
Digital Dynamics of Banking in Saudi Arabia and Comparative Institutional Evidence

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Abstract

Banks have been changing how they operate using digital tools over the past ten years, and this has become a big area of study. This research examines the digital transformation of the banking system in Saudi Arabia in comparison to banks in more developed and emerging Islamic countries. It checks how far each country has come, what digital services they offer, and how their rules and regulations support these changes. To achieve this, the study employed a step-by-step method to collect and analyze the information. They gathered 44 main documents and seven websites through five steps: first, figuring out the topic, then planning, searching for sources, picking the right ones, and checking if they fit. After that, they compared the information to see how similar or different the digital changes are in Saudi Arabia, the U.S., the U.K., and Malaysia. The results showed that Saudi Arabia and Malaysia have banking systems that are about the same size, but smaller than those in the U.S. and the U.K. Still, all these countries' banking systems are very important to their economies, as shown by how much they contribute to GDP. All four countries use similar digital technologies and offer similar banking services. When it comes to their rules, the U.K. has a good system called a sandbox, which is both effective and a good example for others. The U.S. still needs to improve because its rules are complicated and there are differences between state and national laws. Saudi Arabia and Malaysia have built their own systems inspired by the U.K. model, but they each have different levels of following Sharia law.

Keywords: Banking, Banking Regulation, E-Banking, Financial Services, Fintech

Introduction

The banking industry has focused a lot on digital changes all around the world, and Saudi Arabia is also paying attention to this shift. Because of more risky business activities in a less controlled corporate environment, especially in the United States, the traditional banking sector was a big part of the global financial crisis that happened in 2008. After the financial crisis, new laws were introduced that put more rules on banks, which limited their ability to compete freely. Interestingly, these stricter rules helped new technology-based companies, called fintech firms, to grow and become more successful.

The rise of fintech companies has caused worries in the banking sector because banks now have to work alongside and compete with these new players. Because of this technological change, the way financial systems are structured is expected to change a lot in the future. Because of this, it's very important for banks to go through digital transformation, and they will need to spend a lot of money on technology to stay competitive against both each other and new companies entering the market.

This article looks at how banks in Saudi Arabia are transforming digitally and compares this with the situations in the United States, the United Kingdom, and Malaysia.

It tries to understand the effects of digital transformation on banking, see what solutions banks are using, and learn about the rules that help protect digital changes. For this research, a systematic review of existing studies was used. This study helps give a better understanding of how digital transformation is affecting banking in different countries and shares best practices for banks that want to digitally transform.

The article is organized like this: first, a review of existing literature is presented, which offers important ideas for comparing topics like traditional banking, electronic banking, fintech, the search for digital transformation, and regulatory approaches. Next, the Materials and Methods section describes how the systematic review was carried out. Then, the Results section shows the findings from the literature for each main topic. The fourth part is a discussion that compares the main themes between different countries. Finally, the study's conclusions, implications, and limitations are covered.

Literature review

To compare how Saudi banks are changing digitally with other countries, we need to understand some important terms like traditional banking, fintech, digital

transformation, and e-banking. It's important to know how digital transformation, fintech, and banking services are connected.

Traditional banking

Traditional banks work as middlemen between people and money. They take in deposits and help people get loans. Banks come in two main types: retail or commercial banks and investment banks. Retail banks help customers manage their money, make payments, transfer funds, offer investment advice, and give out loans. Investment banks help companies with mergers and acquisitions, manage private equity funds, issue shares, and offer other financial services. Experts like Rahim and Sur (2021), Rupeika-Apoga and Thalassinis (2020) say that the banking industry has started using new technologies to improve how it provides traditional financial services.

Fintech companies

Fintech refers to using digital and software tools to automate and improve how financial services are delivered (Omarova, 2020). It also includes companies that use new technologies to solve problems in the financial world (Alam, 2021). The Financial Stability Board (FSB) defines fintech as using technology to create new ways of doing business, new applications, and new products that have a major impact on financial markets and institutions (Arner et al., 2015; Navaretti et al., 2018; Panetta, 2018; Rupeika-Apoga & Thalassinis, 2020).

Fintech innovation has created a wide range of technologies that include mobile apps, social networks, blockchain, biometrics, quantum computing, cloud computing, open-source software, APIs, big data, machine learning, artificial intelligence, the Internet of Things (IoT), and cybersecurity. (Alam, 2021; Piri, 2018; Pathan, M.S.K 2023). This has introduced new and better ways to provide traditional financial products and services (Chemmanur et al., 2020; Goldstein et al., 2019; Rupeika-Apoga; Pathan, M.S.K 2023 & Thalassinis, 2020).

Digital banking transformation

Fintech has played a big role in changing traditional banking. Banks are investing in new technologies or collaborating with fintech companies to offer better and more different financial services (Rickinghall; Pathan, M.S.K 2023, 2022). This makes business easier, improves competition, and increases the variety and quality of services banks and financial institutions provide. It's likely that banks will continue working with fintechs through joint ventures and mergers (Wewege; Pathan, M.S.K 2023 & Thomsett, 2020). With fintech, e-banking has become a big part of the financial world.

E-banking is a major part of digital transformation. It covers services like accepting deposits, offering credit, managing accounts, giving financial advice, electronic invoicing, and other payment services (Alkhalidi & Al-Sadi, 2016; In addition, in 2015; Yahaya and Ahmad, 2018; Zhihui, 2021). These services can be grouped into three types: phone banking, online banking, and mobile banking. Phone banking lets users do simple banking tasks by connecting their touch screen phones to automated banking systems. Online banking lets users access their accounts through a website and do transactions with strong security measures. It's the most cost-effective tool for increasing productivity (Williams & Adekunle, 2013). Mahad et al. (2015) and Yahaya and Ahmad (2018) say that mobile banking is a new and useful way to access banking services.

With mobile banking, users can make payments, check their account details, look at their balances, transfer money, pay bills, manage their accounts, and get important information. SMS services and mobile apps from banks help them stay in touch and attract new customers, making them a big part of people's everyday lives.

The key to digital transformation

Nasir et al. (2021); Pathan, M.S.K 2023 did a review of fintech literature and found the main themes and directions of research. They identified three key areas of study in the fintech field. These areas include regulatory frameworks for fintech businesses, new innovations in the financial sector, and the digitization of banking services. This study gives a good starting point for understanding these topics in relation to different countries.

Transform banking and related technologies

The growth of fintech in the banking industry is based on the 2018 OECD methodology, as mentioned by Rupeika-Apoga and Thalassinou (2020). This service technology partnership shows the possible benefits of using distributed ledger technology (DLT) in financial services. It also shows the rise of automated financial advisors and the collaboration between traditional banks and lending platforms. DLT can be encrypted and managed by multiple accountants, which helps lower the cost of checking transactions, reduces errors in data, and speeds up the time it takes to settle transactions (Omarova, 2020). Credit analysis systems that use European Union and DLT technology are being used to distribute loans. Lending platforms are working together more, and banks are investing money in lenders to create new digital investment opportunities (Palladino, 2018; Pathan, M.S.K 2023; Williams, 2020).

Fintech's approach to rules

Omarova (2020); Pathan, M.S.K 2023 talks about three ways regulations are handled in fintech: incorporation, practice, and customization. Registration is a way that helps expand the control and reach of individual institutions, while licensing makes it easier for new business models in fintech to be accepted. Regtech, which is an adaptive approach, uses automation and makes regulatory processes easier and more efficient. It helps improve the quality of data by replacing manual tasks like data collection and processing. Regtech can make regulation faster and cheaper, but it might also reduce the personal control that regulators have over the financial system.

The Sandbox is another approach that lets fintech companies test their products and services in a controlled environment with the support of regulators. Everhart (2020), Rupeika-Apoga and Thalassinou (2020), Khalid and Kunhivabab (2018), and Boutor-Kehler and Polasik (2020) describe the sandbox as a safe space for testing new ideas and a way to encourage future innovation. It is becoming a useful tool for financial inclusion and the best way to regulate fintech companies (Boutor-Kehler & Polasik, 2020).

This review gives a general idea of how the banking industry is changing with digital technology, looking at the relationship between traditional banks and fintech in various countries. It sets up a theoretical background for further analysis and comparison. However, the process of digital transformation must keep up with the fast pace of global changes. The goal is to give a full picture of how digital transformation is happening in different countries.

Materials and methods

This study uses qualitative methods, especially a systematic review of existing literature, to answer the research questions. The process involves five main steps: scoping, planning, searching, selecting, and compliance. The review found 350,403 key documents, and 44 were chosen for further review.

