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A Bibliometric Review of FinTech's Impact on Banking Risk

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Abstract: This bibliometric analysis delves into the realm of financial technology (FinTech) and its impact on the banking sector, with a specific focus on research patterns spanning from 2013 to 2023. Given the fast-paced progress in FinTech, this study aims to analyse the scholarly discussions, common topics, worldwide contributions, and changes in research focus found in the current body of literature. Using bibliometric analytical techniques, we examined a dataset of 813 documents obtained from the Scopus database. Our analysis uncovered a notable increase in publications related to FinTech in various regions. Our analysis reveals a dynamic thematic landscape that has evolved from core concepts in FinTech to blockchain technology, cybersecurity, and the profound impact of the pandemic on digitalization. The study also emphasises the significance of international collaborations, interdisciplinary research approaches, and the involvement of multiple funding organisations, all underscoring the strategic importance of FinTech research. In addition, our research highlights the continued importance of comprehending the relationship between FinTech advancements and the stability of the financial system. Ultimately, this study highlights the importance of ongoing and flexible research endeavours that provide valuable insights for policymakers and practitioners to effectively leverage the economic potential of FinTech while responsibly navigating the challenges of regulations and associated risks. This study makes a significant contribution to the ongoing scholarly discussion and policy development in the ever-changing field of FinTech and its impact on the banking industry.

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1.Introduction

Financial technology, or FinTech, has arisen because of significant technological and financial progress brought about by the digital revolution. This revolution encompasses widespread internet usage, data analytics, and mobile technologies. Significantly, the growing digitization of financial services has had a significant impact on shaping the FinTech industry (Ma et al., 2023). This wave of change gained even more momentum after the 2008 financial crisis. The crisis caused people to reevaluate traditional financial systems and led to a surge of new and creative solutions in the financial sector. Stakeholders were increasingly motivated to address vulnerabilities and longstanding inefficiencies due to rapid technological changes and significant disruptions like the global financial crisis of 2008.

Over the years, FinTech has emerged and evolved dynamically to fill needs and capture opportunities created by advances in software, hardware, and connectivity. Originally centred on improving internal systems and operations within traditional banks and other institutions, FinTech has now burgeoned into a diverse array of applications accessible directly to consumers and businesses. These range from peer-to-peer lending platforms and digital payments to crowdfunding websites, contentious cryptocurrencies, automated investment advisors, and contemporary insurance products made possible by technology. A nexus of forces has propelled the growth of FinTech, such as evolving customer demands for convenience and transparency, a growing desire for simple and smart financial tools, and a proliferation of startups determined to reshape legacy practices through innovation.

With the proliferation of financial technology solutions, establishing a clear, consistent definition encompassing its diverse technologies and uses has become imperative. The Financial Stability Board's description recognizing FinTech as technological progress within financial services offers broad acceptance, emphasizing novelty that meaningfully influences markets, institutions, and access through new business models, software, procedures, or merchandise significantly altering the industry (Baldan & Zen, 2020; Li, Tan, & Huang, 2023). This definition fully captures FinTech's importance as a disruptive force, highlighting its capacity to revolutionize conventional methods through innovation yielding profound worldwide effects. It underscores technology's pivotal role in financial transformation, focusing on invention and substantial impacts. However, constant evaluation is needed considering FinTech's rapid evolution, ensuring the definition maintains relevance amidst emerging advancements reshaping finance.

Current research in financial technology primarily focuses on several critical areas. Hu et al. (2019)'s monumental study pioneered the perspective that FinTech can substantially amplify service excellence and performance. They developed an advanced technology acceptance model considering nuanced user innovativeness, supportive government policies, reliable brand reputation, and perceived risk to gauge trustworthiness. Meanwhile, Kou et al. (2021)'s exploration delved into FinTech's multifaceted positive impacts through cost reduction, quality-of-service enhancement, and client contentment. Bollaert, Lopez-de-Silanes, & Schwienbacher (2021)'s groundbreaking examination, regarding inclusive finance advancement, inspects how FinTech impacts financing prospects for enterprises and investors, specifically expanding credit access for individuals who lack banking services or have limited financial histories.

While previous studies have delved into subsets of FinTech's implications, the full scope of its systemic effects remains unknown. Yao et al. (2021) examined how urban FinTech levels impacted green productivity, finding a meaningful correlation. Similarly, Basya & Ayu (2020) analysed how Islamic banks have leveraged FinTech for financing through importance-performance analysis, highlighting both opportunities and challenges. Franco et al. (2019) conducted a wide-ranging analysis of potential systemic risks stemming from FinTech's accelerated growth, emphasising the importance of monitoring unintended consequences. Furthermore, comprehensive surveys by Lai & Samers (2021) and Allen, Gu, & Jagtiani (2021) have provided invaluable discussions of the developing FinTech literature. As the sector rapidly transforms before regulators, financial institutions are proactively exploring innovative technological solutions to enhance accessibility, oversight, and sustainability across markets. Nevertheless, holistic approaches are still needed to fully understand FinTech's dynamic role in reshaping global finance.

