

Newly Developed Financial Technologies and their Implementation Challenges in Islamic Banks The Saudi Arabian Experience

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Abstract: The present study aims to show the implementations of modern financial technologies in Islamic banks, such as the block chain, cryp to currencies, and smart contracts. It also aims to highlight their areas of use and to clarify the challenges of implementing them in the Islamic banks of Saudi Arabia. The study concluded with several results, notably that financial technology, via its techniques, has contributed to the spread and development of Islamic finance. In addition, the increased use of these technologies in Saudi Arabian Islamic banks has made of the latter a main center for Islamic banking.

Keywords: Financial Products , Financial Technology , Islamic Banks.

(JEL) Classification : G20, O33, G32.

1. Introduction

In light of the rapid changes the world has known recently, financial focus is now directed towards a world of technology and innovation, as the financial sector has become heavily reliant on technological developments, and as innovations in this field have given rise to profound changes in the mechanisms of investment financing. These changes are not limited to the use of traditional financial resources, but extend to include modern financial innovations, starting from electronic financing platforms and the use of artificial intelligence techniques, cryptography, and block chains, up to developing and introducing new concepts such as green and sustainable finance. In light of these changes, several Islamic banks have rushed to benefit from these new technologies so as to increase their competitiveness, satisfy their customers, and realize higher levels of transparency, speed and security in banking services.

Statement of the Problem

From what has been stated above, the following study problem can be posed:

- What is the reality of the use of modern financial technologies in Islamic banks, and what are the challenges related to their application?

From the main problem statement, the following sub-questions can be asked:

- What are the applications of modern financial technologies?
- What are the advantages that modern financial technologies introduce?
- What is the reality of the use of modern financial technologies in the Islamic banks under study?
- What are the challenges that Islamic banks face in adopting modern financial technologies?

Aims of the Study

The Present Study Aims at:

- Highlighting modern financial technologies.
- Knowing the forms of modern financial technologies and the mechanisms of their implementation.
- Introducing the experience of some Islamic banks in using the applications of modern financial technologies.

Methodology of Research

The descriptive method has been adopted in the present study to introduce the various aspects related to modern financial technologies, together with the analytical method to highlight the importance of the applications of Islamic financial technologies used in the banks under study.

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2. Conceptual Framework for Financial Technologies

2.1. Definition of Financial Technologies:

The concept “financial technologies” is composed of (Finance and Technology), which means in its broad sense the application of technology in financial industry; it encompasses a wide range of financial services such as lending, investment, payment, risk management, data analysis, insurance, and wealth management. The Finance Stability Board (FSB), to its turn, defines financial technologies as being “Innovations in the domain of financial services by the use of technologies resulting in new business models, applications, processes, or products with an impact on how to provide financial services” ” (Elhajouji, 2024, p. 462).

2.2. Motivations for Using Financial Technologies:

There are several reasons and advantages that encourage many people to use financial technologies, among which (Olaniyi & Adeoye, 2016, pp. 310-336.):

- Providing new products and services designed to meet evolving needs of the customers.
- Low costs and time saving.
- Instant payments and providing greater payment options.
- Using digital platforms for government revenue collection and payments.
- Service facilitation.
- Facilitating access to finance for individuals and owners of small and medium enterprises who lack adequate banking services.
- The expansion use of technological means by banks contributes to increase efficiency, strengthen risk management, and improve compliance with norms and regulations.
- Achieving higher and more inclusive growth for all segments of the population.

2.3. Types of Modern Financial Technologies:

- 2.3 .1. Block Chain:** It is a peer-to-peer public record, ruled by a distributed network of computer. It does not require a central authority or an external intermediary (Wulli & Simplice, 2022, p. 175).
- 2.3. 2. Smart Contracts:** They are agreements between two or more parties that can be electronically programmed and automatically executed when given events and predefined conditions are present. “Smart contracts are executed via a chain of computers related by Oracle technology,” (Vanessa & Nicolas, 2017, p. 91) .
- 2.3.3. Cryptocurrencies:** They are digital currencies in which cryptographic techniques are used to regulate their products and secure fund transfers without any dependency on central banks (Lahsen & Abdessamad, 2018, p. 165).
- 2.3.4. Artificial Intelligence:** It is the ability of a machine to perform cognitive functions which associates it with the human mind, such as perception, reasoning, learning, interacting with the environment, and solving problems.
- 2.3.5. Cloud Computing:** It is a multiuse technique that uses data stored on a server through the internet via a shared network of a group of computers known for high speed and cost efficiency (Lakshmi & Jansi, 2018, p. 802).

