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Prospects, Issues, and Policy Implications for Islamic Fintech Development in Pakistan

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ABSTRACT
Financial technology has the potential to impact positively the financial sector whether it is conventional finance or Islamic finance. It is a dire need of the day to develop Fintech (Financial technology) in Pakistan. There are, however, certain issues present in Pakistan in this regard. The core purpose of this study is to explore these issues in depth and provide a solution for those, to highlight the prospects of Fintech for the Islamic finance sector in Pakistan. This is qualitative research following an exploratory method. Top experts belonging to different categories of stakeholders for a standard Fintech model have been interviewed. The study adopted the semi-structured interview technique for data collection. Data analysis has shown that this includes a lack of IT and Telecom infrastructure, a lack of long-term policies by the Government, tight regulatory rules by the SECP, and low flexibility for the Islamic financial institutions when it comes to the regulatory framework by the SBP. Customers' attitudes and lack of awareness campaigns are the other issues. Another important issue is the non-availability of required human resources for Fintech development. However, all these issues can be overcome by collaboration between banks and other financial institutions. The future of fintech in Pakistan is very bright.

INTRODUCTION

The term used to describe the process of improving and automating financial services is called financial technology or simply Fintech. Financial technology, also known as Fintech (Hoang et al., 2022). For example, mobile banking, online payments, digital lending platforms etc., are included in Fintech. It has the capability to enhance financial inclusion. It also has the capacity to improve financial service efficiency and to reduce the cost for consumers and businesses. In Pakistan, Fintech is growing rapidly with focusing on online payment and digital and mobile banking. The government is also taking initiatives to set polices to encourage the adoption of digital financial services. Alongside mobile phone companies in Pakistan are also playing their role for digital economy. However, being in the early stages of adoption the industry is facing some challenges such as infrastructure lacking and lack of trust in digital financial services by the customers.

The successful and continued expansion of the financial sector, particularly banking, depends on the adoption of technology. The financial industry's use of cutting-edge technology has significantly altered the nature and style of financial services in recent years, and it will continue to do so in the years to come. Today, a revolution of this nature spreads quickly—in months or years—instead of taking a long time, like a decade. The market's largest segment is Digital Payments, with a total transaction value of US$4,137,523m in 2019. The total transaction value of Digital Payments is expected to show an annual growth rate (CAGR 2019-2023) of 12.8%, resulting in a total amount of US$6,699,201m by 2023, according to global statistics about the growth of the Fintech industry.

No total transaction value for all sectors can be estimated because of the significant variances between the KPIs of Fintech products, such as the varied nature of loan origination volume in Alternative Lending compared to Assets under Management in Robo-advisors. As of 2019, there were 3756.1 million users of Fintech. By 2023, 4475.70 million users are anticipated. The data shows how the Fintech sector is expanding quickly and has the potential to alter how the financial sector operates in all nations. Therefore, Fintech development in Pakistan is required to enhance the nation's financial services. However, Pakistan's climate presents several challenges for the creation and uptake of a novel concept like Fintech.

In this study, the obstacles preventing the growth of Fintech in Pakistan will be examined through the perspectives of professionals from various stakeholder categories that make up the ecosystem for financial technology in Pakistan.

LITERATURE REVIEW

Fintech is a development and a paradigm shifter for the entire economy. Agriculture, business, and particularly financial institutions are affected. Fintech businesses concentrate on offering suggestions and services to financial institutions so they can carry out their operations using contemporary software (IOSCO, 2017). In a similar vein, according to Wonglimpiyarat (2017), Fintech has combined cutting-edge technology that has attracted the interest of businesses all over the world as this technology is a catalyst for more effective services in the present-day 21st century. The governments of many nations are taking notice and developing policies to encourage the growth of Fintech and its adoption by the pertinent industries.

Zulkhibri (2016) argues that using Islamic social finance mechanisms reduces economic inequality across Islamic states. Financial technology has made Islamic financial institutions more accessible through social finance mechanisms like zakat, waqf, and Islamic microfinance (Ahmed & Salleh, 2016). Aziz et al. (2021) found a link between digital banking and financial inclusion, supporting this conclusion. Their research found a positive link between digital banking and financial inclusion.

The adoption of Fintech and e-commerce led to economic growth and GAV addition in Indonesia, according to Barata (2019), even if Fintech development is still in its infancy. Additionally, there are a lot of undiscovered prospects in the Fintech space. Human life has benefited from the growth and development of ICT in several fields. The rapid advancement of technology has also transformed Indonesia's economy from a traditional one to a digital one (Fetrina et al., 2017).