Systematic literature search

Connectivity

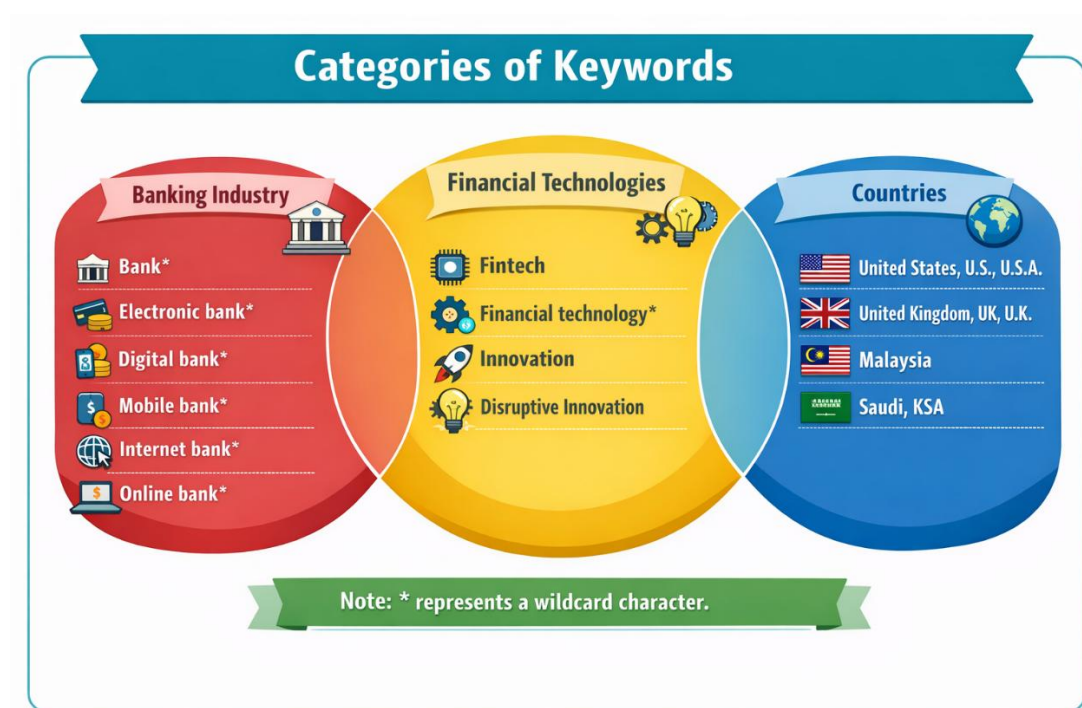
This stage helps set a clear direction and purpose for the research by defining the research objectives. In the introduction, the objectives are clearly stated, which meets the needs of this stage.

Connectivity

The study used four scientific literature search engines: Ingenio, Semantic Scholar, Scilit, and Google Scholar. Ingenio is part of the Politecnico de Madrid's virtual

library and has a database of over 180 and other online resources. Semantic Scholar uses artificial intelligence and was created by the Allen Institute in Seattle Pathan, M.S.K 2023. Scilit is an interdisciplinary digital publishing institute in Basel that gathers and indexes scientific data from CrossRef and PubMed daily. Google Scholar is a specialized search engine by Google that collects a large number of peer-reviewed articles and only returns the results it finds. Keywords and their synonyms fall into three categories: banking, fintech, and country, as shown in Table 1.

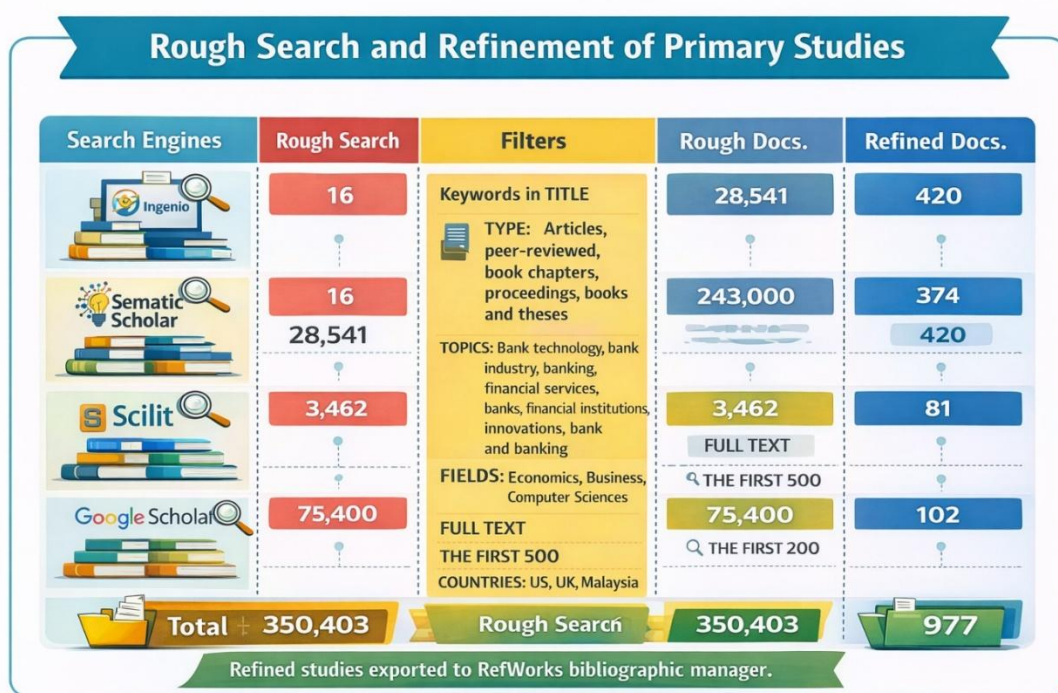
Table 1. Keyword classification



Connectivity

To find relevant studies, a general search was done on each search engine, using keywords from various categories along with the Boolean operators "AND" and "OR". These searches were improved using filters Muhammad, S. K. P. (2023) on the search engines, which helped find 977 possible relevant studies, as shown in Table 2.

Table 2. Find and improve primary education.



Demonstrations

At this point, all 977 studies were checked using RefWorks' repeated testing method, and this time, we found 503 references. As a result, these were removed, leaving only 474 major studies that might be important. Muhammad, S. K. P. (2023) Then, the full text of each document was reviewed, and it turned out that 383 were not accessible. So, they were excluded from the systematic search. 91 studies remained.

Connectivity

At this stage, the final decision was based on the following rules:

The study must be qualitative.

- It must be from the United States, the United Kingdom, Malaysia, or Saudi Arabia.
- It must make banking a main focus along with fintech, e-banking, or fintech regulations.
- It was published in 2013.

According to Nasir et al. (2021), the topic of fintech has become a big area of interest for researchers. The title, abstract, introduction, background, discussion, and results of each major study were reviewed. A total of 44 key studies were agreed

upon to meet all the eligibility rules.

In the systematic search, 977 potentially important primary studies were found, and 44 of them met all the criteria for this study. The process is shown in Figure 1, which is a flow chart made using the "Systematic Review and Meta-Analysis of Preferred Reporting Elements" (PRISMA) method (Urrutia & Bonfill, 2010; Muhammad, S. K. P. (2023)).

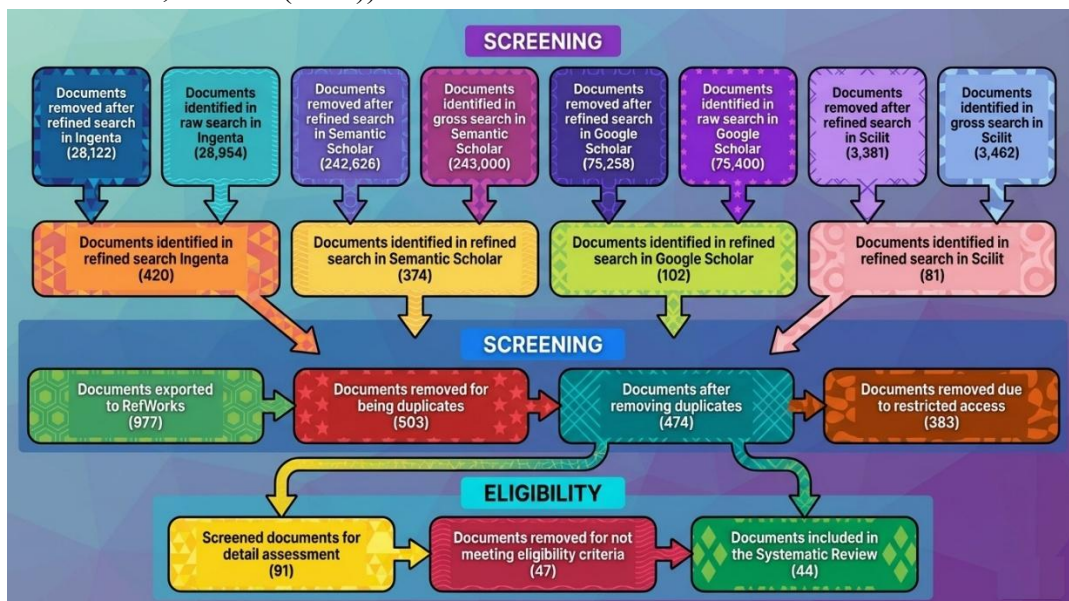


Figure 1. PRISMA flowchart

Besides that, we have picked seven websites that offer valuable information on different parts of research. Muhammad, S. K. P. (2023) The survey responses were based on 50 main sources.

