

# Bibliometric Visualization of Financial Inclusion and Bank Efficiency: A Comprehensive Overview

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## Abstract

The purpose of this paper is to investigate the development of financial inclusion and bank efficiency as there is limited consensus on the direction and magnitude of both relationships. A bibliometric study was conducted on a selection of 106 Scopus and WoS publications from the years 1998 to 2023 on the topic of financial inclusion and bank efficiency. The research used a combination of ScientoPy and VOSviewer to provide additional capabilities for creating bibliometric networks and conducting content analysis. The bibliometric study demonstrates that China has a dominant presence in the subject of financial inclusion and efficiency, making major contributions in these fields. The most renowned writers were Das A. and Ghosh S. (2006), and The Journal of the Academy of Marketing Science was considered one of the leading academic journals. The research in the field has been dominated by Vietnam's institutions. Ultimately, a total of four significant clusters were determined using keyword analysis. The primary topics are financial inclusion, financial system, banking risk analysis, and efficiency. It provides new opportunities for further investigation, thus increasing the level of interest among scholars to get a deeper understanding of the challenges and possibilities of advancing financial inclusion.

**Keywords:** Bibliometric, Financial Inclusion, Bank Efficiency, Scopus, Web of Science

## Introduction

In recent years, the global financial landscape has undergone significant changes, with a growing emphasis on two interconnected issues: financial inclusion and bank efficiency. Bank efficiency, defined as the capacity of financial institutions to provide services at minimal costs while maximizing productivity, is crucial not only for the profitability of banks but also for the stability and growth of entire economies. An efficient banking sector ensures smooth functioning by facilitating safe, swift, and cost-effective payments for goods and services,

which is fundamental for economic activities (Sufian et al., 2017). Furthermore, the efficiency of banks plays a key role in ensuring the successful implementation of monetary policies that promote economic stability (Sunil and Rashita, 2019).

The importance of bank efficiency and financial inclusion stems from their collective role in fostering a resilient and sustainable economy. Inefficiencies in the banking sector can have severe repercussions, including higher transaction costs, misallocation of resources, and an increased risk of financial instability (Le et al., 2019). Banking instability has been shown to trigger widespread economic crises due to its contagion effects—where failures in one sector of the economy spread to others. Given that a fragile banking system can lead to systemic crises, ensuring bank efficiency is paramount to economic health and prosperity (International Monetary Fund, 2021). Simultaneously, financial inclusion—the accessibility of financial services for all members of society, particularly marginalized groups—has become a global development priority. Exclusion from financial systems perpetuates poverty, restricts opportunities for economic participation, and limits access to essential services. Despite numerous initiatives, the World Bank estimates that 2 billion adults remain unbanked, and small and medium-sized enterprises (SMEs) face an unmet financing need of \$5.2 trillion annually (World Bank, 2022; IFC, 2021). These statistics highlight the critical need for comprehensive strategies to promote financial inclusion.

Addressing these intertwined challenges—bank efficiency and financial inclusion—is essential for achieving broader goals like sustainable development and poverty reduction. Financial inclusion, which aims to make financial services more accessible to underserved populations, is increasingly recognized as a key enabler of economic growth. When the unbanked population gains access to financial services, they can save, invest, and participate in economic activities, which stimulates growth across sectors. Improving financial inclusion is not just a moral imperative but also an economic necessity. Furthermore, the COVID-19 pandemic has underscored the urgency of financial inclusion. As the pandemic disrupted economies worldwide, banks had to step up to support households and businesses. Ensuring bank efficiency during crises like this becomes more important, as banking inefficiencies can slow down recovery efforts and undermine trust in the financial system (Banna et al., 2020). Thus, exploring the link between financial inclusion and bank efficiency in a comprehensive and systematic manner is vital for understanding how to create a more resilient banking system.

This study contributes to a growing body of literature by using bibliometric analysis to provide a holistic overview of the research landscape surrounding financial inclusion and bank efficiency. Bibliometric analysis offers a unique methodological perspective, enabling scholars to identify research trends, influential studies, and gaps in the literature that traditional methods may overlook. By consolidating existing knowledge, this study helps to create a more structured understanding of the relationship between financial inclusion and bank efficiency, an area that is rapidly gaining importance but is still underexplored. In addition, the findings of this research have practical significance for a variety of stakeholders. Policymakers can use these insights to design more effective financial inclusion strategies that also enhance bank efficiency. Banks and financial institutions can leverage this information to improve operational practices, thereby serving both their bottom lines and their customers more

effectively. Researchers and scholars will benefit from the identification of key themes and trends, which can inform future studies and encourage interdisciplinary collaboration.

The utility of this research lies in its ability to bridge the gap between financial inclusion and bank efficiency by highlighting how improving one can lead to better outcomes in the other. For instance, greater financial inclusion can improve bank efficiency by expanding customer bases, increasing economies of scale, and driving innovation in financial products. Conversely, a more efficient banking sector can reduce the costs of delivering financial services, making it easier for the unbanked population to access them. Moreover, the effectiveness of this study is demonstrated by its policy relevance. As governments around the world increasingly adopt national strategies for financial inclusion, this research provides timely insights that can guide these efforts. The study highlights how new technologies, like FinTech, can address barriers to financial inclusion, such as the high costs of banking services, lack of accessibility, and fear of debt (Mitra et al., 2021; Lotto, 2020). By identifying effective approaches to overcoming these obstacles, this research not only contributes to the academic discourse but also provides actionable solutions for policymakers and financial institutions.

Considering these pressing issues, this paper aims to advance the understanding of the dynamic relationship between financial inclusion and bank efficiency. By conducting a bibliometric analysis of the literature, the study identifies key research trends, gaps, and emerging themes that can inform future research and policy decisions. By using Scopus and WoS databases, we want to answer the following research questions:

RQ1 - What is the total number of research publications on financial inclusion and efficiency, and how has it evolved over time?

RQ2 - Which countries have made significant progress in the study of financial inclusion and efficiency?

RQ3- What are the most significant and prominent papers with the highest citation count in the fields of financial inclusion and efficiency?

RQ4- Which are the most productive journals and institutions addressing financial inclusion and efficiency?

RQ5- What are the primary research themes and subject areas in the disciplines of financial inclusion and efficiency?

In doing so, it emphasizes the importance of addressing inefficiencies in the banking system while promoting financial inclusion, thus contributing to the achievement of global development goals and economic stability. Ultimately, this research offers valuable insights for a wide range of stakeholders, fostering a deeper understanding of how inclusive and efficient banking systems can be developed to support sustainable economic growth and resilience. The structure of this paper is as follows: Section 2 introduces a related studies that highlights the relevance of financial inclusion and bank efficiency. Section 3 provides a description of the data source and the methodologies that were used. Section 4 provides a comprehensive overview of the primary findings. Section 5 provides a concise overview of the main findings from the study, including the conclusions, limitations, and potential areas for further research.