Helmi et al. (2024) conducted a systematic literature review on Fintech in Islamic Finance and its technical applications for Islamic Financial Institutions. According to Ezzahid and Elouaourti (2021), digital banking can reduce the number of people who lack access to traditional banking services by providing affordable financial services.

The essential support for the growth of a digital economy is the speedy internet. The Indonesian economy is now one of the largest digital economies in Southeast Asia because of technological advancements in ICT over the past thirty years. The people of Indonesia are now able to communicate and conduct business with others, including the government, educational institutions, online retailers, and information centers both within and outside of their nation. Approximately seventeen thousand islands make up Indonesia, which has a population of over 26 billion people. The availability of the spectrum has made it possible for people scattered throughout the world to connect, improving their quality of life (Robinson et al., 2018).

In terms of regulatory frameworks, legal concerns, and operational requirements, Islamic FinTech providers fall behind their conventional counterparts, according to a study conducted in Indonesia by Rahmatullah (2020). The development of unlawful FinTech activities and the inadequate safeguarding of customer data have been exacerbated by the lack of clarity surrounding the legal framework guiding Islamic FinTech. Shariah supervisors' ineffectiveness as regulatory authorities is a major impediment to FinTech start-ups (Tajudin et al., 2020). Malaysia's government aims to digitize its financial industry. This goal aims to liberalize several fields, including insurance, trade, Robo-advisory, and peer-to-peer lending.

Online transactions, crowdsourcing, virtual accounts, digital money, aggregators, personal financial planners, and strong protection against malware assaults are only a few of the common Fintech features described by Saksonova and Kuzmina-Merlino (2017). We want a system that can manage and analyze large data, provide related infrastructure, facilitate financial transactions, digitally promote financial goods, collaborate with investors and financial intermediaries, and more for the development of Fintech. According to a study published in 2018, the lack of educated personnel and ambiguous government policies regarding the development of qualified human resources for this purpose are the biggest challenges facing emerging countries in the development of Fintech.

The operational costs of financial services have decreased with the adoption of Fintech. As a result, there is a considerable chance that finance, and financial institutions will expand in emerging countries. Regulators strive to safeguard financial institution consumers from dishonest practices and ensure the stability of services per standards. Second, regulators will also benefit from Fintech in this aspect (Saba et al., 2019). Universities and other educational institutions should start initiatives to educate people in the finance and technology fields about fintech and Islamic finance (Saad et al., 2019). The IFIs' adoption of Fintech will affect the global finance sector, which will affect both Muslim and non-Muslim countries. As a result, innovation should be prioritized while maintaining a long-term perspective when developing Fintech (Irfan et al., 2019).

It is a difficult effort for regulators and developers to strike a balance between the benefits of Fintech and any potential concerns (Arner et al., 2015). If appropriate rules are not developed for it, Fintech's rapid rise could become dangerous (Wijayanti et al., 2022). Strict laws will impede Fintech's expansion and development. When creating laws for this industry, a flexible approach should be used. The goal of a regulator should be to give the Fintech industry the freedom and assurance to work freely and to support new technologies and ideas (Tsai & Kuan-Jung, 2017).

RegTech is the way of the future for financial industry rules. RegTech requirements will rise along with the regulatory necessity for Fintech businesses as a result of their expansion and growth. The growth of RegTech will compel lawmakers to alter the rules now governing Fintech firms (Armour et al., 2016). These Fintech firms will give online reports, streamlining, and software to handle huge data, as new RegTech firms are mandated to do (Shahnawaz & Mishra, 2015).

Third, assess the client's level of knowledge. Oladapo et al. (2022) found a significant correlation between customer awareness of Islamic FinTech and willingness to use FinTech services. Baber (2020c) found that providing thorough information about Islamic principles improves consumer satisfaction. Continuous professional growth is crucial for banking practitioners and operators to give comprehensive FinTech information to consumers, according to recent studies. Attending regular training sessions, seminars, and conferences might help attain this goal. Despite its enormous expansion, one major obstacle to the advancement of Islamic FinTech is the lack of comprehensive legislative frameworks from authorities.

To ensure harmony between stability measures and access to financial services, which will be provided by Fintech companies, regulators must create legislation (Tsai & Kuan-Jung, 2017). Due to their decentralized structure, Fintech organizations have rather diverse operational patterns, making it challenging to manage them all under the same policy. There should be some latitude in how rules are applied (Peter et al., 2015). The regulators have the power to make people's lives easier and more beneficial if they take a flexible and lenient stance towards Fintech companies (Anagnostopoulos, 2018).