Overview of selected key documents

Table 3 groups the chosen literature by the main types of studies.

It gives a general idea of the selected scientific articles and shows what each study focuses on.

Table 3. Connectivity

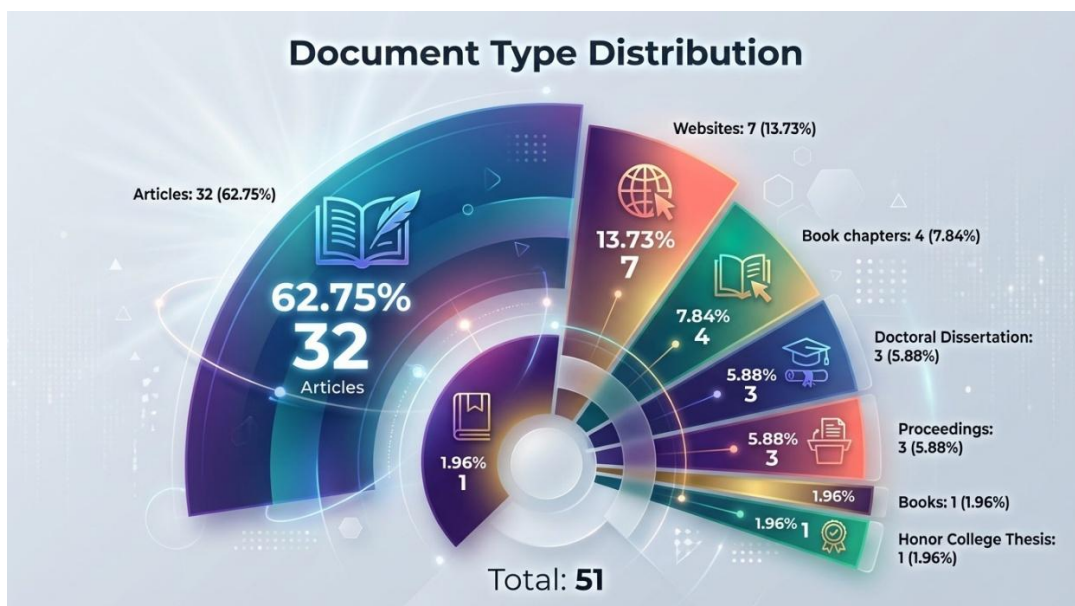


Table 3 lists several selected sources. Most of them are peer-reviewed scientific articles, and there are 32 in total. Muhammad, S. K. P. (2023) This shows that primary research is a key source of information for this topic. Also, there are three doctoral dissertations and four book chapters, which shows that detailed research and careful analysis of the literature are necessary.

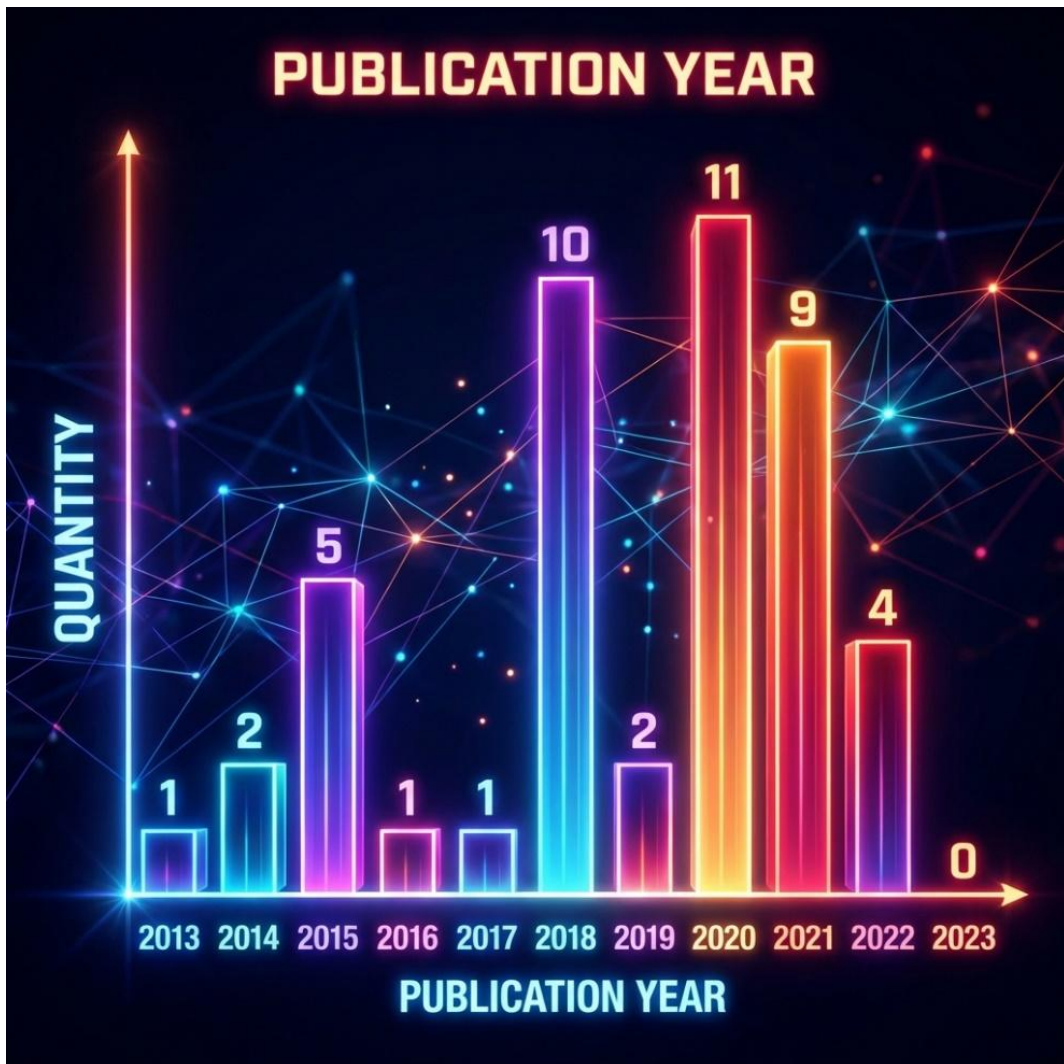


Figure 2. Assign sources according to the year of publication.

Figure 2 shows that most of the chosen articles were published in recent years, especially in 2018, 2020, and 2021. This clearly shows that this area of study is active and growing. There was only one article from 2013 and one from 2015 Muhammad, S. K. P. (2023), which shows that interest in this topic has been increasing over time. Overall, the way the articles are spread over the years supports the findings of Nasir et al. (2021).

Table 4 shows the classification of the selected documents according to the main theme and the country in which the study was conducted

Table 4. Thematic and Geographical Classification of the Selected Literature

Central Theme	Country
Banking and Fintech Companies (19)	USA (5)
Fintech Technology and Banking Services (24)	UK (6) Malaysia (31)
Regulations (19)	KSA (24)

Table 4 shows 19 documents about banks and fintech companies, and 24 documents about fintech and banking services. There are also 19 documents that talk about how fintech is regulated. When looking at the countries, most of the articles are from Malaysia, appearing 31 times. Saudi Arabia has 24, Muhammad, S. K. P. (2023) the UK has six, and the US has five. This section talks about the results of a systematic review of the chosen articles. This study looks at research questions to find answers to key themes around digital transformation, as found by Nasir et al. (2021). These themes include banking functions, the technologies and services that banks offer, and the rules that govern banking in the countries studied (see the comparative summary in Annexes A, B, and C).

Sector

United States

According to the International Monetary Fund (IMF, 2022), the U.S. banking sector

is one of the biggest in the world, with total assets about \$22.9 trillion, which is 7.3% of the U.S. GDP. The three largest U.S. banks are Citigroup, JPMorgan Chase, and Bank of America. The U.S. banking industry is regulated by the Federal Reserve, the Federal Deposit Insurance Corporation, the Office of the Comptroller of the Currency, and the Securities and Exchange Commission. The 2008 global financial crisis caused big changes in regulations, including the Dodd-Frank Wall Street Reform and Consumer Protection Act and the Fast Start Our Business Act. (DeYoung, 2014; Magnuson, 2018; Piri, 2018; Saeed, 2014).

