standpoint. From 2010 to 2015, the scope of research expanded to include operational risk, liquidity risk, and enterprise risk management. Mehra (2010) analyzed operational risk management practices in Indian institutions. In recent years (2016–2023), research has become increasingly specialized, focusing on particular risk management practices and their effects. Sharifi et al. (2016), for instance, analyzed the relationship between operational risk management and bank characteristics such as size and ownership in Indian institutions. Andries and Brown (2017) investigated how risk management mitigates credit cycles during times of crisis. In the meantime, Kaiser (2021) drew parallels between COVID-19 risk management in countries and banks. Studies such as Helbekkmo et al. (2019) discuss the transformation of risk management for emergent threats such as cybercrime and climate change during the period 2020-2023. In addition, research examined the effects of risk management

**Table 7.** The top 20 keywords

| Rank | Keyword | Occurrences | Rank | Keyword | Occurrences |
|---|---|---|---|---|---|
| 1 | Risk Management | 121 | 11 | Operational Risk | 12 |
| 2 | Credit Risk | 44 | 12 | Corporate Governance | 11 |
| 3 | Risk Assessment | 34 | 13 | Liquidity Risk | 10 |
| 4 | Banks | 23 | 14 | Risk | 9 |
| 5 | Banking | 22 | 15 | Risk Management Practices | 9 |
| 6 | Islamic Banks | 20 | 16 | Risks Management | 9 |
| 7 | Commercial Banks | 19 | 17 | Finance | 8 |
| 8 | Credit Risk Management | 17 | 18 | Profitability | 8 |
| 9 | Credit Risks | 15 | 19 | Bank | 7 |
| 10 | Commercial Bank | 14 | 20 | Bank Performance | 7 |


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on outcomes such as bank performance and stability. For instance, Bunkanwanicha et al. (2022) discovered that replacing the CEOs of bailed-out U.S. banks reduced bank risk and systemic risk.

Over the years, research on risk management in banking has expanded from focusing predominantly on credit risk to more diverse risks and practices, while also connecting risk management to outcomes such as performance. The need for risk management to evolve in tandem with growing concerns such as climate change hazards is supported by recent research.

This study investigates the various facets of risk management in the banking industry, as evidenced by the emergence of six clusters (Figure 1) addressing specific risk categories and practices. The red cluster (cluster 1) is concerned with operational risk management in banks, with a concentration on mitigating financial crises and managing operational hazards. The green cluster (cluster 2) focuses on risk governance, specifically investigating the practices of Pakistani and Islamic banks with regard to conventions and standards. The management of liquidity risk in commercial banks and Islamic banks forms a cluster of sky blue (cluster 3). The focus of the yellow cluster (cluster 4) is risk management in commercial banks. The pink cluster (cluster 5) investigates the impact of credit risk management on the overall performance of institutions. Finally, the blue cluster (cluster 6) investigates the relationship between interest rate risk and credit risk. The variety of these colored clusters demonstrates the complexity of the field of risk management, which includes operational, governance, liquidity, credit, and market risks. The research provides insights from both micro and macro perspectives by focusing on specific bank categories and the banking system as a whole. Risk management emerges as fundamental to ensuring the stability and performance of banks.

Risk management has attained a central position in the ever-evolving world of banking. As this study navigates the era following 2023, three key research directions (Table 8) have emerged, each reflecting the intricate interaction between global economic shifts and the inherent complexities of the banking sector. These research directions illuminate not only the challenges confronted by banks but also potential avenues for innovation and enhancement of risk management strategies. Each of these research directions offers a plethora of insights and avenues for further investigation in the domain of banking risk management.