The regulation of Islamic Fintech services is already planned in many countries where Islamic finance is expanding. However, this poses a significant obstacle to the Islamic finance sector (Natoor, 2019). The development of Islamic banking and Fintech in a nation presents regulatory agencies with both an opportunity and a threat. The procedures for Shariah-compliant products are more complex than conventional finance contracts, that is why Islamic finance system of Pakistan is more influences on risk management techniques (Iqbal & Fikri, 2023), and it is necessary to take such measures that can mitigate the risks involved, so the regulators must consider this. Fintech development and adoption have many advantages for this sector (Miskam et al., 2018; Rabbani et al., 2020).

Another crucial element to evaluate is the degree of user friendliness. Fianto et al. (2020) found that the technical acceptance model is the main factor influencing customers' willingness to utilize FinTech, particularly peer-to-peer (P2P) services. Shaikh et al. (2020) found that customer intention is highly influenced by perceived product or service simplicity and usability. Ali et al. (2021) found that secure Islamic FinTech applications and operations increase client confidence when using these services. These studies highlight the importance of user experience when using Islamic FinTech. FinTech companies must prioritize improving the quality of their applications and websites to meet consumer needs and stay current with industry changes.

The first sub stream concerns customers' perceptions. Most Islamic FinTech research projects assess customer perception by looking at a range of variables, including customer acceptance (Shaikh et al., 2020), customer satisfaction (Baber, 2019), customer retention (Baber, 2020b, 2020c), customer trust (Ali et al., 2021), and customer intention to use Islamic FinTech (Fianto et al., 2020; Oladapo et al., 2022).

Baber (2020a) claims that Islamic finance institutions provide a variety of FinTech services, such as payments, crowdsourcing, financing, advising, and compliance. Earlier studies have found a number of important factors that affect consumers' propensity to use Islamic FinTech. First, consider the concept of Shariah conformity. Scholars and practitioners continue to debate whether customers' religious influences their adoption of Islamic banking. Recent research by Baber (2020b) and Marzuki and Nurdin (2020) indicate that Islamic banking clientele prioritize Shariah-compliant FinTech solutions.

According to Baber (2019), adherence to Shariah principles in FinTech services significantly affects client satisfaction. Improving the quality and performance of Islamic banking, especially in mobile banking, is crucial for retaining and satisfying clients. These research findings emphasize the importance of strengthening shariah obligations. He found that designing applications has increased client satisfaction with Islamic FinTech.

These studies aim to assess the influence of Islamic FinTech on financial inclusion. This article engages in a controversy over numerous key academic papers. Islamic social finance mechanisms, such as zakat, Sadaqah, Waqf, Islamic microfinance, and micro takaful, have been linked to increased financial inclusion (Macchiavello, 2017; Zauro et al., 2020). Islamic social finance instruments can improve financial inclusion.

Islamic FinTech has the potential to provide financial services to a specific demography and build trust in the financial system through technology. Kim et al. (2018) believe that combining technology and Islamic finance can lead to financial inclusion. Islamic FinTech is a good opportunity to achieve this goal. Nawaz (2017) studied how Islamic financing differs from conventional finance in terms of promoting financial inclusion. Albaity et al. (2019) found that Islamic FinTech's ethical and moral foundations make it ideal for promoting financial inclusion.

Khan et al. (2019) underline that Islamic finance, including zakat, promotes financial inclusion. Sain et al. (2018) found that integrating Islamic financial services with technology can increase financial inclusion. This supports the argument. Reputable research, such as Baber (2020a), found no link between FinTech adoption and financial inclusion. Research suggests that using Financial Technology (FinTech) can boost access to banking services and improve Islamic finance performance.

Regular digital financial literacy training has been shown to improve mobile banking usage among marginalized groups, including the unbanked, small business owners, individuals with limited education, women, and the elderly (Banna et al., 2021; Ezzahid & Elouaourti, 2021), further, most of the people in developing country have access to mobile phones but not the part of mobile banking (Hakizimana et al., 2023). Establishing a robust regulatory framework for Islamic FinTech is crucial, both nationally and internationally. This regulatory norm is vital for improving collaboration between FinTech and Islamic financial institutions, as well as boosting the expertise of Shariah board members in technology sectors. The goal is to ensure FinTech regulation in the Islamic finance sector fits with its values.

For both users and fund providers, Fintech has shown itself to be quite advantageous. Fintech companies may compete with financial institutions. Additionally, Fintech companies compete with one another. This reality has compelled the FIs to adopt a customer-centric strategy. With the introduction of Fintech, there is a certain amount of risk for customers, investors, and regulators. They must investigate ways to safeguard investors as well as consumers. With the use of Fintech, consumers are benefiting from new, improved services as well as lower prices for already-existing financial services (Van Loo, 2018; Wijayanti et al., 2022). A more robust financial system and stringent rules were seen as being necessary following the global financial crisis of 2008. The emphasis today is primarily on services rather than items that can be offered affordably with the use of new technologies called Fintech.