3. Current Trends in the Market of financial Technologies

3.1. World Investments in the Sector of Financial Technologies:

The sector of financial technology represents one of the fastest sectors in terms of development at a global scale in light of the great developments in digital financial innovations, as the technological innovations applied on financing have been widely adopted by consumers and companies, benefiting from the drawbacks of the traditional banking system. This is achieved through financial technology companies, providing solutions that meet the current needs of companies and consumers in terms of accessibility, speed, and diversity (Lee & Shin, 2018, p. 35). This can be seen through applications that help track and facilitate personal investment, make quick payments and money transfers by the use of smart phones. Today, financial technology addresses all aspects of the world of finance, with reports indicating that the market of financial technology is experiencing rapid growth due to increased reliance on it, especially in light of world conditions during and after the corona disease.

The market of investments has witnessed in this domain a big increase during the last few years thanks to technological advance and the change of consumers’ attitudes towards digital payment solutions. This requires investments of over 200 billion dollars, which is likely to generate a significant trend in innovation in the domain of finance. Financial institutions are aware of the intertwined importance of these technologies which helps generate startups and companies working on innovations that relate to payments, block chain, digital banking, and insurance. The data in the following table illustrate the development of the volume of global investments in financial technologies during the period from 2016 to 2024:

Table (01) : Evolution of Financial Technology Market Size during the Period from 2016 to 2024 billion dollars

year	2016	2017	2018	2019	2020	2021	2022	2023	2024
Market size	110	128.9	149.7	173.9	202	234.7	272.8	316.9	340.1

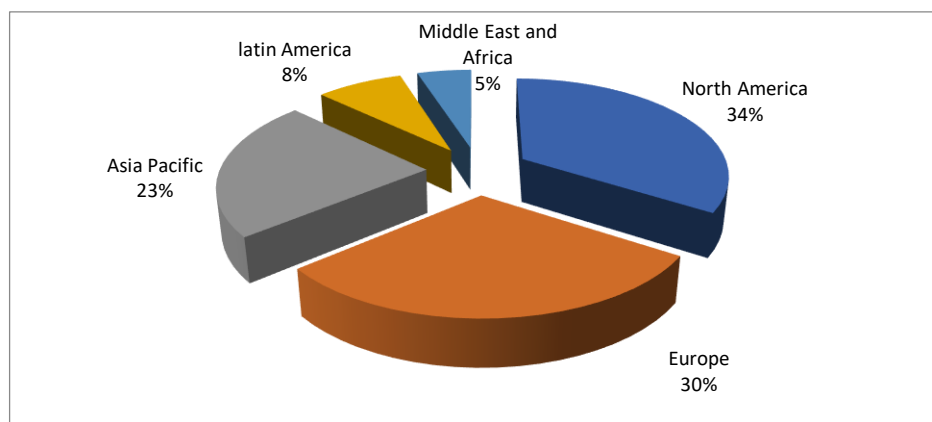
Source : (Fortune Business Insights, 2025, pp. 3- 6)

The data in the previous table show that there has been a continuous increase in the size of the global financial technology market, rising from 110 billion dollars in 2016 to around 340.1 billion dollars in 2024. This big increase of registered investments is due to several factors, the most notable of which are the expansion of digitalization and the increased reliance on technology, as financial institutions have adopted products based on mobile payments, digital banking, group funding, and embedded financial technology within applications, as well as the widespread adoption of modern technologies such as artificial intelligence and block chain, along with increased innovation in emerging countries, particularly India and China.

3.2. Geographic Distribution of Financial Technology Investment Volume

With the acceleration of digitalization in banking services and payments, the geographical distribution of the financial technology market has become a strategic indicator for understanding growth dynamics, innovation centers, and investment attraction sites. In 2023, specific regions emerged as key players in leading this sector, while the United States of America dominated the international financial technology sector with more than 13000 startups. by contrast, Europe, the Middle East, and Africa (EMEA) continue to reinforce their position via developing innovative financial platforms and attracting significant investments.