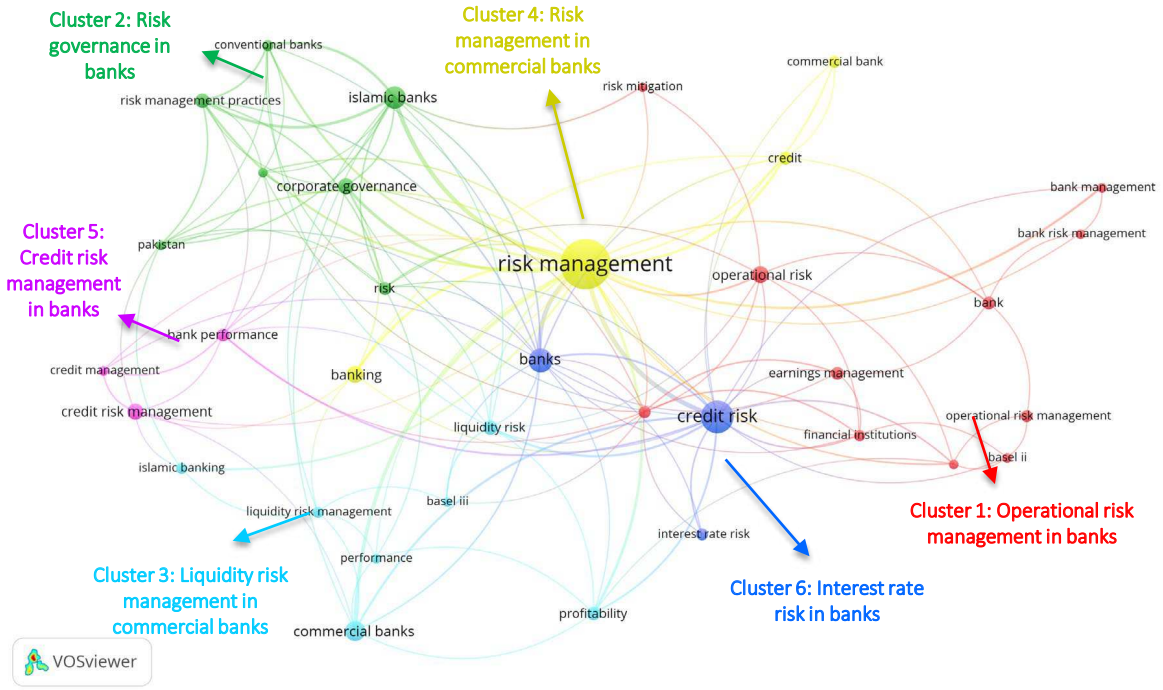


**Figure 1.** Network of keyword co-occurrence in publications about bank risk management

### 4.1. Impact of pandemics and disasters on bank risk management

This research direction draws parallels between the management of COVID-19 risks in countries and in banks, suggesting that banks must evolve their pandemic risk management. In addition, the paper examines the varying pandemic resilience of institutions. Future research could investigate specific strategies and regulations that enhance bank resiliency and stability during times of crisis without compromising profitability. Kaiser (2021) drew parallels between the management of COVID-19 risks in countries and banks, indicating that banks must evolve their pandemic risk management. During COVID-19, Sawafta (2021) discovered that Islamic institutions in Palestine have a lower credit risk than conventional banks. This provides evidence for the differential pandemic resilience of banks. Future research could investigate specific strategies and regulations that enhance bank resilience and stability during crises without compromising profitability. Using models, research can also quantify the costs of pandemics to enhance preparedness.

### 4.2. Emerging risks like cybersecurity, climate change

This field of study discovered that an increase in climate risk reduces bank valuation and financing terms, demonstrating the need for climate risk management to mitigate negative effects. In addition, it demonstrated that enterprises managing climate risks can mitigate the negative effects of bank lending. Additional research can develop methodologies for stress-testing the resilience of financial institutions against emergent cyber and climate threats. Bai et al. (2022) found higher climate risk reduces bank valuation and financing terms. This demonstrates the need for climate risk management to reduce adverse effects. This demonstrates the value of emergent practices for risk management. Further research can establish methodologies for stress-testing the resilience of financial institutions against emerging cyber and climate threats. Additionally, research can investigate optimal risk disclosure and incorporation into business strategies for managing new risks.