Although the Islamic Finance industry is progressing in Pakistan its rate of growth is decreasing over time. The Islamic finance industry is facing tough competition from its conventional counterparts. Islamic countries of the world have adopted Fintech to gear up the growth of Islamic finance there. Pakistan can also develop Fintech to reap its fruits but there are certain issues present in this regard. Therefore, there is a need to analyze these issues to provide a solution for those. To explore the prospects of Fintech adoption by the Islamic finance sector in Pakistan. To analyze the issues associated with the growth of Fintech and Pakistan's use of it. What are the prospects of Fintech adoption by the Islamic finance sector in Pakistan? What are the issues associated with the growth of Fintech and Pakistan's use of it and the suitable solution for those issues?

The results of this study will provide guidelines to solve the issues present in Pakistan in the way of the development of Fintech and then its adoption by the Islamic financial sector. The exploration of prospects of Fintech will motivate the different stakeholders of the financial system to play their role in the development of Fintech in the country.

DATA AND METHODOLOGY

This is a qualitative study following the constructivism paradigm and grounded theory method. The primary data has been gathered from experts in the fields of information technology and financial technology, as well as from bankers, Shariah scholars, Takaful operators, and academicians, in addition to the data gathered through various documents made available on the Internet as a secondary source. Semi-structured interviews have been used to gather primary data. While some of the questions were reliant on the interviewee's line of work and evolved during the discussion, others were dependent on the sort of interviewee. The sample included 25 experts belonging to different categories of stakeholders which were selected based on purposive sampling (expert sampling). Data is collected by following ethical standards. NVivo software is used for data analysis.

RESULT AND DISCUSSION

In Pakistan, there is a disconnect between education and actual requirements. Better work will be done in the Fintech industry if this gap is closed. Do our educational institutions have the capacity to supply the necessary human resources for Fintech, or do we also need to import people?

> *The primary issue with universities is that the lecturers lack experience in the subjects they are teaching. For instance, in the sector of IT, an instructor who is charged with instructing pupils on software development hasn't written any software. Universities should employ experts to teach students or at the very least run workshops for them as a solution to this problem. While subjects like Islamic studies and history are purely*

theoretical, Fintech requires a person to be highly skilled in both finance and technology to properly instruct the pupils. (Interviewee 1)

Online banking, ATMs, and cash deposit machines are products of IT use in the financial sector.

Yes. We are not, however, utilizing it to its fullest extent. For instance, I could use my mobile phone to purchase if I had a debit or credit card and a payment app on it, but very few shops in our area accept payments made in this way. (Interviewee 3)

Issues develop when an IT product is put into use. Is the answer being tested?

The process of developing software includes testing, but problems still happen. The voting system was tested, but even that program crashed. Before release, Microsoft Windows was tested by roughly 6000 individuals, but problems still surface. Thus, we can conclude that to advance Fintech, several initiatives must be carried out together with ongoing upgrading procedures. Yes. Instead of using technology for business goals, Pakistanis are more likely to utilize it for amusement. Someone who uses TikTok can also utilize a financial app, but he will be hesitant to do so. (Interviewee 7)

Does this imply that user attitudes toward future technologies may likewise be problematic?

True, I do. To get people ready for anything new, we need to launch awareness efforts for using Fintech in banks and Takaful. Customers' attitudes regarding it are negative in Pakistan. They are more likely to utilize it for amusement. So, when Fintech is applied in Pakistan, client attitude would also be a problem. Campaigns to educate consumers are highly advised. similar to how a person's fingerprints are used to verify which mobile SIMs they have. (Interviewee 9)

You've brought attention to a crucial issue and made a crucial recommendation. The problem is that the industry does not specifically require our education.

Yes, absolutely. For instance, Gujranwala's business needs technical people resources, but the local colleges or universities aren't generating them. (Interviewee 13)

You informed me that Pakistan's high rate of inflation and erratic currency exchange are to blame for PayPal's decision not to expand there. Is the Pakistani government inviting them or not?