Figure.(01): Geographic Distribution of Financial Technology Investment Volume in 2023



Source : (Global Growth Insights, 2025)

4. Implementations of Financial Technologies in Islamic Banks

4.1. The Concept of Islamic Financial Technologies

Islamic financial technology innovations represent the use of financial technology by Islamic financial institutions to provide Sharia-compliant financial services to customers in an innovative, transparent, and cost-effective manner. These innovations are also considered an important driver of their growth as they aim to ameliorate customer experience and provide chain services (Sidibe & Kone, 2024, p. 616). These products and financial services are introduced through innovative digital channels, and their activities include the creation of new business models based on technology to promote economic, environmental, financial,

and social objectives, ensuring the delivery of better services through Islamic financial products and achieving broader benefits such as enhancing financial inclusion, improving competency, and reducing costs, in addition to reaching the objectives of Sharia intentions (Umar & Nazim, 2019, pp. 26 - 31).

4.2. Islamic Finance Applications Based on Financial Technologies

There are numerous applications related to financial technologies in the sector of banking. Among the successful technologies, the following can be mentioned:

- **Digital Islamic Banking Platforms:** These are electronic applications and portals that allow customers the managing of accounts, transferring, and paying bills, while sticking to Sharia restrictions.
- **Block Chain Technology for Sharia-Compliant Smart Contracts:** This technology is used to document and execute contracts of Murabaha, Ijara, and Musharaka transparently and securely, which reduces the risk of manipulation (Wulli & Simplicie, 2022, p. 175).
- **Islamic Group Funding:** These are Financing platforms by Murabaha, Musharaka, or Mudaraba to support small and medium enterprises (SMEs) in accordance with Sharia principles.
- **Artificial Intelligence and Advanced Analytics:** They are designed for analyzing customer behaviors, evaluating risks, and personalizing products, while considering the Sharia standards in offerings.
- **Instant Payments via Smartphones:** They are fast and secure payment systems between individuals and companies, with transaction filtering to ensure Sharia compliance.
- **Digital Currencies Compliant to Sharia:** They are currencies such as stablecoins backed by real assets, which do not comprise interest or prohibited activities.

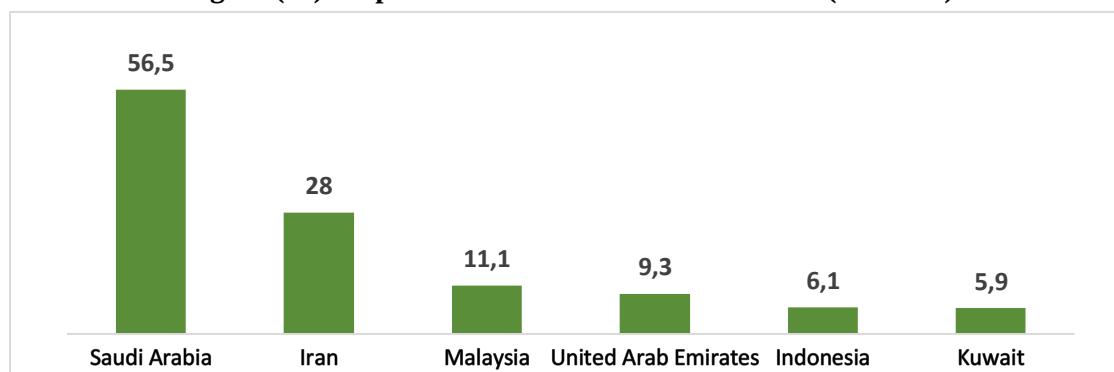
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4.3. Reality of Islamic Financial Technology Market

The Islamic financial technology market has recently witnessed rapid growth and an upward trend, especially after the significant boost it received due to the side effects of the COVID-19, which can be considered positive for technology uses. According to the Global Islamic Financial Technology issued by Dinar Standard Ellipsis Organizations, the size of the financial technology market reached about 307 billion dollars in 2023, and is expected to reach 307 billion dollars in 2027. (Dinar Standar, Marketing Partner, 2024, p. 6), Saudi Arabia, Iran, Malaysia, the United Arab Emirates, Indonesia, and Kuwait are considered the six largest Islamic financial technology markets in the Organization of Islamic Cooperation (OIC) region. These six markets together represent 85 percent of the global Islamic financial technology market size.

Figure.(02): Top 6 Fintech Market Sizes 2022/2023 (USD Bn)



Source : (Dinar Standar, Marketing Partner, 2024, p. 6)

5. Saudi Islamic Banks' Experience in Using Modern Financial Technologies

The Kingdom of Saudi Arabia is considered the first country in the world in terms of Islamic assets, which reached more than 299 billion dollars during the first quarter of 2019, followed by Malaysia with 134 billion dollars during the same year. Consequently, financial and banking transactions in Saudi Arabia are largely subject to the terms and regulations of the Islamic finance and banking industry.

