TUJISE Turkish Journal of Islamic Economics

Banking Regulators' Views on FinTech Disruption in the Islamic Finance Industry

Mohamed Cherif El Amri*
Mustafa Omar Mohammed
Ramadhani Mashaka Shabani

Abstract: The Islamic finance sector has experienced increasing interest in the FinTech movement, viewed as a driver of innovation, growth, efficiency, and competitive edge. Conversely, there is mounting documented evidence of the detrimental impacts of technology on employment, the environment, social structures, and overall quality of life, among other issues. There is a dearth of research investigating the perspectives of principal stakeholders in the Islamic finance sector regarding the impacts of FinTech adoption. This study employed a qualitative research methodology, utilizing expert interviews to obtain the viewpoints of central bank regulators regarding the impact of FinTech on the Islamic finance sector. The research demonstrates that FinTech substantially impacts Islamic finance. FinTech promotes the financial inclusion of a substantial portion of the unbanked demographic. The findings reveal adverse effects, including employment losses due to labour displacement. FinTech has revolutionized the engagement between banking staff and clients. Obstacles to FinTech adoption encompass awareness, the scale of the financial institution, security, and Shariah compliance, among other factors. The future of FinTech will produce both beneficial and detrimental effects, with Islamic finance expected to experience a higher ratio of favorable results.

Keywords: Islamic finance, Islamic banking, FinTech, Banks' regulators.

* Corresponding Author

Dr., Istanbul Sabahattin Zaim University, mohamed.amri@izu.edu.tr, 0000-0003-4607-2926
Dr., Al Qasimia University, momar@alqasimia.ac.ae, 0000-0002-3328-1369
PhD., Istanbul Sabahattin Zaim University, shabani.ramadhani@std.izu.edu.tr, 0000-0002-8147-2442

El Amri, M. C., Mohammed M. O & Shabani, R. M. (2025). Banking Regulators' Views on FinTech Disruption in the Islamic Finance Industry. Turkish Journal of Islamic Economics, 12(2), 191-221.

DOI: 10.26414/A573
TUJISE, 12(2), 2025, 191-221.
tujise.org

Received: 12.05.2025
Revised: 14.05.2025
Accepted: 03.07.2025
Online First: 07.08.2025

Introduction

The modern world has undergone significant transformations due to environmental changes, population growth, and resource availability. These transformations can be categorized into four industrial revolutions, such as the introduction of hydraulics and steam power in manufacturing, harnessed electricity for large-scale production, the integration of electronics and information technology to automate the production of goods and services (Ali et al., 2019, p. 2), and AI with IoT influence production technologies, consumer behavior, and business models (Li et al., 2017), leading to the emergence of FinTech.

FinTech is a term derived from the combination of "Financial" and "Technology." Various definitions exist, with one of the earliest provided by Bettinger (1972, p. 62), who described it as *"an acronym which stands for financial technology, combining bank expertise with modern management science techniques and the computer."* Arner et al. (2015, p. 1) define FinTech as "*technology-enabled financial solutions.*" Schueffel (2017, p. 45) characterizes it as "*the combination of technology to be applied to the financial industry to improve financial activities.*" Oseni & Ali (2019, p. 4) expand on this definition, stating that *"FinTech includes blockchain applications and other web-based services utilized in the financial services industry as well as offline-to-online (O2O) and IoT applications."* Based on these definitions, the authors define FinTech as "the fusion of technology and financial services to enhance service quality and reduce costs."

Islamic finance is among the sectors that have embraced FinTech innovations. Islamic banking operates under the principles of Shariah (Islamic law), requiring financial institutions to adhere to Islamic guidelines and ethical principles. Both Muslim-majority and non-Muslim nations have adopted Islamic banking. The expansion of Islamic finance began in the early 1970s, following the establishment of two key institutions. The first experimental Islamic bank was introduced in the 1950s in a rural region of Pakistan, offering interest-free loans. Later, in 1963, economist Ahmed Elnaggar founded the first modern Islamic bank in Egypt (Visser, 2009, p. 94; Wilson, 1983b, p. 19).

Islamic banking growth has been largely driven by the ethical financial products that appeal to a diverse clientele. The growth has been influenced by technological advancements and the digitalization of financial services, leading to the emergence of financial technology (FinTech). Although FinTech existed long ago, its significance grew substantially following the 2008 global financial crisis. However, Islamic FinTech incorporates distinctive features such as Shariah transaction verification and Shariah-compliant Robo-advisory services, which are not typically required in conventional banking (Oseni & Ali, 2019, p. 4).

FinTech adoption also allows commercial banks to refine their traditional business models, reducing operational costs, improving service efficiency, and enhancing risk management while offering customer-centric financial solutions (Wang et al., 2020, p. 1). The Global Islamic FinTech Report 2023/24 projects that advancements in digital banking, blockchain, and AI-driven advisory services will propel the Islamic FinTech sector from $138 billion in 2022/23 to $306 billion by 2027. The Global Islamic FinTech (GIFT) Index highlights Malaysia, Saudi Arabia, and the UAE as key leaders in this growth, driven by favorable regulatory environments. This expansion enables Islamic financial institutions (IFIs) to scale their operations and attract a global, tech-savvy customer base (DinarStandard, 2024).

Islamic finance has experienced an 8.0% growth in assets in 2023, primarily due to the expansion of banking assets and the sukuk sector (S&P Global Rating, 2024). Saudi Arabia leads the FinTech market size, with a total size of $56.5 billion. Iran, Malaysia, the United Arab Emirates, Indonesia, and Indonesia are the top five leading countries for market size in 2022/23 [See Fig. 1 below].

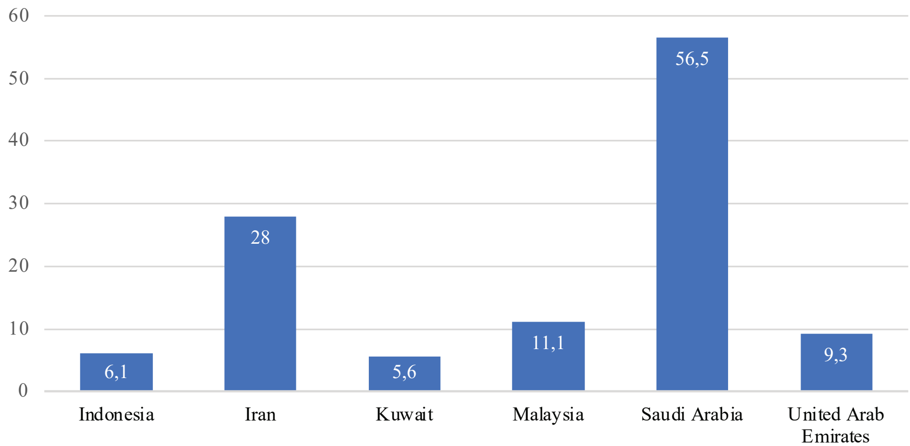

Figure 1: Top 6 Islamic FinTech Markets 2022/2023 (USD Billion)

Source: DinarStandard (2024, p. 9)

According to a report by DinarStandard (2024, p. 6), FinTech transactions in Islamic finance within Organization of Islamic Cooperation (OIC) member countries amounted to $137.5 billion in 2021. By 2026, this figure is projected to reach

$305.9 billion, with a growth rate of 17.3 percent. Figure 2 below illustrates the growth and future projections of FinTech transactions.