While FinTech has great promise to upend traditional banking methods and help streamline operations across the sector, existing studies have largely centred on how it affects service quality, efficiency gains, and financial inclusion. However, little exploration has been done into its precise ramifications for individual institutions. Simultaneously, banks have displayed increasing intrigue surrounding FinTech's influence, especially concerning its impacts on internal processes and productivity. The work by Phan et al. (2020) delved deeply into this issue, scrutinising how continued FinTech advancement might undermine performance at traditional banks through both subtle and stark changes. Their empirically driven assessment raises sobering prospects for full-service financial companies seeking to modernise while guarding profitability against nimbler upstarts.

Similarly, Ntwiga (2020) delved deeply into the realm of FinTech-bank collaboration and its impact on efficiency within the banking sector. Researchers have scrutinised FinTech's performance regarding lending operations, considering small business lending through FinTech platforms, as Balyuk, Berger, & Hackney (2020) analysed, while Karaman et al. (2021) compared loan outcomes between Turkish FinTech and bank customers the following year. Moreover, Bao & Huang (2021) dissected loan records following the pandemic's outbreak. In another recent investigation, Chen, You, & Chang (2021) inspected the consequences of FinTech products for commercial bank performance in China. Likewise, Yunita (2021) conducted a multifaceted examination of digital banking facing uncertain global fiscal conditions.

While studies exploring the link between financial technology and banking sector risks have been scarce, the few examinations delving into this subject have predominantly concentrated on single regions. Regarding China specifically, several investigations have analysed how the evolution of FinTech impacts various facets of the banking industry. These analyses have assessed the connection between FinTech and bank risk exposure, credit risk levels, risk-taking among publicly traded commercial banks, and banking sector productivity. The outcomes of such research help to partially untangle the intricate interplay between FinTech innovation and traditional financial institutions. Nevertheless, more cross-country evaluations may further clarify how differing FinTech development stages in diverse markets can shape vulnerability profiles for native banks.

Exploring the impact of FinTech development on bank risk-taking is a fascinating area of study that requires further research. This analysis assesses the complex relationship between rapidly evolving FinTech innovations and traditional banking risk management through a comprehensive bibliometric assessment of over eight hundred scholarly papers published between 2013 and 2023. The results provide insight into how FinTech has influenced banking stability across regions while also highlighting trajectories for improved systemic risk protections. Maintaining a pulse on present FinTech literature trends and predicting how they may unfold help deepen our scholarly understanding of this dynamic field, contributing nuanced perspectives to the ongoing academic dialogue regarding both the opportunities and challenges of FinTech progress.

2. Literature Review

2.1 The Evolution and Impact of FinTech

The rise of the FinTech revolution owes itself to the seamless marriage of finance and technology, birthing a symbiotic union that has upended traditions. Through its development, FinTech has played a significant role in changing the financial landscape globally. The field has witnessed a series of momentous leaps and ruptures, posing puzzles for overseers and established orders alike (Arner, Barberis, & Buckley, 2015). In their wide-ranging examination of the digital shift, Gomber, Koch, & Siering (2017) assessed the profound impact of progressive developments on the sector of finance, where technologies have transformed precedents at their core.
To begin, the digital revolution completely overhauled how the financial sector conducts business. It spawned a wealth of novel financial products, enterprises, technologies, and models for engaging consumers. In addition, FinTech meaningfully advances financial inclusion by delivering formal financial services to underprivileged groups in developing nations. This showcases FinTech's remarkable success in confronting and diminishing financial disparities. Of late, the emergence of digital currency has played a pivotal function in boosting financial incorporation, specifically in regions like Africa. The extensive adoption of mobile technologies has rendered this achievable. Furthermore, FinTech startups are designing ingenious solutions to complicated financial pain points experiences by impoverished communities and developing novel methods of enhancing financial wellness amongst society's most vulnerable members (Makina, 2019).
The reach of FinTech extends beyond traditional financial services, as evidenced clearly within Malaysia's Islamic money management sphere. Miskam, Yaacob, & Rosman (2019) provide illuminating perspectives on FinTech's historical evolution and effects, particularly how it revolutionised Sharia fund management frameworks. Moreover, technological progress, amplified investments in FinTech firms, and robust cooperation between conventional financial corporations and nascent FinTech start-ups have significantly strengthened FinTech's integration into the global economy, bearing widespread implications. This transformative impact stems from myriad recent advances, increased allocations in FinTech ventures, and the fruitful alignment of established financial institutions and pioneering FinTech start-ups.
To comprehensively summarise, a deep examination of the transformation of FinTech reveals that its impact on the banking sector is not a new occurrence but instead a continuous modernization that spans across diverse eras. This progression hints towards a future where digitization will be further ingrained into every facet. Some shorter advancements spurred novel startups, while longer analyses fostered more nuanced integrations.