### Related Studies

Financial inclusion is a critical issue affecting the ability of individuals and businesses to access financial services, which can have significant implications for economic growth and development. However, there is limited consensus on the direction and magnitude of the relationship between financial inclusion and bank efficiency. Banks have been acclaimed as a significant contributor in promoting inclusive growth and reducing the vulnerability of the poor and excluded (Chakrabarty, 2009). Regarding the role of the bank in promoting financial inclusion, Ramzan et al (2021), note that government and financial institution support raises the level of financial inclusion. Through financial inclusion, many unbanked adults can have access to affordable financial products and services adapted to their daily needs such as payments, savings, credit, and insurance (Vo et al., 2019).

As stated by Allen et al (2016), financial inclusion provides easy access to financial facilities such as savings, credit, payments, pension funds, and other products. This has greatly helped marginalized low-income groups to improve their welfare. It also provides financial security to households, enhances the savings of individuals, and eventually leads to sustainable growth (Fraczek, 2019; Vo et al., 2019). More broadly, financial inclusion impacts economic growth by empowering consumers to make better and well-informed choices, thereby enabling them to make sound financial decisions and raise their standard of living. It can be considered as a tool for economic opportunity, complements and supports the broader reforms aimed at addressing inequalities, climate change and other development goals.

Chauvet and Jacolin (2017), studied the impact of financial inclusion and bank concentration on the performance of firms in developing and emerging countries. The studies also show that financial inclusion has beneficial effects on financial stability in general and bank stability (Nguyen and Du, 2022). Ahamed and Mallick (2019), point out that banks can benefit from financial inclusion by reducing marginal financing costs, enhancing currency market strength, and adding stability in their financial mechanisms. Le et al (2019), analyses the trend of financial inclusion in 31 Asian countries from 2004 to 2016, finding fluctuating patterns and revealing that financial inclusion negatively impacts financial efficiency, but positively influences financial sustainability. It highlighting the need for policies that balance these effects.

Moreover, countries with a higher degree of financial inclusion are less likely to be affected by the declines in credit and borrowing. As a result, countries which are more financially integrated enjoy more flexible financial markets during periods of crisis (Lopez and Winkler, 2019). Hence, financial services need to be widely provided to different sectors of society, especially for the SME sector and the underprivileged groups of people. Another area of interest within the literature is the role of efficiency in promoting bank efficiency. The study conducted by Farrell (1957), established the fundamental principles for measuring efficiency. These various techniques can be categorized into parametric and non-parametric methods. However, the empirical literature commonly employs the two most prominent methodologies, namely the parametric Stochastic Frontier Analysis (SFA) and the non-parametric Data Envelopment Analysis (DEA) methods, to evaluate efficiency.

However, the diffusion of efficiency has been studied extensively in the context of Data Envelopment Analysis (DEA) models. The DEA approach, developed by Charnes et al. (1978), assumes no substantial correlation between operations size and efficiency, based on Constant Returns to Scale (CRS) thus it provides Overall Technical Efficiency (OTE). This assumption is only valid when all DMUs operate at an optimal scale. This can lead to scale inefficiency if not all units are operating at an optimal scale. Banker et al. (1984) extended the CCR model by relaxing the CRS assumption, resulting in the BCC model, which evaluates the effectiveness of DMUs distinguished by Variable Returns to Scale (VRS). The VRS assumption quantifies Pure Technical Efficiency (PTE), which measures Technical Efficiency (TE) without considering Scale Efficiency (SE). A difference between TE and PTE values indicates scale inefficiency.

Sufian (2010), uses Data Envelopment Analysis (DEA) to examine the impact of the Asian financial crisis on the efficiency of the banking sectors in Malaysia and Thailand. The study revealing significant inefficiencies, particularly in the year following the crisis, with Malaysia showing higher technical efficiency post-crisis under intermediation and value-added approaches, while Thailand exhibited lower efficiency under all approaches. Another study by Das A. and Ghosh S. (2006) assesses the efficiency of Indian commercial banks during the 1992-2002 post-reform period using Data Envelopment Analysis (DEA) and found that medium-sized public sector banks tend to operate with higher technical efficiency, which correlates with better capital adequacy ratios and fewer non-performing loans. Furthermore, Rosman et al., (2014) evaluates the efficiency of Islamic banks in the Middle East and Asia during the 2007-2010 financial crisis using DEA model, revealing that the Islamic banks had scale inefficient with decreasing returns to scale, and highlighting profitability and capitalization as key determinants of efficiency.

### **Datasets Retrieval and Analysis**

Bibliometrics analysis can be conducted using tools such as ScientoPy, VOSviewer, Biblioshiny, CitNetExplorer and SciMat. However, the suitability of the software depends on the specific research questions being addressed. This indicates that the selected software has the capability to effectively answer the research questions proposed by the researchers. This research used bibliometric analysis using ScientoPy and VOSviewer. The ScientoPy software utilises Python scripts to automate the creation of reports on important criteria, such as authors, countries, and documents, based on the research questions or goals provided by the researchers. ScientoPy has a key advantage in its capability to mitigate any bias in obtained datasets by using pre-processing methods (Azizan, 2024).

ScientoPy conducted data pre-processing by combining and eliminating duplicate entries from Scopus and WoS databases before we ran the analysis, guaranteeing a complete and non-repetitive dataset for bibliometric analysis (Abdullah and Azizan, 2024). ScientoPy conducted data preprocessing by merging the Scopus and WoS datasets and removing duplicate entries prior to analysing the datasets (Figure 1). It is to ensure that the bibliometric analysis was conducted using a comprehensive and non-duplicated dataset. Therefore, ScientoPy provides researchers with a straightforward, time-saving, and fast way to do this pre-processing phase. Table 1 displays the pre-processed results.

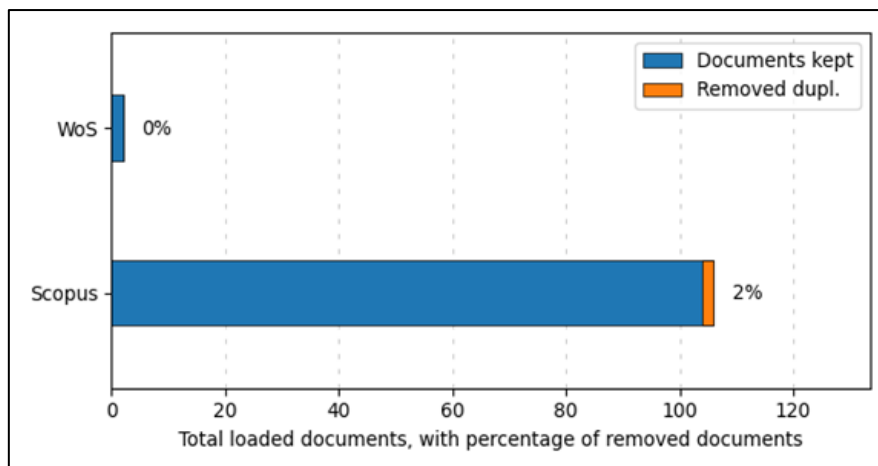


Figure 1: The total loaded documents of removed documents.