United Kingdom

The banking sector is one of the most important parts of the UK economy, providing more than 40% of all jobs in the financial sector. The IMF report (2022) says that since 1990, the UK has seen strong economic growth, with total assets reaching \$9.8 trillion, which is 6.9% of the UK's GDP. The country's four largest banks are HSBC, Barclays, Lloyds, and Royal Bank of Scotland, with the Financial Conduct Authority and the Bank of England leading the way. Cornelius et al. (2022); Muhammad, S. K. P. (2023) point out that the UK banking sector is going through a digital transformation, which has led to job losses, issues with collective bargaining, and a pause in discussions between major banks and unions. Employers are driving the digital transformation, and unions have been kept informed about the changes in plans and the closure of branches.

Malaysia

Malaysian banks, like Bank Malaysia, CIMB Group Holdings, and Societe Generale, hold a total of US\$714 billion, which is 3.7% of the country's GDP, according to the IMF in 2022. Indonesia is a major economy in the Islamic world because of its strong laws, growing fintech industry, active Islamic finance community, and government support for the Islamic economy. Malaysia's banking system is controlled by the Banks and Financial Institutions Act 1989, which is managed by Bank Negara Malaysia. Other laws, such as the Financial Services Act 2013, the Islamic Financial Services Act 2013, and the Money Services Business Act 2011, help regulate different parts of the financial industry, including commercial banks, investment banks, and fintech companies. But right now, there are no special rules for fintech in Islamic finance, so it's not clear how these businesses should follow Sharia law, as shown by Ab Razak and others in 2020.

In 2005, Bank Negara Malaysia created the Shariah Council's Rules for the Governance of Islamic Financial Institutions, which helped raise the standards for Shariah governance. Islamic banks in Malaysia offer products that follow Sharia

law, while traditional banks also provide products that are Shariah-compliant. Societe Generale Bank follows Sharia law completely, while Maybank and CIMB offer products and services that allow interest payments in some loans and deposits, as long as they meet Sharia law requirements.

Saudi Arabia

Saudi Arabia's banking sector has total assets of about \$683 billion, which is roughly 3.2% of the country's GDP, according to the IMF in 2022. Saudi Arabia is the biggest Islamic financial market globally and leads in the e-banking industry. E-banking services are offered by eight traditional banks, four major Islamic banks, several international institutions, and Saudi banks like the Arab National Bank and the National Commercial Bank. All banks in Saudi Arabia, including international ones, must follow Sharia law and provide Islamic financial products and services. Muhammad, S. K. P. (2023) However, foreign banks can offer standard services to non-Muslim customers. The Saudi Arabian Monetary Authority (SAMA) oversees the banking system and has set rules for online banking to prevent fraud. Even though foreign banks can offer non-Sharia products, they often use Islamic banking principles for Saudi retail customers. Bank of America in Saudi Arabia is playing a key role in moving from local commercial banking to international banking.

Fintech

United States

Plaid (2021) found that 88% of people in the U.S. have started using fintech technology, which is higher than the global average of 64%. Mobile payment apps have become popular for online shopping and are now available in the United States. This adoption is partly because the U.S. has a more developed payment system. For example, Apple Pay uses existing debit and credit card networks (Clements, 2021; Yadav, 2020). Companies like Lending Club and Prosper are using new technology to improve how people get loans (Clements, 2021; Anderson, 2019; Gao, 2022); Muhammad, S. K. P. (2023). AI-powered robo-advisors are helping traditional banks like JPMorgan Chase & Co. offer automated financial advice services (Williams, 2020; Morgan, 2022). Machine learning is changing how U.S. banks operate by automating credit checks, detecting fraud, and reducing costs (Piri, 2018).

United Kingdom

Fintech is helping the UK move towards a more digital economy and putting pressure on traditional banks (Mazure, 2022). According to Fintech Global (2021), a large number of fintech companies in the UK use banking software as a way to

manage customer relationships, and 86% of the public use these services. Technologies like open banking, AI, APIs, cloud computing, and chatbots are changing the financial sector (Kornelakis et al., 2022; Williams, 2020; Williams & Adekunle, 2013). As part of their digital transformation, banks are working with fintech firms, and this partnership has grown over the last ten years, changing how corporate banks interact with the market (Hornuf et al., 2021).

Malaysia

More Malaysian consumers are using fintech, with 75% of them using these services in their daily financial lives (Alam, 2021; Rahim et al., 2021). The Bank Negara Malaysia (BNM) has introduced policies to support cashless payment products and an open data environment (Rahim et al., 2021). Other mobile payment tools also require a bank account, such as Visa Checkout, Masterpass, CIMB Pay, Maybank Pay, MOL Pay, Samsung Pay, and Alipay (Yahaya & Ahmad, 2018). New innovations in banking and payment systems are greatly influencing the fintech industry in Malaysia (Khalid & Kunhibavab, 2018; Normalini & Ramayah, 2015; Rahim et al., 2021).

Saudi Arabia

The adoption of e-banking has significantly improved traditional banking services in Saudi Arabia, with 80% of young people aged 16 to 39 adopting fintech (Entrepreneur et al., 2021). As noted by Alotaibi (2015) and Alsomali (2015), the Saudi Monetary Authority (SAMA) has been operating advanced banking payment systems for over two decades. These systems include the Saudi Express Remittance System (SARIE), the Saudi Payment Network (SPAN), and the Saudi Payment System (SADAD). SARIE includes automated clearing houses, check clearing and electronic transmission networks. SPAN connects ATMs and POS terminals, expanding services beyond Saudi Arabia through networks like GCC Net Member Switches. SADAD is a centralized electronic clearing and payment system in Saudi Arabia that allows them to pay bills and debts efficiently. Abuhusain (2020); Muhammad, S. K. P. (2023) argues that AI and big data influence Saudi banks' lending decisions and outcomes. Traditional methods are often used to assess loan applicant interest, but Saudi banks are now leveraging AI and big data to improve credit analysis techniques. Fintech innovations have increased the likelihood that AI and big data have the ability to support decision-making in this area.

Connectivity

United States

In the United States, banks provide main banking services like sending money

electronically, using ATMs and paying at stores, making approved transfers, and handling payments (Williams, 2020). There is a big development where banks work with peer-to-peer lending platforms, and the real lenders for these loans are the banks themselves (Anderson, 2019; Clements, 2021; Williams, 2020). Steps will be taken to make sure everyone has equal access to credit and that lending is fair for all.

Robo-advisory services, which use artificial intelligence and machine learning to give investment advice, are becoming more common in the U.S. fintech industry (Williams, 2020). JPMorgan Chase & Co. has added these services to their offerings (Morgan, 2022).

In the United Kingdom, more people are using online banking services. These services include sending money electronically, approved transfers and payments, setting up deposits, checking account balances, getting transaction details, peer-to-peer lending, and robo-advisory services (Rupeika-Apoga & Thalassinou, 2020; Williams, 2020; Williams & Adekunle, 2013). These improvements help customers manage their money better.

In Malaysia, the fintech industry has seen major growth, with mobile banking and payment systems being key in helping more people access financial services (Khalid & Kunhibavab, 2018); Pathan, M. S. K. (2022). Online banking, debit cards, and robo-advisors are also becoming more popular (Alam, 2021; Rahim et al., 2021). Malaysian banks are trying new ways to offer more financial services, cut costs, and improve customer satisfaction (Rehman & Zabari, 2020; Yadav, 2020); Pathan, M. S. K. (2022). The Account Investment Platform (IAP), started in 2015, uses the credit scoring systems of Islamic banks along with technology to move money from investors to companies (Miskam et al., 2018); Pathan, M. S. K. (2022). And the robot screams. Malaysian services do not currently seek to follow Sharia principles (Ab Razak et al., 2020).

Saudi Arabia

The Saudi government is making efforts to improve the e-banking system of the country's banks (Alkhaldi & Al-Sadi, 2016; also in 2015). These services include using ATMs, managing bank accounts, getting cash back, paying at stores, making transfers that are already approved, sending money electronically, making online payments, and paying with mobile devices (Alotaibi, 2015). People can deposit money online or over the phone, and online financial advice is becoming easier to get. Even though there are security worries and some risks, e-banking can help a bank work better and have more capabilities.

Fintech regulatory framework

United States

Because of the financial regulatory system in place, the U.S. government is ready to take action against fintech (Clements, 2021; Magnuson, Pathan, M. S. K. (2022), 2018; Piri, 2018). Since the 2007-2009 financial crisis, the Federal Reserve, FINRA, CFPB, FDIC, OCC, and CFTC have been the main regulators of the U.S. economy. The OCC is responsible for overseeing and regulating fintech companies, while the CFPB safeguards users and enforces consumer finance rules (Clements, 2021; Pathan, M. S. K. (2022); Omarova, 2020). The FDIC is in charge of banks, savings institutions, holding companies, non-bank financial firms, and government-approved banks in each state.