The government is supportive, yet there are barriers on various levels. This cannot be done only on the government's will. The government cannot, for instance, control the dollar exchange rate. Paypal might be introduced to Pakistan with the aid of the forces managing the dollar exchange rate. (Interviewee 19)

Have Easypaisa and Jazz Cash handled the payment issue*?*

A little bit. However, this is not a global platform. if we export a product to another nation. Since Pakistanis like free IT applications, IT professionals choose to work for other nations rather than in Pakistan. For such things, they do not wish to pay money. Can the speed and stability of the Internet be fixed with the introduction of 5G? Yes, in *large part. According to certain reports, 5G will be significantly more stable. (Interviewee 20)*

While I sit here in Pakistan, working professionals are providing services to their clientele in other nations. This implies that they can effectively serve Pakistan as well. We can claim to have enough human resources on hand. The individuals you are referring to won't work for Pakistan, I can assure you of that. One important factor is that the money they charge clients, let's say in the USA, per hour or day, won't be paid to them in Pakistan. In Pakistan, no business or government agency would be willing to pay a developer 30,000 to 40,000 rupees a day. As a result, such a thing won't be imported here. (Interviewee 21)

When do you want to introduce an IT system to your company? What then is the issue with that?

Resistance to change is the main issue that arises. People are unwilling to alter the long-standing practices of the company. Some people worry about their job security since they don't know what their status will be following the installation of a new system. People who are used to performing manual tasks dislike IT systems, especially in the government. The situation is different in the banking industry, where practically all banks in Pakistan are utilizing IT to its fullest potential. For a new system to be offered, personnel training is required. (Interviewee 22)

What challenges might bank, and other financial institutions have while using Fintech?

banks and more financial organizations. Here, a thorough analysis is first conducted to determine how the new system would be created, followed by implementation. The solution has been created to meet the needs of both business and human resources. Training is used to prepare the solution and apply it. There are three types of training available: pre-implementation, during-implementation, and post-implementation. There are no acceptability problems with banks. Since the state bank also regulates it, all the banks have embraced the technology. Graduates who have recently been hired already comprehend IT better. Customers' needs are taken into consideration when developing the system. Technology is being used to deliver banking services to better fulfill consumer needs and make it convenient and simple for users to access various financial services. (Interviewee 25)

The first is the technical difficulties. Each bank begins to roll out its applications. When considering a new system, consider its viability, affordability, and readiness for adoption. A final feasibility report has been created with feedback from the IT team. After that, it is sent to the Board for approval. The key distinction, in this case, is between cost and benefit. Value and pricing serve as the two pillars on which a new product is built. In some instances, we wish to expand our clientele, thus the cost is immaterial. For instance, the State Bank was assigned the responsibility of gathering donations for the dam fund, which he completed without weighing the cost and benefit because it was for the benefit of the nation. When launching a product with a price tag, a cost-benefit analysis is *performed first, and if the benefit outweighs the cost, the product is released. (Interviewee 25)*

CONCLUSION AND POLICY IMPLEMENTATION

The greatest way for Muslims to stay away from interest-based transactions is through Islamic finance, which is essential for corporate growth, human prosperity, and both. It is becoming better every day throughout the world. Financial technology is now the key to the growth of the Islamic finance sector. Its prospects are very positive for the Pakistani Islamic finance market. There are however certain issues concerning the development of Fintech in Pakistan which include a lack of IT and Telecom infrastructure, lack of long-term policies by the Government, tight regulatory rules by the SECP, low flexibility for the Islamic financial institutions when it comes to the regulatory framework by the SBP. Customers' attitudes and lack of awareness campaigns are the other issues. Another important issue is the non-availability of required human resources for Fintech development. The good news is that all these issues can be overcome. If each stakeholder of the Islamic finance and Fintech system plays its necessary role as mentioned under “Implications for Policies” in this study, Pakistan will In Sha Allah overcome these hindrances. As a result of the development of Fintech, Pakistan will experience growth in Islamic finance and financial technology regimes.

Shariah experts should grip themselves with the necessary knowledge of finance, business, and economics. They should continuously advise Islamic financial institutions about the Shariah compliance of cutting-edge products and services and impart accurate information about Islamic finance to the public.

All business and IT programs offered by Pakistani universities should include courses on Islamic Fintech and Islamic finance. They should also work with the sector to supply the necessary human resources in the Fintech sector. They ought to participate in educational initiatives run by the government and Islamic financial institutions. IT companies should expand their business to incorporate cloud services and offer integrated solutions to the Islamic finance sector. They ought to recruit, develop, and keep talented individuals.

The Islamic banking industry is undergoing technical developments, which existing and potential clients should accept. They should inform the Islamic financial institutions of their thoughts on new goods and services. Additionally, they ought to aid the government's initiatives to promote greater financial inclusion. The Security & Exchange Commission of Pakistan ought to make it simpler to register tech businesses and cloud service providers and offer a legal framework for tech entrepreneurs.