2.2 FinTech and Traditional Banking: A Complex Symbiosis

As global financial authorities adapt to FinTech innovations, some question the old banking business. Romānova & Kudinska (2016) found that certain banking industry partisans view this improvement as a threat to their long-term rule. However, a further analysis reveals both opportunities and challenges with this growth. Some banks fear losing control, but others see cooperation. New technologies may help banks improve services while remaining centralised. Client-focused agreements using cutting-edge tools may help banks succeed more than those that resist change.
It has been argued that financial technology has the capacity to challenge long-established models used by traditional banks. Chen et al. (2017) conducted a comparative analysis on Citibank and the Industrial and Commercial Bank of China, two well-known institutions. The study envisioned an "electric vehicle mode" metaphor for ICBC's adaptation and an "aeroplane mode" for Citibank's response to the transformative impact of financial technology. Another crucial aspect to consider is the effect of financial technology on conventional banking lending practices. Jagtiani & Lemieux (2017) examined the advantages and disadvantages of loans from a prominent financial technology lender versus those obtained through standard banking channels. The findings highlighted the noteworthy sway of alternative data sources, enabling some borrowers typically seen as subprime applicants to receive more favourable risk classifications.
Furthermore, banks have forged strategic alliances with FinTech companies while also closely scrutinising rival products. Hornuf et al. (2021)'s study uncovered that partnerships elicit stronger market reactions when innovative online banks rather than traditional institutions announce collaborations. Within this evolving cooperative landscape, notable yet delicate modifications transpire. Indeed, research by Zveryakov et al. (2019) constructed a conceptual design investigating how financial services could circumvent conventional banking through alternative routes. FinTech wields the power to upend conventional industry practices by introducing services that established monetary facilitators struggle to match.
Gavrilko & Skripnik (2021)'s recent research delved deeply into the interwoven ties linking inward and outward elements impacting the calibre of banking offerings in today's Fintech era. They stressed optimising customer focus and pioneering technology to enhance quality. The myriad goods, services, and processes involved show finance's inner workings are a rich tapestry, with cutting-edge companies and tradition-bound banks intricately interlaced rather than strictly competing. As these two forces alternately converge and diverge, fused together yet retaining uniqueness, thoughtful cooperation and mutual adjustment appear crucial to shaping finance's future course.

2.3 Regulatory and Risk Landscape in the FinTech Era

The lightning-fast evolution of financial technology has sparked boundless advancements yet also multiplied regulatory difficulties and hazards. Consequently, skilfully choreographing high-velocity technological strides with shifting compliance frameworks necessitates a deeper understanding to shelter fiscal solidness, consumer concerns, and global cooperation.
The conception of sandbox schemes to nurture FinTech environments by relaxing regulations was a landmark success, though critics voiced issues. Buckley et al. (2019) questioned whether accessible data adequately confirmed sandboxes as the blueprint for ecosystem flourishing. Meanwhile, Ahern (2019)'s exhaustive examination of sandbox architecture illuminated the challenges overseers encounter guiding these systems. Beyond sandboxes, discussions encompassed regulations. Concentrating on management instead of legal

views, Alaassar, Mention, & Aas (2020) tapped social capital theory to probe how sandbox interactions impacted rules by utilizing social networking. Seymour (2021)'s analysis revealed a federal and state focus proliferating on safeguarding customers and evaluating prudential risks amidst the extensive FinTech ecosystem. States actively pursue interstate reciprocity.

Aside from legislative changes, FinTech has significantly impacted the risk landscape. As Avci (2020) discovered in a recent study, technological advancement greatly influences financial risk management. This highlights the necessity for tailored approaches in our increasingly digital era. Velázquez Martínez (2020) examined both the difficulties and potential benefits of bitcoin and virtual assets amidst the COVID-19 pandemic. While emphasising the dangers of fraud and money laundering undermining the integrity of these assets, the study also stressed implementing robust safeguards against prevailing cyberattacks in response to such risks. In a complex environment with emerging technologies rapidly changing the financial industry, continually adapting risk management strategies remains crucial to stability and protecting consumers.

FinTech is fundamentally transforming the financial sector and requires a proactive, well-informed, and flexible approach to regulation and risk mitigation. Regulators, financial institutions, and innovators must adeptly handle the current circumstances, guaranteeing a balanced integration of progress and prudence.

2.4 Emerging Models and Future Trajectories

The integration of advanced technologies, such as artificial intelligence, robots, and blockchain, has profoundly transformed the financial sector in complex ways. The dizzying growth of FinTech indicates the emergence of innovative banking models and strategies that pose a formidable challenge to traditional financial institutions. In a groundbreaking study, Ghosh, Vallee, & Zeng (2021) explored the intriguing connection between FinTech finance's informational value and cashless transactions. Their research offers a compelling rationale for their coevolution and presents thought-provoking possibilities for an alternative banking model unshackled from conventional balance sheets or relationships. Meanwhile, Santoso et al. examined the convergence of technical proficiency and talent management in their wide-ranging study. They identified several pivotal skills that future professionals across diverse domains must cultivate to navigate the continuously morphing environment of FinTech.

In their study, Raza Rabbani, Bashar, & Khan (2021) delved deeply into the potential influence of adaptability and FinTech on the trajectory of Islamic banking in the future, with a particular focus on the context in Bahrain. The findings clearly demonstrate that agile methods and FinTech are poised to have a truly transformative impact on specialised banking businesses in the coming years. Moreover, new notions of banking, such as the financial control centre, are anticipated to enhance financial decision-making through the real-time analysis of data. Meanwhile, another emerging domain involves third-party developers leveraging banks' infrastructure to craft financial products via banking-as-a-service (BaaS). Specialised financial institutions catering to specific customer segments are expected to burgeon in popularity, specifically within the sphere of Islamic banking.

Soon, the banking sector is poised for a major shift because of the rapid progress in FinTech. In order to excel in a rapidly evolving and interconnected financial environment, it is crucial to develop cutting-edge frameworks, proactively anticipate future challenges, and set intelligent strategic goals.