Financial institutions are facing pressure from the Dodd-Frank Act of 2008 and the Jobs Act of 2012 to follow rules like auditing and reporting suspicious activities, currency exchanges, bank account details, and international financial matters (Piri, 2018). The Government Accountability Office has warned that these rules might either encourage or stop innovation in the financial sector (Magnuson, 2018; Pathan, M. S. K. (2022); Piri, 2018; Thomas, 2018).

The OCC is in legal disputes with state regulators, consumer groups, and Union Bank over its authority to issue fintech licenses. Despite resistance from state banking regulators, the OCC stated it plans to accept applications for national bank licenses from fintech companies that don't hold custody of funds (Piri, 2018; Pathan, M. S. K. (2022); Thomas, 2018). Fintech licensing offers legal options for big fintech companies, but it has been criticized for benefiting only those with money and experience. However, experimental models (sandboxes) can be used in various situations and areas (Clements, 2021). The U.S. hasn't started a national regulatory sandbox yet, but some states have begun creating their own or regional fintech sandboxes. The Financial Services Innovation Act of 2016 (FSIA) introduced a federal regulatory sandbox, but the Office of the Comptroller of the Currency (OCC) did not approve it. In 2018, Arizona became the first state to start a fintech sandbox, and many other states followed. The U.S. Treasury should consider using the sandbox model earlier because the current financial system is split into different parts.

When it comes to banking, the U.S. payments industry relies on a complex electronic money transfer system (ETF) that includes ATM transactions, phone payments, point-of-sale (POS) terminals, and pre-approved transfers. (Clements, 2021; Pathan, M. S. K. (2022); Williams, 2020) The rules for fintech loans in the

U.S. involve state lender licenses, consumer protection laws, privacy laws, anti-money laundering rules, banking rules, interest rate laws, and personal securities rules (Clements, 2021); Pathan, M. S. K. (2022). To help banks become "true lenders," the Consumer Financial Bureau (CFBP) and the U.S. Treasury Department suggest reducing barriers to bank expansion and applying the "good is good" principle. In the U.S., Islamic financial institutions operate under the same rules as traditional banks but must follow Sharia law (Susilawati et al., 2021); Pathan, M. S. K. (2022).

United Kingdom

The Financial Conduct Authority (FCA) is the main regulator for financial services in the UK and supervises fintech companies. The Prudential Regulation Authority (PRA) oversees organizations that need a banking license. A study by Rupeika-Apoga and Thalassinou (2020) showed that fintech companies do not have a specific set of rules. The UK launched a regulatory sandbox called the "Regulatory Sandbox" to help fintech firms test new ideas and services without facing full regulations (Butor-Keler & Polasik, 2020; Everhart, 2020; Rupeika-Apoga and Thalassinou, 2020; Pathan, M. S. K. (2022) Thomas, 2018). Since 2016, the FCA has been the most successful regulatory sandbox in the fintech sector, helping new ideas develop safely and encouraging more investments (Clements, 2021; Pathan, M. S. K. (2022) Omarová, 2020; Thomas, 2018). Countries like Malaysia, Denmark, Lithuania, the Netherlands, Poland, and Australia have also created sandboxes to help manage risks from fintech. In the UK, Islamic financial institutions include banks and other non-bank companies that offer financial services in line with Sharia rules (Susilawati et al., 2021; Pathan, M. S. K. (2022)). These institutions follow the same rules as regular banks but must follow Sharia law.

Malaysia

Malaysia is known as a leader in Islamic finance and is considered a new fintech hub (Ab Razak et al., 2020; Susilawati et al., 2021). Its strong regulations, wide range of fintech activities, support for the Islamic financial community, and government support help the Islamic economy grow. In Malaysia, fintech is managed by several laws, including the Financial Services Act 2013 (FSA), the Islamic Financial Services Act 2013 (IFSA), the Money Services Act 2011 (MSBA) Pathan, M. S. K. (2022), and the Capital Markets and Services Act (CMSA) 2009. Bank Negara and the State of South Carolina also have rules to regulate fintech in Malaysia.

Start-ups in Malaysia are supported by Bank Negara Malaysia (BNM) and the Securities and Exchange Commission (S.C.) (Alam, 2021). Following the UK model, the Bank of France started a regulatory sandbox in 2016. This gives fintech companies a safe space to test new ideas, with a focus on protecting customers and improving financial inclusion (Alam, 2021; Khalid & Kunhibavab, 2018).

In Saudi Arabia, fintech companies must follow Sharia law and focus on fairness, equality, and transparency (Mohamed & Yildirim, 2021); Pathan, M. S. K. (2022). Sharia law controls Islamic finance, limits high-risk actions, and requires licenses, anti-money laundering checks, and Shariah-compliant practices. Albarrak and Alokley (2021), Alotaibi (2015), and Alsomali (2015) suggest introducing Shariah requirements, oversight boards, and standard Shariah governance for Islamic fintech companies.

Fintech in Saudi Arabia is managed by organizations like SAMA, CMA, and Fintech Saudi. SAMA is focused on innovation, protecting consumers, and managing risks (Khan & Abdulrahman Saad, 2022) ; Pathan, M. S. K. (2022). Fintech Saudi was created by the Saudi government to work with SAMA and CMA to help the fintech industry grow, develop, and improve financial inclusion.

New rules cover electronic payment services and a law for debt-based crowdfunding through peer-to-peer payment service providers.

By following Sharia law, working with regulatory bodies like Pathan, M. S. K. (2022) SAMA and CMA, and participating in projects like Saudi fintech, the country has created an environment that supports innovation, financial inclusion, and proper oversight in the fintech industry (Susilawati et al., 2021); Pathan, M. S. K. (2022).

Discussions

This section talks about how digital transformation is happening in the banking industry in the US, Malaysia, and the US CSA. The UK report looks at how big and important banking technology and services are, along with the rules and regulations banks and fintech companies must follow, especially those related to Sharia law. It gives a clear and easy-to-understand picture of Saudi Arabia's banking features, which can help when looking at other banking markets.

The banking sector in Saudi Arabia plays a big role in the country's economy. Its total assets are over \$683 billion, which makes up about 3.2% of the country's GDP. Comparing this to the US and the UK, which have much larger banks, the US has total assets of about \$22.9 trillion, and the UK has around \$8.5 trillion. Malaysia's

banking sector has total assets of \$714 billion, which is about 3.7% of its GDP. Saudi Arabia's contribution to GDP is similar to Malaysia's, but not as high as the US and the UK. In terms of both size and share, the US and UK banking sectors are way bigger.

Fintech and the services that go with it are changing how people handle their money. In the US, UK, Malaysia, and Saudi Arabia, about 75% to 88% of people use fintech banking. These companies offer tools like ATMs, POS machines, mobile banking, and online banking to help with deposits, payments, transfers, and managing accounts. In the US and the UK, online and mobile banking are the most popular. In Malaysia and Saudi Arabia, online transactions and ATMs are more common. The US and the UK are starting to use more services like robo-advisors and big data technologies, which are already popular in the EU. Malaysia and Saudi Arabia are adopting these changes more slowly because they need better awareness and education.

More and more, fintech companies and traditional banks are working together to offer loans through peer-to-peer (P2P) lending platforms. In Malaysia and Saudi Arabia, P2P platforms have not worked closely with traditional banks, but they can offer loans faster and at lower interest rates.

The banking systems in the United States, the United Kingdom, Malaysia, and Saudi Arabia each have their own situations to deal with as they face new challenges. In the U.S., the government is committed to closely watching the banking system to avoid another serious financial crisis like the one in 2008. In the UK, banks are cutting jobs because they are moving towards digital services and closing some physical branches. Even with these difficulties, the government's main goal is to keep the financial system stable.

Malaysia is focusing on growing the economy through its Islamic financial system. In Saudi Arabia, the banking sector is going through a period of change to keep up with digital advancements and stay stable. Banks in Saudi Arabia are creating new services that support financial and technological innovation, helping to achieve the goals of Saudi Arabia's Vision 2030.

Malaysia, Saudi Arabia, and the UK are involved in key regulatory groups. In Saudi Arabia, SAMA and CMA look after the stability and safety of the financial system. In the UK, the FCA and PRA regulate the banking industry, while in Malaysia, BNM and South Carolina oversee the regulatory framework. The U.S. has a complicated banking regulation system with different regulators at both the federal and state levels. Even though these countries have different systems, they all share

the same main goal: to make sure their financial systems are secure and well-managed.