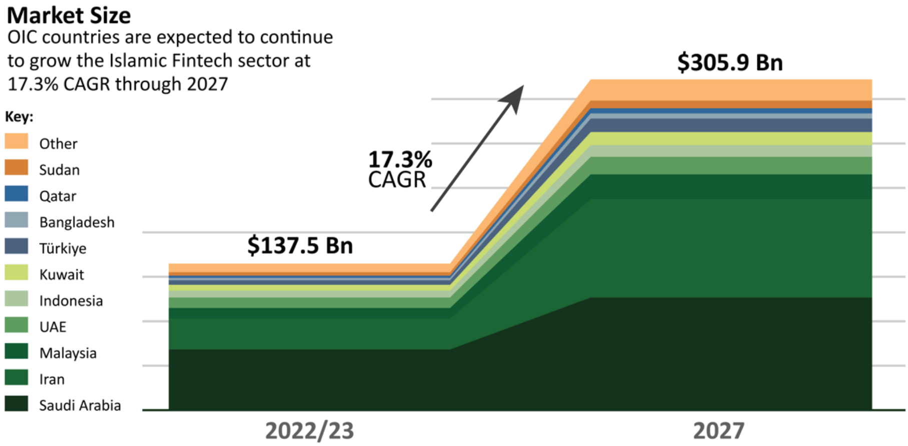

Figure 2: The Market Size of FinTech in OIC Countries

Source: DinarStandard (2024)

The adoption of FinTech is anticipated to introduce an innovative approach to financial services, improving global income levels and overall quality of life by enhancing financial inclusion worldwide (Schwab, 2016). However, concerns persist regarding the challenges and risks associated with its implementation. The rapid advancement of FinTech has garnered significant attention within the Islamic finance sectors, where it is viewed as a driving force for innovation, growth, operational efficiency, and competitive advantage. On the other hand, an increasing body of research highlights the negative implications of technological advancements, including their impact on employment, the environment, social interactions, and overall quality of life.

There is a noticeable gap in the existing literature concerning the perspectives of key stakeholders in the Islamic banks and finance sector on the impact of FinTech adoption. However, how do central bank regulators perceive the alignment of FinTech with a Shariah-compliant framework? The study hypothesizes that bank regulators perceive the positive and negative impacts of FinTech that enables financial inclusion while introducing unresolved Shariah and security risks. To answer the question above, the aims of the study are to (1) assess the extent to which FinTech adoption has influenced Islamic finance, (2) identify the challenges associated with integrating FinTech into Islamic finance, and (3) examine the perceptions of central bank regulators regarding FinTech adoption in Islamic finance.

Following the introduction, this study presents a comprehensive review of existing research on Islamic finance and FinTech adoption, impacts, and challenges while highlighting gaps in the current literature. The third section details the methodological approach followed by the fourth section, which discusses the findings obtained from the interviews, which are subsequently followed by the conclusion and recommendations.

Literature review

This section is organized into four subsections. The first subsection examines the impact of FinTech adoption within the Islamic banking sector. The second subsection reviews existing studies on perceptions regarding the effects of FinTech in Islamic banks. The third subsection gives gaps in the literature and the contribution of the study.

Impact of FinTech Adoption in Islamic Finance.

The evolution of technology, from the first industrial revolution to today, has transformed how individuals and institutions operate. While technological advancements bring many benefits, they also pose challenges. Positive impacts align with developers' and users' goals, while negative effects, though unwanted, often drive future innovations. Many studies have explored FinTech adoption in Islamic banking and finance, offering strategies to tackle its challenges.

Positive Impacts of FinTech Adoption in Islamic Finance

The integration of FinTech within Islamic banking has yielded multiple advantages, including improved financial inclusion, market expansion, enhanced operational efficiency, cost reduction, strengthened Shariah compliance, and the development of innovative financial products (Alzwi et al., 2024; Hamadou et al. 2024; M. Hasan, 2023; Ismamudi et al., 2023; Qudah et al., 2023).

The rapid expansion of FinTech has significantly transformed the global financial sector. In Islamic economics, Shariah-compliant FinTech serves as an innovative mechanism to foster sustainable financial inclusion (Ismamudi et al., 2023). Islamic FinTech broadens access to financial services, empowering individuals and microenterprises. Specific examples, such as Islamic digital payment systems and Shariah-compliant peer-to-peer lending platforms, demonstrate a positive impact on financial inclusion and economic growth in various communities (Hamadou et al., 2024).

Similarly, Qudah et al. (2023) and Hasan (2023) emphasize that FinTech enhances operational efficiency and cost-effectiveness. The integration of FinTech with Islamic finance increases transparency in financial transactions, reduces costs, and extends market reach (Qudah et al., 2023). Moreover, FinTech has the potential to revolutionize the Islamic finance sector by fostering cost savings, improving efficiency and transparency, and enhancing customer satisfaction. However, its successful implementation necessitates well-defined regulatory frameworks (Hasan, 2023).

Zhou et al. (2022), suggest that FinTech innovation significantly improves the overall productivity of businesses, facilitates industrial transformation, and promotes sustainable economic growth. Zhao et al. (2022) further argued that while FinTech adoption may reduce bank profitability and asset quality in large state-owned banks, it enhances capital adequacy and managerial efficiency.

Yasini et al. (2019) highlighted the role of FinTech in fostering financial inclusion through the development of digital financial products. Examples include mobile payment systems such as M-Pesa in East Africa, Mobicash in Pakistan, and TransferWise in the United Kingdom, which have extended financial services to previously underserved populations. Aisyah (2018, p. 380) noted that FinTech advancements in payment systems have facilitated seamless transactions, driven by widespread internet access and mobile technology. Similarly, Baber (2020, p. 217) emphasized that the digital payment infrastructure has a more significant influence on customer retention in Islamic banks than in conventional financial institutions.

Nzabri, Masron, & Malim (2020) found that FinTech adoption has positively impacted micro-entrepreneurs by enabling them to monitor their financial performance through digital tools, aiding business planning and decision-making. Additionally, El Amri et al. (2024), reported that FinTech has transformed payment systems within the Organization of Islamic Cooperation (OIC) member states by incorporating artificial intelligence (AI) for fraud detection, credit scoring, and personalized financial services. Robo-advisory services provide investment strategies, while blockchain technology enhances transparency. The report also notes a global shift towards cashless transactions through platforms such as Apple Pay and Google Pay.

FinTech adoption also allows commercial banks to refine their traditional business models, reducing operational costs, improving service efficiency, and enhancing risk management while offering customer-centric financial solutions (Wang et al., 2020, p. 1). The Global Islamic FinTech Report 2023/24 projects that advancements in digital banking, blockchain, and AI-driven advisory services will propel the Islamic FinTech sector from $138 billion in 2022/23 to $306 billion by 2027. The Global Islamic FinTech (GIFT) Index highlights Malaysia, Saudi Arabia, and the UAE as key leaders in this growth, driven by favorable regulatory environments. This expansion enables Islamic financial institutions (IFIs) to scale their operations and attract a global, tech-savvy customer base (DinarStandard, 2024).

Negative Impacts of FinTech Adoption in Islamic Finance

Although FinTech innovations aim to streamline financial operations and enhance efficiency, they also pose several challenges. Some of the key concerns include regulatory fragmentation, issues related to Shariah compliance in emerging technologies, market concentration and inequality, limited awareness and adoption, as well as operational and investment risks (M. Hasan, 2023; Hassan et al., 2022; Ines & Mohammed, 2024; Jumat et al., 2023).

Rafaheh (2024) identified Shariah compliance risks associated with FinTech, particularly in the use of smart contracts. These contracts may inadvertently incorporate terms that violate Islamic financial principles, such as *gharar* (uncertainty) or impermissible transactions. The challenge arises because most FinTech innovations originate from non-Muslim-majority countries, where compliance with Islamic law is not a primary consideration. Similarly, R. Hasan et al. (2020) analyzed the challenges of FinTech adoption in Islamic finance, concluding that Islamic financial institutions face greater regulatory and operational constraints compared to their conventional counterparts.