Moreover, VOSviewer software is developed by Van Eck and Waltman (2009) for creating and visualizing networks, with a strong emphasis on graphical representation, making it particularly useful for depicting large-scale bibliometric maps. In addition, the combination of ScientoPy and VOSviewer provided additional capabilities for creating bibliometric networks and conducting web-based bibliometric analysis, respectively. In this study, we used ScientoPy analysis to address RQ1 and RQ4, and VOSviewer to address RQ5.

To conduct a bibliometric study on financial inclusion and bank efficiency, we used two primary databases: Web of Science (WoS) and Scopus. Both databases are generally recognised as the most comprehensive collections of abstracts and citation databases for academic research literature worldwide. The present research was conducted on the title, abstract, and keyword sections of Scopus, as well as the subject field of WoS, which includes the title, abstract, author keywords, and keywords plus R. The dataset was acquired on July 10, 2024, using the given search criteria. The search yielded a total of 106 documents from the two databases. Subsequently, the datasets from Scopus and Web of Science were merged, showing 2 duplicate entry that was present in both databases (Table 1).

Table 1

*The pre-processed results.*

Info	Number	Percentage	Source	Conference Paper	Article	Review	Proceedings Paper	Article in Press	Total
<b>**Original data**</b>									
Loaded papers	109								
Omitted papers by document type	1	0.90%							

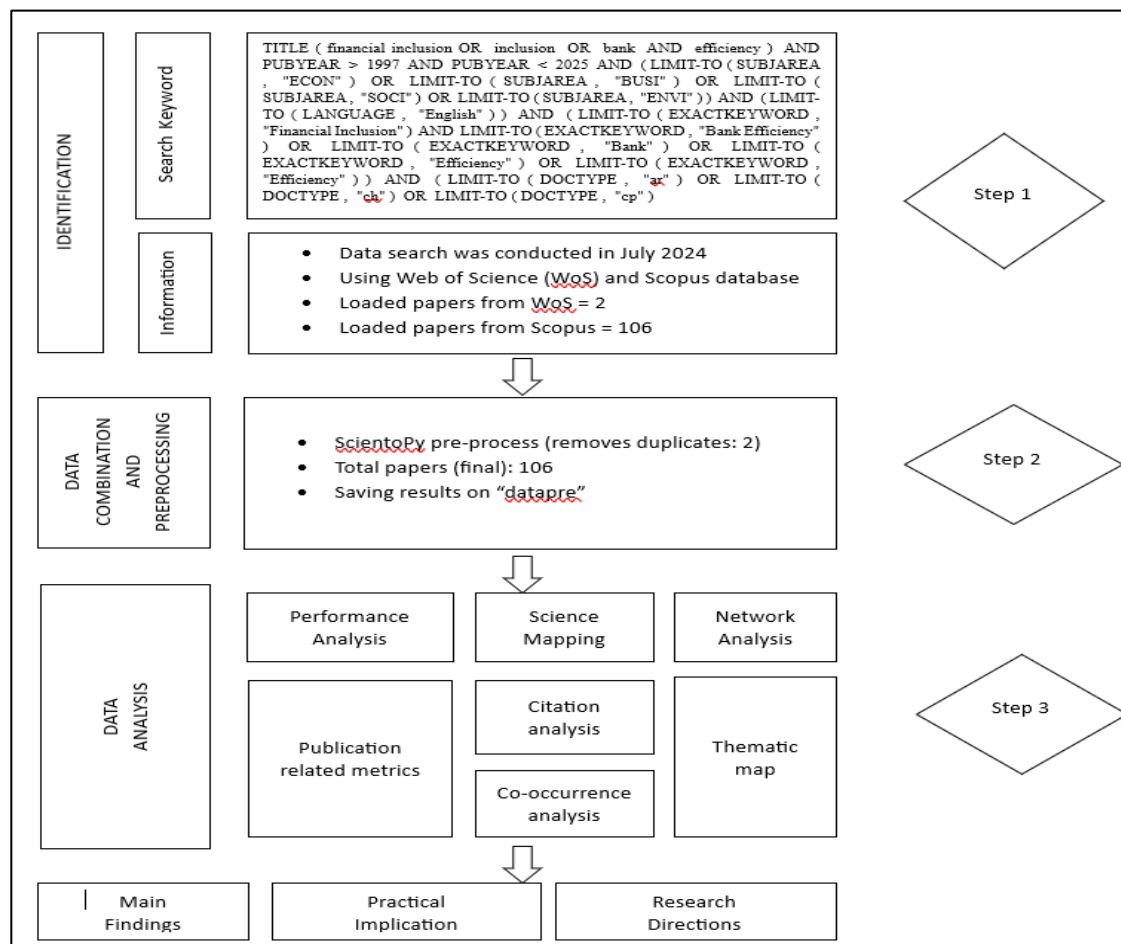
Total papers after omitted papers removed	108								
Loaded papers from WoS	2	1.90%							
Loaded papers from Scopus	106	98.10%							
			<b>WoS</b>	0, 0.0%	2, 1.9%	0, 0.0%	0, 0.0%	0, 0.0%	2, 1.9%
			<b>Scopus</b>	0, 0.0%	104, 96.3%	0, 0.0%	0, 0.0%	0, 0.0%	104, 96.3%
<b>Duplicated removal results:</b>									
Duplicated papers found	2	1.90%							
Removed duplicated papers from WoS	0	0.00%							
Removed duplicated papers from Scopus	2	1.90%							
Duplicated documents	2	100.00%							



nts with different cited by									
Total papers after rem. dupl.	106								
Papers from WoS	2	1.90%							
Papers from Scopus	104	98.10%							
<b>Statics after duplication removal filter</b>									
			<b>WoS</b>	0, 0.0%	2, 1.9%	0, 0.0%	0, 0.0%	0, 0.0%	2, 1.9%
			<b>Scopus</b>	0, 0.0%	102, 96.2%	0, 0.0%	0, 0.0%	0, 0.0%	102, 96.2%

We adopt the PRISMA best practice, as suggested by Moher et al. (2009), which consists of four main elements (Figure 2). The process involves choosing the appropriate keywords for literature search, assessing the literature, deciding the eligibility of full-text papers, and selecting the articles to be included in the data analysis (Mardani et al., 2019). The data from Scopus and WoS was obtained by using the keyword "financial inclusion" or "inclusion" or "bank" and "efficiency." The present study examines the available literature on financial inclusion and efficiency. Therefore, just the selected phrase was used as a keyword in the search criteria, resulting in the discovery of 109 documents. The search string was limited to the topic area, time period, document type, and language. This study focused on the topic of financial inclusion and efficiency, which is a subject of interest in the fields of economics, econometrics and finance business, management and accounting social sciences and environmental science. We applied the chosen document type filters like articles, conference papers, proceeding paper, and book chapters to further narrow down the search, resulting in a total of 106 articles. The investigation only focused on documents published in the English language.