The discussion will cover the regulatory structures, how each country approaches regulation, fintech regulators, specific laws, and how they handle Sharia compliance in these countries. Both the U.S. and Saudi Arabia are taking steps to allow fintech innovation while staying within a regulated environment. In the U.S., fintech firms need to get a federal banking license, and this process is managed by different regulatory bodies. In Saudi Arabia, fintech companies must get a license from SAMA. The process for getting a license varies between countries.

The U.S. and Saudi Arabia have similar procedures, while the CSA is more flexible. Both countries require fintech companies to meet certain standards, like having a minimum amount of capital and managing risks. However, both approaches aim to support fintech growth, keep the financial system stable, and protect consumers.

Despite their differences, these countries have chosen to use experimental approaches. The UK has developed a sandbox, which lets companies test fintech ideas with less strict rules. This sandbox has always been a model for others. Malaysia has created a sandbox inspired by the UK, allowing fintech firms to try new technologies with fewer obstacles. In Saudi Arabia, the Fintech Innovation Sandbox allows companies to either test their ideas under limited conditions or apply for bigger banking licenses. This broad strategy aims to support innovation within controlled environments.

Fintech regulation differs a lot in the US, UK, Malaysia, and Saudi Arabia because of the way different groups handle rules. In the US, many agencies like the Federal Reserve, SEC, and others are involved, making it hard to keep everything in line. In contrast, the UK, Malaysia, and Saudi Arabia have focused regulation under one or two main organizations. In the UK, the FCA and PRA oversee fintech. In Malaysia, BNM and South Carolina handle the industry. In Saudi Arabia, SAMA, CMA, and Fintech regulators manage the sector and run the sandboxes.

In short, putting regulation under one or two agencies helps create a more organized and adaptable system, which matches the fast-changing fintech world better. The UK's fintech system is considered a top model and has influenced other growing economies.

In the US, fintech companies must follow many laws, including the Dodd-Frank Act, the Jobs Act, lending rules, consumer protection, privacy, anti-money laundering, banking, interest rate, and securities laws. The UK doesn't have special rules just for fintech, so companies follow FCA guidelines. Malaysia and Saudi

Arabia also don't have unique fintech laws but use existing banking rules. Malaysia uses BAFIA, FSA, IFSA, MSBA, the Electronic Payment Services Act, and the Anti-Money Laundering Act. The UK's system is seen as better than the US's because it promotes innovation and helps companies get licenses more easily. In the US, having many laws and regulators, old licensing methods, and conflicting rules at the state and federal levels create serious problems that slow down innovation and future fintech growth.

Sharia compliance is an important part of the banking and fintech industry in Malaysia, Saudi Arabia, the US, and the UK. It plays a key role in the laws and regulations of these countries. In Malaysia, Islamic banks offer Shariah-compliant financial products, while traditional banks may or may not follow Shariah rules. There are also large Islamic banks in Malaysia that strictly follow Sharia law. In the fintech sector, both Malaysia and Saudi Arabia have specific rules to make sure the industry follows Sharia law.

Regulators in Malaysia and Saudi Arabia have set up rules for fintech companies to follow Sharia law. These rules include consumer protection, preventing money laundering and terrorist financing, and managing risks. Overall, Sharia compliance is important in the banking and fintech industries in Malaysia and Saudi Arabia, because Sharia law is a key part of the legal and regulatory system in these countries.

In the US and UK, the banking sector has traditionally focused on regular banking activities. However, Islamic financial institutions operate within their countries and offer Shariah-compliant products and services. These institutions follow Islamic financial principles, allowing Muslims to take part in the financial system in line with the teachings of the Qur'an. This paper looks at the results of a study on the digital transformation of Saudi banks and the digital transformation of banks in the US, UK, and Malaysia.

Based on the study results, the following conclusions can be made:

The banking industry is undergoing rapid digital transformation in the US, UK, Malaysia, and Saudi Arabia. These countries have different regulatory systems in terms of structure, scope, and authority, but all aim to ensure the stability and security of the financial system, while supporting innovation and growth. The US government is focusing on tightening banking regulations to avoid taking extreme actions after the 2008 global financial crisis. In the UK, banks are facing job losses because of digital transformation and bank failures. Malaysia is promoting economic growth and development through its Islamic financial system.

Meanwhile, Saudi Arabia's banking sector is shifting from local commercial banks to international banks.

Malaysia and Saudi Arabia have the most developed Islamic financial markets in the world. In Malaysia, Islamic banks offer Shariah-compliant products, while traditional banks may offer products that are not Shariah-compliant. Islamic financial institutions in the US and UK operate within their own jurisdictions and offer Shariah-compliant products.

Fintech banking services are used by a large number of people in the US, UK, Malaysia, and Saudi Arabia, with usage rates between 75% and 88%. Similar solutions like ATMs, point-of-sale terminals, mobile phones, and online banking are commonly used in all these countries. Robo-advisors, which help people manage their money, are becoming more popular, but they are not widely used in Malaysia and Saudi Arabia yet. In the US and UK, fintech companies and traditional banks are working together on lending, and the US and UK are developing peer-to-peer lending platforms as an alternative. In Malaysia and Saudi Arabia, there are more regional efforts between peer-to-peer platforms and traditional banks.

The rules for getting a fintech banking license differ in the US and Saudi Arabia. In the US, the process is standardized, while in Saudi Arabia, the same banking license is required. Although Saudi Arabia's licensing process is more open compared to the US, the goal is to support innovation and ensure financial stability and consumer protection.

The UK has a modern regulatory system for fintech that allows for some testing and has fewer rules. Malaysia has a similar system called a sandbox, modeled after the UK's. Saudi Arabia also has a fintech innovation sandbox that requires a banking license. There is no official fintech sandbox in the US due to conflicting views between federal and state authorities. The UK's approach is advanced and can offer useful lessons for countries like Malaysia and Saudi Arabia that are developing their own fintech regulations.

This article can help other researchers who are studying how digital changes affect the banking and financial sectors. It compares how traditional banks are moving towards digital methods and how they are using new technologies to be more efficient and compete with fintech companies. It also shows the difficulties traditional banks face during this transformation, which could help other researchers find new solutions.

This article could lead to new studies on different areas connected to digital

transformation in the banking industry, like looking at similar situations in other countries or regions and seeing how banks are using digital tools and adjusting to changes in the market. It talks about the new ways banks are solving problems from digital transformation and gives a general idea of how fintech is affecting financial markets and how it's changing traditional banks. It also gives information on how financial regulators are dealing with digital transformation and keeping financial markets safe and steady. This article can help people in general, especially those who work in finance, understand how digital transformation is changing financial markets and how to deal with those changes.

Also, this article has some important points for investors. They need to work together with fintech companies, invest in technology to make their operations more efficient, team up with fintech firms, and change rules to help innovation and fair competition. This article can help investors understand how the digital revolution is changing financial markets and how it affects their investments. Banks need to realize the importance of adapting to digital changes, invest in technology to be more efficient, and work with fintech companies to stay competitive.

However, it's important to note that this study might have some limitations. For example, the study mainly compares the digital transformation in the banking industry with other countries, which might not apply well in different situations. The research focuses on the technical and rules-based parts of digital transformation. It doesn't look at other important things like cultural and organizational factors, or the ethical and social issues related to the digital transformation in the Saudi banking sector.

References

1. Ab Razak, M. I., Dali, N. A. M., Dhillon, G., & Manaf, A. W. (2020). Fintech in Malaysia: an Appraisal to the Need of Shariah-compliant Regulation. *Pertanika Journal of Social Science and Humanities*, 28(4), 3223-3233. <https://doi.org/10.47836/pjssh.28.4.40>
2. Abuhusain, M. (2020). The Role of Artificial Intelligence and Big Data on Loan Decisions. *Accounting*, 6(7), 1291-1296. <https://doi.org/10.5267/j.ac.2020.8.022>
3. Alabdan, R. I. (2017). A Saudi female perspective on the adoption of online banking with Saudi Arabian Banks (Doctoral dissertation, Robert Morris University, Carnot-Moon, Pennsylvania, United States). ProQuest LLC. Retrieved from <https://t.ly/Lzdv>
4. Alam, N. (2021). Malaysia's Regulatory Framework: A Catalyst for Fintech Adoption. *ISEAS Perspective*, 128, 1-9.