Islamic Financial Institutions should invest in the development and adoption of Fintech, make innovative products and services, and provide training to the employees. They should support tech start-ups. They should launch awareness campaigns. Regulations for the implementation of Islamic financial technology should be issued right away by the State Bank of Pakistan. They provide Islamic banks more latitude to create cutting-edge, tech-based products. They must enable Islamic banks to broaden their capabilities. They should also release policies that facilitate the implementation of Fintech by Islamic financial institutions.

The Pakistani government needs to build the necessary telecom and infrastructure and create long-term plans for Islamic financial technology. They should take quick action to advance Fintech in Pakistan by rewarding Islamic financial technology specialists per worldwide market standards.

Fintech is currently a very vital need, not a luxury. We must work very hard on it. The fact that the researchers are taking an interest in this area is a good sign. We should be optimistic that its growth will be tremendously advantageous for Pakistan's banking, finance, and economy. To promote the growth of Fintech in Pakistan, the government of Pakistan must act right away. The founding of PIAIC is a critical step in this direction. Both long-term planning and policy creation as well as immediate action are required.

The policies and rules that the regulators like SBP and SECP make sure help to encourage and assist the growth of the nation's Fintech ecosystem. Facilitating investors, businesses, start-ups, and trainers is necessary. The growth of Fintech should be the government's primary concern. Fintech is the future of global finance; it is not only a method.

SBP must release explicit and encouraging policies for Islamic financial institutions adopting Fintech. The SBP should permit diversification because technology makes it possible for banks to grow and extend their businesses. Fintech will act as a catalyst to help banks capitalize on the value of their client database. Collaboration between banks and other financial institutions and universities is a good idea. They will gain greater advantages from such cooperation. Students will have real-world tasks to hone their talents while getting trained and prepared to work with colleagues. If they recruit IT professionals, they must provide them with substantial Fintech training; however, if they work with universities to develop Fintech programs, they will ultimately obtain the right human resources.

REFERENCES

Ahmed, H., & Salleh, A. M. H. A. P. M. (2016). Inclusive Islamic financial planning: A conceptual framework. *International Journal of Islamic and Middle Eastern Finance and Management, 9*(2), 170-189. doi:10.1108/IMEFM-09-2015-0085

Albaity, M., Mallek, R. S., & Noman, A. H. M. (2019). Competition and bank stability in the MENA region: The moderating effect of Islamic versus conventional banks. *Emerging Markets Review, 38,* 310-325. doi:10.1016/j.ememar.2018.10.002

Ali, M. H., Chung, L., Kumar, A., Zailani, S., & Tan, K. H. (2021). A sustainable blockchain framework for the halal food supply chain: Lessons from Malaysia. *Technological Forecasting and Social Change, 170,* 120870. doi:10.1016/j.techfore.2021.120870

Anagnostopoulos, I. (2018). Fintech and regtech: Impact on regulators and banks. *Journal of Economics and Business, 100,* 7-25. doi:10.1016/j.jeconbus.2018.05.002

Armour, J., Awrey, D., Davies, P. L., Enriques, L., Gordon, J. N., Mayer, C. P., & Payne, J. (2016). *Principles of financial regulation.* Oxford University Press.

Arner, D. W., Barberis, J., & Buckley, R. P. (2015). The evolution of fintech: A new post-crisis paradigm. *Geo. J. Int'l L., 47,* 1271.

Aziz, M. R. A., Jali, M. Z., Noor, M. N. M., Sulaiman, S., Harun, M. S., & Mustafar, M. Z. I. (2021). Bibliometric analysis of literature on digital banking and financial inclusion between 2014-2020. *Library Philosophy and Practice (e-journal).* doi:10.31274/libphilprac.7905

Baber, H. (2019). Relevance of e-SERVQUAL for determining the quality of FinTech services. *International Journal of Electronic Finance, 9*(4), 257-267. doi:10.1504/IJEF.2019.103622

Baber, H. (2020a). Financial inclusion and FinTech: A comparative study of countries following Islamic finance and conventional finance. *Qualitative Research in Financial Markets, 12*(1), 24-42. doi:10.1108/QRFM-12-2018-0132

Baber, H. (2020b). FinTech, crowdfunding and customer retention in Islamic banks. *Vision, 24*(3), 260-268. doi:10.1177/0972262920955372

Baber, H. (2020c). Impact of FinTech on customer retention in Islamic banks of Malaysia. *International Journal of Business and Systems Research, 14*(2), 217-227. doi:10.1504/IJBSR.2020.108662