5.1. Financial Technology Strategy in the Kingdom of Saudi Arabia

The Kingdom's financial technology sector is experiencing rapid growth, driven by regulatory developments, digital transformation, and investment in financial infrastructure. The financial technology strategy aims to make the Kingdom a global leader in the sector by fostering innovation, developing regulations and legislation, and building a fully digital financial ecosystem. The strategy supports entrepreneurs and startups, promotes collaboration between traditional and digital financial institutions, and works to expand financial inclusion which would contribute to a more efficient and secure financial sector (Fintech Saudi, 2024).

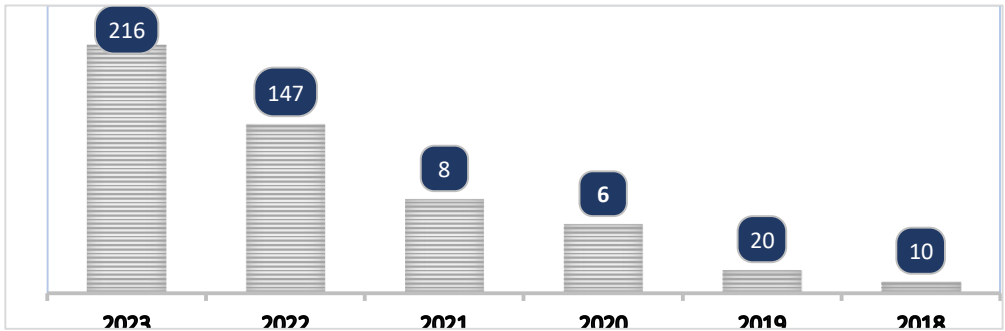
The strategy focuses in the first place on developing financial infrastructure, including open banking, digital payments, blockchain, and financial services that rely on Artificial Intelligence. By attracting investments, promoting financial literacy, and expanding the scope of digital transactions, the strategy contributes to making financial services more efficient, easier, and safer. Several entities in the Kingdom are leading the strategic initiatives, including the Saudi Central Bank, the Capital Market Authority, the Insurance Authority, the Ministry of Communications and Information Technology, the General Authority for Small and Medium Enterprises, and the Saudi Fintech.

The market size of the Saudi Arabian financial technology was estimated at about 43.78 million dollars in 2024 and is expected to reach 77.63 million dollars by 2029, with an annual growth rate of 12.14% during the expected period (2024-2029). Money transfer, payment, and digital lending services via online platforms, group funding, and insurance marketplaces are among the most frequently used financial technology services by the Saudi society. 74% of the Saudis aged over 15 have accounts at financial institutions, while 25% possess a credit card.

5.2. Developments of Financial Technology Companies in Saudi Arabia

The financial technology system in Saudi Arabia has witnessed a qualitative leap, evolving from an emerging sector in 2018 into a vital financial technology center in 2023. The annual growth of 47 percent in 2022 reflects a big expansion in the financial services available to customers in the Kingdom, as the entry of new financial technology companies with innovative business models in various financial sectors has led to an increase in the number of financial technology companies, as illustrated by the data in the following figure:

Figure .(03): Development of the Number of Financial Technology Companies During the Period 2018-2023



Source : (Fintech Saudi, 2024)

. As can be seen from the previous figure, the number of financial technology companies increased from 10 registered companies in 2018 to more than 216 companies in 2023, and then to 261 companies in 2024 (Fintech Saudi, 2024, pp. 13 - 15). This continuous increase is mainly due to the Kingdom's focus on fostering innovation and development in this field through the Financial Technology Laboratory launched by the Capital Market Authority. This has been achieved by providing a simplified regulatory framework for financial technology companies which would allow them to select their business models, products, and innovative financial technology services related to financial technology within standards and timeframes. International financial technology companies can also have access to the Financial Technology Laboratory, provided that they have a commercial presence in the Kingdom. The following figure illustrates the distribution of the number of financial technology companies in Saudi Arabia according to the type of activity:

Figure 4. Distribution of the Number of Financial Technology Companies in Saudi Arabia According to the Type of Activity



Source : (Fintech Saudi, 2024, pp. 13 - 15)