5. Albarrak, M. S., & Alokley, S. A. (2021). Fintech: Ecosystem, Opportunities and Challenges in Saudi Arabia. *Journal of Risk and Financial Management*, 14(10), 460. <https://doi.org/10.3390/jrfm14100460>
6. Alkhalidi, A. N. & Al-Sadi A. (2016). The Impact of Demographic Factors on Arabic Users' Adoption of M-Banking in Saudi Arabia: A Review. *International Journal of Knowledge and Research in Management and E-Commerce*, 5(4), 1-10. Retrieved from <https://t.ly/YH9n>
7. Alotaibi, M. N. A. (2015). Exploring the Demand and Supply Conditions of E-Commerce and E-Banking Services in Saudi Arabian Conventional and Islamic Banks (Doctoral Dissertation, Durham University, England). Retrieved from http://etheses.dur.ac.uk/11142/1/Mohammed_Alotaibi_E_Business_PhD.pdf
8. Alsomali, Z. (2015). Facilitating adoption of e-banking in Saudi Arabia through reduction of perceived risk in e-banking
9. Arner, D. W., Barberis, J., & Buckley, R. P. (2015). The Evolution of Fintech: A New Post-crisis Paradigm. *Georgetown Journal of International Law*, 47, 1271. <https://doi.org/10.2139/ssrn.2676553>
10. Banking Services. In: Bilgin, M., Danis, H., Demir, E., Lau, C. (Eds.) *Innovation, Finance, and the Economy. Eurasian Studies in Business and Economics*, vol 1 (pp. 79-87). Cham, Switzerland: Springer International
11. Butor-Keler, A., & Polasik, M. (2020). The Role of Regulatory Sandboxes in the Development of Innovations on the Financial Services Market: The Case of the United Kingdom. *Ekonomia i Prawo. Economics and Law*, 19(4), 621- 638. <https://doi.org/10.12775/EiP.2020.041>
12. Chemmanur, T. J., Imerman, M. B., Rajaiya, H., & Yu, Q. (2020). Recent Developments in the Fintech Industry. *Journal of Financial Management, Markets and Institutions*, 8(01). <https://doi.org/10.1142/S2282717X20400022>
13. Clements, R. (2021). Regulating fintech in Canada and the United States: Comparison, challenges and opportunities. In *The Routledge Handbook of Fintech* (pp. 416-454). London, England: Routledge. <https://doi.org/10.4324/9780429292903-30>
14. DeYoung, R. (2014). Banking in the United States. In Allen N. Berger, Philip Molyneux, and John O. S. Wilson (eds), *The Oxford Handbook of Banking*, 2nd edn, (pp. 825-848). Oxford, England: Oxford Academic. <https://doi.org/10.1093/oxfordhb/9780199688500.013.0034>
15. Entrepreneur (2021, august 10). Fintech Saudi's National Fintech Adoption Survey Reveals People's Interest In Adopting Fintech Solutions In Saudi Arabia. Retrieved February 9, 2023 from <https://www.entrepreneur.com/en- ae/finance/Fintech-saudis-national-Fintech-adoption-survey-reveals/379759>
16. European Economy Banks, Regulation, and the Real Sector, 2017.2, 9-50. <https://doi.org/10.2139/ssrn.3099337> Normalini, M. K., & Ramayah, T. (2015). A Proposed Biometrics Technologies Implementation in Malaysia Internet

17. Everhart, J. R. (2020). The Fintech Sandbox: An Overview of Regulatory Sandbox Regimes. *Southern Journal of Business and Ethics*, 12, 64-73. Retrieved from https://sjbe.s3.us-east-2.amazonaws.com/SJBE_Volume_12_2020.pdf#page=64
18. Fintech Global. (2021, october 13). FinTech adoption reaches 86% in the UK. Retrieved February 6, 2023 from <https://fintech.global/2021/10/13/fintech-has-reached-an-86-adoption-rate-in-the-uk-market-in-fintech/>
19. Fintech Saudi. (2018). About Us. Retrieved February 6, 2023 from <https://Fintechsaudi.com/about/>
20. Gao, J. (2022). Comparison of Fintech Development between China and the United States. *International Journal of Innovative Science and Research Technology*, 7(4), 1150-1155. Retrieved from <https://t.ly/zbo8>
21. Goldstein, I., Jiang, W., & Karolyi, G. A. (2019). To Fintech and Beyond. *The Review of Financial Studies*, 32(5), 1647- 1661. <https://doi.org/10.1093/rfs/hhz025>
22. Hornuf, L., Klus, M. F., Lohwasser, T. S., & Schwienbacher, A. (2021). How do Banks Interact with Fintech Startups?
23. *IJUM Law Journal*, 20(1), 1-35. <https://doi.org/10.31436/ijumlj.v28i1.475>
24. International Monetary Fund (2022). Monetary and Financial Statistics by Indicator. Retrieved January 24, 2023 from <https://data.imf.org/regular.aspx?key=63243610>
25. J. P.Morgan (2022). Wealth Management. Retrieved February 9,2023 from <https://www.chase.com/personal/investments/online-investing/automated>
26. Khalid, M. B., & Kunhibavab, S. (2020). Fintech Regulatory Sandboxes in Australia and Malaysia: A Legal Analysis.
27. Khan, M. S., Rahpoto, M. S., & Mangnejo, G. M. (2020). The Effect of the Financial Crisis on Corporal Well-Being: Apparent Impact Matters: Assessment of Contagion to Developing Economies. *Research Journal of Social Sciences and Economics Review*, 1(3), 232-238.
28. Khan, M. S., Rahpoto, M. S., & Talpur, U. (2021). The Effect of the Financial Crisis on Corporal Wellbeing: Apparent Impact Matters. In *Internet of Everything and Big Data* (pp. 25-34). CRC Press.
29. Khan, M. S., Wang, J., Memon, A. A., & Muhammad, T. (2024). Investigating the Enhanced Cooling Performance of Ternary Hybrid Nanofluids in a Three-Dimensional Annulus-Type Photovoltaic Thermal System for Sustainable Energy Efficiency. *Case Studies in Thermal Engineering*, 104700.
30. Khan, S., & Abdulrahman Saad, A. A. H. (2022). The Use of Fintech and Its Impact on Financial Intermediation-A Comparison of Saudi Arabia with Other GCC Economies. *Intellectual Economics*, 16(2), 26-43. Retrieved from https://repository.mruni.eu/bitstream/handle/007/18736/IE_2_straipsnis.pdf?sequence=1

31. Khaskhely, I. Z., & Pathan, M. S. K. (2022). Assessing the mediating role of job satisfaction in the relationship between organizational culture and employee commitment. *International Research Journal of Management and Social Sciences*, 3(4), 44-54.
32. Khoso, A. A., & Pathan, M. S. K. (2021). The Role of Islamic Banking Industry in The Perspective of Global Financial Sector and its Impact in Pakistan's Economic Growth. *International Research Journal of Education and Innovation*, 2(2), 81-91.
33. Khoso, A. A., & Pathan, M. S. K. (2023). The Mediating Role of Job Satisfaction in The Relationship Between Organizational Culture and Employee Commitment in Islamic Banking. *International Research Journal of Management and Social Sciences*, 4(2), 13-30.
34. Khoso, A. A., Pathan, M. S. K., & Ahmed, M. (2022). Exploring The Impacts and Aftershocks of Covid-19 on Islamic Banking and Conventional Banking in Pakistan. *International Research Journal of Management and Social Sciences*, 3(1), 179-192.
35. Khowaja, I. A., Talpur, U., Soomro, S. H., & Khan, M. S. (2021). The non-banking financial institutions in perspective of economic growth of Pakistan. *Applied Economics Letters*, 28(8), 701-706.
36. Kornelakis, A., Kirov, V., & Thill, P. (2022). The Digitalisation of Service Work: A Comparative Study of Restructuring of the Banking Sector in the United Kingdom and Luxembourg. *European Journal of Industrial Relations*, 28(3), 253-272. <https://doi.org/10.1177/09596801211056829>
37. Magnuson, W. (2018). Regulating Fintech. *Vanderbilt Law Review*, 71(4), 1167-1226. Retrieved from <https://scholarship.law.vanderbilt.edu/cgi/viewcontent.cgi?article=1033&context=vlr>
38. Mahad, M., Mohtar, S., & Othman, A. A. (2015). The Effect of Perceived Trust of Mobile Banking Services in Malaysia. *International Academic Research Journal of Business and Technology*, 1(2), 1-7. <https://doi.org/10.31580/jmi.v8i1.45>
39. Mazure, G. (2022). Financial Platforms as Alternative Financial Instrument to Crediting in Europe. *Research for Rural Development*, 37, 202-209. <https://doi.org/10.22616/rrd.28.2022.029>
40. Memon, A., & Khan, M. S. (2019). Industry Academia Linkages of Jamshoro Universities: The Case of University of Sindh, Mehran University of Engineering and Technology & Liaquat University of Medical and Health Sciences. *Mediterranean Journal of Basic and Applied Sciences (MJBAS)*(Peer Reviewed International Journal), 3(3), 13-52.
41. Miskam, S., Shahwahid, F. M., & Sholehuddin, N. B. (2018). Catching the fintech wave in Islamic finance: Regulatory approach for Malaysia. In 4th Muzakarah Fiqh & International Fiqh Conference, MFIFC 2018 (pp. 223-235) Kuala Lumpur, Malaysia, October 17. Retrieved from <https://t.ly/kMMhM>
42. Modern Management based on Big Data III, 352, 93-102. <https://doi.org/10.3233/faia220088>