Alam et al. (2019a, p. 8) noted that one of the significant hurdles for Islamic financial institutions is the need to develop innovative products that not only comply with Shariah but also meet consumer expectations. Soualhi (2021) further elaborated on regulatory challenges, explaining that Islamic financial products initially replicated conventional financial instruments, resulting in compliance complexities.

Firmansyah et al. (2019) argued that while Islamic banks and financial institutions generally receive adequate governmental support, their primary challenge lies in regulatory frameworks. Many Muslim-majority countries lack comprehensive regulations to govern FinTech operations in Islamic finance, which are necessary to protect both investors and consumers. Effective regulatory frameworks should strike a balance between encouraging innovation and ensuring compliance with Islamic financial principles.

Soualhi (2021) also highlighted unresolved Shariah concerns regarding cryptocurrency and smart contracts. International Islamic regulatory bodies have yet to determine whether cryptocurrencies should be classified as legal tender, digital assets, or financial instruments. In Malaysia, for instance, cryptocurrencies are permitted only as exchangeable digital assets, rather than as a medium of exchange. This regulatory ambiguity continues to hinder widespread adoption in Islamic finance.

Another challenge is the decentralization versus Shariah oversight dilemma. Many FinTech platforms operate without direct supervision from Shariah boards, raising concerns about compliance. Billah et al. (2025) investigated the interconnections between decentralized finance (DeFi) and Islamic financial markets, finding limited integration between Sukuks, Islamic stock markets, and DeFi assets. However, a potential long-term connection between certain DeFi instruments and Sukuks suggests that DeFi could become more influential in the Islamic finance sector in the future.

Security risks also pose a significant challenge in FinTech adoption. Technological literacy remains a barrier, particularly among older generations who may struggle to adapt to digital financial services. Alam et al. (2019b) identified cybersecurity threats, including hacking and data breaches, as critical concerns in FinTech ecosystems. Startups often face additional constraints such as limited resources for cybersecurity, marketing, and customer acquisition. Schulz (2006) recommended implementing multi-layered security measures to safeguard sensitive financial information and mitigate risks associated with cyberattacks.

Perception of stakeholders on the adoption of FinTech in Islamic finance

The scarcity of regulators' opinions in the stakeholder analysis represents the significant oversight, as the central bank and regulatory authority ultimately provide the rulings and determine the legality and risk parameters of FinTech solutions. Regulators' opinions always provide the direction of whether the emerging technologies are embraced or are restricted. Their role to promote financial innovation makes their perspective unique and valuable for theorizing sustainable adoption models. This subsection reviews the perception of stakeholders on the adoption of FinTech in Islamic finance, filling a critical evidence gap in the stakeholder literature.

Research on stakeholder perceptions regarding the adoption of FinTech in Islamic finance remains relatively limited. One such study by Altwijry et al. (2021, p. 1) sought to develop and validate a Shari'ah-compliant FinTech Money Creation Free model for Islamic banking. Their study primarily focused on the challenges of money creation and explored the perspectives of shareholders. The findings indicated that FinTech presents significant advantages in addressing money creation-related challenges. Additionally, the study suggested that FinTech could encourage customers to utilize financial services more frequently and increase their savings. Furthermore, it was argued that the necessity for government supervision in money creation could be minimized, as the risk of unethical financial practices is comparatively lower.

Similarly, Samir (2019) examined the potential of blockchain technology in poverty alleviation and proposed that if blockchain technology is effectively implemented, it could ensure that financial resources reach underprivileged individuals seeking investment opportunities to improve their livelihoods. This would, in turn, assist governments in achieving their economic development objectives.

The increasing prominence of FinTech in Islamic finance has garnered significant attention from scholars and industry stakeholders. A substantial body of literature focuses on various aspects of FinTech, including its adoption, impact, and associated challenges, employing diverse research methodologies. As FinTech gains wider recognition, different stakeholder groups become increasingly aware of its applications based on their specific financial needs. However, a lack of understanding and awareness of FinTech among key players in the Islamic finance industry—such as researchers, students, banking professionals, and practitioners—could hinder the sector's future development (Ali et al., 2018).

Shah et al. (2019, p. 491) further highlighted that perceptions of FinTech services vary across different age groups. Their study found that younger individuals, being more technologically proficient, are more inclined to adopt FinTech services. In contrast, middle-aged adults utilize FinTech primarily for financial planning purposes.

Morgan and Trinh (2019, p. 5) investigated the relationship between financial literacy and the awareness and adoption of FinTech and revealed that financial literacy plays a crucial role in shaping FinTech awareness. However, factors such as educational attainment, professional background, and age also influence adoption rates. Their study further found that while 30 percent of mobile smartphone users had access to FinTech applications, only 4 percent actively utilized them.

Ali et al. (2018) examined FinTech awareness among Islamic banking and finance students in Pakistan. Their statistical analysis revealed that a considerable number of students lacked familiarity with FinTech concepts. Additionally, older students demonstrated a greater degree of unawareness compared to younger ones. The study concluded that younger individuals tend to be more technologically proficient and, therefore, more open to adopting FinTech innovations.

Gaps in the Literature

From the literature above, the topic of FinTech in Islamic banks has attracted the interest of researchers and scholars alike. Issues addressed include consumer behavior, product innovation, and FinTech acceptance. Nevertheless, there are issues that are yet to be addressed or have gained little attention from researchers, such as the viewpoint of policymakers and managers in regulatory bodies of the Islamic finance industry. The impacts of FinTech on customers and financial institutions have been addressed considerably. But such impacts on central banks and regulatory bodies are still unappreciated. Since regulatory bodies affect the framework of the operation of the banks and their innovation, addressing their viewpoint is necessary.

Research conducted by quantitative approaches might ignore the direct insight towards the challenge. These insights should be addressed in qualitative form, including the extent to which FinTech adoption has influenced Islamic finance, challenges associated with integrating FinTech into Islamic finance, and the perceptions of central bank regulators regarding FinTech adoption in Islamic finance. While several studies have examined the benefits and challenges of FinTech adoption, few have looked at how regulatory bodies balance them. Shari'ah compliance and technology advancement provide different challenges that need to be looked at.

This study makes several contributions to the industry. With the insight from the central banks, regulators from different jurisdictions provide opinions on the development of the framework and accommodating the challenges. The study examines the issues that were not addressed in the previous research or gained little attention, such as FinTech operation over different jurisdictions and the reconciliation of decentralized FinTech with centralized Shari'ah governance. It also offers insights on workforce balance by examining displacement of jobs and the emergence of new working opportunities. The findings give the directions for policymakers wishing to promote innovation while maintaining stability in the financial operation as well as religious compliance.

So, the study fills in the gap of debate between theoretical ideas of FinTech and governance issues. It gives the perspective of bank regulators, allowing the Islamic financial system to use the FinTech appropriately. For the financial institutions wishing to embrace FinTech, the study offers information that was missing from quantitative studies.

Conceptual Framework

The study adopts the Dual-Path Framework to examine the opinion of bank regulators on the adoption of FinTech in the Islamic banking and finance industry. The framework contains three components: enablers, barriers, and outcomes.

