A SYSTEMATIC REVIEW OF FINTECH AND BANKING: MOTIVATIONS, CHALLENGES AND RECOMMENDATIONS

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Abstract

Financial technology (Fintech) refers to innovations driven by technology that have rapidly transformed the financial landscape, contributing significantly to global economic growth. While countries like the United States and China have experienced substantial Fintech advancements, regions such as Western Europe, Eastern Asia, and the Middle East are still in the process of fully integrating these technologies. Despite Fintech's expanding global influence, academic research remains limited in comprehensively exploring its benefits, motivations, challenges, and practical recommendations. This study conducts a systematic review to better understand the current research landscape, aiming to address the primary question: What are the key motivations, challenges, and recommendations for Fintech adoption in the banking sector? A structured literature search was performed across the Web of Science and Scopus databases, covering publications from January 2019 to December 2022. The review investigates various Fintech applications across diverse banking contexts and regions, identifying core themes including drivers of Fintech adoption, obstacles to its implementation, and disparities in its regional adoption. Furthermore, the study provides valuable insights and strategic recommendations for both academics and policymakers to promote broader acceptance and effective implementation of Fintech innovations in the financial sector.

Keywords: Financial Technologies; Fintech, Financial Institution; Financial Performance; Banks, Systematic Review and PRISMA.

مراجعة منهجية للتكنولوجيا المالية والقطاع المصرفي:
الدوافع، التحديات، والتوصيات

الملخص:

تشير التكنولوجيا المالية (Fintech) إلى الابتكارات التقنية التي أحدثت تحوّلاً جذريًا في القطاع المالي وأسهمت في تعزيز النمو الاقتصادي العالمي. وبينما سجّلت دول مثل الولايات المتحدة والصين تقدمًا كبيرًا في هذا المجال، لا تزال مناطق أخرى مثل أوروبا الغربية، وشرق آسيا، والشرق الأوسط تمرّ بمرحلة الاندماج التدريجي مع هذه التقنيات. وعلى الرغم من النمو المتسارع للتكنولوجيا المالية على المستوى العالمي، إلا أن الأبحاث الأكاديمية لا تزال محدودة في تغطية الفوائد المتوقعة، والدوافع المحفزة، والتحديات التطبيقية، والتوصيات العملية المتعلقة بتبنّيها.

تهدف هذه الدراسة إلى إجراء مراجعة منهجية للإجابة عن السؤال الرئيس: ما هي أبرز الدوافع، والتحديات، والتوصيات المرتبطة بتبني التكنولوجيا المالية في القطاع المصرفي؟ وقد تم تنفيذ بحث ممنهج في قواعد بيانات Web of Science وScopus، شمل الدراسات المنشورة في الفترة الممتدة من يناير 2019 وحتى ديسمبر 2022. تناولت المراجعة تطبيقات التكنولوجيا المالية في السياقات المصرفية المختلفة، وسلّطت الضوء على ثلاثة محاور رئيسة: محفّزات التبني، ومعوّقات التطبيق، والتفاوت الجغرافي في تبنّي التكنولوجيا المالية. وتخلص الدراسة إلى تقديم رؤى استراتيجية وتوصيات عملية موجهة للباحثين وصنّاع السياسات، تسهم في دعم التبني الأوسع وتنفيذ هذه الابتكارات بكفاءة وفعالية ضمن القطاع المالي.

الكلمات المفتاحية: التكنلوجيا المالية، المؤسسات المالية، الأداء المالي، البنوك، المراجعة المهنية، منهجية بريزما.

1. Introduction

Fintech, the fusion of financial services and technology, has emerged as a transformative force in the modern world, significantly impacting innovation and driving economic growth. Its importance lies in its ability to disrupt traditional financial systems, democratize access to financial services, and foster entrepreneurship and innovation across various sectors (Hoang et al., 2022; Sun et al., 2023). Nevertheless, one of the key reasons why Fintech is crucial for innovation and economic growth is its potential to enhance financial inclusion. By leveraging technology, Fintech businesses have created innovative solutions that allow underserved populations, particularly in developing countries, to access basic financial services. Mobile payment platforms, digital wallets, and peer-to-peer lending platforms have enabled individuals and businesses to participate in the formal financial system, empowering them with the tools to save, invest, and manage their finances more efficiently (Basha et al. 2021). This inclusion, in turn, leads to increased economic activity and growth, as more people are able to participate in the financial ecosystem (Alaassar et al., 2023; Guang-Wen & Siddik, 2023).

Furthermore, Fintech has revolutionized the way banks operate. Traditional banking systems often impose cumbersome processes and strict criteria for accessing credit, hindering the growth of startups and innovative ventures. Fintech platforms, on the other hand, leverage alternative finance sources and employ innovative risk assessment models, enabling faster and more accurate credit decisions (Sidaoui et al., 2022). This streamlined access to capital allows banks to invest in research and development, expand their operations, and bring new products and services to market. By nurturing innovation Fintech becomes a catalyst for economic growth, job creation, and increased competitiveness (Li et al., 2022).

Therefore, Fintech has become increasingly important for innovation and economic growth in the banking sector, revolutionizing traditional banking practices and driving significant transformations. Its impact can be seen in various areas, including profitability performance, customer experience, operational efficiency, risk management, and product development (Chen et al., 2021). One of the key aspects of Fintech's importance in the banking sector is its ability to enhance the customer experience. Traditional banking often involved lengthy processes, paperwork, and limited accessibility. Fintech

solutions have changed this landscape by providing digital banking platforms, mobile applications, and online payment systems that offer customers convenience, speed, and personalized services. With Fintech, customers can access their accounts, transfer funds, make payments, and even apply for loans or investments from the comfort of their own devices. This improved customer experience not only satisfies consumer demands but also attracts new customers, resulting in increased customer retention and acquisition for banks (Riikkinen & Pihlajamaa, 2022).

Fintech has also significantly contributed to operational efficiency within the banking sector. By leveraging automation, artificial intelligence, and data analytics, Fintech solutions have streamlined processes, reduced manual errors, and optimized resource allocation. Robotic process automation (RPA) and machine learning algorithms can handle repetitive tasks, such as data entry or document verification, more efficiently and accurately than humans. Additionally, data analytics tools enable banks to gain valuable insights into customer behavior, fraud detection, and risk assessment, allowing for proactive decision-making. These technological advancements improve operational efficiency, reduce costs, and free up human resources to focus on more complex and value-added tasks. Moreover, Fintech has played a crucial role in transforming risk management practices in the banking sector. With the increasing volume and complexity of financial transactions, banks require advanced tools to assess and manage risks effectively. Fintech solutions provide real-time monitoring, predictive analytics, and early warning systems to identify potential risks and vulnerabilities. By leveraging big data and machine learning algorithms, banks can detect fraudulent activities, assess creditworthiness, and manage market and operational risks more efficiently. This enhanced risk management capability minimizes financial losses, ensures regulatory compliance, and strengthens the stability of the banking system, ultimately contributing to economic growth (Jahanger et al., 2022).

Moreover, Fintech has spurred innovation in product development and expanded the range of services offered by banks. Traditional banks often had limited product portfolios and faced challenges in adapting to changing customer demands. Fintech startups, however, have introduced innovative financial products and services, such as peer-to-peer lending, robo-advisors, crowdfunding platforms, and digital wallets (Kumar et al., 2020). These offerings cater to evolving customer needs, provide alternative financing options,

and promote financial inclusion. Traditional banks have responded to this innovation by collaborating with Fintech firms, investing in their own digital transformation, or developing their in-house Fintech capabilities (Ye et al., 2022). This collaboration between Fintech and banks drives product innovation, improves competitiveness, and stimulates economic growth in the banking sector.

"Fintech" is characterized as a fluid and progressive entity, challenging easy definition and understanding by both academia and policymakers. It is contended that the emergence of Fintech is driven by three interrelated factors that disrupt conventional practices. These factors encompass organizations, individuals, and specific geographical markets. As a result, they have the potential to reshape business models, bring about structural changes, or influence any aspect of the examined system. As newcomers in the financial services sector, (Fintech) firms thrive and innovate by offering technologically advanced financial services that seamlessly integrate into the busy operations of businesses, aiming to replace established players in the industry (Zhou et al., 2021). Thus ,such phenomena have spurred researchers to undertake extensive investigations into the Fintech industry and its effects on diverse sectors (Anagnostopoulos, 2018). The banking sector, which is recognized as a crucial component of countries' economies and spans various industries, has encountered the challenges presented by the Fintech revolution. It is widely acknowledged that banks are subjected to stringent regulatory obligations. These banking regulations encompass policies designed to safeguard the stability of banking systems against excessive risk-taking behaviors (Nguyen et al., 2021).

With the inadequacy of traditional approaches in meeting the technological requirements of financial institutions, specialized Fintech emerged to address this gap. Initially, the financial industry introduced computer-based applications to automate financial transactions and streamline office tasks, aiming to enhance efficiency. Presently, banking and stock market transactions are predominantly recorded in databases and accessed through electronic terminals. ATM machines have become prevalent for cash withdrawals. As a result, Fintech experienced significant growth, capitalizing on the benefits offered by emerging technologies. The convergence of the Internet and mobile devices has created a platform that hosts influential technologies deeply intertwined with our daily lives and financial undertakings. These new technologies have revolutionized banks conventional methods of

engaging in financial activities through information sharing and the integration of businesses (Zhao et al., 2022). Furthermore, the fundamental concept behind "Fintech + Commercial Bank" is to transform the traditional profit model of commercial banks by achieving comprehensive and multidimensional integration between Fintech and commercial banks. Data plays a central role in this operation. Fintech offers commercial banks a range of innovative ideas for risk management, leveraging diverse dimensions. The application of Fintech has effectively diminished the cost associated with information asymmetry, leading to improved profitability and risk management for banks (Yao & Song, 2021).