Banna, H., Hassan, M. K., Ahmad, R., & Alam, M. R. (2021). Islamic banking stability amidst the COVID-19 pandemic: The role of digital financial inclusion. *International Journal of Islamic and Middle Eastern Finance and Management, 15*(2), 310-330. doi:10.1108/IMEFM-07-2020-0312

Barata, A. (2019). Strengthening national economic growth and equitable income through sharia digital economy in Indonesia. *Journal of Islamic Monetary Economics and Finance, 5*(1), 145-168. doi:10.21098/jimf.v5i1.979

Ezzahid, E., & Elouaourti, Z. (2021). Financial inclusion, mobile banking, informal finance and financial exclusion: Micro-level evidence from Morocco. *International Journal of Social Economics, 48*(7), 1060-1086. doi:10.1108/IJSE-09-2020-0503

Fetrina, E., Rustamaji, E., Nuraeni, T., & Durrachman, Y. (2017). Inventory management information system development at BPRTIK KEMKOMINFO Jakarta. In *2017 5th International Conference on Cyber and IT Service Management (CITSM)* (pp. 1-5). doi:10.1109/CITSM.2017.8262172

Fianto, B. A., Hendratmi, A., & Aziz, P. F. (2020). Factors determining behavioral intentions to use Islamic financial technology: Three competing models. *Journal of Islamic Marketing, 12*(4), 794-812. doi:10.1108/JIMA-02-2020-0034

Hakizimana, S., Wairimu, M.-M. C., & Stephen, M. (2023). Digital banking transformation and performance-where do we stand? *International Journal of Management Research and Emerging Sciences, 13*(1).

Helmi, S., Setyadi, B., Wedadjati, R. S., & Najmudin, M. (2024). Fintech in Islamic finance and technical applications for Islamic financial institutions: A systematic literature review study. *Kurdish Studies, 12*(1), 4148-4172.

Hoang, T. G., Nguyen, G. N. T., & Le, D. A. (2022). Developments in financial technologies for achieving the sustainable development goals (SDGs): FinTech and SDGs. In *Disruptive* *technologies and eco-innovation for sustainable development* (pp. 1-19). IGI Global. doi:10.4018/978-1-7998-8920-7.ch001

Iqbal, M. S., & Fikri, S. M. (2023). Comparison of credit risk management practices among Islamic and public commercial bank's in Pakistan. *International Journal of Management Research and Emerging Sciences, 13*(3).

Irfan, M., Wang, M., & Akhtar, N. (2019). Impact of IT capabilities on supply chain capabilities and organizational agility: A dynamic capability view. *Operations Management Research, 12*(3), 113-128. doi:10.1007/s12063-019-00125-0

Khan, S., Sheikh, A., & Bakar, M. A. (2019). Zakat-financial inclusion nexus: Empirical evidence from Pakistan. *International Journal of Innovation, Creativity and Change, 8*(9), 44-56.

Kim, D.-W., Yu, J.-S., & Hassan, M. K. (2018). Financial inclusion and economic growth in OIC countries. *Research in International Business and Finance, 43,* 1-14. doi:10.1016/j.ribaf.2017.10.006

Macchiavello, E. (2017). *Microfinance and financial inclusion: The challenge of regulating alternative forms of finance.* Routledge.

Marzuki, M., & Nurdin, N. (2020). The influence of halal product expectation, social environment, and fiqih knowledge on intention to use shariah financial technology products. *International Journal of Innovation, Creativity and Change, 13*(1), 171-193.

Miskam, S., Shahwahid, F. M., & Sholehuddin, N. (2018). Catching the fintech wave in Islamic finance: Regulatory approach for Malaysia. In *4th Muzakarah Fiqh & International Fiqh Conference (MFIFC 2018)* (pp. 1-6).

Natoor, B. (2019). Islamic FinTech faces regulatory hurdles, Fitch Ratings says. *Fitch Ratings*.