### 4.3. Risk culture and governance

This line of inquiry demonstrates that robust risk management practices mitigate credit boom-and-bust cycles during financial crises. Additionally, it suggests that governance influences risk-taking. Future research could delve further into how risk culture and governance influence banking operations and results. Strong risk management practices mitigate credit boom-and-bust cycles during crises, according to Andries and Brown (2017). This demonstrates the effect of risk culture on results. Bunkanwanicha et al. (2022) demonstrated that replacing the CEOs of bailed-out U.S. banks reduced both bank and systemic risk. This suggests that governance affects risk-tak-

**Table 8.** Three potential future directions for bank risk management research

| Research Topic | Research Questions | Outstanding Studies |
|---|---|---|
| Impact of Pandemics and Disasters on Bank Risk Management | - How can banks quantify pandemic and disaster risks?<br>- What risk management strategies help banks withstand pandemics and disasters?<br>- How does disaster preparedness affect bank stability and profitability?<br>- What regulatory changes can promote bank resilience to pandemics and disasters?<br>- How can banks balance profitability and stability during crises? | Kaiser (2021)<br>Sawafta (2021) |
| Emerging Risks like Cybersecurity, Climate Change | - How can banks manage new risks like cybercrime and climate change?<br>- What risk management strategies are effective against cyber attacks?<br>- How does climate risk exposure affect bank lending and risk-taking?<br>- How can banks measure and disclose climate change risks?<br>- What regulations can address emerging risks for banks? | Helbekkmo et al. (2019)<br>Bai et al. (2022) |
| Risk Culture and Governance | - How does bank culture influence risk-taking and outcomes?<br>- What governance practices curb excessive risk-taking?<br>- How can risk governance be improved to enhance risk management?<br>- What motivates bank employees and managers to properly manage risks?<br>- How do compensation incentives affect risk-taking? | Bai et al. (2022)<br>Bunkanwanicha et al. (2022) |


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ing. Future research could examine how governance practices and compensation incentives influence risk culture and discourage excessive risk-taking. Also required is research on how to motivate employees to practice appropriate risk management.

Future research must address evolving risks, such as pandemics and climate change, and examine cultural and governance factors that influence the efficacy of risk management. This can equip institutions with the strategies and resources necessary to combat emerging threats.

## CONCLUSIONS

This study aimed to analyze the progression of academic research on risk management in banking over the last forty years. Through a thorough analysis of 286 English-language articles, a number of significant findings have emerged, offering valuable insights into this particular research area.

In the beginning, the focus was on credit risk fundamentals. However, scholarly research has since broadened to include operational, liquidity, market, and other important banking risks. Simultaneously, there has been an expansion in geographical representation, with scholars from emerging Asian economies making increasingly significant contributions alongside the traditionally dominant U.S. and European academics. By analyzing commonly used terms, it becomes clear that core risk management themes remain important despite the expanding scope. Cluster analysis revealed six distinct conceptual domains, covering operational risks, governance, liquidity risks, commercial bank risks, credit risks and performance, and market risk interactions.

The bibliometric results highlight three potential avenues for furthering research in banking risk management. Additional analysis is required to fully understand the effects of major crises, such as pandemics and natural disasters, on the management of bank risk. The need for further research on risk quantification and mitigation strategies is evident in light of emerging threats like cybercrime and climate change. In addition, studying risk culture and governance can offer valuable insights into reducing excessive risk-taking. Given the ever-changing risk landscape, it is essential for banks to continuously conduct research to enhance risk management theories and practices. This will enable them to effectively fulfill their economic roles while ensuring security. This study provides a valuable overview of the evolution of ideas and intellectual structure in this highly significant field.

## AUTHOR CONTRIBUTIONS

Conceptualization: Nguyen Minh Sang.
Data curation: Nguyen Minh Sang.
Formal analysis: Nguyen Minh Sang.
Methodology: Nguyen Minh Sang.
Software: Nguyen Minh Sang.
Visualization: Nguyen Minh Sang.
Writing – original draft: Nguyen Minh Sang.
Writing – review & editing: Nguyen Minh Sang.

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