In short, Fintech's importance for innovation and economic growth in the banking sector is undeniable. By enhancing the customer experience, improving operational efficiency, transforming risk management practices, and driving product innovation, Fintech has reshaped the way banks operate and interact with their customers. Embracing Fintech solutions enables banks to stay relevant in a rapidly changing digital landscape, foster innovation, and contribute to economic growth in the financial sector. As technology continues to advance, the role of Fintech in banking will only become more critical, shaping the future of banking and driving further economic development. Despite, the recognized importance of Fintech, there is still a noticeable lack of comprehensive studies and research on the subject. While academia and policymakers have acknowledged the transformative impact of Fintech on various sectors, including finance, economics, and entrepreneurship, the available literature and research often fall short of providing a deep understanding of the intricacies and implications of Fintech. This gap in studies limits the ability of academics and policymakers to fully comprehend the potential risks and opportunities associated with Fintech, hindering the development of informed policies and regulatory frameworks (Alaassar et al., 2023). Therefore, this study seeks to address this gap through a systematic review, offering valuable insights for scholars, policymakers, and financial institutions to support informed decision-making and contribute to the sustainable growth of the banking sector.

2. Method and Procedures

In the line with Tarawneh et al. (2024), this study adopted a systematic review approach due to its effectiveness in conducting an in-depth exploration of specific research area. The Systematic Literature Review (SLR) method is extensively used in management, finance,

and economics. A key advantage of employing SLR is its capacity to reduce subjective interpretations and biases, strengthening the objectivity of the analysis by limiting the influence of academic preferences in the selection of sample materials (Khatib et al., 2023).

2.1 The review protocol (PRISMA)

This study adhered to the guidelines outlined in the Preferred Reporting Items for Systematic Reviews (Page et al., 2021). As noted by Sierra-Correa and Kintz (2015), PRISMA offers three key advantages: (1) it defines a clear research question to support the study objectives, (2) it specifies criteria for content inclusion and exclusion, and (3) it emphasizes results validation, The SLR process began with the development of well-structured review questions aligned with PRISMA standards. A three-stage document search strategy was designed and implemented, involving identification, screening, and eligibility phases.

2..2 Research question development

The research questions for this study was developed using the PICO framework, which stands for Population, Interventions, Comparators, and Outcomes. This framework is a valuable tool for formulating relevant research questions for systematic reviews (Lockwood et al., 2015). Accordingly, the study incorporated three core components: Banking industry (representing the population), Fintech development (as the primary focus). These elements were instrumental in framing the central research questions:

1- How does Fintech influence financial inclusion and economic growth in the banking sector, particularly in developing regions?

2- What is the impact of Fintech adoption on operational efficiency, risk management practices, and customer experience in the banking industry?

3- What is the impact of Fintech adoption on operational efficiency, risk management practices, and customer experience in the banking industry?

4- What challenges and barriers do banks face when adopting Fintech solutions, and how can they be addressed to maximize the benefits?

5- To what extent does the current literature provide a comprehensive understanding of Fintech's role in transforming the banking sector, and what gaps remain for further research?

2.3 Systematic research strategy

The systematic search strategy involves three main stages: identification, screening, and eligibility assessment.

2.3.1 Identification

The identification phase involves searching for synonyms, related terms, and variations of the core keywords used in the study, specifically "Fintech" and "banking industry." This approach expands the database search, helping to identify additional relevant articles for the review. The keyword selection process followed the guidance of Okoli (2015) and drew from multiple sources, including an online thesaurus, keywords used in previous studies, suggestions from Scopus, and feedback from subject experts. The finalized keywords were tailored for use in the WoS and Scopus databases, followed by the construction of a search string incorporating Boolean operators, phrase searches, truncation, wildcards, and field codes, as shown in Table 1.

Table 1. Search strings and databases

Database	Search String
Web of Science (WoS)	Query: ((“Fintech” OR “Financial Innovation” OR “Financial Technology” OR “Digital Bank*” OR “Digitalization” OR “Crowdfunding” OR “P2P Lending” OR “Peer to Peer Lending” OR “Shadow Bank*” OR “Online Bank*” OR “Mobile Money” OR “Mobile Transaction*” OR “Payment System*”) AND (“Bank*” OR “Financial Institut*”) AND (“Performance” OR “Profitability”))
Scopus	Query: ((“Fintech” OR “Financial Innovation” OR “Financial Technology” OR “Digital Bank*” OR “Digitalization” OR “Crowdfunding” OR “P2P Lending” OR “Peer to Peer Lending” OR “Shadow Bank*” OR “Online Bank*” OR “Mobile Money” OR “Mobile Transaction*” OR “Payment System*”) AND (“Bank*” OR “Financial Institut*”) AND (“Performance” OR “Profitability”))

2.2.2 Screening

The identified papers were downloaded using Mendeley software (version 1.19.8.0) and exported to Excel for further processing. An automated selection process was then applied using the sorting functions available in the WoS and Scopus databases, following the guidelines of Okoli (2015). This allowed for the preliminary filtering of all 147 articles before conducting a more detailed review. The search was restricted up to December 2022, building on the initial search that began in June 2021. Consequently, the inclusion period was set from January 2019 to December 2022 to ensure the capture of the most recent studies and developments in the rapidly evolving Fintech sector. A five-year timeframe was considered sufficient to observe research trends and relevant publications in the field, as supported by Shaffril et al. (2021).

The review specifically focused on articles addressing Fintech and its applications in one or more of the following areas: (1) Digital Banking, (2) Online Banking, (3) Performance, (4) Profitability, and (5) Islamic Fintech. To avoid ambiguities, only studies published in English with concrete data were included in the analysis. During this process, 37 duplicate entries and 59 articles failing to meet the inclusion criteria were excluded. The remaining 51 articles proceeded to the third phase, where their eligibility was further evaluated. (see table 2).

Table 2. Inclusion and exclusion criteria

Criteria	Eligibility	Exclusion
Type of Literature	Journals indexed in databases that publish research articles exclusively featuring empirical data with a focus on quantitative studies.	Non-indexed journals, systematic literature review publications, book chapters, conference proceedings, and papers centred on conceptual discussions.
Language	English articles, only	Non- English articles
Timeline	Jan 2019 to December 2022	<2019
Unite of Analysis	Fintech and profitability of banks	Non-banking entities, as well as papers unrelated to profitability or Fintech.

The final set of articles used in this review was thus related to studies focusing on two aspects (i) studies conducted in countries and (ii) studies that emphasized on the types of banks (see Figure 2). Any significant piece of information used in writing this review was saved to an Excel file, which was extracted from the related articles during the full reading process. Only studies that fulfilled the inclusion criteria listed in Figure 1 were included in our review. The exclusion conditions applied were as follows: papers not in English, articles, and studies unrelated to Fintech aspects. The list of relevant papers was

organized in an 'Excel sheet file'. In the process of the 'Full-Text Reading' the researchers extracted several significant highlights and materials from the articles. Important information was extracted to reflect a detailed aspect of the Fintech in the bank's context field, such as important motivations to study this phenomenon, its recommendations, and methodological aspects for further research, among others. The articles were grouped into two categories in the form of a taxonomy on country-focused and bank types, as displayed in Figure 2.

2.2.3 Eligibility

During the eligibility assessment, a manual review of the retrieved articles was performed to ensure they met the required criteria following the initial screening. This review involved carefully examining the titles and abstracts of the articles. As a result, 34 articles were excluded as they primarily focused on qualitative and quantitative assessments of customer trust, customer perception, and managerial perspectives on Fintech adoption and the performance of Fintech firms. These studies did not align with the study's primary objective, which aimed to include quantitative research specifically emphasizing Fintech and the banking industry.

2.2.4 Data extraction

As shown in Figure 1, the 51 selected articles were thoroughly reviewed, and the relevant data were extracted. Each publication underwent detailed examination, with particular attention given to the abstracts, findings, and discussions. Key information was collected in alignment with the research questions, and studies addressing these questions were selected and systematically organized in a table (Braun and Clarke, 2006).