Nawaz, T. (2017). Conventional vs. Islamic banks in dual-banking systems: Business model, outlay stratagems and economic performance. *International Journal of Business Governance and Ethics, 12*(4), 330-348. doi:10.1504/IJBGE.2017.087641

Oladapo, I. A., Hamoudah, M. M., Alam, M. M., Olaopa, O. R., & Muda, R. (2022). Customers' perceptions of FinTech adaptability in the Islamic banking sector: Comparative study on Malaysia and Saudi Arabia. *Journal of Modelling in Management, 17*(4), 1241-1261. doi:10.1108/JM2-02-2022-0063

Peter, S., Li, J., Zhang, I., Ports, D. R., Woos, D., Krishnamurthy, A., Anderson, T., & Roscoe, T. (2015). Arrakis: The operating system is the control plane. *ACM Transactions on Computer Systems (TOCS), 33*(4), 1-30. doi:10.1145/2771537

Rabbani, M. R., Khan, S., & Thalassinos, E. I. (2020). FinTech, blockchain and Islamic finance: An extensive literature review. doi:10.2139/ssrn.3628530

Rahmatullah, I. (2020). The legal protection of sharia financial technology in Indonesia (Analysis of regulation, structure and law enforcement). *Journal of Islamic Finance, 9*(1), 1-12. doi:10.1108/JIF-03-2020-0014

Robinson, J. T., Turner, D., Durand, N. C., Thorvaldsdóttir, H., Mesirov, J. P., & Aiden, E. L. (2018). Juicebox.js provides a cloud-based visualization system for Hi-C data. *Cell Systems, 6*(2), 256-258. e251. doi:10.1016/j.cels.2017.12.003

Saad, W., Bennis, M., & Chen, M. (2019). A vision of 6G wireless systems: Applications, trends, technologies, and open research problems. *IEEE Network, 34*(3), 134-142. doi:10.1109/MNET.2019.8906331

Saba, L., Biswas, M., Kuppili, V., Godia, E. C., Suri, H. S., Edla, D. R., Omerzu, T., Laird, J. R., Khanna, N. N., & Mavrogeni, S. (2019). The present and future of deep learning in radiology. *European Journal of Radiology, 114,* 14-24. doi:10.1016/j.ejrad.2019.02.013

Sain, M. R. M., Rahman, M. M., & Khanam, R. (2018). Financial exclusion and the role of Islamic finance in Australia: A case study in Queensland. *Australasian Accounting, Business and Finance Journal, 12*(4), 23-42. doi:10.14453/aabfj.v12i4.3

Saksonova, S., & Kuzmina-Merlino, I. (2017). Fintech as financial innovation: The possibilities and problems of implementation. *Journal of Innovation Management, 5*(3), 54-68. doi:10.24840/2183-0606_005.003_0004

Shahnawaz, & Mishra, R. B. (2015). An English to Urdu translation model based on CBR, ANN and translation rules. *International Journal of Advanced Intelligence Paradigms, 7*(1), 1-23. doi:10.1504/IJAIP.2015.073154

Shaikh, I. M., Qureshi, M. A., Noordin, K., Shaikh, J. M., Khan, A., & Shahbaz, M. S. (2020). Acceptance of Islamic financial technology (FinTech) banking services by Malaysian users: An extension of technology acceptance model. *Foresight, 22*(3), 367-383. doi:10.1108/FS-01-2020-0005

Tajudin, M., Omar, R., Smedlund, A., & Aziz, R. P. (2020). Financing with heart and intelligence: Augmenting intimacy and sustainability through Islamic fintech. *International Journal of Advanced Science and Technology, 29*(9 Special Issue), 1638-1664. doi:10.1109/ICCIIS48638.2020.9179886

Tsai, C.-H., & Kuan-Jung, P. (2017). The FinTech revolution and financial regulation: The case of online supply-chain financing. *Asian Journal of Law and Society, 4*(1), 109-132. doi:10.1017/als.2017.11

Van Loo, R. (2018). Making innovation more competitive: The case of fintech. *UCLA Law Review, 65*, 232-259. doi:10.2139/ssrn.3124049

Wijayanti, M., Rohaeni, H., Mukarromah, A., & Yunita, T. (2022). The influence of financial literature, benefits, easy and income on interest in using Shopee PayLater (study on millennial generation, Bekasi regency). *International Journal of Education, Information Technology, and Others, 5*(2), 389-399. doi:10.53899/ijeito.v5i2.55

Wonglimpiyarat, J. (2017). Technology auditing and risk management of technology incubators/science parks. *World Journal of Entrepreneurship, Management and Sustainable Development, 13*(1), 44-56. doi:10.1504/WJEMSD.2017.086176

Zauro, N. A., Zauro, N. A., Saad, R. A. J., & Sawandi, N. (2020). Enhancing socio-economic justice and financial inclusion in Nigeria: The role of zakat, Sadaqah and Qardhul Hassan. *Journal of Islamic Accounting and Business Research, 11*(3), 555-572. doi:10.1108/JIABR-06-2018-0079

Zulkhibri, M. (2016). Financial inclusion, financial inclusion policy and Islamic finance. *Macroeconomics and Finance in Emerging Market Economies, 9*(3), 303-320. doi:10.1080/17520843.2016.1215429