3. Methodology

This study conducted a comprehensive analysis of the literature on FinTech-bank risk, using a meticulous bibliometric methodology to evaluate its findings. The study data comprised papers published between 2013 and 2023, which were chosen from the Scopus database. The time frame for inclusion was limited to ensure the data's relevance and comparability. In 2013, the chosen starting point was based on the increasing recognition of "FinTech" in scholarly discussions. Unfortunately, the search had to be stopped in 2023 because including publication data from 2024 would have created an incomplete sample, which would have compromised the accuracy of the representation of the population.

Scopus contains a mammoth compilation of scholarly works, housing more than 22,000 articles from over 5,000 foreign periodical publishers. It touches upon a broad spectrum of disciplines, including finance, technology, computer science, information technology, software engineering, banking, risk management, and several others. Owing to the remarkably wide-ranging plethora of subjects spanned in this compilation, such as FinTech literature covering blockchain, mobile banking innovations, cybersecurity challenges, and regulatory issues, it was deemed the ideal data reservoir for this investigation.

The search methodology applied in this research was exhaustive and accurate. A broad set of keywords including "FinTech" and "bank risk" narrowed the collection of articles to those published between 2013 and 2023 that were in English. This refined approach evolved to encapsulate the most contemporary and pertinent scholarly sources while adapting to evolving terminology. Initially, nearly one thousand works from 902 separate publications surfaced from the search. A diligent screening eliminated pieces published after the study period ended, works not in English, and articles still undergoing formal publication processes. Ultimately, our analysis encompassed the refined set of 813 scholarly works that remained.

To find the latest FinTech and bank risk research, we thoroughly analysed the selected articles' introductions, methodologies, conclusions, and abstracts. VOSviewer, a popular bibliometric visualisation tool, was used to visualise article type, year published, subject area examined, financial supporter, association involved, and geographic distribution. Word clouds showing common terms, maps showing co-author networks, and charts showing topic connections helped us identify patterns over time, themes, alliances, and conceptual relationships in the literature. Some articles used advanced statistical models to analyse risk factors, while others broadly examined global financial trends and their implications in diverse situations.

After conducting a comprehensive analysis of the data, this study uncovered a range of patterns, trends, and areas where knowledge is lacking in the dynamic realm of FinTech and bank risk. This research offers valuable insights into the continuous development of this subject.

4. Findings

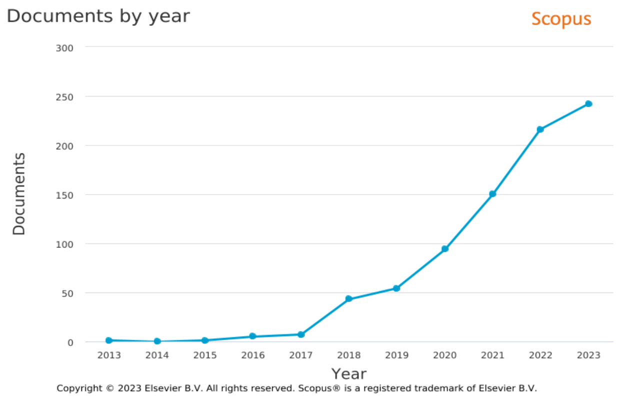

Figure 1: Documents by Year.

From 2013 to 2023, FinTech and bank risk research increased dramatically, as seen in Figure 1. After a cautious period from 2013 to 2015, research production has accelerated since 2016, with a particularly large jump from 2020 to 2023. The example shows how important FinTech is and how dangerous it is to banks in the economy. It focuses on technological risks and how financial institutions are embracing them. Technology is reshaping finance, raising significant risk and regulation problems. Early studies focused on disruptive concerns, while later studies evaluated how banks are using FinTech to control risks and seize new opportunities.
The notable surge in recent scholarly publications, particularly amidst the ongoing COVID-19 pandemic, underscores an expanding recognition and examination of the systemic hazards presented by financial technology innovations. There has been a discernible scholarly emphasis on interrogating the difficulties and consequences of merging emerging technologies with traditional banking models. This growing acknowledgment stresses the importance of conducting more searching analyses to successfully negotiate the nuanced domain of digital finance and risk mitigation during a period of unprecedented digital transformation.

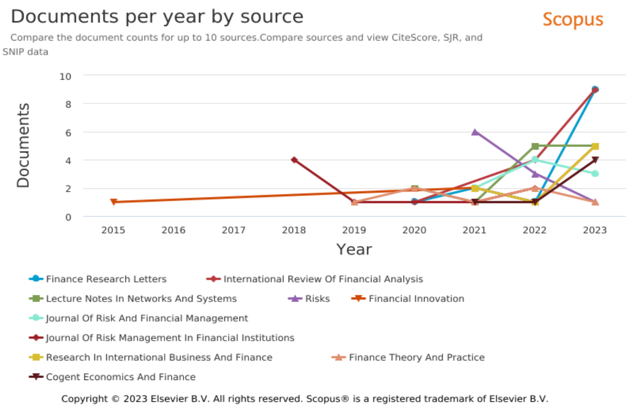

Figure 2: Documents by Source.