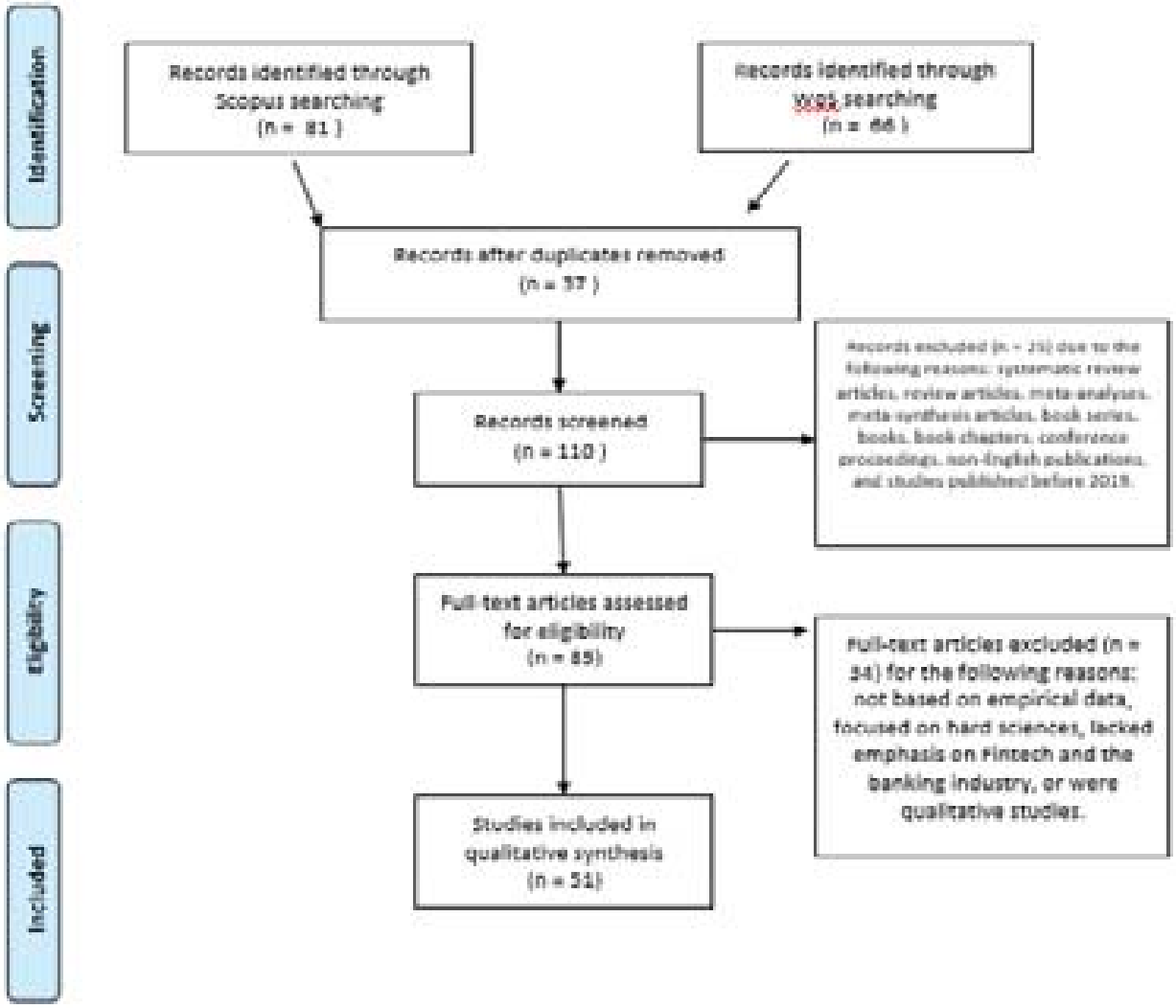

Figure 1. Flowchart of The Selection of Studies, Queries, and Inclusion Criteria (PRISMA)

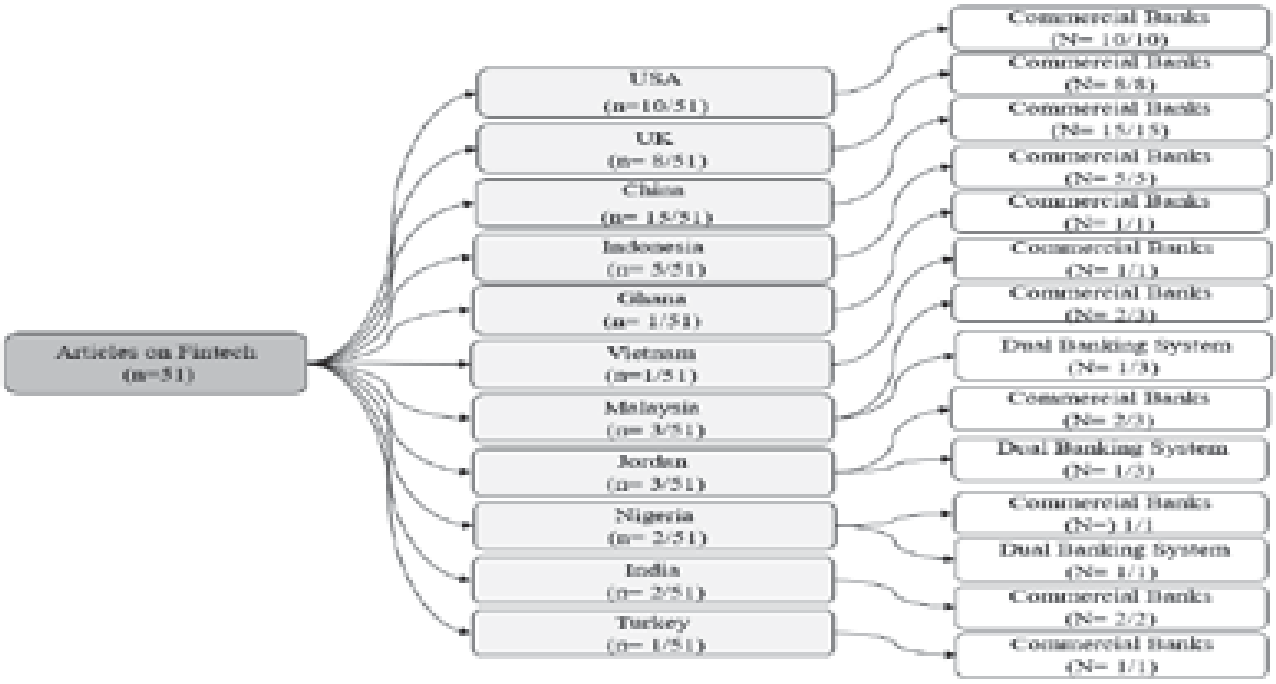

Figure 2. A Taxonomy of Research Literature on Fintech

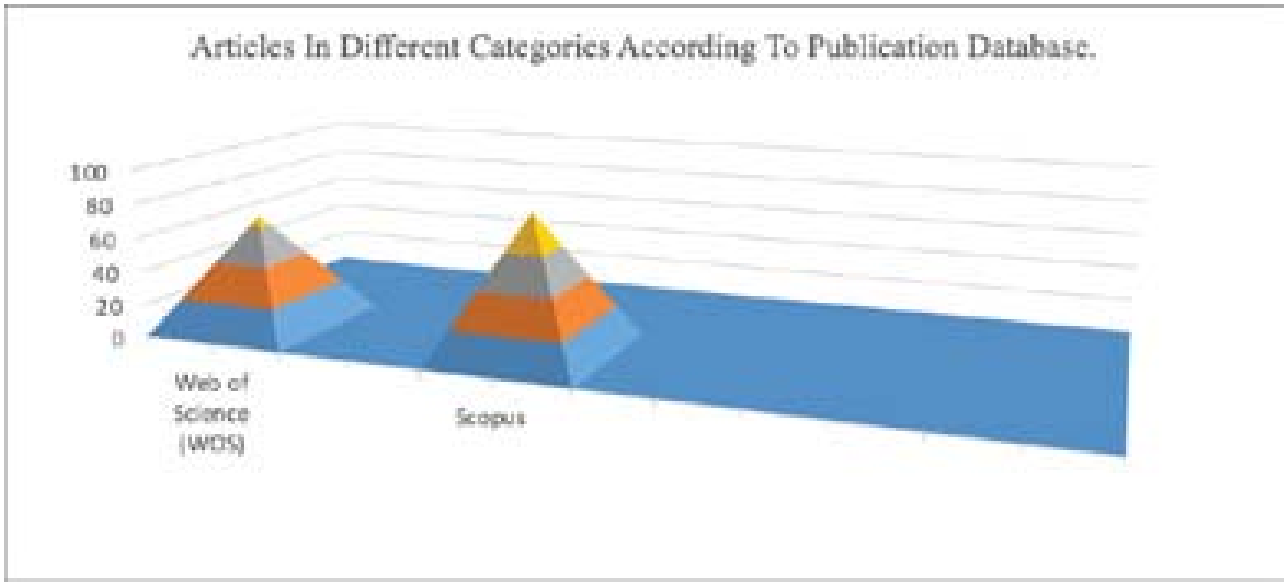

Figure 3. A number of included articles in different categories according to publication database.

3. Content Analysis

This part presents the first layer of the taxonomy which focused on the studies emphasized by countries (see Figure 4). All the information is discussed as followed.

3.1 Studies Emphasized in the USA

The Fintech industry in the United States is the largest globally, and the country also boasts the highest number of people adopting Fintech services. Most of Fintech firms started since 2010. For instance, there are various Fintech firms operating in the US, including Kabbage OnDeck and Avant. For example, Avant utilizes advanced machine-learning algorithms to evaluate the creditworthiness of consumers who experienced negative impacts on their credit scores during the financial crisis (Li et al., 2017). Furthermore, there is a growing trend of Peer-to-Peer (P2P) lending platforms gaining popularity in the United States. As an example, Lending Club, which is the largest P2P lending platform globally, experienced a significant increase in the value of its loans distributed. In just two years, from 2014 to 2015, the value of loans facilitated by Lending Club almost doubled, rising from USD 4.4 billion to USD 8.4 billion. More interestingly, in the United States, the volume of Fintech Peer-to-Peer (P2P) loans experienced a notable increase from January 2019 to June 2020, particularly during the COVID-19 pandemic. The data indicate that the volume of P2P loans during the pandemic surpassed the levels observed prior to the outbreak (Najaf et al., 2022).