- **Enablers**: *Include the factors that enhance the Islamic banking and finance industry in the adoption of Shariah-compliant FinTech. These factors include the level of knowledge of the relevant stakeholders, the adoption of Shariah-compliant FinTech, the* positive impact of Shariah-compliant FinTech on the Islamic banking and finance industry, and the potential of Shariah-compliant FinTech in enhancing the effectiveness of the Islamic banking and finance industry.
- **Barriers:** *Prevent the full employment of Shariah-compliant FinTech in its potential in the Islamic banking and finance industry. This barrier is essentially the* challenges in the adoption of Shariah-compliant FinTech in the Islamic banking and finance industry. Such challenges could have negative impacts that include reduction of employment (human beings replaced by machines), effects on social fabrics, polluting the environment, undermining quality of life—stressful, and creating stiff competition with conventional banking and finance.
- **Outcomes**: *The outcome is the sustainable growth of the Islamic banking and finance industry. Furthermore, the stakeholders need to balance between the factors of enablers and the factors of barriers in order to enhance the former and mitigate all risks associated with the latter. Figure 3 below presents the framework of the study.*

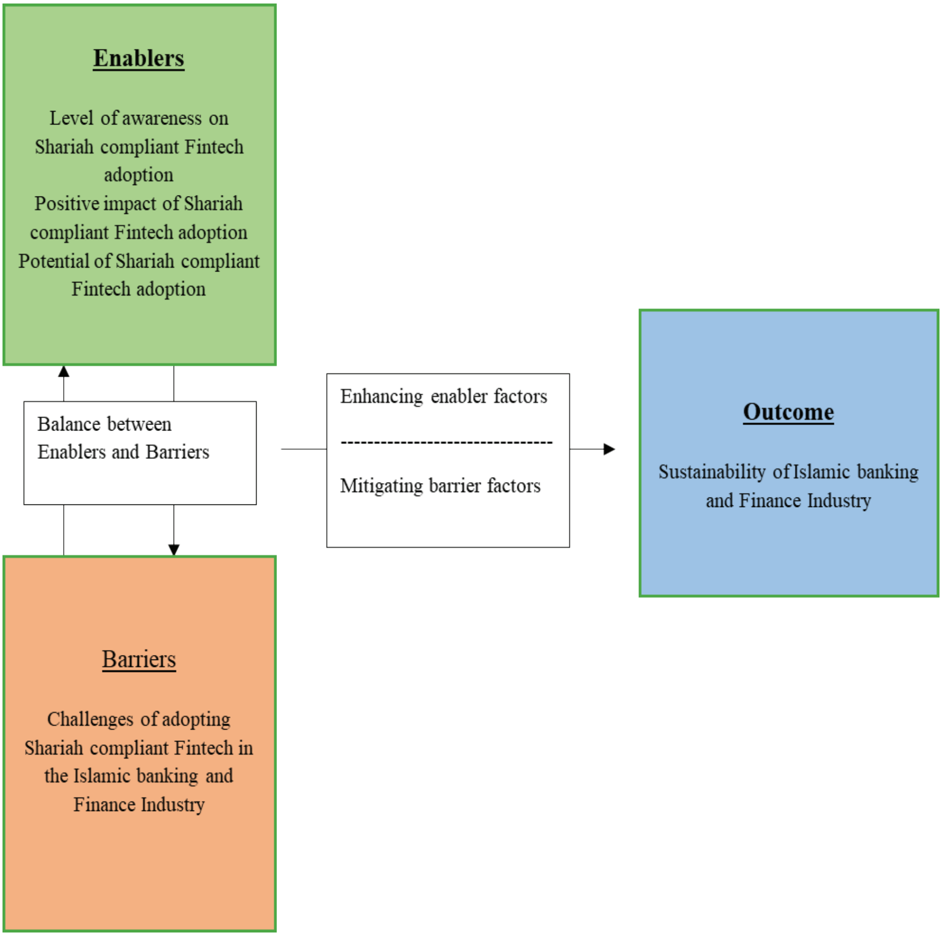

Figure 3: Dual-Path Framework on Enablers and Barriers to FinTech Adoption in Islamic Finance

Source: Authors

The interaction between enablers and barriers leads to the outcomes. On one hand, mitigating those challenges brings sustainable growth by increasing the financial inclusion and efficiency and improving the global competitiveness of Islamic finance. On the other hand, the failure of the challenges might lead to destabilization of risks, including cybersecurity risks, decline of consumer trust in the industry due to the Shari'ah compliance concern, and effects on market development across the globe. The balance between the outcomes depends on the effective cooperation between regulators and industry stakeholders to develop an adaptive framework that will enhance innovation while maintaining the principles of Islamic finance.

Methodology of the Study

To achieve the objectives of this study, a qualitative research methodology was adopted, employing semi-structured interviews as the primary data collection method. The study follows an exploratory research design, which is typically utilized when a research problem has not been clearly defined. According to Robson and McCartan (2002), exploratory research aims to *"identify ongoing developments, particularly in areas that are not well understood, gain new insights, pose relevant questions, reassess phenomena from a fresh perspective, and generate ideas or hypotheses for future studies."* This research design is particularly suitable, as qualitative approaches are more adaptable to capturing the perspectives and interpretations of participants (Patton, 2002).

The study focused on central bank regulators as the target population, considering their expertise and knowledge as a valuable source of information. The sampling technique employed was purposive sampling, specifically utilizing a non-probability snowball approach. Bryman & Bell (2015, p. 47) define purposive sampling as a method that involves selecting specific units—such as individuals, organizations, or documents—based on their direct relevance to the research questions.

Researchers employed 12 semi-structured, open-ended questions along with planned and spontaneous probing techniques to collect data, ensuring thorough coverage of key themes and deeper insights [See Table 1].

Table 1

Interview Questions

SN	Interview Questions
1	How do you rate your knowledge and understanding of FinTech, say from 1 to 10, and why?
2	To what extent are you versed in the Islamic finance industry, say from 1 to 10?
3	How much has the FinTech industry progressed over the years, and why?
4	To what extent has the Islamic banking and financial services industry progressed, and why?
5	What are the major challenges that the FinTech industry faces in relation to the Islamic banking and financial services industry?
6	Experts and people, in general, are optimistic about the positive impacts of the FinTech revolution. To what extent do you agree with this sentiment, and why?

7	How has the FinTech industry contributed positively or negatively to the following, and why? • Innovation • Efficiency • Growth • Quality of life • Competitive Advantage
8	Are there other emerging areas other than the ones listed above that reflect the positive impact of FinTech on the Islamic banking and financial services industry, and why?
9	The literature lists the following as reflecting the negative impact of the FinTech revolution on the Islamic banking and financial services industry. • Reduction of employment: human beings replaced by machines • Effect on social fabrics • Polluting the environment • Undermined Quality of Life—Stressful • Created stiff competition with conventional banks and finance Do you agree or disagree with this, and why? -
10	Are there other emerging negative impacts of FinTech on Islamic banking and financial services, and why?
11	What is your opinion about the future of FinTech in the Islamic banking and financial services industry?
12	Do you think Islamic banking and financial services will experience more positive or negative impacts with the continued progress of FinTech, and why?

Results and Analysis

This section presents the findings derived from the collected data. The questionnaire used in this retrospective analysis was meticulously reviewed to ensure that the gathered information was conveyed in a clear and comprehensible manner. The primary objective of this study is to examine the perspectives of bank regulators regarding the impact of FinTech on the Islamic finance industry.

The section is structured into three subsections. The first provides an overview of the profile of the experts. The second organizes the interview questions into relevant thematic categories. The third presents an in-depth discussion and analysis from the experts.

Profile of Experts

The backgrounds of the interviewed experts are presented in **Table 2** below. This table provides key demographic and professional information, including their gender, occupation, and affiliated institution. To maintain confidentiality, the experts' identities have been anonymized using coded labels. For instance, **Expert 1** is referred to as **(E1)**, **Expert 2** as **(E2)**, and so forth, up to **Expert 11 (E11)**.