Figure 2 illustrates a comparison of publications on FinTech and bank risk per year, categorised by source and indexed in Scopus. This analysis focuses solely on the period from 2015 to 2023, as it coincides with the time when the top 10 publication sources initiated their research on Fintech and bank risk. A diverse array of journals has made valuable contributions to the literature, showcasing the increasing fascination with FinTech and bank risk. Several journals, including 'Finance Research Letters', 'Journal of Risk and Financial Management', and 'Financial Innovation', began publishing articles in 2020. This timing coincided with the emergence of FinTech innovations and the increased awareness of COVID-19 risks (Zhou & Li, 2022).
Undoubtedly, the pandemic crisis accelerated the adoption of digital technology in the financial sector, while also introducing new risks. The significant increase in publications in 2022 and 2023 can be attributed to the growing concerns in the banking industry regarding FinTech, such as cybersecurity risks, regulatory issues, and the ability of financial institutions to adapt to rapid technological advancements (AlBenJasim et al., 2023).
There has been a significant amount of research published in journals such as 'International Review of Financial Analysis' and 'Journal of Risk Management in Financial Institutions', highlighting the wide range of topics covered in the field of financial analysis and risk management. In addition, significant publications in 'Lecture Notes in Networks and Systems' focus on the technical and systemic aspects of FinTech solutions, as well as the integration of financial networks.

Overall, Figure 2 demonstrates the growth of FinTech research, highlighting the increasing focus on bank risk in a technologically advanced financial system. The sources' diverse and expanding publishing output reflects the growing interest in FinTech and banking. It also emphasises the increasing relevance of this issue in financial practices and legislation.

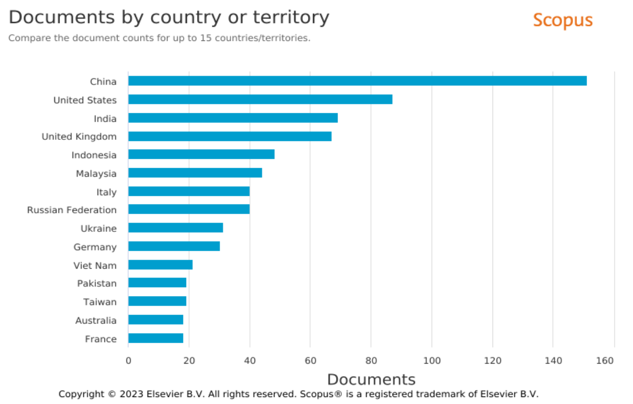

Figure 3: Documents by Country or Territory.

Figure 3 displays an extensive map of the Scopus database illustrating the vast research output in the field of FinTech and associated banking sector risks across various countries. Data reveals China has emerged as a primary publisher, closely trailed by the US and India. The predominance of these nations in FinTech research can be attributed to robust financial markets and rapid FinTech adoption. China's dominance specifically stems from its position as a leading global economy alongside widespread electronic payments, cashless transactions, and digital currencies usage nationally. Uniquely dynamic, China's financial sector has proven a promising hub for varied research endeavours.
In addition to the leading nations, countries from every continent and economic sector have contributed meaningfully to the dialogue. The graphic underscores the sizeable contributions of the UK and Indonesia towards FinTech breakthroughs, signifying a robust emphasis on scholarly participation and an acute cognizance of possible hazards. Malaysia, Italy, and the Russian Federation have also made sizeable contributions, accentuating the global interest in FinTech and banking risk. The involvement of developed countries like the UK and Italy illustrates their continuous commitment in this area, while the notable advances in developing countries highlight their impressive growth and enthusiasm during this ascending trend. The wide range of contributions from nations at various stages of development clearly shows that research on FinTech and bank risk has tremendous global significance. Studying FinTech is intensely prioritised by both industrialised and emerging economies, as it has the potential to revolutionise financial services (Liao, 2023).
Finally, Figure 3 presents a compelling analysis of current global research trends linking financial technology innovation and bank risk management, illuminating the nations playing leading roles in advancing knowledge. The worldwide spread of ideas depends on established legal structures, prevailing marketplace dynamics, and available technological prowess in complex ways. These influential factors substantially impact the character and priorities of scholarly pursuits differently across borders. The profound involvement of academia on financial technology issues indicates the challenges and prospects it ushers hold worldwide relevance requiring cross-cultural comprehension. The findings further emphasize the importance of understanding rapidly progressing fintech and mitigating

potential hazards within diverse financial systems and regulatory environments from a broad international perspective.

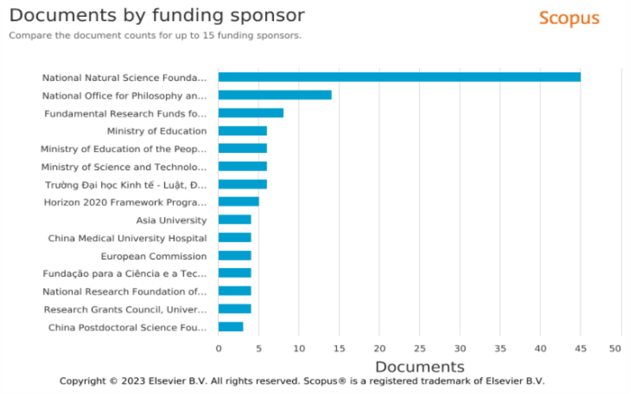

Figure 4: Documents by Funding Sponsor.