3.2 Studies Emphasized in the UK

Recently, both the Bank of England and the Financial Conduct Authority in the UK have conducted experiments utilizing novel digital technology for regulatory intentions. The objective is to substitute regulations expressed in ordinary legal language with computer code and employ artificial intelligence to fulfill regulatory functions (Micheler & Whaley, 2020). The United Kingdom is frequently mentioned in banking literature due to its substantial banking industry, often serving as a point of comparison. The United Kingdom has positioned itself as a leader in the Fintech landscape of Europe. In the past ten years, the UK has drawn an impressive $159.8 billion in investment, establishing a record in the Fintech sector. This investment amount includes a substantial $38 billion contribution. By June 2020, six out of the top ten Fintech unicorns in Europe, which

refers to companies with a private market valuation of $1 billion or higher, were based in the United Kingdom. FinTech banks like Starling and Monzo have significantly impacted the retail banking industry in the UK. They have achieved this by showcasing their ability to comply with regulations and gain investor trust. UK policymakers have generally shown favorable attitudes towards Fintech banks. This reflects a shift in their perspective on retail banking, influenced by the global financial crisis, and a desire to participate in the perceived global competition in the Fintech sector (Hodson, 2021).

3.3 Studies Emphasized in China

China is establishing itself as a prominent player in the Fintech market, not just within the Asia-Pacific region but on a global scale as well. In 2018, the largest Fintech investment globally was secured by China's Ant Financial, a subsidiary of Alibaba, raising an impressive $14 billion. Furthermore, Chinese Fintech companies held four out of the top ten positions in the 2018 Fintechs Ranking. During 2018, the adoption rates of consumer Fintech services in China and India stood at 87%, significantly surpassing the global average of 64%. Additionally, China took the lead in SME Fintech adoption with a rate of 61%, outpacing the United States, which followed at 23% (R. Wang et al., 2021). Moreover, Chinese commercial banks are continuously introducing mobile banking applications and consistently enhancing their systems to offer advanced services to their customers. An instance of this is the China Merchants Bank, whose mobile banking app has undergone several upgrades since 2010, reaching its eighth-generation version. These updates have expanded its range of services, encompassing essential banking transactions and catering to the needs of both individual customers and corporate clients. Furthermore, in addition to their primary services, the mobile banking platforms of Chinese commercial banks have established partnerships with external entities such as Didi Taxi and Starbucks. This collaboration enables them to offer supplementary services that add value for customers. Notably, China Merchants Bank ranks as the second-largest bank in terms of the number of users on its own mobile banking app. By 2019, the app had amassed a user base of 114 billion, representing a market share of 19.1%. While online finance companies like Alipay have played a significant role in introducing various mobile apps to customers, almost all commercial banks in China have now introduced their own mobile banking apps, thereby diversifying the market share (Chen et al., 2021). Following the integration of finance with

emerging technologies like artificial intelligence, blockchain, cloud computing, and big data, over 100 commercial banks have enhanced their business strategies and efficiency. They achieved this through collaboration with Alibaba Cloud, utilizing cloud computing technology. Additionally, in 2015, ICBC introduced a novel development strategy called E-ICBC 2.0, which harnessed big data and internet technology. Furthermore, China Construction Bank (CCB) initiated the implementation of robo-advisors in 2016, leveraging artificial intelligence technology to facilitate their adoption (Cheng & Qu, 2020).

3.4 Studies Emphasized in Indonesia

Indonesia has witnessed remarkable growth in its Fintech sector among other emerging markets. This exceptional expansion of Fintech firms in the country presents an intriguing opportunity to examine the impact of Fintech on bank performance within the context of an emerging market (Phan et al., 2019). The rapid emergence of the "new" Fintech sector in Indonesia can be attributed to the significant advancements in information and communication technology since the 2010s. This indicates that Indonesia has made substantial progress in its digital landscape. Alongside China and India, Indonesia is recognized as an innovator in technology development. Bank Indonesia identifies several categories of Fintech businesses, including crowdfunding and peer-to-peer (P2P) lending, market aggregators, risk and investment management, as well as payment, clearing, and settlement services. Unfortunately, despite the expectations of many stakeholders, Fintech's potential in promoting financial inclusion appears to be partially implemented, mainly due to the concentration of Fintech startups in Jakarta. Nevertheless, payment and financing transactions conducted through Fintech platforms in Indonesia have experienced significant growth. For instance, Fintech payment transactions were a mere USD 12.0 billion in 2015 but escalated to USD 18.6 billion in 2017. It is projected that these figures will surpass USD 36.6 billion by 2021. Similarly, Fintech financing transactions, valued at USD 12.0 billion in 2015, increased to USD 18.6 billion in 2017 and are expected to reach USD 37.1 billion by 2021 (Iman, 2019;Tobing & Wijaya, 2020).

3.5 Studies Emphasized in India

In India, the inception of "internet banking" took place in the late 1990s with ICICI Bank being the pioneering institution to introduce e-banking. The emergence of e-banking in various sectors of the banking industry led customers to increasingly utilize its services starting in 1996. The introduction of internet banking proved to be highly advantageous for customers. The concept of internet banking was solidified in 1999, prompting other banks such as Housing Development and Finance Corporation Bank, Citi Bank, IndusInd Bank, and Times Bank to follow suit and offer this facility (Singh & Kaur, 2019).

3.6 Studies Emphasized in Turkey

The banking sector plays a significant role in Turkey's financial system, comprising approximately 82% of total assets. Deposit banks, in particular, employ 91% of all bank employees and account for 90% of the overall assets as of December 2017. Turkey is home to 33 deposit banks, including nine privately owned banks, three state-owned banks, one bank under the deposit insurance fund, and 20 foreign banks, as reported by the Turkish Banks Association (TBA). The advent of technology and the integration of digital banking services such as ATMs, point-of-sale systems (POSs), internet banking, call centers, and mobile apps have transformed the traditional dependence of the banking industry on physical branches. As a result, digital banking products have become a significant component of the overall banking services offered. By December 2017, the number of customers actively utilizing digital banking services in Turkey had reached 35 million, highlighting the widespread adoption and popularity of these digital channels (Kahveci, Eyup, 2018).

3.7 Studies Emphasized in Ghana

The banking industry in Ghana has witnessed significant advancements since the pre-independence era, primarily driven by technological progress, government regulations, and competition. This sector plays a crucial role, contributing approximately 50% to the overall services sector's GDP. In Ghana, the banking sector consists of one central bank, the Bank of Ghana, and four prominent commercial banks: GCB Bank, Ecobank Ghana, Barclays Bank Ghana Ltd, and Standard Chartered Bank Ltd. According to official data,

these top four banks hold significant market shares, with Ghana Commercial Bank at 12.6%, Ecobank Ghana at 11.80%, Standard Chartered Bank at 10.00%, and Barclays Bank Ghana Limited at 9.80%. Over the past couple of decades, the Ghanaian banking sector has experienced a notable increase in competition and innovation. One particular area that has witnessed intense competition is product development, with the introduction of new offerings such as international funds transfer, school fees loans, negotiable certificates of deposit, car loans, consumer/hire purchase loans, travelers' cheques, and more. Another significant development in the past decade has been the computerization and networking of branches. Many banks now have nationwide networks or have extensively connected their branches through advanced networking systems. This has greatly enhanced banking operations and information processing. ATMs have become commonplace, granting clients the convenience of conducting transactions at their own leisure. The introduction of personal computer banking, telephone banking, internet banking, branchless banking, SMS banking, and other services has further expanded customer options. Banks are also expanding their branch networks to reach more customers. The evolving banking sector landscape in Ghana is characterized by competition and holds promise in terms of savings mobilization, development financing, and service delivery. These advancements have been made possible by improvements in telecommunication networks and advancements in computer technology within the country. If these innovative practices focus on mobilizing savings for productive sectors, they have the potential to drive economic growth (Kwateng et al., 2020).

3.8 Studies Emphasized in Vietnam

Vietnam, as an emerging market, has observed a rising prevalence of digital banking, presenting significant benefits due to its large population residing in remote regions. The proportion of mobile payments in Vietnam surged from 37% in 2018 to 61% in 2019, marking the most substantial increase in Southeast Asia. By January 2020, Vietnam, with a population of 96 million, had 145.8 million mobile subscribers, of which 93% utilized smartphones. Moreover, there were 68 million households with internet subscriptions, and 65 million individuals actively engaged with social networks. Amidst the COVID-19 pandemic, Vietnamese banks of various scales have swiftly adapted to accommodate the increased number of digital customers. In order to align with the evolving work methods

and embrace the "new normal," banks have had to handle a higher volume of online transactions. As of December 2020, 95% of credit institutions reported having either implemented or planned to implement Digital Banking (DB). Additionally, 39% of banks have approved a digital transformation strategy or incorporated it into their business development or information technology strategies. Furthermore, 42% of organizations are actively working on devising a digital transformation strategy (Thi et al., 2022).

3.9 Studies Emphasized in Malaysia

Among its neighboring countries, Malaysia stands at the forefront in terms of e-wallet usage. Malaysian consumers have been and will continue to be avid users of electronic payment methods as a preferred means of conducting transactions. This trend can be attributed to the influence of technological advancements and globalization on various stakeholders, including consumers, businesses, and institutions. The drive towards cashless transactions has become increasingly significant, as evident in the recently announced annual government budget, which allocated around RM450 million to promote the usage of e-wallets. Such policies aimed at encouraging e-wallet adoption have led to the emergence of various e-wallet providers, including GrabPay, Touch 'n Go eWallet, Boost, BigPay, and FavePay, offering attractive incentives for remittances. Additionally, the introduction of the Real-time Retail Payments Platform (RPP) by the Central Bank of Malaysia (Bank Negara Malaysia) has played a crucial role in advancing the adoption and utilization of e-wallet payment systems (Thaker et al., 2022). In Malaysia, leading banks such as Maybank, Hong Leong Bank, RHB Bank, Public Bank, and CIMB Bank have made significant investments in technology over the past few years. Furthermore, Samsung Pay, a digital payment platform, has partnered with Maybank, CIMB, Hong Leong Bank, RHB Bank, Public Bank, and other banks to provide users with cashless transaction capabilities. Additionally, Alipay, an eWallet payment method, has collaborated with Maybank, Public Bank, and CIMB in Malaysia to offer eWallet services. Moreover, a significant majority of 66% of banks in Malaysia have set their sights on achieving digital maturity by the year 2020. This objective is being pursued through substantial investments in technology alongside their individual growth strategies. Additionally, over 50% of Malaysian banks are anticipated to establish partnerships or engage in joint ventures within their core markets (Bakar & Nordin, 2020).