Table 2

Profile of Experts

Experts	Gender	Professional	Organization
E1	M	Head of Section	Financial Sector Surveillance, Financial Stability Department, Bank of Uganda
E2	M	Senior Expert	Fiscal Services Department, Bulgarian National Bank
E3	M	In charge of the Securities Issuance and Registration Unit	Monetary Operation Department, Central Bank of Oman
E4	M	Leading Specialist	Economist, Accounting Department, National Bank of Kazakhstan
E5	M	Joint Director	Banking Inspection Department, State Bank of Pakistan
E6	M	Associate Analyst	Specialist Risk Unit, Central Bank of Malaysia
E7	M	Senior Associate	Legal Department, Astana Financial Services Authority, Kazakhstan
E8	M	Principal Examiner	Bank Examination Unit, Nigeria Deposit Insurance Corporation
E9	M	Secretary-General	Participation Banks Association of Turkey
E10	M	Head of Department	Banking Regulation and Supervision Agency, Turkey
E11	M	Senior Expert	Banks Supervision Department, Central Bank of Turkey

Results of the Qualitative Data

As previously discussed, the qualitative data collected were systematically categorized into four key themes corresponding to the interview questions. These themes include (1) preliminary theme, which examines the experts' awareness and understanding of FinTech within the Islamic finance industry; (2) full adoption of FinTech and the challenges faced by Islamic finance; (3) the impact of FinTech on the Islamic finance sector; and (4) the potential of FinTech in enhancing the effectiveness and performance of Islamic finance. Table 3 below presents an overview of these identified themes alongside their corresponding interview questions. The subsequent findings are structured and discussed in accordance with these four themes [refer to subsections 4.2.1 to 4.2.4].

Table 3

Themes Connected with Their Corresponding Interview Questions

Main Theme	Interview Questions
Knowledge and awareness of experts regarding FinTech and IBF	How do you rate your knowledge and understanding of FinTech, say from 1-10, and why?
	To what extent are you versed in the Islamic finance industry, say from 1-10?
Adoption of FinTech and Challenges Facing Islamic Banking and Finance	How much has the FinTech industry progressed over the years and why?
	To what extent has the Islamic banks and finance industry progressed, and why?
	What are the major challenges that the FinTech industry faces in relation to the Islamic banks and finance industry?

Impact of FinTech on the Islamic banking and financial services	Experts and people, in general, are optimistic about the positive impacts of the FinTech revolution. To what extent do you agree with this sentiment and why?
	How has the FinTech industry contributed positively to the following and why? Innovation Efficiency Growth Quality of life Competitive Advantage
	Are there other emerging areas other than the ones listed above that reflect the negative impact of FinTech on the Islamic banking and financial services industry and why?
	The literature lists the following as reflecting the negative impact of the FinTech revolution on the Islamic banking and financial services industry: Reduction of employment human being replaced by machines Effect on social Fabrics Polluting the environment Undermined Quality of Life -Stressful Created stiff competition with conventional banks and finance Do you agree or disagree with these lists and why? -
	Are there other emerging negative impacts of FinTech on Islamic banks and finance, and why?

Potential of FinTech in Enhancing the Effectiveness of Islamic Banks and Financial Services Performance	What is your opinion about the future of FinTech in the Islamic banking and financial services industry?
	Do you think Islamic finance will experience more positive or negative impacts with the continued progress of FinTech, and why?

Knowledge and awareness of experts regarding FinTech and IBF

This preliminary theme aimed to assess the knowledge and awareness of experts regarding the FinTech industry within Islamic banking and financial services. To facilitate interpretation, this theme was further divided into two sub-themes based on the research questions. The first sub-theme required experts to self-assess their knowledge of FinTech on a scale of 1 to 10, while the second sub-theme focused on their familiarity with the Islamic finance industry using the same scale.

Regarding FinTech knowledge, 63% (7 out of 11) of the experts demonstrated a high level of understanding, scoring above 50% on the scale. Conversely, 33% (4 out of 11) reported only basic knowledge or scored below 50%. Specifically, E2, E3, and E11 actively work in FinTech regulation, while E6, E7, and E8 have acquired knowledge through formal education and training courses. E1 primarily engages with FinTech as a user, whereas E5 and E10 possess only a general understanding of the industry.

In terms of knowledge of Islamic finance, 72% (8 out of 11) of the experts rated their understanding as high, with 27% (3 out of 11) scoring between 8 and 10, indicating near-perfect knowledge. Meanwhile, 27% (3 out of 11) reported only a basic understanding, primarily those from minority Muslim countries.

Findings indicate that FinTech and Islamic finance knowledge and skills differ by professional job and region. FinTech experts are more conversant with FinTech, whereas Islamic finance experts are more knowledgeable. Despite their inexperience, some individuals have gained broad understanding via coursework, training, or personal application.

Adoption of FinTech and Challenges Facing Islamic Banking and Finance

This section is structured into three sub-themes based on the study objectives: (1) the progress of the FinTech industry, (2) the development of Islamic finance and the reasons behind it, and (3) the key challenges hindering the adoption of FinTech in Islamic banking and finance.

Progress of the FinTech Industry

Experts unanimously acknowledged that the FinTech industry has experienced significant growth over the past two to three decades, primarily driven by technological advancements and internet accessibility. E5, E9, and E11 attributed this progress to rapid technological development, particularly in computing, over the last two to three decades, with significant acceleration in the past ten years. E1 suggested that this expansion is largely due to the demand for increased efficiency in financial transactions. Similarly, E3 emphasized the role of financial inclusion, asserting that the ability to provide financial access to a broader population has been a key driver. E4 highlighted the influence of financial institutions' investment in FinTech, while E6 suggested that the alignment of FinTech with modern banking operations has contributed to its growth. E8 noted that FinTech's competitiveness with traditional financial services has further fueled its expansion.

However, some experts expressed reservations regarding the extent of this progress. E2 argued that the industry has not advanced as much as expected, while E10 pointed out that FinTech organizations still hold a relatively small market share. From their perspective, the FinTech industry has yet to achieve even 40% of its potential.

In summary, while there is a consensus on the overall growth of FinTech, opinions vary regarding whether the progress reflects its full potential. The key drivers of its expansion include technological advancements, the need for efficiency, financial inclusion, and institutional investment. Conversely, concerns persist about its market penetration and untapped potential.

Progress of the Islamic Banking and Finance Industry

All experts agreed that Islamic finance has experienced growth over the years, albeit at varying rates. E1 highlighted that Islamic banking excels in transactions backed by real assets. E3 pointed out that the industry reached $3.3 trillion in 2023, with more than 1,800 Islamic financial institutions operating across more than 80 countries. E8 attributed the growth of Islamic finance to its value-based financing model, which appeals to individuals underserved by conventional banking systems. E9 emphasized the sector's expansion into new geographical markets and the increasing development of its FinTech segment.

Despite this progress, some experts believe that Islamic finance has not grown at the desired pace. E1 noted that a significant portion of global financial transactions still falls outside the scope of Islamic finance. E2 and E7 expressed concerns over slow growth, while E4 suggested that political constraints might be impeding expansion. E5 linked the industry's progress to global economic downturns, which may hinder smooth development. E6 acknowledged that Islamic banking is growing alongside conventional banking but highlighted emerging risks, governance issues, and cultural factors as areas requiring further examination. E9 argued that while the industry is expanding, its adherence to foundational Islamic principles is not necessarily evolving at the same rate. E11 identified Shariah compliance as a major challenge limiting growth.

Overall, while the Islamic finance industry is progressing, its growth trajectory is not uniform across all regions. Challenges such as political will, economic conditions, regulatory compliance, and adherence to Shariah principles continue to influence its development.

Major Challenges of FinTech Adoption in Islamic Banking and Finance

The adoption of FinTech in Islamic finance is a complex process that requires multiple stages of implementation. Experts identified several key challenges:

1. **Regulatory and Security Concerns**

- E1 highlighted concerns over transaction anonymity, financial crimes, tax evasion, and financial stability risks.
- E3 emphasized cybersecurity risks and competition from conventional financial institutions.
- E7 pointed out regulatory challenges and the lack of professionals in Kazakhstan specializing in FinTech and Islamic finance.