## Findings

Benchkendorff and Zehrer (2013) classify bibliometric studies into three categories: review methods, evaluation techniques, and relational techniques. This paper adopts two categories, which are evaluation and relational techniques. Evaluative procedures assess the academic significance and comparative effect of a subject. This category measures the chronological progression of publication counts, the breakdown of articles by journal and individual author, and the most cited authors (Hall, 2011). Relational techniques use co-citation, co-authorship, and co-word analyses to expose a subject's conceptual framework. We chose the co-citation and co-word strategies since they recognise trends and detect popular subjects (Zupic and Cater, 2015). Figure 3 illustrates the progression of academic articles each year from 1998 to 2023 by countries. Following an initial timeframe from 2017 onwards, there has been a steady and continuous rise in the number of published works in these field.

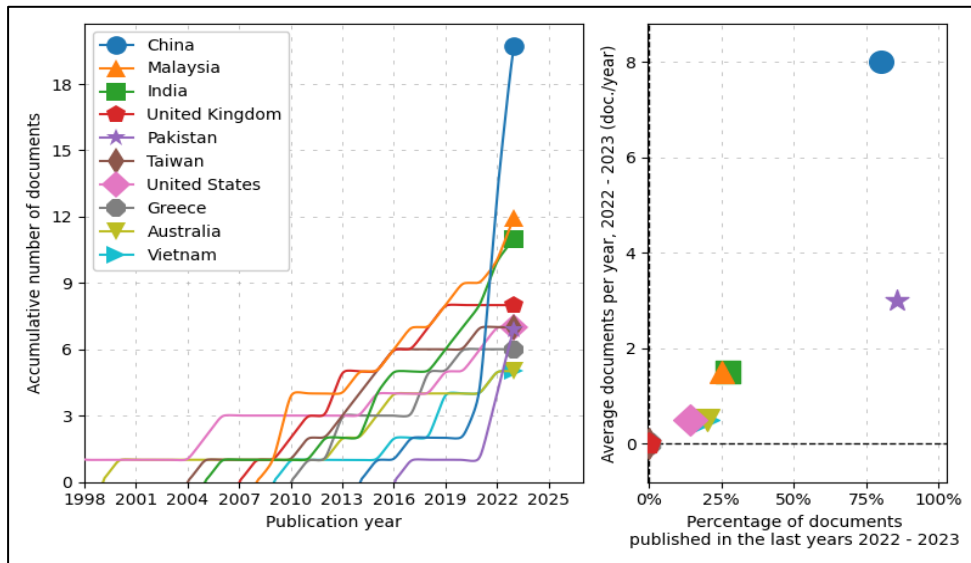


Figure 3: The ten leading countries in terms of academic publications.

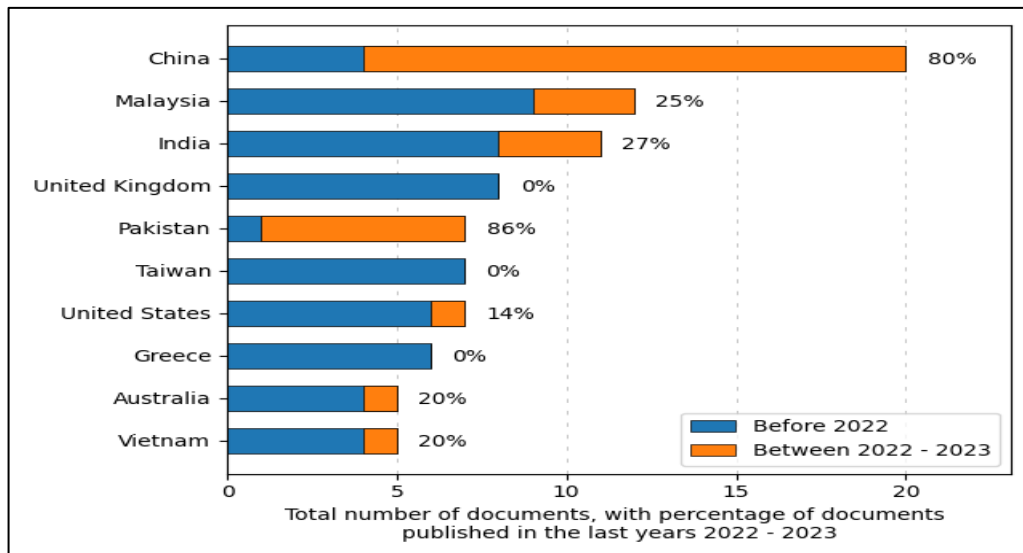


Figure 4: The most prolific country in terms of academic publications

Figure 3 displays the ten leading countries in terms of academic publications on financial inclusion and bank efficiency. The figure presents the total number of documents published by each country and the respective percentage (PDLY) of these documents that were published in 2023 and 2022. The PDLY referred as the Percentage of Documents Published in the Last Year (PDLY). It represents the proportion of each country's total publications on financial inclusion and bank efficiency that were produced in the most recent years, 2023 and 2022. By using the PDLY, we can determine which countries have been the most active in publishing research on these subject over the past two years. A higher PDLY percentage shows that a larger share of a country's publications on financial inclusion and bank efficiency is recent, indicating an increasing trend in these field.

As shown in figure 4, China has been recognised as the most prolific country in terms of academic publications on financial inclusion and bank efficiency with a total of 20 works.

Between 2023 and 2022, approximately 80% of these publications were published. Malaysia is the second-ranked country with 12 academic publications, of which 25% were published in the PDLY. India is on third position, producing 11 academic works. However, there is a considerable difference in the PDLY percentages. Pakistan demonstrated a significantly greater rate of 86% in 2023 and 2022, while China exhibited a publication rate of 80%. The plausible reasons that could explain PDLY Pakistan's 86% PDLY score is there may have been an increasing awareness and demand for research on financial inclusion and bank efficiency where there is a surge in academic publication on financial inclusion with numerous articles published in recent years.

The availability of comprehensive data sets has facilitated detailed research. The SBP regularly publishes data on financial access and usage, supporting these research efforts (SBP, 2021). Furthermore, Pakistan's financial inclusion initiatives have received support from international organisations. For example, the Financial Inclusion and Infrastructure Project has provided critical funding and support to bolster these efforts (World Bank, 2021).