3.10 Studies Emphasized in Jordan

The banking sector holds a crucial position in Jordan's economy, playing a significant role in contributing to the gross domestic production (GDP) and providing employment opportunities. Furthermore, it serves as a source of funding for individuals, corporations, and government projects. Notably, the sector has demonstrated its resilience even in challenging times, including periods such as Gulf Wars I and II, as well as during the global economic recession in 2008 (Al-Dmour et al., 2020). Jordan has experienced a significant transformation in the realm of financial technology and innovation, primarily driven by an investment-friendly environment that fosters innovation and a strong demand for financial technology in the local market. The country has witnessed the emergence of digital financial services that are readily available, efficient, and secure, with a particular emphasis on promoting the cybersecurity of financial services. Notably, the Central Bank of Jordan introduced the regulatory guide for the Fintech Regulatory Sandbox in early 2018, aimed at providing a nurturing environment for entrepreneurs to encourage innovation and advancement in the field of financial technology, ultimately enhancing competitiveness in the realm of digital financial services (Bashayreh & Wadi, 2021).

3.11 Studies Emphasized in Nigeria

In Nigeria, it is crucial to emphasize that digitalization has disrupted various sectors, including large industries, retail businesses, media, transportation, and now it is rapidly spreading to the domain of commercial banks. In terms of the banking industry, although Nigerian commercial banks have implemented digitalization in their operations, customers still face several limitations. They encounter significant restrictions while conducting their daily banking transactions, such as the continued need to fill out physical forms for tasks that could be efficiently handled through digital means. Consequently, customers often encounter long queues within the premises of commercial banks as they await assistance. Despite the introduction of the cashless policy in 2017 by the Central Bank of Nigeria (CBN) and similar initiatives aimed at promoting digitalization, it remains perplexing why these limitations persist. Many commercial banks have invested heavily in the necessary IT infrastructure and digital technologies, making the persistence of these limitations seem wasteful (Agboola et al., 2019).

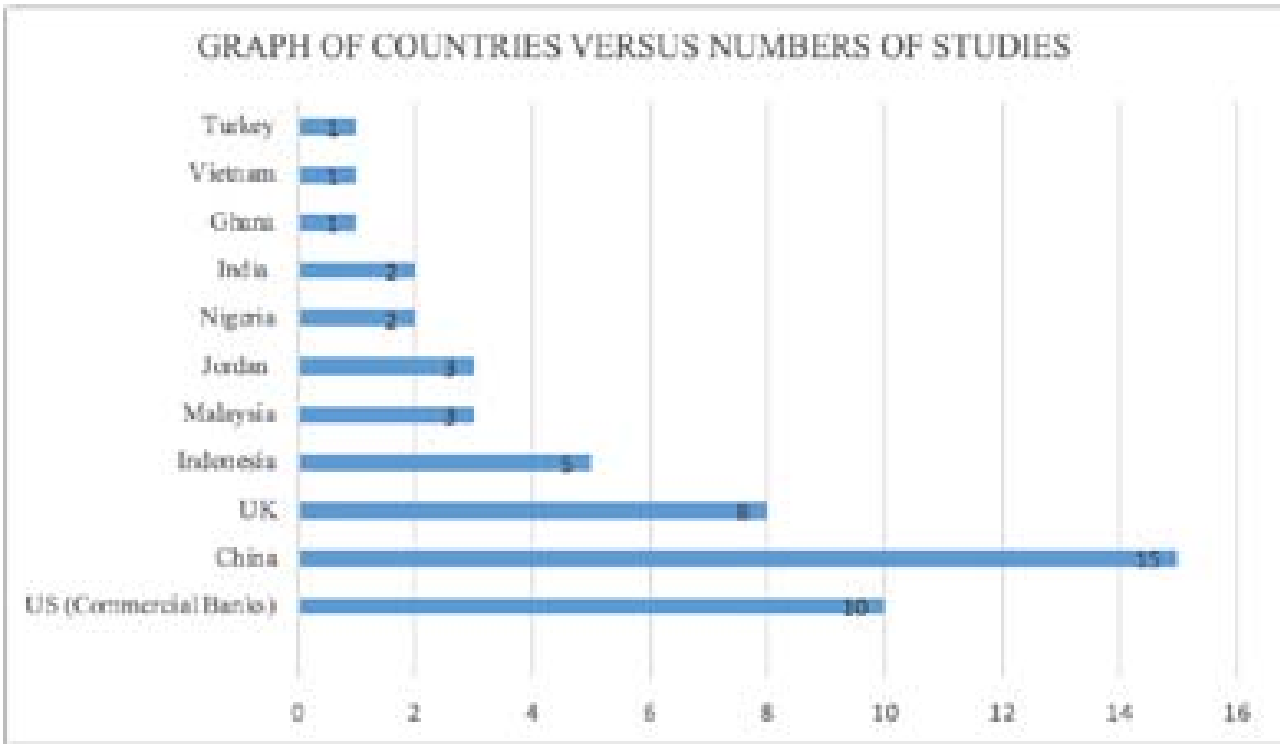

Figure 4. Number of Studies by Country

4. Studied Conducted on A Bank Type

This section discusses the studies that have been conducted based on banks type. There are studies that been done on only commercial banks including Acharya et al., (2008) who take the community banks. Moreover, (Bruce Ho & Dash Wu, 2009; Tao et al., 2013; Usman, 2016; Mbama et al., 2018; Mbama & Ezepue, 2018; Agboola et al., 2019; Hsu & Lee, 2017; Koroleva & Kudryavtseva, 2020; Al-Dmour et al., 2020; Chen et al., 2021; Kwateng et al., 2020; Tobing & Wijaya, 2020; Wadesango & Magaya, 2020; R. Wang et al., 2021; Wang et al., 2021; Bashayreh & Wadi, 2021). More specifically, studies that take different types of banks, such as (Li et al., 2017) who works on the incumbent's retail banks. while, some studies focused on the listed commercial banks including; (Chhaidar et al., 2022; Carlini et al., 2021; Phan et al., 2020). Furthermore, some studies conducted on the listed stat-owned banks, rural banks, policy banks, industrial banks, joint-stock banks, construction banks, development banks and city banks such as; (Tan, 2017; Cheng & Qu, 2020; Yao & Song, 2021a; Yao & Song, 2021b; Zhang et al., 2022; Katsiampa et al., 2022; Zhao et al., 2022; Thi et al., 2022; Wu & Yuan, 2021). Other

scholars conducted their analysis on the national banks (Campbell & Frei, 2010; Awwad, 2021). Also, other scholars focused on the large international bank (Forcadell et al., 2020). Moreover, regional banks (Iman, 2018). Furthermore, some studies was about development commercial banks (Bakar, 2020). In additional to giant banks (Dexiang & Wu, 2010), also on private banks (Zouari-hadiji, 2021) and public banks (Singh & Kaur, 2019). On the other hands, some studies have been conducted on countries that have dual banking system including, (Almulla & Aljughaiman, 2021; Wang et al., 2021) and a study was conducted on Islamic banks, commercial banks, cooperative banks and saving banks (Banna et al., 2021).

5. Fintech and Related Variables

This section presents the studies have included the Fintech and various variables. A strand of studies has been emphasis on the online banking. Where online banking stands out as a captivating subject for examination within the realm of technology. This is because it encompasses a domain where numerous companies have implemented strategies with the goal of lowering expenses, augmenting income, and improving customer loyalty (Campbell & Frei, 2010). Online banking and banks profitability performance was conducted by (Acharya et al., 2008; Singh & Kaur, 2019). Also online banking with banks efficiency (Ho & Wu, 2009; Tao et al., 2013; Kwateng et al., 2020). Moreover, one self- service channel, online banking, on customer-level service demand, cost, profitability, and retention (Campbell & Frei, 2010). Furthermore, the online banking efficiency along with the risk analysis has been conducted by (Dexiang & Wu, 2010). Recently, a study by Al-Janahi et al., (2021) was conducted for measuring the customers' acceptance of biometrics adoption. Moreover, a study conducted by Hsu and Lee, (2017) has also explored the evaluation of service quality and performance in the context of online banking.

The emergence of the subprime mortgage crisis in 2008 made the shadow banking system more visible to the general public. Where Paul McCulley, the executive director of the Pacific Management Company, initially introduced the notion of shadow banking. He describes it as a comprehensive collection of nonbank leveraged channels, carriers, and structures (Han et al., 2019). There are a group of studies emphasis the shadow banking in the literature of banking. Tan, (2017) has investigated the relationship between shadow

banking, competition and banks profitability. From different angle, Han et al., (2019) have looked into the relationship between of nonfinancial enterprises' shadow banking activities and business performance. Moreover, Chen et al., (2019) assess the impact of managerial overconfidence on equity, default risk, and efficiency in a shadow-banking life insurance company.