Figure 4, sourced from the Scopus database, visualizes the funding landscape pertaining to studies on FinTech and bank hazards. It underscores the wide assortment of establishments that have nurtured research in this realm. The generous backing furnished by the National Natural Science Foundation of China emphasizes a weighty investment in FinTech inquiries, underscoring China's dedication to technological progress in its banking sector, as Hua & Huang (2021) have highlighted. Additional benefactors to this project in China integrate the National Office for Philosophy and Social Sciences as well as the Fundamental Research Funds for the Central Universities, showcasing a solid commitment from the administration to support the progression of exploration in this exact field.
The figure prominently features contributions from varied international groups, including the European Commission's Horizon 2020 Framework Programme, demonstrating acknowledgement of FinTech research's importance in Europe. Funds disbursed from assorted domestic and global collectives underscore worldwide consciousness of the pressing necessity to comprehend and govern risks tied to technology's integration into the financial sector. Furthermore, education, scientific ministries, and technology departments serving as key backers imply these fields and bank risk are deemed consequential nationally. This calls for a careful breakdown, employing inventive tactics. The broad scope of sponsors from differing domains and industries exhibits the diversified approach taken to tackle obstacles in the swiftly progressing FinTech sphere. It emphasises the need for cross-border, cross-discipline collaboration within this dynamic area, where advances can happen quickly and challenges may emerge from any direction.

Figure 5 shows a colourful spectral visualisation that shows how the priorities of academic discussions about FinTech, and bank risk management have changed over time. This is made possible by VOS viewer's network modelling. Nodes taking darker azure tones signify earlier periods under examination, transitioning to more yellowed hues for recent eras.
The continued concentration on "FinTech" in a deeper cobalt is indicative of its persistent significance across the full span, maintaining a robust role at the core of discourse over time. Ongoing discussions revolve around pressing matters of "financial stability" and the imperative of prudent "regulation," topics that Yudaruddin (2023) also highlighted as warranting diligent scrutiny in all spheres. Periodic shifts in supporting themes and shorter-lived areas of focus serve to reinforce FinTech's anchoring importance, even amid variances in accent across the timeframe under review.
While the outer areas of the visualisation warmed in hue, indicating a drifting focus over time, certain nodes shone brighter due to sharply rising academic attention. Terms like "blockchain," "bitcoin," and "central bank digital currency" now gleam prominently where once lay dimmer shades. This illuminates practical breakthroughs and expanding acceptance within finance that surely sparked interest in later years, as the dataset attests. Within the web, a paler "COVID-19" emerges, its recent addition underscored. Its presence highlights the pandemic impact on the field in stark relief. Where "digital transformation" glows in nearly identical tints, the swift embrace of new technologies throughout the crisis becomes clear. Rapid adoption bore unforeseen risks, demanding study as digital change was forced at pandemic pace (Kong & Wu, 2023).
The inclusion of a colour gradient also indicates a development in the matters concerning FinTech. Initially, the emphasis may have been on understanding basic technologies and their potential. Over time, as the use of these technologies has grown and their impact has become more evident, there has been a noticeable shift in focus towards practical applications in studies. This movement covers various areas including cybersecurity, operational risk, and the broader concern of trust within the field of FinTech.
In a nutshell, Figure 5 offers a glimpse into the timeline of the scholarly discussion surrounding FinTech and bank risk. It is worth mentioning that the analysis highlights the growing importance placed on emerging technologies and the associated risks in recent years. The mentioned evolutionary process exemplifies the swift progress observed in the FinTech sector, along with the imperative to efficiently address emerging challenges and regulatory barriers. The map not only presents a visual depiction of the current state of study, but also provides valuable insights into the evolving academic landscape, shaped by technological advancements and global events such as the COVID-19 pandemic.

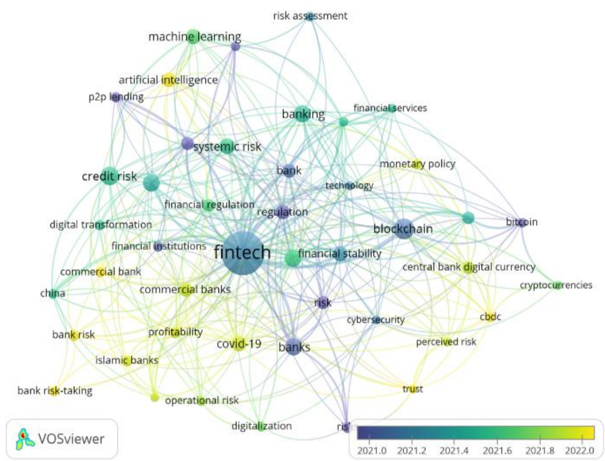

Figure 5: Co-Occurrence (Author Keywords).

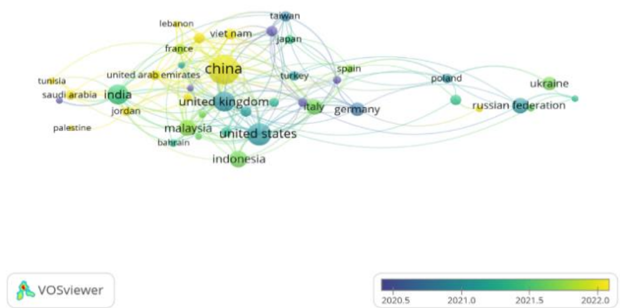

Figure 6: Co-Authorship (Countries).