2. **Lack of Awareness and Market Readiness**

- E2 and E6 noted that limited awareness of market dynamics and technological innovations hinders FinTech adoption.
- E8 argued that FinTech's acceptability remains low due to continuous technological advancements, which create adaptation challenges.
- E9 pointed out that the Islamic finance sector is significantly smaller than conventional banking, making it difficult to allocate sufficient resources to FinTech integration.

3. **Shariah Compliance**

- E8, E10, and E11 cited Shariah compliance as a major challenge, as financial innovations must align with Islamic legal principles.

- E9 expressed concerns that while the industry is expanding, its adherence to core Islamic finance principles remains uncertain.

4. **Industry-Specific Limitations**

E5 identified five key challenges:

a) Islamic finances are still in the growth stage and have yet to mature.

b) Limited understanding of Islamic finance among IT professionals.

c) Islamic finance experts lack familiarity with FinTech and IT advancements.

d) Both Islamic finance and FinTech sectors face regulatory and legal constraints.

e) The diverse experiences of Islamic finance across different regions make it difficult to implement standardized FinTech solutions.

In conclusion, regulatory compliance, industry knowledge, financial constraints, cybersecurity threats, and Shariah compliance are the main FinTech adoption challenges for Islamic finance.

Impact of FinTech on Islamic Banking and Financial Services

This section explores the impact of FinTech on Islamic banking and financial services. The analysis is divided into two main categories below based on expert opinions:

Positive Impact of FinTech on Islamic Banking and Financial Services

The discussion on the positive impact of FinTech is further divided into two sub-themes: (i) expert perceptions of the benefits and (ii) specific areas where FinTech positively influences Islamic finance.

(i) Expert Perceptions on the Positive Impact of FinTech

Most experts agreed that FinTech has significantly improved the efficiency and growth of financial transactions. **E1, E2, E4, and E9** highlighted that FinTech enhances efficiency, making financial transactions faster and more accessible. **E1, E2, E4, and E10** added that FinTech eliminates obstacles to accessing financial services and has a promising future.

E3 emphasized that FinTech enables Islamic banks to attract more customers, reduce costs, expand product offerings, and enhance competitiveness against conventional finance without sacrificing profitability. **E5** noted that FinTech has broadened financial access, reaching a larger segment of the population. **E8** pointed out that the new generation is highly engaged with technology, making FinTech an essential tool for the advancement of Islamic finance.

However, **E6** agreed with the positive impact but stressed the need for greater awareness and education, particularly for financially excluded populations who might find FinTech difficult to navigate. **E7** argued that FinTech is still in an evolutionary phase and will develop further in the coming decade, driven by increasing regulatory attention. **E10** was cautious, acknowledging the cost advantages of FinTech while also pointing out its complexity and security risks. **E11** suggested that the perception of positive impacts is largely due to insufficient awareness of FinTech's potential drawbacks.

(ii) Key Positive Impacts of FinTech

All experts agreed that FinTech positively influences Islamic finance in five key areas:

1. **Innovation**

- Enhances value creation by developing new financial products and services.
- Expands financial inclusion, making services accessible to a broader population.
- Increases awareness and education about financial services.

2. **Efficiency**

- Reduces operational costs by minimizing the need for human resources.
- Improves the speed and convenience of financial transactions.
- Enhances marketing strategies and outreach.

3. **Growth**

- Higher efficiency leads to greater market penetration and customer acquisition.

4. **Quality of Life**

- Improves financial accessibility, making transactions smoother and more convenient.

5. **Competitive Advantage**

- Provides quicker and easier financial solutions.
- Initially benefits larger financial institutions, but smaller firms can leverage FinTech for crowdfunding and microfinance.

Expert opinions on the impact of FinTech on Islamic finance fall into three categories:

Majority View: FinTech has substantial positive effects.

Moderate View: Positive effects are currently visible, but a larger impact is expected in the future.

Skeptical View: Some experts remain unconvinced, particularly regarding its effects on quality of life and competitive advantage.

Despite some skepticism, FinTech is widely regarded as a force for innovation, efficiency, growth, and financial inclusion in the Islamic finance industry.

Negative Impact of FinTech on Islamic Banks and Finance

The discussion on the negative impacts of FinTech focuses on five main concerns as shown below.

1. Impact on Employment

All experts agreed that FinTech reduces the demand for human labor. However, some experts argued that while automation replaces certain jobs, it also creates new employment opportunities in the technology sector.

2. Impact on Social Structures

Opinions were divided on whether FinTech negatively affects social structures:

- E1, E3, E4, E5, E6, E8, and E9 believed that FinTech disrupts traditional banking relationships and human interactions in financial services.
- E2, E11, and E12 argued that FinTech does not negatively impact social structures.

3. Environmental Impact

Most experts agreed that FinTech has minimal negative environmental impact since it promotes paperless transactions (**E2, E6, E8, E9, E10, and E11**). However, **E1, E3, E4, and E5** suggested that there may be some environmental concerns but did not specify them.

4. Impact on Quality of Life

- E1, E2, E8, E9, E10, and E11 believed that FinTech improves the quality of life by making financial services more convenient.

- E3, E4, E5, and E6 argued that FinTech adds complexity and stress, which could reduce overall well-being.

5. Increased Competition with Conventional Banking

- E1, E3, E5, E6, and E10 stated that FinTech has intensified competition between Islamic and conventional banks.
- Other experts disagreed, believing that the competition is not yet a major issue.

6. Additional Concerns

Other negative impacts mentioned by experts include:

- **Financial crime risks** (e.g., money laundering and terrorism financing) due to transaction anonymity (**E1**).
- **Cybersecurity threats** (**E3**).
- **Uncertain regulatory frameworks** (**E5**), making it difficult to manage financial risks effectively.
- **Shariah compliance challenges** arising from blockchain and other financial technologies (**E10**).

While FinTech presents some risks—such as job displacement, regulatory uncertainty, and cybersecurity threats—experts agree that its benefits outweigh its drawbacks. Many believe that the focus should remain on leveraging FinTech's advantages rather than overemphasizing its potential downsides.

Potential of FinTech in Enhancing the Effectiveness of Islamic Banks and Financial Performance

This section explores the potential of FinTech in improving the effectiveness of Islamic banks and financial performance. The discussion is divided into two sub-themes as shown below.

Future of FinTech in Islamic Banking and Finance

Experts were asked to share their perspectives on how FinTech will shape the future of Islamic banks and finance. The general consensus is that FinTech will continue to grow and significantly impact the sector. E1 and E2 believe that FinTech will enhance financial inclusion, improve accessibility to funding, and expand the sector's market share. E3 foresees a bright future for FinTech in Islamic finance, leading to improvements in users' quality of life. Similarly, E4 suggests that as the broader FinTech industry grows, Islamic banks and finance will also benefit, especially if FinTech becomes as influential as the IT industry. E5 highlights the urgency for financial institutions to adopt FinTech quickly, with appropriate regulatory controls and stakeholder capacity building. E8 argues that FinTech will shape the Islamic finance industry by making banking operations easier for both institutions and customers.

However, some experts expressed concerns. E6 stresses the need to assess and manage emerging risks associated with FinTech in Islamic banking, as its impact extends beyond financial institutions to society as a whole. E10 doubts that Islamic banks and finance have the capability to develop a unique and original approach to FinTech. E11 acknowledges the potential for growth but believes FinTech adoption in Islamic banking might take time.

In summary, the future of FinTech in Islamic finance appears promising. Experts believe it will drive growth, enhance efficiency, and increase awareness, ultimately attracting new customers. However, concerns regarding risk management, regulatory adaptation, and the sector's ability to develop FinTech-specific solutions remain.