Fintech, which refers to the application of technology in the financial sector, is a relatively recent phenomenon that has experienced substantial and ongoing growth. Its impact extends beyond just banking and financial services, disrupting various other industries as well. Notably, the Fintech sector is not solely controlled by established banks and traditional financial institutions. It also attracts technology-driven startups that are eager to enter and establish dominance in this particular market segment (Iman, 2019). The effects of Fintech firms have been conducted by different scholars. Li et al., (2017) studied the relationship between Fintech start-ups and banks share- price performance. Moreover, Fintech firms and their relationship with banks profitability have been conducted in different studies (Phan et al., 2019; Wu & Yuan, 2021;Zhao et al., 2022). Furthermore, Katsiampa et al., (2022) looked into the impact of Fintech on both financial and prudential performance of banks. Also, Iman, (2019) explores the strategies employed by traditional banks as they vie for competition with the rising Fintech startups.

In addition to the rise of new players in the industry and the rapid expansion of online commerce platforms, technology giants have played a significant role in driving the digitization of banks. They have harnessed these innovative technologies to generate fresh sources of revenue and enhance the interaction process between customers and banks (Chhaidar et al., 2022). There are studies that focused on the banks investments in Fintech firms and its impacts of banks stock returns (Carlini et al., 2021). Also, the relationship between Fintech investments by banks and profitability performance of banks (Bakar, 2020; Bashayreh & Wadi, 2021; Chhaidar et al., 2022). More further, there are studies conducted on the relationship between Fintech and banks market risk and risk taking (Yao & Song, 2021a;Yao & Song, 2021b;Wang et al., 2021). In the context of banks risk, Banna et al., (2021) went further and conducted a comprehensive analysis to delve into the effects of Fintech-based financial inclusion on the risk levels of banks. Moreover, there are studies conducted on the relationship between banks investment in Fintech and

their efficiencies (Yang et al., 2021). Moreover, Wang et al., (2021) conducted research examining the impact of IT investments on intellectual capital in banks. They analyzed intellectual capital both as a whole and in its individual components, as well as its influence on competitive advantage and overall performance. In addition, the relationship between banks Fintech and credit risk have been empirically studied by Cheng and Qu, (2020). More interestingly, Zhang et al., (2022) conducted a study investigating the impact of Fintech on risk levels before and after loan transactions. More interestingly, Al-Dmour et al., (2020) conducted a study that explored the mediating role of Fintech innovation in elucidating the connection between market knowledge management and banks' performance.

The banking sector is propelled to enhance its performance through digital innovation and inclusive financial services facilitated by technologies such as ATMs, VTMs, and mobile banking. These advancements offer new opportunities for improving various aspects of the sector (Chen et al., 2021). In this context, Chen et al., (2021) conducted a study examining how the performance of commercial banks is affected by the introduction of Fintech products (FTPs). Additionally, researchers have examined the correlation between Fintech services, Fintech firms, and the profitability of banks. (Almulla & Aljughaiman, 2021). Furthermore, electronic payment methods, also known as E-Payment, are poised to supplant traditional payment methods and offer digital financial services, commonly referred to as "E-Banking," in diverse formats that align with the nature of transactions, operations, and the varying requirements of customers. In this context, the study by Awwad, (2021) was about studying the impact of electronic payments on the banks financial performance.

The advancement of technology within the banking sector has profound ramifications for the marketing endeavors of banks, particularly in the realm of digital banking (DB), as it directly impacts customer interactions. The widespread adoption of DB through telephone, internet, and mobile platforms has emerged as a primary method of providing customers with multi-channel services, thereby presenting a challenge to traditional banking models (Mbama & Ezepue, 2018). In this context, there are group of studies emphasis on the impact of digital banks on banks efficiency (Kahveci & Wolfs, 2018; Bataev & Plotnikova, 2019). Also, researchers have directed their attention towards examining

the influence of digital banking on the financial performance of banks (Wadesango & Magaya, 2020). Additionally, Forcadell et al., (2020) conducted a study investigating the combined effects of sustainability and digitization on the financial performance of banks. Approaching the topic from a different standpoint, Mbama & Ezepue, (2018) conducted research exploring customers' viewpoints regarding digital banking (DB), encompassing aspects such as customer experience, satisfaction, loyalty, and financial performance (FP). Also, Mbama et al., (2018) conducted a study focusing on managers' perspectives regarding the impact of digital banking (DB) on customer experience and the financial performance of banks. Moreover, Agboola et al., (2019) conducted a study examining the performance of digital banking from the perspective of non-managerial mangers of banks. Furthermore, Koroleva, (2020) studied the factors that influence the digital banks financial performance. More interestingly, Thi et al., (2022) conducted a study investigating customer experience (CE) and its connection with intermediate variables to analyze the influence of digital banking (DB) on the financial performance (FP) of banks, both before the onset of the Covid-19 pandemic and during the subsequent lockdown period.

Fintech credit has become a worldwide phenomenon, leading central banks and public authorities to utilize information on the volume of Fintech credit for monitoring economic and financial conditions. This data is used to inform monetary policy decisions and establish macroprudential policies, including measures like the countercyclical capital buffer. In this particular context, Nguyen et al., (2021) carried out an empirical investigation that explored the correlation between Fintech credit, banks regulations (as a moderating variable), and the financial performance of banks. Peer-to-peer (P2P) lending is a facet of modern financial technology that facilitates lending and borrowing at comparatively low interest rates for both individuals and businesses. In this context, Tobing & Wijaya, (2020) conducted research to examine the influence of peer-to-peer (P2P) lending on the financial performance of banks. The diffusion of information and communications technology (referred to as ICT) and its impact on the banking industry have garnered significant attention in academic circles. Del Gaudio et al., (2021) conducted research to explore the influence of information and communication technology (ICT) on the banks profitability and risk of financial distress.

In addition to the existing studies examining the relationship between Fintech and banks' performance, research has also been conducted on the factors influencing the intention to adopt e-wallets (Thaker et al., 2022). Furthermore, investigations have been carried out on the impact of Fintech on healthcare (Jing et al., 2022). Furthermore, the impact of Fintech on the green growth throught the mediating effect of the green finance has got the attention Zhou et al., (2022). The global economy has been significantly impacted by the coronavirus (COVID-19) pandemic. However, there is limited research available (Najaf et al., 2022) on the extent to which COVID-19 has influenced the crucial factors related to peer-to-peer lending (P2P) that utilizes financial technology (Fintech).

Financial innovation presents itself as a strategic hurdle for banks seeking to maintain their competitiveness. This requirement underscores the vital role that financial innovation can play in driving economic growth and creating value. It accomplishes this by altering the structures inherent in existing financial products or by introducing novel products and services (Hadiji, 2021). Within the realm of financial innovation, a cluster of studies has concentrated on examining the influence of financial innovation on financial performance, risk, and economic growth (Usman, 2016; Chipeta, 2018). Additionally, research has delved into the impact of financial innovation on banks' financial performance, with a particular focus on the mediating effect of financial risk management (Hadiji, 2021).