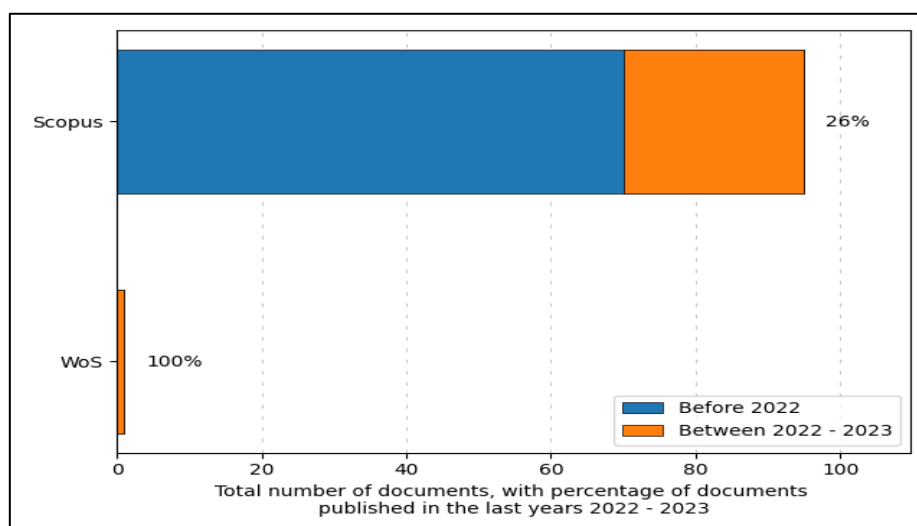


Figure 5: The distribution of documents published in two major databases, Scopus and WoS

Figure 5 illustrates the distribution of documents published in two major databases, Scopus and WoS (Web of Science), categorised by their publication dates. For Scopus, the graph indicates that most documents were published before 2022. A smaller portion, 26 percent, was published between 2022 and 2023. In contrast, all documents in WoS were published between 2022 and 2023, with none from before 2022. According to this figure, Scopus has had a consistent addition over the years, including a significant fraction of recent publications, whereas Web of Science is a relatively newer or updated collection focusing on recent publications from the last two years.

Table 2

*The highest cited publications*

Rank	Authors	Citations	Title	Year	Publisher
1	Das A.; Ghosh S.	206	Financial deregulation and efficiency: An empirical analysis of Indian banks during the post reform period	2006	<i>Review of Financial Economics</i>
2	Chortareas G.E.; Girardone C.; Ventouri A.	188	Financial freedom and bank efficiency: Evidence from the European Union	2013	<i>Journal of Banking and Finance</i>
3	Le T.H.; Chuc A.T.; Taghizadeh-Hesary F.	180	Financial inclusion and its impact on financial efficiency and sustainability: Empirical evidence from Asia	2019	<i>Borsa Istanbul Review</i>
4	Rosman R.; Wahab N.A.; Zainol Z.	143	Efficiency of Islamic banks during the financial crisis: An analysis of Middle Eastern and Asian countries	2014	<i>Pacific Basin Finance Journal</i>
5	Liu H.; Yao P.; Latif S.; Aslam S.; Iqbal N.	124	Impact of Green financing, FinTech, and financial inclusion on energy efficiency	2022	<i>Environmental Science and Pollution Research</i>
6	Chen H.; Shi Y.; Zhao X.	114	Investment in renewable energy resources, sustainable financial inclusion and energy efficiency: A case of US economy	2022	<i>Resources Policy</i>
7	Bonaccorsi di Patti E.; Hardy D.C.	103	Financial sector liberalization, bank privatization, and efficiency: Evidence from Pakistan	2005	<i>Journal of Banking and Finance</i>
8	Luo Y.; Tanna S.; De Vita G.	97	Financial openness, risk and bank efficiency: Cross-country evidence	2016	<i>Journal of Financial Stability</i>
9	Anu, Singh A.K.; Raza S.A.; Nakonieczny J.; Shahzad U.	88	Role of financial inclusion, green innovation, and energy efficiency for environmental performance? Evidence	2023	<i>Structural Change and Economic Dynamics</i>

			from developed and emerging economies in the lens of sustainable development		
10	Gaganis C.; Pasiouras F.	69	Financial supervision regimes and bank efficiency: International evidence	2013	<i>Journal of Banking and Finance</i>

In the last ten years, research on financial inclusion has significantly increased, leading to a growth in related studies. This section examines the highest frequently cited articles, using the number of citations as an indicator of their reliability and significance. Among the top 10 research articles, the study by Das A. and Ghosh S. (2006) stands out with 206 citations (as shown in Table 2). This paper focuses on the impact of financial deregulation on the efficiency of Indian banks during the post-reform period.

Table 3

*Most productive countries in financial inclusion and efficiency*

Rank	Country	No of publications	Citations	Developed/Developing
1	China	20	571	Developing
2	Malaysia	12	216	Developing
3	India	11	362	Developing
4	United Kingdom	8	461	Developed
5	Pakistan	7	212	Developing
6	Taiwan	7	93	Developing
7	United States	7	450	Developed
8	Greece	6	295	Developed
9	Australia	5	30	Developed
10	Vietnam	5	304	Developing

The most productive country in terms of its contributions to publications on financial inclusion and efficiency are displayed in Table 3. China ranks first with 20 publications, followed by the Malaysia (12) and India (11). However, China possesses the highest number of citations (571) among the countries, with United Kingdom and United States closely following. The list of countries comprises a harmonious blend of advanced and developing economies that are engaged in the financial inclusion and efficiency indicating a widespread understanding of its potential.

Table 4

*The top 10 journals ranked on citescore 2023*

Rank	Source title	Cite Score 2023	SJR 2023	SNIP 2023	Percentile
1	<i>Journal of the Academy of Marketing Science</i>	30.0	7.194	5.443	99th percentile
2	<i>Quarterly Journal of Economics</i>	24.22	30.448	9.636	99th percentile
3	<i>Canadian Journal of Agricultural Economics</i>	23.2	1.563	1.663	99th percentile
4	<i>Resources, Conservation and Recycling</i>	22.9	2.770	2.633	99th percentile
5	<i>International Journal of Production Economics</i>	21.4	3.074	2.855	99th percentile
6	<i>Review of Asset Pricing Studies</i>	19.8	6.315	3.520	99th percentile
7	<i>Entrepreneurship Theory and Practice</i>	19.0	5.819	4.215	99th percentile
8	<i>Energy Economics</i>	18.6	3.555	2.637	98th percentile
9	<i>American Economic Review</i>	18.6	22.344	7.493	98th percentile
10	<i>Journal of Economic Literature</i>	17.8	11.092	8.818	98th percentile

The database has 716 journals that published within a subject area of economics, econometrics, and finance, management and accounting and management and accounting. Table 4 list represents the top 10 of high-impact academic journals across various fields, ranked based on several bibliometric indicators for the year 2023. These indicators include CiteScore, SJR (SCImago Journal Rank), SNIP (Source Normalized Impact per Paper), and their respective percentiles within their subject categories.