Figure 6 shows a VOS viewer co-authorship network map that visually represents the collaborative relationships between different countries in the field of FinTech and bank risk research. The size of the nodes represents the number of documents produced by writers from various countries, while the lines illustrate the strength and frequency of collaboration among them.

The map showed increased movement in China, the US, and the UK, suggesting FinTech and bank peril assessments should focus on these countries. In addition to managing research alone, they collaborated globally. China's visibility in the field showed its rapid FinTech adoption (Luo et al., 2022). The US and UK's major centres and interconnections also impacted global budgetary markets and scholarship. Each country investigated individually, but they shared a goal of using AI and DLT to better understand risk and enhance inclusiveness.

The image illuminates other pivotal nations, including the powerhouse of India, the rising force of Malaysia, and Indonesia, which all provide influential contributions. The international significance of FinTech inquiry is emphasized through the engagement of European frontrunners like Germany, a leader in innovation, Italy, with its economic intellect, and France, a hub of ideas, along with their bonds to blooming markets. The interconnections exemplified demonstrate a widespread, globe-spanning drive to tackle the intricacies and conundrums presented by developments in the evolving field of FinTech and to mitigate the potentially destabilizing dangers they can introduce.

Over the following years, there shall be an observable transformation in the colour scheme employed, with a migration towards more temperate tones. Across the decades, cooperative endeavours have seen a discernible amplification, especially within the domain of scientific inquiry. This phenomenon can be attributed to FinTech's worldwide impact and the need for a collective strategy to seriously address intersecting vulnerabilities that surmount geographical confines. Meanwhile, short-term experimental initiatives revealed the importance of aspiring toward holistic solutions through multi-party collaboration when tackling borderless issues.

In short, Figure 6 illustrates a global network of collaboration in the realm of FinTech and bank risk research, highlighting the collective international effort to understand and tackle the challenges that arise from the integration of technology in the finance industry. The map provides concrete evidence for the interconnected and ever-evolving nature of research that spans multiple continents, thus highlighting the global importance of FinTech advancements and their potential impact on the banking sector.

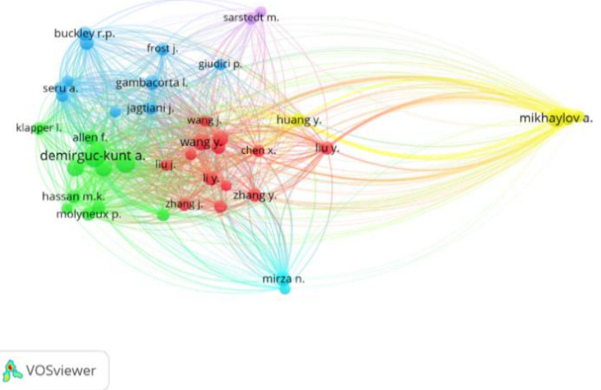

Figure 7: Co-Citation (Authors).

Figure 7 presents a co-citation network map that demonstrates the close connections between authors frequently mentioned together in the literature of FinTech and bank risk. The size of each node reflects the number of citations received by the author's work, indicating their impact and importance in the academic field. Alternatively, the strength of the lines connecting the nodes reflects the level of co-citation associations, revealing how frequently scholars cite specific authors together. The network map serves the purpose of not only identifying the authors with significant influence, but also illustrating the collaborative dynamics inherent in research endeavours. Over the following years, there will be an observable transformation in the colour scheme employed, with a migration towards more temperate tones. Across the decades, cooperative endeavours have seen a discernible amplification, especially within the domain of scientific inquiry. This phenomenon can be attributed to FinTech's worldwide impact and the need for a collective strategy to seriously address intersecting vulnerabilities that surmount geographical confines. Meanwhile, short-term experimental initiatives revealed the importance of aspiring towards holistic solutions through multi-party collaboration when tackling borderless issues.

In the academic network being analysed, there are several prominent scholars who have contributed significantly to our understanding of FinTech and bank risk management. Among these notable experts, including A. Mikhaylov, N. Mirza, Y. Wang, L. Gambacourta, and A. Demirguc-Kunt, are the largest nodes, signifying the profound impact of their seminal works on the foundational knowledge in these fields. The close positioning of these distinguished individuals implies a robust level of interconnectivity within the research community. This interconnectivity arises from the regular cross-referencing of certain scholars together in published literature, demonstrating their shared focus on similar topics or methodological stances through frequent citation of one another's formative ideas.

The map of co-citation linkages shows the broad yet interconnected group of scholars writing about technology innovation in banking and financial risk management. A panoramic picture of the intellectual landscape highlights conversation-shapers and popular themes. Veterans track academic movements to better comprehend concepts and cooperation evolution, while novices might start by discovering and using influential sources. This novel format unveils the interrelated web of contributed work, providing a portal for accessing relevant research.

5. Discussion and Conclusion

This complex area of study has yielded valuable insights into the profound changes unfolding within financial technology and risk assessment (Ye & Junilo, 2023) among banks, mirroring FinTech's precipitous rise. The burgeoning corpus of publications underscores the necessity of unravelling FinTech's intricate character and considerable impact on the worldwide financial order, with some analyses exploring its potential pitfalls while others celebrate its promise of innovation. Careful consideration of both technology's opportunities and challenges will be pivotal in shaping resilient institutions for the future.