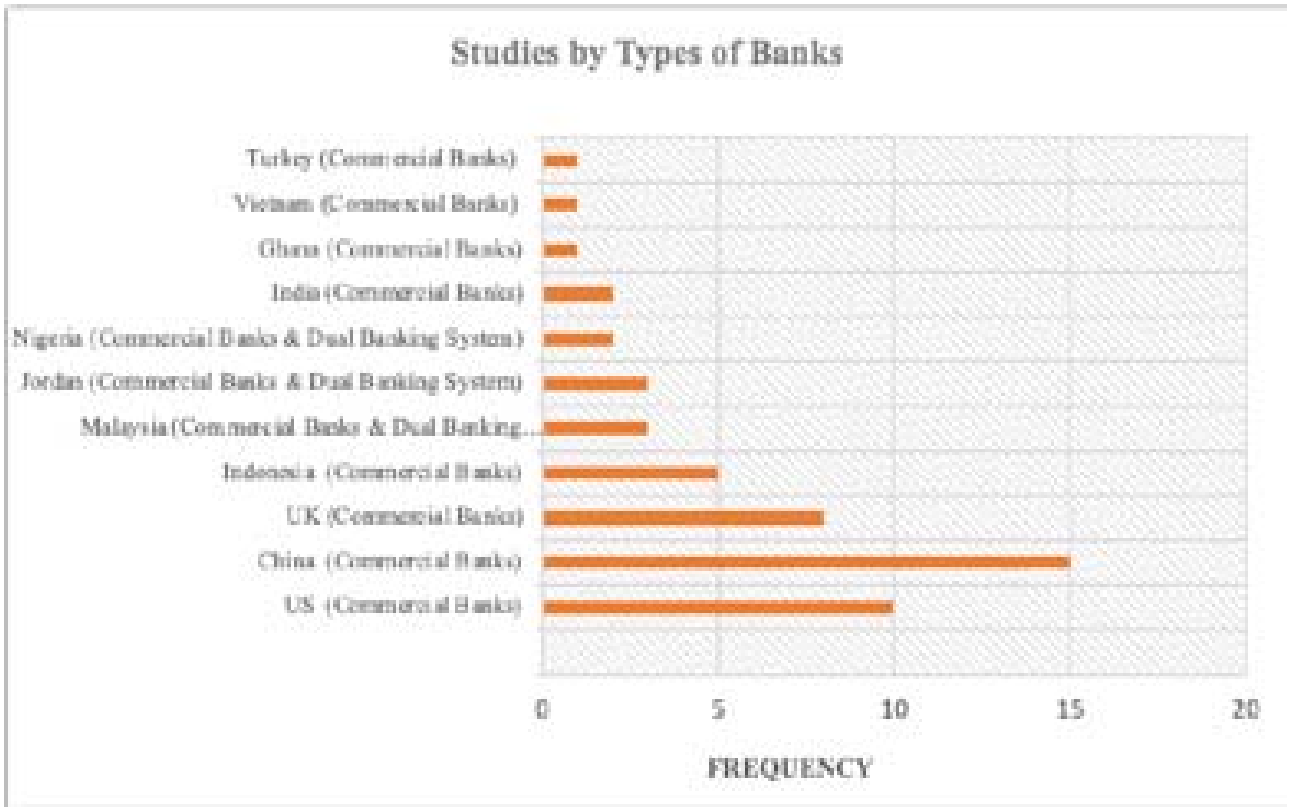

Figure 5. Number of Studies by Types of Banks

6. Discussion

Disruptions have had a profound impact on numerous industries, such as Uber and Airbnb revolutionizing transportation and hospitality. For a long time, the financial sector had remained relatively unaffected by these disruptions. However, this situation changed with the emergence of Fintech companies, which utilize technology for various financial purposes like banking, payments, financial data analytics, capital markets, and personal financial management (Li et al., 2017). The term "Fintech" or "financial technology" originated in the 1990s when Citigroup initiated a project called the "Financial Services Technology Consortium," aiming to foster technological collaboration in the financial services sector. The more recent usage of the term "Fintech" began in 2014 and garnered significant public interest. Since then, Fintech has been widely employed to describe the substantial influx of technology, platforms, and interconnected systems that enhance accessibility, efficiency, and affordability of financial services and products for a larger population (Iman, 2019).

Fintech refers to the introduction of technology-driven financial innovations that generate novel business models, applications, processes, or products, resulting in a substantial influence on financial markets, financial institutions, or the enhancement of financial services (Zhou et al., 2022). In 2015, the investment in Fintech companies worldwide witnessed an impressive growth of 75%, surpassing the significant sum of 22 billion USD, and this upward trend continues to this day (Li et al., 2017).

Financial technology, or Fintech, seeks to offer enhanced and automated financial services. Initially, it referred to computer technology employed in the backend operations of banks and trading companies. However, Fintech has evolved and now relies on cutting-edge information technologies like blockchain, artificial intelligence (AI), big data, and the Internet of Things. By utilizing these technologies, Fintech aims to streamline information transfer, enhance processing speed, lower costs, facilitate strategic disintermediation, open avenues for entrepreneurship, blur industry boundaries and democratize access to financial services and facilitate ongoing advancements in transactional lending (Wang et al., 2021; Chhaidar et al., 2022). Also, Fintech has played a role in reducing the information imbalance caused by geographical limitations and has also contributed to the reduction of transaction expenses (Zhao et al., 2022).

6.1 Motivation of Studies on Fintech

Efficiency plays a vital role in accomplishing a firm's objectives. Banking institutions can achieve efficiency in two ways: firstly, by minimizing the number of inputs used while maintaining the same level of output, and secondly, by utilizing the same amount of inputs to generate a higher level of output (Kwateng et al., 2020). In the essence of relationship between Fintech and banking efficiency, the rise of Fintech has increased the competitiveness of commercial banks, as digital technologies have played a significant role in enhancing the efficiency of services offered by banks and other financial institutions to small and micro enterprises, as well as private businesses (Wang et al., 2021).

The banking sector holds immense importance for the economy of every nation as it assumes responsibility for managing the country's financial assets. Traditional banking is typically characterized by a physical decentralization approach, where branches are strategically located in populated areas to ensure a widespread and easily accessible

presence. Nevertheless, relying solely on traditional banking practices is inadequate to thrive in the technology-centric world of today (Bakar, 2020). The impact of Fintech on banking profitability performance have been the focus of many scholars (Li et al., 2017;Tan, 2017; Chen et al., 2021; Chhaidar et al., 2022; Zhao et al., 2022). Fintech services have the potential to impact the performance of banks. Specifically, with the widespread use of smart devices, Fintech services make banking services more accessible, attracting a larger customer base. Consequently, this influx of customers injects funds into the banks, bolstering their deposits and liquidity. As a result, banks are able to increase their investments in assets and generate higher profits (Almulla & Aljughaiman, 2021; Bashayreh & Wadi, 2021; Chhaidar et al., 2022).

Despite being the biggest and rapidly advancing emerging economy globally, China's economic expansion is coupled with significant environmental pollution, rendering this growth model unsustainable. There is a crucial need to fundamentally alter the approach to economic growth and adopt a path towards environmentally friendly development ***(green growth).*** Given this, the imperative question of how to eradicate the negative environmental impact during rapid economic expansion and achieve sustainable growth is a matter of great significance to both China and numerous countries worldwide. The primary manifestation of Fintech's influence on the economy lies in its role in advancing sustainable growth. As a result, Fintech's impact on promoting environmentally friendly (green growth) development stands out as distinct and unparalleled (Zhou et al., 2022).

The behavior of banks in taking risks has been extensively studied, and scholars consider it a significant policy concern for ensuring the overall financial stability of the economy. Among them, the relationship between Fintech and banks risk. Fintech has the ability to offer commercial banks a wide range of innovative ideas for diversified and multi-dimensional risk management operations (Yao & Song, 2021).

The impact of Fintech on ***bank credit risk*** presents an intriguing inquiry that serves as a driving force for us to delve into this matter. Furthermore, the absence of proper regulations pertaining to banks' adoption of Fintech not only leads to inefficiencies in regulation but also gives rise to numerous risks. The utilization of emerging technologies by banks plays a crucial role in enhancing the efficiency of bank risk management, thereby decreasing bank credit risk. Additionally, the integration of bank Fintech improves internal

governance and internal control within banks, leading to a reduction in bank credit risk. Finally, bank Fintech has the potential to increase bank diversification and generate a diversification effect, further contributing to the mitigation of bank credit risk. (Cheng & Qu, 2020). On the other hand, there is a notable correlation between the riskiness of banks and the advancement of Fintech. Specifically, Fintech has a propensity to amplify the risk-taking behavior of banks (Wang et al., 2021).

Also, within the realm of the loan market, there is a prevalent existence of information asymmetry between banks and borrowers. This information asymmetry gives rise to adverse selection, resulting in pre-loan risks. Moreover, with the arrival of the big data era, the nature of underlying data in commercial banks has transitioned from structured to unstructured, presenting a growing complexity in managing bank risks. Consequently, Fintech emerges as a solution to address these evolving circumstances (Zhang et al., 2022).

The market risk is the risk that banks face due to ongoing fluctuations in market prices, such as stocks, foreign exchange, and interest rates, the uncertainty surrounding future cash flow for commercial banks intensifies. Within this context, Fintech has the potential to mitigate the cost of information asymmetry during transactions, subsequently lowering the market risk associated with commercial banks (Yao & Song, 2021b).

Fintech- based financial inclusion and the revolution 4.0 (IR4.0) era. Financial inclusion posits that individuals engaging in financial intermediation should have unrestricted access to a comprehensive range of financial instruments and information sources. This accessibility aims to decrease the cost of financing and address issues related to asymmetric information, while also fostering employment opportunities and enhancing financial stability. The fundamental lesson derived from the Fourth Industrial Revolution (IR4.0) entails the pursuit of simplifying and enhancing people's lives, promoting intelligence and efficiency, achieving cost-effectiveness, fostering inclusivity, and ensuring long-term sustainability. In this context, scholars have directed their attention towards examining the correlation between Fintech-driven financial inclusion and banks' risk-taking behavior (Banna et al., 2021).

The sustainable development of the healthcare system is a significant factor that

stimulates human capital and serves as a fundamental characteristic of economic progress. The essence of Fintech and healthcare relationship is that Fintech enhances the healthcare system by leveraging blockchain technologies, machine learning, artificial intelligence, mobile payments, and investment robotic devices. Fintech covers the insurance system and also offers solutions to address financing challenges, reducing financial exclusion and income inequality. This enables individuals with moderate and low income to access and afford healthcare services (Jing et al., 2022).

The onset of the COVID-19 pandemic has brought about a unique form of disruption for various businesses (e.g., banking industry). COVID-19 is acknowledged as a global event that directly affects the financial performance of banks. Additionally, widespread outbreaks have the potential to escalate the risk of a banking industry collapse in developing countries. This pandemic has compelled a significant portion of the global population to embrace digital banking or Fintech products, such as peer-to-peer lending (Najaf et al., 2022; Thi et al., 2022).

6.2 Fintech Challenges

While many banking industries worldwide have successfully embraced the new technology known as "Fintech," some countries, such as Ghana, still face obstacles in its adoption. Ghana encounters specific challenges that hinder the implementation of internet banking. Additionally, it is important to highlight that internet banking in Ghana is primarily utilized by a select group of customers, which limits its effectiveness to a narrow target audience (Kwateng et al., 2020).