The journals listed are among the most prestigious in their fields, evidenced by their high CiteScore values, which reflect the average number of citations received per document published in the journal. For example, the *Journal of the Academy of Marketing Science* tops the list with a CiteScore of 30.0, indicating its significant influence within the marketing research community. Similarly, the *Quarterly Journal of Economics* boasts an exceptional SJR of 30.448, underscoring its dominance in the field of economics to the ranked based on the CiteScore. As for *Canadian Journal of Agricultural Economics* which maintain high percentile ranks despite relatively lower SJR and SNIP scores compared to some others on the list.

Table 5

*The top ten organizations based on their total link strength, number of citations, and number of documents*

Rank	Organization	Total link strength	No of citations	No of documents
1	Communist Review Vietnam	6	31	1
2	Faculty of Accounting and Auditing, Foreign Trade University Vietnam	6	31	1
3	Faculty of Animal Science, Universitas Gadj Mada Indonesia	6	31	1
4	Faculty of Business Administration, Van Lang University Vietnam	6	31	1
5	Research Group Public Governance and Developmental	6	31	1
6	School of Government, University of Economics Ho Chi Minh	6	31	1
7	European Banking Centre, Tilburg, Netherland	6	31	1
8	Federal Reserve Bank Philadelphia, United States	5	69	1
9	Lancaster University, United Kingdom	5	69	1
10	University of Massachusetts, United States	5	69	1

The research in the field has been dominated by the Vietnam and its institutions, such as Communist Review Vietnam and Faculty of Accounting and Auditing, Foreign Trade University Vietnam. As shown in Table 5, it ranks based on their total link strength, number of citations, and number of documents. Each organization has contributed one document to the analysis. The top seven organizations, ranked 1 to 7 have a total link strength of 6. Each of these organizations has cited 31 times, demonstrating a consistent impact in their field of study. Their equal total link strength indicates similar levels of collaborative ties, yet their citation counts highlight the influence of their work. In contrast, the bottom three organizations ranked 8 to 10 including the Federal Reserve Bank Philadelphia, Lancaster University and University of Massachusetts have a slightly lower link strength of 5 but a higher number of citations, at 69 each. It indicating slightly fewer collaborative connections but high citation impact of the organization, possibly reflecting the broader dissemination and acceptance of their research findings.



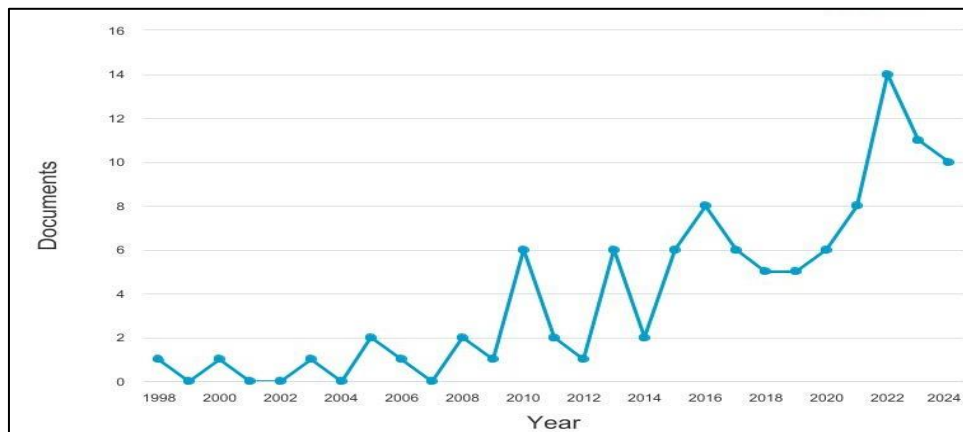


Figure 6: The number of documents published each year, starting from 1998 to 2024.

Figure 6 illustrates the number of documents published each year, starting from 1998 to 2024. The publication numbers were low and stable, typically ranging from 0 to 2 documents per year between 1998 and 2008. The number of documents increased significantly in 2009 and 2015, reaching a maximum of 6 documents in 2010 and 2014. A significant spike is observed from 2020 to 2022, peaking at 14 documents in 2022. The numbers slightly declined in 2023 and 2024 but remained relatively high compared to previous years. Overall, the data indicates significant growth in publications over the years, especially in recent times, suggesting greater interest or focus in the research area.

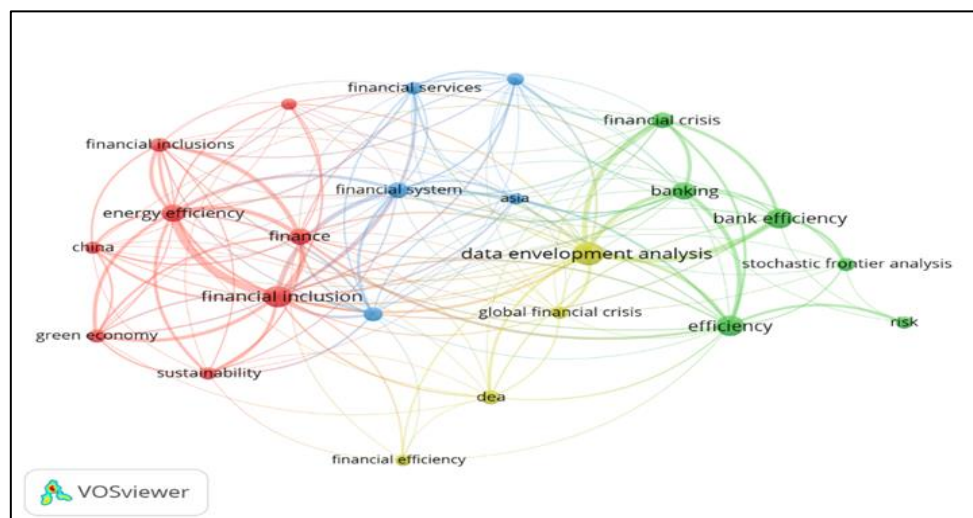


Figure 7: Co-occurrence network of keywords in the field of financial inclusion and efficiency

We used VOSviewer to get information about important keywords. A total number of 490 keywords, 23 met the threshold were found from the 106 papers. Figure 7 displays the compilation of the most often used terms found in the literature pertaining to financial inclusion and efficiency. It reflects how the authors' keywords have evolved over time. The network is divided into four clusters (red, blue, green, and yellow). The thickness of the lines connecting the nodes signifies the strength of the co-occurrence relationships between the keywords.