Future Impact of FinTech on Islamic Banking and Finance

Experts were also asked to predict the potential impact of FinTech on Islamic banking—whether it will be predominantly positive or negative. The majority believe that the future impact will be positive. E1, E2, E4, E9, E10, and E11 are confident that FinTech will bring long-term benefits, particularly in making financial services more accessible and reinforcing Shariah compliance, as highlighted by E4 and E11. E5 argues that the impact will vary depending on how each institution integrates FinTech into its products, processes, and marketing strategies. E6 takes a balanced stance, stating that both positive and negative impacts are currently equal, and the outcome will depend on how challenges are addressed. E8 believes that Islamic banks and finance will experience both positive and negative impacts, with the scale of each determined by how the sector adapts to FinTech advancements.

Regarding potential negative impacts, some experts raised specific concerns. E3 warns that if not properly managed, FinTech could introduce Shariah compliance risks and reputational risks for Islamic banks. These risks could arise from inadequate oversight of digital financial transactions or the adoption of financial technologies that may not align with Islamic finance principles.

While the future is uncertain, experts generally express optimism about FinTech's role in Islamic banking. Many challenges will likely find solutions over time, making the future outlook largely positive. Despite some concerns, the prevailing view is that the benefits of FinTech will outweigh its risks, provided the sector takes proactive measures to address emerging issues.

Conclusion

There has been a growing interest in FinTech within the Islamic finance industry. This has led to the development of new financial products and services, along with a transformation in the way business is conducted. Additionally, international trade through online platforms has expanded, supported by multiple payment methods that cater to a global audience. The rise of the FinTech industry within Islamic finance has significantly contributed to the growth and enhancement of financial services offered by Islamic financial institutions.

The study finds that the integration of FinTech into Islamic finance is inevitable. Experts unanimously agree that FinTech plays a crucial role in the industry, particularly in driving financial inclusion by reaching a large portion of the unbanked population. The accessibility of financial services through mobile devices has allowed many individuals to engage with financial transactions without requiring a traditional bank account. This has contributed to greater financial inclusion and convenience for users. Despite the numerous benefits, there are also some negative impacts associated with FinTech. One of the major concerns is job displacement, as automation and digital processes replace traditional banking roles. Additionally, FinTech has altered the close relationship that once existed between bank staff and customers, making financial interactions less personal. However, some experts argue that focusing on these negative aspects should not overshadow the many advantages that FinTech brings to the industry. The adoption of FinTech in Islamic finance is not without challenges. Experts identify key obstacles such as awareness, the size of financial institutions, security concerns, and the need for strict adherence to Shariah compliance. Addressing these challenges is essential for ensuring a smooth and effective integration of FinTech into the industry.

The study's findings show several key areas where the regulatory challenges can be employed to enhance the adoption of FinTech in Islamic finance. Referring to the insight from E3, E7, and E10 over multiple jurisdictions, several recommendations are given addressing both current challenges and future opportunities. The first recommendation includes the development of a regulatory sandbox center providing the Shari'ah-compliant solution on FinTech matters with a lesson from Bank Negara Malaysia (2023). This approach focuses on uncertainty regarding the Shari'ah compliance that E3 and E5 comment is a major barrier. These frameworks will enable the financial institutions and startups to embrace the FinTech while experimenting with the solution, adhering to the Islamic finance principles, and innovating within appropriate boundaries. This includes the framework on matters relating to such things as AI, blockchain, and smart contracts, as commented by E4 and E10. The Shari'ah committee can be established to oversee and evaluate their compliance with Islamic finance principles.

The regulatory differences, referred to as the decentralization of finance and cross-border transactions, also rise as the major challenge, according to experts E7 and E11. The study recommends that to address this challenge, the collaboration between stakeholders such as OIC member countries develop harmonized standards to be employed by the members for emerging innovations such as blockchain and smart contracts. Such harmonization will facilitate the market integration in different jurisdictions with consistent Shari'ah governance. For policy intervention, human resources development is also highlighted as a crucial area. The study suggests that the banks should provide mandatory FinTech literacy training for Islamic bank professionals to create awareness and fill the knowledge gap that experts E6 and E9 identified. The training will enhance the fast adoption of FinTech while maintaining essential Shari'ah governance. For security concerns, as stated by E1 and E8, the study recommends the development of cybersecurity guidelines for Islamic FinTech and the conduct of regular security audits and performance testing of digital financial infrastructure to protect the privacy of customers and sensitive information.

Jointly, these policy recommendations offer the optimal balance between financial innovation and maintaining stability and ethical principles of Islamic finance. Future regulation development should engage stakeholders, especially between Shariah scholars and technology experts, to address new challenges at the intersection of finance and technology. By implementing this, the supportive environment for sustainable growth can be developed while mitigating potential risk in Islamic FinTech adoption.

Future research should compare regulatory frameworks applied in FinTech within the OIC countries, mainly focusing on how the governance model affects innovation and shariah compliance, while also examining the potential of emerging technologies such as AI, robo-advisors, and decentralized finance (DeFi) through empirical study to be able to analyze the economic impacts and other risks and how aligned they are with Maqasid al-Shariah. In addition, the application of longitudinal data can be used to examine the impact on the adoption of FinTech and analyze both job displacement and the creation of new tech-driven jobs together with studies on the development of a standardized framework that will be used to examine and analyze the Shari'ah compliance of blockchain-based products and smart contracts to create the bridge between technology innovation and religious oversight in Islamic finance.

References

Aisyah, M. (2018). Islamic Bank Service Quality. *Al-Iqtishad: Jurnal Ilmu Ekonomi Syariah (Journal of Islamic Economics)*, *10*(2), 367–388.

Alam, N., Gupta, L., & Zameni, A. (2019a). Challenges and Success Factors for Islamic Fintech. In *Fintech and Islamic Finance* (pp. 159–173). Springer International Publishing. https://doi.org/10.1007/978-3-030-24666-2_9

Alam, N., Gupta, L., & Zameni, A. (2019b). Fintech Emergence and Global Evolution. In *Fintech and Islamic Finance* (pp. 11–35). Springer International Publishing. https://doi.org/10.1007/978-3-030-24666-2_2

Ali, H., Abdullah, R., & Zaki Zaini, M. (2019). Fintech and Its Potential Impact on Islamic Banking and Finance Industry: A Case Study of Brunei Darussalam and Malaysia. *International Journal of Islamic Economics and Finance (IJIEF)*, *2*(1), 73–108. https://doi.org/10.18196/ijief.2116

Ali, H., Zaki Zain, M., Saqib Hashmi, H., Hassan Abbas, M., Waqas Shahid, M., & Tariq, U. (2018). Awareness and Knowledge of Fintech among Islamic Banking and Finance Students in Pakistan. *Islamic Banking and Finance Review*, *05*(01), 01–22. https://doi.org/10.32350/ibfr.2018.05.01

Altwijry, O. I., Mohammed, M. O., Hassan, M. K., & Selim, M. (2021). Developing a Shari'ah based FinTech money creation free [SFMCF] model for Islamic banking. *International Journal of Islamic and Middle Eastern Finance and Management*. https://doi.org/10.1108/IMEFM-05-2021-0189

Alzwi, A. S., Jaber, J. J., Rohuma, H. N., & Omari, R. Al. (2024). Evaluation of Total Risk-Weighted Assets in Islamic Banking through Fintech Innovations. *Journal of Risk and Financial Management*, *17*(7), 288. https://doi.org/10.3390/jrfm17070288

Arner, D. W., Barberis, J. N., & Buckley, R. P. (2015). The Evolution of Fintech: A New Post-Crisis Paradigm? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2676553

Baber, H. (2020). Impact of FinTech on customer retention in Islamic banks of Malaysia. *International Journal of Business and Systems Research*, *14*(2), 217–227. https://doi.org/10.1504/IJBSR.2020.106279

Bank Negara Malaysia. (2023). *Regulatory Sandbox*. Financial Development & Innovation. https://www.bnm.gov.my/sandbox

Bettinger, A. (1972). *Fintech: A series of 40-time shared models used at manufacturers Hanover trust company*. *2*(4), 62–63.