The economy of China is one of the largest and most influential in the world. Despite of that, China is undergoing a transition towards a more advanced and balanced economic structure. The deceleration of economic growth, structural adjustments, and the ongoing implementation of policies will inevitably impact certain industries and companies, causing them to experience significant shocks. The Chinese banking industry is one of these sectors that encounters such challenges. For example, due to that, the behavior of mainstream financial institutions (i.e. state-owned commercial banks) in China, characterized by credit rationing, has posed challenges for small and medium-sized enterprises (SMEs) in accessing credit support. However, it is important to note that

despite receiving only 30% of bank loans, small and medium-sized enterprises (SMEs) in China played a significant role in the economy. In 2012, these SMEs accounted for 70% of employment opportunities and their contributions amounted to 60% of China's GDP. Consequently, due to the discriminatory treatment towards SMEs, SMEs have turned to alternative financing methods, such as financial leaks from the state sector to the private sector, in addition to bank loans, self-raised funds, and internal capital. As financial products continue to innovate and financial institutions evolve, financial leverage has progressively extended beyond commercial credit, encompassing direct or indirect capital financing through the shadow credit market (Tan, 2017; Han et al., 2019).

The discussion surrounding China is still ongoing. The Chinese banking industry encounters another obstacle in the form of inadequate regulations for Fintech. Despite the increasing adoption of bank Fintech in China, there is a lack of comprehensive legal and regulatory frameworks governing its activities. This insufficiency not only hampers regulatory effectiveness but also exposes the industry to numerous risks (e.g., credit risk). Therefore, it is crucial for Fintech regulators and policymakers to prioritize the enhancement of legislation pertaining to bank Fintech (Cheng & Qu, 2020). Furthermore, China follows a characteristic bank-based financing system, where banks remain the predominant component of the financial system and serve as the primary source of financing. This indicates that the consequences of excessive risk-taking by banks could have more severe repercussions compared to countries with a lesser reliance on banks for financing (Wang et al., 2021). Looking at it from a different perspective, despite being the largest and rapidly growing emerging economy, China faces a significant challenge of environmental pollution that accompanies its economic growth. The current mode of economic growth is no longer sustainable, necessitating a fundamental shift towards green growth. Consequently, the crucial question that both China and many other countries worldwide are deeply concerned about is how to eliminate the negative environmental impact caused by rapid economic growth and achieve sustainable, environmentally friendly development (Zhou et al., 2022).

Indonesia is considered a digitally advanced country, with rapid development of the Fintech sector. Where the primary focus of Fintech activities lies in lending (45%) with payments (38%) being the subsequent area of concentration. However, regrettably, the

anticipated role of Fintech in promoting financial inclusion has not been fully realized, as the majority of these Fintech startups are based in Jakarta (Iman, 2019; Phan et al., 2019). ***Interestingly,*** the Organization of Islamic Countries (OIC), consisting of 57 nations where Islam is the state religion and Muslims form the dominant population, presents unique challenges for achieving Fintech-based inclusion (FFI) compared to technologically advanced countries. Banks in OIC countries may face greater complexities in implementing FFI due to limited technological infrastructure. These banks would need to make substantial investments in developing technological interfaces with customers, potentially exposing them to intense competition from technologically advanced foreign banks. For instance, countries like Iraq and Chad have lower levels of digitalization, resulting in high levels of digital exclusion among their populations. Furthermore, the presence of Islamic banks in this region implies lower levels of risk due to compliance with Shariah law (Banna et al., 2021).

Even in Malaysia, where the Fintech industry is experiencing rapid growth, there are certain limitations in terms of product coverage. Currently, these Fintech products can only be used in specific shops or establishments. However, this arrangement is expected to enhance user perception towards e-wallets and further support their role in facilitating transactions. Additionally, in terms of social influence and habits, it is advisable to conduct more campaigns related to the digital world. Such campaigns should specifically target rural areas where the level of financial literacy is relatively lower compared to urban areas (Thaker et al., 2022).

Islamic finance is an integral part of the Fintech industry today. The goal of Islamic financial technology (i-Fintech) is to establish a valuable chain that connects trust in the provision of *Shariah*-compliant products and financial technology, thereby promoting the creation of a seamless chain. In order to maintain their resilience, both micro and macro-Islamic financial institutions must prioritize innovation. Innovation serves as a crucial foundation for the advancement of the Islamic financial industry, as the "brick-and-mortar" channels are becoming less appealing in today's context. However, there are challenges when it comes to employing blockchain technology in i-Fintech. The primary challenge pertains to the difficulty of encoding *Sharīʿah* principles computationally. Blockchain exposes all transactions to the public, which facilitates checks for *Sharīʿah*

compliance and the determination of whether these transactions align with Islamic principles. However, these checks can only be conducted after the transactions have taken place. The second challenge is linked to the algorithmic protocol utilized for validating smart contracts, including smart *Sukuk*. This situation raises concerns about upholding the principles of *Maqasid al-Sharīʿah*, which emphasize that transactions should not inflict harm upon society (Chong, 2021).

In summary, Banks can utilize these insights to effectively address identified challenges by adopting a region-specific strategy that overcomes barriers while optimizing Fintech's benefits. In countries like Ghana, expanding financial literacy programs and improving digital infrastructure can promote broader adoption of internet banking beyond a limited customer segment. In China, mitigating credit rationing issues can involve the development of alternative credit assessment models using big data and AI, while regulatory gaps can be addressed through collaboration with policymakers to establish clearer Fintech guidelines. To better support SMEs, banks can diversify financing options by integrating Fintech solutions such as peer-to-peer lending and digital microloans to improve credit accessibility. In the OIC region, banks can focus on developing Shariah-compliant digital platforms and enhancing technological capabilities to remain competitive against foreign firms. Meanwhile, in Malaysia and other rapidly growing markets, banks can promote wider use of Fintech products beyond limited sectors while launching digital financial literacy initiatives, particularly targeting rural populations. Ultimately, banks should prioritize innovation alongside regulatory compliance while fostering collaborations with Fintech firms to ensure balanced growth, stability, and financial inclusion.

6.3 Limitations

The systematic review highlighted that there are developed and developing countries with less research on Fintech adoption (e.g., Japan, South Korea, Egypt, Sudan and Iraq) often include those with developing economies or countries where financial systems are more prevalent. Some of these countries may have limited resources or face regulatory challenges, which could contribute to a relatively smaller body of research on Fintech adoption. However, it is important to note that this situation can change rapidly as Fintech continues to gain traction globally.

Regarding the credit policy of traditional banks, strict banking regulations, especially in credit policies, can pose significant challenges for these banks. These regulations are typically implemented to enhance financial stability, safeguard consumers, and manage risks in the banking industry. While they play a crucial role in achieving these goals, they can also bring disadvantages for established banks while potentially opening doors for new players (Fintech startups) in the market (Nguyen et al., 2021). Regarding the involvement of traditional banks in shadow banking activities, the systematic review reveals that the shadow banking sector is particularly vulnerable to the adverse effects of Fintech. This suggests that banks are motivated to shift risks through unregulated shadow banking channels. As a result, it becomes imperative for regulatory authorities to enhance their oversight of shadow banking as the Fintech industry continues to advance (Wang et al., 2021).

In terms of research, there is a lack of empirical evidence regarding how Fintech contributes to the sustainability of the healthcare system, irrespective of the specific effects of blockchain-related Fintech platforms on the comfort of patients and consumers in healthcare (Jing et al., 2022). Furthermore, the majority of studies (Li et al., 2017; Chhaidar et al., 2022; Jing et al., 2022) focusing on financial technology encounter challenges in assessing Fintech metrics owing to the lack of accessible data. When it comes to evaluating banks' performance indicators, the majority of research has concentrated on financial metrics. However, there is a scarcity of studies that have specifically addressed non-financial performance measures (Chen et al., 2021). Significantly, this systematic review emphasized the limited number of studies (Forcadell et al., 2020; Nguyen et al., 2021; Banna et al., 2021; Jing et al., 2022) that have conducted cross-sectional analyses within the Fintech sector. Moreover, the majority of research investigating the performance of Fintech in relation to banks has predominantly focused on traditional commercial banks. Only a few studies have taken into account Islamic banking (Wang et al., 2021). Furthermore, there have been limited studies that have conducted a comparative analysis of the impact of Fintech on Islamic banks and conventional banks (Almulla & Aljughaiman, 2021).

In terms of the relationship between Fintech and banks' risk, the majority of studies, as indicated by this systematic review, have primarily concentrated on the Chinese banking

sector (Cheng & Qu, 2020; Cheng & Qu, 2020; Wang et al., 2021; Yao & Song, 2021a; Yao & Song, 2021b; Zhang et al., 2022). Few scholars shed the light on the Fintech – banks risk relationship on Islamic banks (Banna et al., 2021). In terms of the impact of Fintech on banking performance, few studies considered the recent pandemic (Covid 19) (Najaf et al., 2022; Thi et al., 2022).

6.4 Recommendations to Scholars and Policymakers

This systematic review has shed light on a new avenue for future researchers to explore. It is evident that additional studies are necessary to gain a deeper understanding of various aspects related to Fintech activities and their impact on the financial stability of banks. Further empirical research is crucial in examining the influence of competition between banks and Fintech firms on the financial stability of markets in countries where Fintech lending is extensively utilized. It is important to conduct further research to examine the effects of Fintech on banks in terms of risk management. Additionally, more research is needed to address regulatory aspects of the Fintech industry. Furthermore, exploring the impact of COVID-19 on Fintech-based inclusion in developing countries is an area that warrants future investigation. Of utmost importance, there is a strong demand for additional empirical research to explore the correlation between Fintech and Islamic finance, with a particular focus on Islamic products such as *Sukuk*. Furthermore, it is crucial to investigate the impact of Fintech on Islamic banking regulations governed by *Shariah* law. While numerous countries worldwide have adopted green growth as their economic development approach, and various studies have investigated the factors influencing green growth from various perspectives, limited attention has been given to the effects of Fintech and green finance on green growth in the existing literature (Zhou et al., 2022).

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