In detail, the red cluster (financial inclusion) includes related terms like "financial inclusions," "energy efficiency," "green economy," and "sustainability," suggesting a focus on the broad impacts of financial inclusion on various sectors and environmental sustainability. This cluster highlights the relationship between financial inclusion and sustainability. It suggests that research in this field often examines the impact of expanding financial services can promote sustainable practices, energy efficiency, and a green economy. The prominence of terms like "china" indicates a regional focus within the studies, suggesting significant contributions from or about China in this topic. The blue cluster revolves around "financial system" and "financial services," indicating research related to the structure and services of financial systems. The inclusion of "asia" suggests a geographical focus, indicating that many studies within this cluster analyse the financial systems and services within Asian contexts. Research here might explore the structure, efficiency, and performance of financial services, and how they integrate into the overall financial system.

The green cluster revolves around performance measurement and risk analysis in banking and financial institutions. "data envelopment analysis" and "stochastic frontier analysis" are common methods used to assess efficiency. The keywords "financial crisis", "bank efficiency" and "global financial crisis" suggest a focus on the impact of economic downturns on banking efficiency and financial stability. This cluster likely includes studies that evaluate how banks manage risks and maintain efficiency during times of financial stress. The yellow cluster is connected to other clusters, particularly the green cluster (which also focuses on efficiency but in the context of banking and global financial crises). This suggests that the themes of efficiency and performance measurement are central to multiple areas of financial research and are often studied in conjunction with topics like financial crises and risk management.

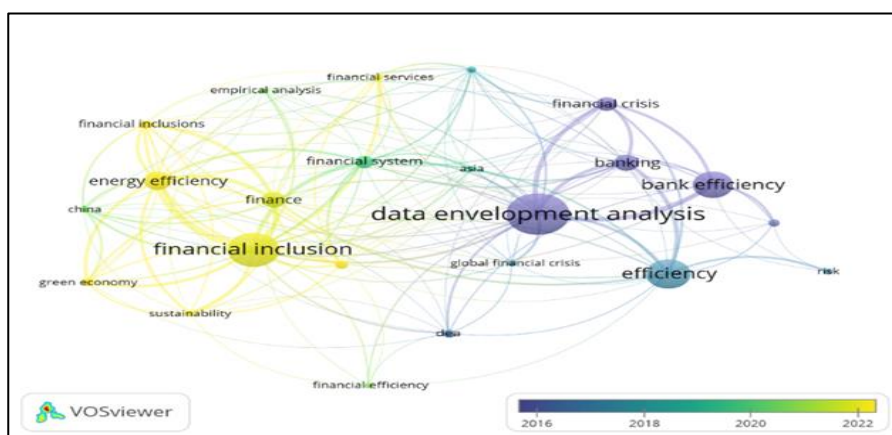


Figure 8: Co-occurrence network of keywords between older and recent area of study.

This VOSviewer visualization also reveals distinct gaps in the bibliometric network of financial research topics, particularly between older, traditional areas of study and more recent, emerging themes in Figure 8. The nodes and connections represent the frequency and co-occurrence of various terms from academic publications. Terms like "data envelopment analysis," "financial crisis," and "bank efficiency," predominantly from 2016-2018, form a cluster in blue and green, indicating an earlier focus on these areas. In contrast, more recent terms like "financial inclusion," "energy efficiency," and "sustainability" appear in yellow, reflecting a shift towards these topics from 2020 to 2022.

It highlights the expanding scope of financial research to address global challenges. This conceptual divergence underscores the growing recognition of the interconnectedness between financial systems and broader socio-economic and environmental issues, suggesting a need for more integrated studies that bridge these areas. Furthermore, further investigation into the relationship between financial inclusion and bank efficiency is necessary, given the temporal differences between these two studies. While financial inclusion research is more recent and diverse in scope, bank efficiency research appears to be more concentrated around specific traditional banking themes. We could explore how inclusive financial practices can enhance overall bank efficiency and stability.

Another potential research area is the geographical gap. The researchers can add a regional study from developing economies and make a collaborative effort. From there, it can lead to comprehensive insights to formulate policies that mandate banks to adopt inclusive financial practices and a regulatory framework as part of their efficiency and performance metrics (Sufian et al., 2017). By fostering international collaborations and interdisciplinary research, the financial research community can bridge these gaps, advancing towards a more comprehensive understanding of financial systems in the context of global challenges.

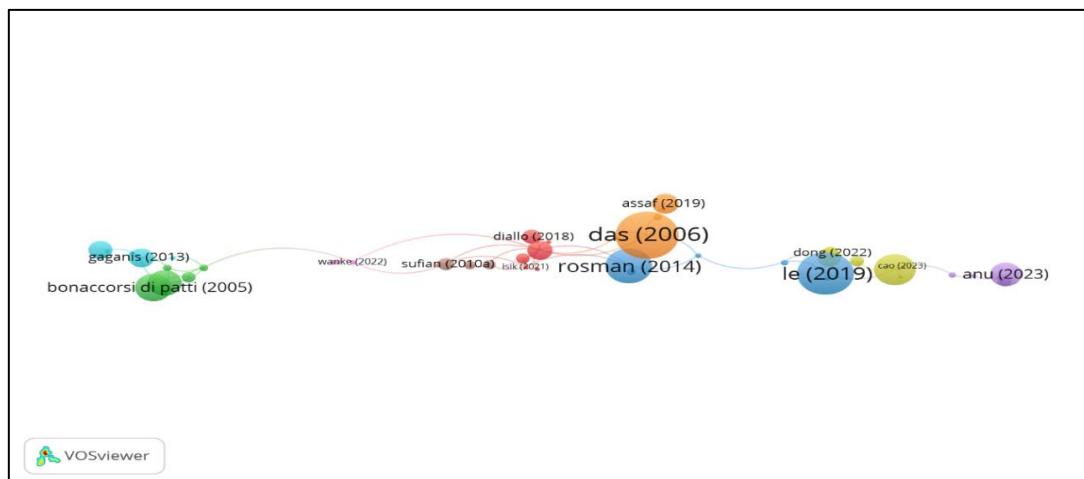


Figure 9: Co-citation network of documents in financial inclusion and efficiency

The co-citation network of influential publications in financial inclusion and efficiency from 1998 to 2023 as shown in Figure 9. The size of each node represents the number of citations a publication has received. Using writer analysis, it was found that Sufian F. (2010) had the highest quantity of documents. However, foundational studies by Bonaccorsi di Patti (2005) and Gaganis (2013), are highly cited and central, highlighting their significant impact. Mid-period influential works, such as Das (2006), and Rosman (2014), focus on financial crises and bank efficiency, marking these as key research areas during that time. Recent publications like Le (2019), Dong (2022), and Anu (2023), emphasize ongoing and emerging themes in financial inclusion and sustainability. The visualization depicts a chronological and thematic evolution, with earlier foundational works connecting to mid-period studies, which in turn link to more recent publications.