There is a palpable global footprint in the arena of FinTech, with technologically sophisticated nations and emerging economies taking important steps forward alike. This underscores the importance of incorporating FinTech into diverse financial frameworks and adopting a synchronized worldwide strategy to confront the many difficulties posed by FinTech, such as vulnerabilities in cybersecurity and instability in the fiscal arrangement. Lengthy sentences mixed with shorter one's help convey complex ideas while maintaining a human voice. Regulations aim to promote innovation through calibrated oversight (Rangapur, Wang, & Shu, 2023).

Research also emphasises interdisciplinary collaboration. Knowledge sharing throughout fields is valued and useful for all. Recent technology advances have changed studies on financial sector emerging technologies and risk. This has led to a deeper understanding of cutting-edge technologies like distributed ledger technology and its influence on monetary stability and governance. Analysing the complex relationships between FinTech solutions and traditional financial institutions requires technological, economics, and regulatory expertise. Computer science and economic and regulatory studies in research centres have yielded new insights. Future collaboration across domains will be essential to fully understand technology change's benefits and problems.

This analysis uncovers the multiple webs of co-authorship and co-citation that fuel FinTech research across borders and domains. Scholars from all fields are clearly recognising the significance of teamwork and cooperation to share insights, improve understanding, and develop strategies to address FinTech's disruptive nature. The intertwined nature of co-authorship and co-citation networks emphasises the complex collaborations needed to advance this subject. No single discipline or area has a monopoly on knowledge, so various perspectives across borders promote innovative ways to handle perennial difficulties. These collaborative networks' links lead to shared progress and knowledge.

While FinTech continues to rapidly evolve, transforming potential risks and impacts, studies must explore its connections to bank risks. This evolving environment demands robust frameworks to manage risks and adapt regulations supporting FinTech's advancements. Recent research highlights FinTech's crucial role in informing laws and practices, ensuring growth while upholding stability. As Bu, Li, & Wu (2022) discuss, the research aims to keep pace with the dynamic changes in this industry.

FinTech research's strategic value lies partly in its financing, with significant investments domestically and abroad. Such support promotes important projects, balancing business opportunities with thorough risk management and oversight vital to reliability. The ongoing progress underscores research's role in navigating trade-offs between innovation and stability in technology's rapid reshaping of finance. As this review highlights, academics must offer insights for regulations enabling continued progress without compromising strength or trust in the system. Adaptability to regulatory changes proves crucial to the research environment's focus on both implementation and oversight in this shifting landscape.

The ongoing evolution of financial technology continually brings both risks and rewards for traditional banking. This analysis underscores the necessity of sustained academic scrutiny to smoothly guide such changes. Maximizing fintech's promise while safeguarding stability demands persistent study and cross-border collaboration. Academia must carefully observe unfolding impacts and nimbly react through sound rules and solutions balancing progress and protection. From streamlining transfers to innovation in investing, fintech's growing influence necessitates judicious oversight ensuring continued benefit with manageable hazard.

While studies of FinTech's influence on banking risk have increased greatly, reflecting developments within the industry, assessing its worldwide consequences remains vital. The burgeoning literature highlights the recognition that technologies profoundly impact finance globally. Publications span disciplines and nations, emphasising universal stakes. Accordingly, coordinated efforts are imperative to address challenges through understanding diverse perspectives. Local factors like regulation and societal adoption additionally shape outcomes, necessitating tailored solutions. Overall, holistic views and cooperation seem key to discerning technology's role amid intricate systems as changes accelerate (Guang-Wen & Siddik, 2023).

6. Limitations and Future Research

While this bibliometric review provides a comprehensive analysis of the research landscape surrounding FinTech and bank risk, it is crucial to recognise the existence of certain limitations. Initially, the study focused solely on documents within the Scopus database. Although the database has extensive coverage, it may not include all pertinent articles, particularly those from smaller journals or regional databases. In addition, the research primarily concentrated on scholarly publications, which limited its ability to incorporate valuable insights from industry reports, white papers, and other forms of 'grey' literature that still make significant contributions to the subject.

One drawback is that the study heavily relies on search methods driven by specific words, which might unintentionally exclude valuable research that is relevant to the fields of FinTech and banking risk but doesn't use the exact same keywords. In addition, it is important to acknowledge that studies based on citations, such as co-citation and bibliometric coupling, have an inherent retroactive quality. These methods typically capture the impact of publications once they have accumulated citations over time. As a result, they might not be aware of the latest or emerging trend.

To improve future research endeavours and gain a more thorough grasp of the subject matter, it is crucial to expand the analytical scope by incorporating a wide range of databases and grey literature sources. There is great potential in utilising advanced text-mining and natural language processing techniques to effectively incorporate a wide range of study topics and quickly uncover emerging patterns. Furthermore, potential improvements in research could be achieved by implementing a longitudinal approach, allowing for the monitoring of research topics and collaborations over extended periods of time. This would result in a deeper understanding of the impact of significant global events, like the COVID-19 pandemic, on the trajectory of scientific pursuits.

Finally, conducting qualitative studies that thoroughly analyse the content of important articles could provide a deeper understanding of the impact of FinTech developments on bank risk, thereby enhancing bibliometric results. This research methodology may involve utilising case studies, conducting expert interviews, and employing thematic analysis to delve into the complexities of the research area beyond the confines of publication and citation counts.

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