-
43. Mohamed, H., & Yildirim, R. (2021). Regtech and regulatory change management for financial institutions. In: A. Hamdam, A. E. Hassaniem, A. Razzaque & B. Alareeni (Eds.), *The Fourth Industrial Revolution: Implementation of Artificial Intelligence for Growing Business Success* (pp. 153-168). Cham, Switzerland: Springer International Publishing. https://doi.org/10.1007/978-3-030-62796-6_8
 44. Nasir, A., Shaukat, K., Iqbal Khan, K., Hameed, I. A., Alam, T. M., & Luo, S. (2021). Trends and Directions of Financial Technology (Fintech) in Society and Environment: A Bibliometric Study. *Applied Sciences*, 11(21), 10353. <https://doi.org/10.3390/app112110353>
 45. Navaretti, G. B., Calzolari, G., Mansilla-Fernandez, J., & Pozzolo, A. F. (2018). Fintech and Banking. Friends or Foes?
 46. Omarova, S. T. (2020). Dealing with disruption: emerging approaches to Fintech regulation. *Washington University Journal of Law & Policy*, 61, 25-53. Retrieved from <https://t.ly/UIGS>
 47. Palladino, L. (2018). Small Business Fintech Lending: The Need for Comprehensive Regulation. *Fordham Journal of Corporate & Financial Law*, 24, 77-103. <https://doi.org/10.2139/ssrn.3194694>
 48. Panetta, F. (2018, may 12). Fintech and banking: today and tomorrow. Speech presented at the Bicentennial Annual Reunion of the Harvard Law School Association of Europe, Harvard Law School, Rome. Retrieved from <https://www.bancaditalia.it/pubblicazioni/interventi-direttorio/int-dir-2018/panetta-120518.pdf>
 49. Pathan, M. S. K. (2022). The Impact of Emotional Intelligence on Leadership Effectiveness. *International Research Journal of Management and Social Sciences*, 3(3), 1-7.
 50. Pathan, M. S. K. (2022). The influence of organizational culture on employee commitment and turnover intentions. *International Research Journal of Management and Social Sciences*, 3(4), 34-43.
 51. Pathan, M. S. K. (2022). The influence of organizational culture on employee commitment and turnover intentions. *International Research Journal of Management and Social Sciences*, 3(4), 34-43.
 52. Pathan, M. S. K. (2022). The Role of Social Capital in Promoting Entrepreneurial Success. *International Research Journal of Education and Innovation*, 3(3), 8-16.
 53. Pathan, M. S. K. (2023). Assessing the mediating role of job satisfaction in the relationship between organizational culture and employee commitment. *International Research Journal of Education and Innovation*, 4(1), 1-11.
 54. Pathan, M. S. K., & Khoso, A. A. (2023). Misfortune Tragedy Findings in Pakistan: A Public Learning Perspective on Virtue of Economic Recovery Mindset. *International Research Journal of Management and Social Sciences*, 4(2), 1-12.

-
55. Pathan, M. S. K., Ahmed, M., & Khoso, A. A. (2022). Islamic banking under vision of green finance: The case of development, ecosystem and prospects. *International Research Journal of Management and Social Sciences*, 3(1), 193-210.
 56. Pathan, M. S. K., Khoso, A. A., & Ahmed, M. (2022). Digital Model Anecdotes Through Artificial Intelligence in Socioeconomic and Islamic Investments. *International Research Journal of Education and Innovation*, 3(2), 195-209.
 57. Piri, M. M. (2018). The Changing Landscapes of Fintech and Regtech: Why the United States Should Create a Federal Regulatory Sandbox. *Business & Finance Law Review*, 2, 233-255. Retrieved from <https://gwbflr.org/wp-content/uploads/2019/04/Regulatory-Sandbox-Piri.pdf>
 58. Plaid (2021). The Fintech effect: Fintech's mass adoption moment. Retrieved February 7, 2023 from <https://plaid.com/the-fintech-effect-2021-mass-adoption/>
 59. Publishing. https://doi.org/10.1007/978-3-319-15880-8_7
 60. Rahat, S., & Pathan, M. S. K. (2021). Sustainable Climate Approach and in Context of Environment Economy: A Classical Analyze Matters. *Neutron*, 21(1), 40-45.
 61. Rahim, N. F. A., Jaaffar, A. R., Sarkawi, M. N., & Binti Shamsuddin, J. (2021). Fintech and commercial banks development in Malaysia: continuous intention to use fintech services in IR 4.0 environment. In: B. S. Sergi & A. R. Jaaffar (Eds.), *Modeling Economic Growth in Contemporary Malaysia (Entrepreneurship and Global Economic Growth)*, (pp. 235-253). Bingley, UK: Emerald Publishing Limited. <https://doi.org/10.1108/978-1-80043-806-420211018>
 62. Rehman, Z. U., & Zabri, S. B. M. (2020). Determinants of Mobile Banking Adoption in Malaysia: A Conceptual Framework. *Journal for Studies in Management and Planning*, 4(13), 260-270. Retrieved from <https://t.ly/BX9J>
 63. Retrieved from <https://t.ly/D7EM>
 64. Retrieved from <https://t.ly/vhNG>
 65. Rickinghall, M. (2022). Impact of Fintech on Islamic Bank Performance in Malaysia: Descriptive Study on Fintech.
 66. Rupeika-Apoga, R., & Thalassinou, E. I. (2020). Ideas for a Regulatory Definition of Fintech. *International Journal of Economics and Business Administration*, 8(2), 136-154. <https://doi.org/10.35808/ijeba/448>
 67. Saeed, M. S. (2014). Bank-related, Industry-related and Macroeconomic Factors Affecting Bank Profitability: A Case of the United Kingdom. *Research Journal of Finance and Accounting*, 5(2), 42-50. Retrieved from <https://t.ly/yJSR> Sangale, B., & Salve, T. N. (2019). *Fundamentals of Banking*. India: University of Pune. Retrieved from <https://t.ly/z-gO> Susilawati, C., Sulaiman, A. A., Abduh, M., Prasetyo, Y., & Athoillah, M. A. (2021). Comparative Study on the Regulation of Sharia Financial Technology in Indonesia and Malaysia. *Jurisdictie: Jurnal Hukum Dan Syariah*, 12(1), 1-19.

-
68. Small Business Economics, 57(3), 1505-1526. <https://doi.org/10.1007/s11187-020-00359-3>
69. Thomas, L. G. (2018). The Case for a Federal Regulatory Sandbox for Fintech Companies. North Carolina Banking Institute, 22(1), 257-281. Retrieved from <https://scholarship.law.unc.edu/cgi/viewcontent.cgi?article=1462&context=ncbi>
70. Urrutia, G., & Bonfill, X. (2010), PRISMA Statement: A Proposal to Improve the Publication of Systematic Reviews and Meta-analyses, Clinical Medicine, 135(11), 507-511. <https://doi.org/10.1016/j.medcli.2010.01.015>
71. Wewege, L., Lee, J., & Thomsett, M. C. (2020). Disruptions and Digital Banking Trends. Journal of Applied Finance and Banking, 10(6), 15-56. Retrieved from <https://t.ly/LA-g>
72. Williams, K. O., & Adekunle, K. O. (2013). Information and Communication Technology in Banking Sector: Nigeria and United Kingdom Comparative Study. International Journal of Advanced Research in Computer Science, 4(11), 61-65. Retrieved from <https://t.ly/o0jJb>
73. Williams, V. (2020). Fintech Regulations in the United States Compared to Regulations in Europe and Asia (Honor College Theses, Pace University, New York, United States). Retrieved from <https://t.ly/g862>
74. Yadav, Y. (2020). Fintech and International Financial Regulation. Vanderbilt Journal of Transnational Law, 53, 1109- 1146. <https://doi.org/10.2139/ssrn.3684821>
75. Yahaya, M. H., & Ahmad, K. (2018). Financial inclusion through efficient zakat distribution for poverty alleviation in Malaysia: Using Fintech & mobile banking. In: Proceedings of the 5th International Conference on Management and Muamalah (pp. 15-31), Kuala Lumpur, Malaysia. Retrieved from <http://t.ly/7ZDZ>
76. Zhihui, L. (2021). Reform And Development of E-banking in Modern Age Scenario: An Indepth Study Based on Malaysian Banking Sector. Turkish Journal of Computer and Mathematics Education (TURCOMAT), 12(10), 6674-6684. Retrieved from <https://turcomat.org/index.php/turkbilmat/article/download/5533/4636>