Despite this connectivity, there is a notable gap in comprehensively integrating financial inclusion and efficiency. Addressing this gap requires interdisciplinary research,

international collaborations, and the development of inclusive policies, which can enhance both financial inclusion and bank efficiency, contributing to a more stable and inclusive financial system.

## Discussion

This study used bibliometric and network visualization methods to evaluate global patterns in research on financial inclusion and efficiency. This bibliometric analysis investigated a total of 106 publications on financial inclusion and efficiency from the Scopus and Web of Science (WoS) databases spanning the years 1998 to 2023 using ScientoPy and Vosviewer software. From 2022 to 2023, there was a significant growth in the body of knowledge about financial inclusion and efficiency, with 26% published between 2022 and 2023 in the Scopus database. In contrast, Web of Science only contains documents published between 2022 and 2023, not any from prior to 2022. Scopus consistently adds recent publications, whereas Web of Science is a newer collection that focuses on recent ones.

Researchers from several academic fields, including economics, econometrics and finance, social sciences, business, management and accounting, and environmental science, have conducted an extensive study on the topic of financial inclusion and efficiency. During the period from 1998 to 2022, many significant studies were published, such as Das A. and Ghosh S. (2006), Rosman (2014), and Le et al. (2019). Based on the bibliographic coupling of countries, China emerged as the top among Malaysia, India, the United Kingdom, the United States, Greece, Australia, and Pakistan in terms of completing valuable projects and making substantial contributions.

While the list of prestigious journals in their fields is based on high CiteScore values, reflecting the average number of citations received per document, *The Journal of the Academy of Marketing Science* has a CiteScore of 30.0, indicating its influence within the marketing research community. *The Quarterly Journal of Economics* has an exceptional SJR of 30.448, demonstrating its dominance in the field of economics. *The Canadian Journal of Agricultural Economics* maintains high percentile ranks despite lower SJR and SNIP scores.

Using writer analysis, it was found that Sufian (2010) had the highest quantity of documents, with Gaganis (2013) following closely after, having also produced significant outputs in terms of document count. However, Bonaccorsi di Patti (2005) and Gaganis (2013) become foundational studies in co-citation analysis with 103 and 67 citations, respectively. Bibliographic coupling was used to analyse the papers that received the most citations. The research study titled "Financial deregulation and efficiency: An empirical analysis of Indian banks during the post-reform period," written by Das A. and Ghosh S. (2006), had the most citations, demonstrating its significant influence. Moreover, Chortareas et al. (2013) achieved the second-highest number of citations.

The ranking of the most effective organizations in terms of financial inclusion and efficiency, with a total link strength of 6, includes the Communist Review Vietnam, the Faculty of Accounting and Auditing at Foreign Trade University Vietnam, the Faculty of Animal Science at Universitas Gadjra Mada Indonesia, the Faculty of Business Administration at Van Lang University Vietnam, the Research Group on Public Governance and Development, the School

of Government at the University of Economics Ho Chi Minh City, and the European Banking Centre in Tilburg, Netherlands.

This study also conducted an analysis of keywords to identify the main topics addressed in financial inclusion and efficiency research. This led to the identification of four thematic clusters. The red node cluster mostly concentrated on research pertaining to "financial inclusion," "energy efficiency," "green economy," and "sustainability." The prominence of terms like "china" indicates a regional focus within the studies, suggesting significant contributions from China to this topic. The blue node cluster highlighted the structural elements and services of financial systems through terms like "financial system" and "financial services." The inclusion of "asia" suggests a geographical focus, indicating that many studies within this cluster analyze financial systems and services in Asian contexts.

The green node cluster specifically focused on research paths related to measurement and risk analysis in banking and financial institutions, where "data envelopment analysis" and "stochastic frontier analysis" are common methods used to assess efficiency. The yellow node cluster is connected to other clusters, particularly the green node cluster, where it focusses on efficiency but in the context of banking and global financial crises. Based on a cited reference's co-citation analysis, it is clear that the study on financial inclusion is still in its nascent stage. Furthermore, only a limited number of studies use comprehensive and qualitative methodologies.

## Conclusion

This bibliometric analysis reveals a growing academic interest in financial inclusion and bank efficiency, highlighting the crucial role of inclusive financial services in improving access to finance and fostering economic growth (Le et al., 2019). The interdisciplinary nature of the emerging research underscores the complexities inherent in these topics and the need for cross-disciplinary collaboration. This further emphasises the increasing importance of financial inclusion and bank efficiency across various academic disciplines, encapsulating the intricate relationships between finance, societal development, and the optimisation of banking operations (Vo et al., 2019).

The study also contributes to the existing body of literature on financial inclusion by identifying important terms such as bank efficiency. These terms are the main focus of research in this area and provide new opportunities for further investigation, thus increasing the level of interest among scholars to get a deeper understanding of the challenges and possibilities of advancing financial inclusion in the context of bank efficiency. By identifying inefficient areas through financial inclusion measurement, banks can concentrate their efforts on enhancing operations, minimising waste, and optimising resource allocation. This can result in cost savings, an increase in profitability, and a boost in competitiveness (Isik and Hassan, 2002; Sufian and Habibullah, 2010).

Additionally, the content analysis performed in this study will assist scholars in understanding both existing and emerging issues in the field of financial inclusion and efficiency. This comprehension enables academics to efficiently navigate the landscape, focussing on countries that need more investigation and action, like developing countries, because of the huge gap between developing and advanced economies (Wang and Luo, 2021;

Demircuc-Kunt et al., 2020). By using this valuable data, policymakers can collectively promote financial inclusion and empower marginalised groups.

Future research should focus on the current digital technologies and communication infrastructure with smart innovations for marginalised populations, assessing the effectiveness of alternative financing solutions, and thus exploring the potential contributions of emerging technologies like blockchain, AI, and big data in promoting financial inclusion and economic development (Afjal, 2023). Furthermore, it is important to investigate the impact of financial literacy and education on financial inclusion by using efficient tactics and technologies to improve financial literacy, especially among unbanked populations.

It is important to acknowledge certain limitations in this study. The research uses the Scopus and WOS databases. We recommend using EBSCO and other databases for future research to do comprehensive and comparative analyses. Introducing a diverse assortment of databases would significantly improve the quality of the study. Furthermore, this research only used ScientoPy and VOSviewer software for scientific mapping and performance analysis of the financial inclusion and efficiency literature.

Other tools such as Biblioshiny, CitNetExplorer, and SciMat can be included to create more effective data visualisations. Furthermore, our analysis was limited to published materials only such as articles, conference papers, proceeding paper, and book chapters. Finally, the choice of keywords should be improved to include more relevant phrases for searching the database. In addition, researchers have the potential to enhance this bibliometric study by doing theme meta-analyses on empirical studies in the same subject.

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