Billah, M., Enamul Hoque, M., Hadhri, S., & Do, H. X. (2025). Tail risk connectedness between DeFi and Islamic assets and their determinants. *International Review of Economics & Finance*, *97*, 103789. https://doi.org/10.1016/j.iref.2024.103789

Bryman, A., & Bell, E. (2015). *Business Research Methods*. Oxford: Oxford University Press.

DinarStandard. (2024). *Global Islamic Fintech Report 2023/24*. https://salaamgateway.com/reports/state-of-the-global-islamic-economy-2023-report

El Amri, M. C., Oseni, U., Mohammed, M. O., Bekiroğlu, A., Chachi, A., Dinç, Y., & Modan, C. (2024). *Digital Transformation of Payment Systems in OIC Member Countries 2024*. http://ebook.comcec.org/Kutuphane/Icerik/b9155875-460a-463b-8766-799c7cc5514b.pdf

Firmansyah, E. A., & Anwar, M. (2019). Islamic Financial Technology (Fintech): Its Challenges and Prospect. *Advances in Social Science, Education and Humanities Research (ASSEHR*, *216*(2018), 52–58. https://doi.org/10.2991/assdg-18.2019.5

Hamadou, I., & Suleman, U. (2024). FinTech and Islamic Finance: Opportunities and Challenges. In *The Future of Islamic Finance* (pp. 175–188). Emerald Publishing Limited. https://doi.org/10.1108/978-1-83549-906-120241011

Hasan, M. (2023). The Impact of Financial Technology (Fintech) on the Financial and Banking Services Sector and Its Applications in the Islamic Financial Industry. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.4369683

Hasan, R., Hassan, M. K., & Aliyu, S. (2020). Fintech and Islamic Finance: Literature Review and Research Agenda. *International Journal of Islamic Economics and Finance (IJIEF)*, *3*(1), 75–94. https://doi.org/10.18196/ijief.2122

Hassan, M. K., Rabbani, M. R., & Rashid, M. (2022). *FinTech in Islamic Financial Institutions* (M. K. Hassan, M. R. Rabbani, & M. Rashid, Eds.). Springer International Publishing. https://doi.org/10.1007/978-3-031-14941-2

Ines, S., & Mohammed, G. (2024). A Statistical Analysis of Islamic Finance and Global Islamic Fintech: Reality and. *Remittances Review*, *9*(4). https://doi.org/10.33282/rr.vx9i2.110

Ismamudi, I., Alcoriza, G. B., Marzuki, M., & Bani, M. '. (2023). Islamic Fintech and Financial Inclusion: Innovations for Sustainable Economic Empowerment. *DEAL: International Journal of Economics and Business*, *1*(1). https://jurnal.pelitabangsa.ac.id/index.php/deal

Jumat, Z. H., Hafiz Khateeb, S., & Nazim Ali, S. (2023). *Islamic Finance, FinTech, and the Road to Sustainability* (Z. H. Jumat, S. Hafiz Khateeb, & S. Nazim Ali, Eds.). Springer International Publishing. https://doi.org/10.1007/978-3-031-13302-2

Li, G., Hou, Y., & Wu, A. (2017). Fourth Industrial Revolution: technological drivers, impacts and coping methods. *Chinese Geographical Science*, *27*(4), 626–637. https://doi.org/10.1007/s11769-017-0890-x

Morgan, P. J., & Trinh, L. Q. (2019). Fintech and Financial Literacy in the Lao PDR. *SSRN Electronic Journal*, *933*. https://doi.org/10.2139/ssrn.3398235

Nzabri, M. Z. M., Masron, T. A., & Malim, N. A. K. (2020). The utilization of Islamic fintech (i-fintech) in promoting sustainable inclusive growth: evidence from micro-entrepreneurs in Malaysia. *Journal of Islamic Monetary Economics and Finance*, *6*(3), 555–576. https://doi.org/10.21098/jimf.v6i3.1180

Oseni, U. A., & Ali, S. N. (2019). *Fintech in Islamic Finance; Theory and Practice* (U. A. Oseni & S. N. Ali, Eds.). New York, NY 10017.

Patton, M. Q. (2002). *Qualitative Research and Evaluation Methods*.

Qudah, H., Malahim, S., Airout, R., Alomari, M., Hamour, A. A., & Alqudah, M. (2023). Islamic Finance in the Era of Financial Technology: A Bibliometric Review of Future Trends. *International Journal of Financial Studies*, *11*(2), 76. https://doi.org/10.3390/ijfs11020076

Rafaheh, N. R. (2024). Smart Contracts and the Possibility of Gharar. *Islamic Economics International Refereed Journal*, *2*(1). https://doi.org/doi.org/10.59202/ieco.v2i1.787

Robson, C., & McCartan, K. (2002). *Real world research : a resource for users of social research methods in applied settings*. 533.

Samir, N. (2019, January 7). *Using blockchain for poverty alleviation*. Opinion - The Jakarta Post. https://www.thejakartapost.com/academia/2019/01/07/using-blockchain-for-poverty-alleviation.html

Schueffel, P. (2017). Taming the Beast: A Scientific Definition of Fintech. *Journal of Innovation Management*, *4*(4), 32–54. https://doi.org/10.24840/2183-0606_004.004_0004

Schulz, G. (2006, August 13). *Top 10 ways to secure your stored data* . Computerworld. https://www.computerworld.com/article/2546352/top-10-ways-to-secure-your-stored-data.html

Schwab, K. (2016). The Fourth Industrial Revolution: what it means and how to respond. *World Economic Forum*, 1–7. https://www.foreignaffairs.com/articles/2015-12-12/fourth-industrial-revolution

Shah, C., Jain, A., Ahmed, S., Khandelwal, N., & Misra, S. (2019). Fintech and Adoption Model: A User Perspective. *Adalya Journal*, *8*(12), 488.

Soualhi, Y. (2021). Islamic Fintech : Issues , Challenges and Prospects. *Islamic Economic Assocciation*, 18.

S&P Global Rating. (2024). Islamic Finance 2024-2025: Resilient Growth Anticipated Despite Missed Opportunities. *Explore S7P Global*. https://www.spglobal.com/ratings/en/research/articles/240429-islamic-finance-2024-2025-resilient-growth-anticipated-despite-missed-opportunities-13074068

Visser, H. (2009). *Islamic Finance: Principles and Practice*.

Wang, Y., Xiuping, S., & Zhang, Q. (2020). *Can fintech improve the efficiency of commercial banks?-An analysis based on big data*. https://doi.org/10.1016/j.ribaf.2020.101338

Wilson, R. (1983). Emergence of Modern Banking. In *Banking and Finance in the Arab Middle East*. Palgrave Macmillan UK. https://doi.org/10.1007/978-1-349-04817-5_2

Yasini, S., & Yasini, M. (2019). Current trends and future impacts of fintech in Islamic finance. In *Fintech In Islamic Finance* (pp. 327–335). Routledge. https://doi.org/10.4324/9781351025584-20

Zhao, J., Li, X., Yu, C. H., Chen, S., & Lee, C. C. (2022). Riding the FinTech innovation wave: FinTech, patents and bank performance. *Journal of International Money and Finance*, *122*. https://doi.org/10.1016/j.jimonfin.2021.102552

Zhou, G., Zhu, J., & Luo, S. (2022). The impact of fintech innovation on green growth in China: Mediating effect of green finance. *Ecological Economics*, *193*, 107308. https://doi.org/10.1016/j.ecolecon.2021.107308