5.3. Case Studies of Islamic Banks in the Kingdom that Have Used Financial Technology

The Islamic banking sector is considered a fundamental pillar in achieving significant economic growth in the kingdom, particularly over the last five years, be it in terms of services and applications offered to customers and the interplay of recent technological advancements, or digital transformations and innovations to achieve a qualitative shift in accordance with all global standards. In line with the kingdoms' 2030 aims, the Saudi Central Bank launched the Saudi Financial Technology initiative as one of the sector development initiatives with the aim of building a distinguished banking system that would emphasize the use of modern financial technologies under the supervision of the Central Bank. This initiative was adopted by the majority of Islamic banks except that there was a disparity among them in terms of the application, rapidity, and fields of executing those technologies. This is clearly evident in the experiences of the leading Islamic banks in the kingdom, namely:

5.3. 1. Al Rajihi Bank

Al Rajihi Bank is considered one of the most prominent banks in the world, the Middle East, and the Kingdom of Saudi Arabia in terms of market capitalization, with a paid-up capital of about 10 billion dollars. It has adopted new technologies to provide innovative and highly personalized financial solutions, representing a landmark in light of the ongoing digital and technological transformation that is making a revolution in the banking sector worldwide. The bank is adopting several initiatives, the most important of which is the plan to establish a "Digital and Data Expertise Center" with the aim of exploring and implementing the best capabilities and technologies at the level of the bank and its branches. As for the most important financial technology services offered by Al Rajihi Bank, they include (EL MOUSSAOUI & MAAROUFI, 2022, p. 192) :

Tatbiq Mubasher : The innovative Tatbiq Mubasher provides a range of services, such as bill payments and product applications, in addition to the latest advancements in security technologies. During 2019, more than five million customers benefited from the bank's digital services, compared to 3.6 million users of Mubasher application in 2018.

Self-Service Device "Israa": "Israa" is a unique smart device that provides innovative solutions for customer banking transactions. Thanks to this device, based on financial technology and artificial intelligence, you can instantly issue a Debit card, replace an expired or damaged card, access your checkbooks instantly without prior request, pay all government fees such as landline and mobile phone, electricity, and water bills, in addition to instant money transfer to anywhere in the world, around the clock, seven days a week. Al Rajihi Bank's "Israa" devices are spread across the Kingdom.

Al Rajihi Business: Al Rajihi Business is a digital banking services portal specifically designed for small and medium enterprises to meet their needs and expectations through the concept of digital banking services. Through Al Rajihi Business, customers are now able to manage their bank accounts and benefit from a variety of treasury and cash management services. This enabled the bank to realize significant annual growth at the level of its digital platforms, as shown in the following table (Alrajih Bank, 2023, pp. 139- 141):

Table (02): Growth Rate of Al Rajihi Bank's Services in 2023

Personal Banking Services	Company Banking Services
A 298% growth rate of individual accounts opened online A 15% of total trade financing operations carried out through digital channels A 21% increase in personal financing? as about 60% of total personal financing operations is carried out through digital channels A 500% improvement in housing financing A 168% growth rate in cards and 103% increase in card issuance A 316% increase in investment funds	A 63% growth rate in business accounts opened online A 184% growth rate in small and medium enterprise accountsopened online A doubling of digital accounts opened during the year 5 million is the average number of monthly logins A 86% rate of new company customers joinedonline A 547% growth rate in digital account liabilities

Source (Alrajihi Bank, 2023, pp. 139- 141)

5.3. 2. Al-Jazira Bank

Innovation is one of the main strategic pillars in Al-Jazira Bank. The bank has established a fully dedicated department with a qualified and highly competent team to explore, support, establish partnerships, and collaborate with financial technology startups worldwide. The 2024Annual Report of Al-Jazira Bank highlights the bank's efforts in adopting a set of modern financial technologies that have contributed to the development of its banking operations and services, most notably (Aljazira Bank, 2024, pp. 56- 61):

- Al-Jazira Bank’s launching of the so-called New Payments Center, which is considered a qualitative leap in payment systems management, a system that integrates and unifies all payment channels that previously operated independently: it contributes to increased processing efficiency, and accelerates the launch of new products to the market.
- Developing new mobile applications for both individuals and companies via full in-house development through the technical unit of TechMal Garage: this trend represents an important step towards achieving the bank’s technological independence and enabling it to design flexible digital interfaces compliant with changing customer requirements.
- Al-Jazira Bank’s adopting of Agile and DevOps methodologies in managing technological projects: these approaches aim to accelerate the development rates of financial and product systems through cooperative group work between technological teams and the administration.

The adoption of those applications at the level of the bank has contributed to:

-Improving operational competency and speeding up services: One of the most significant positive impacts of applying the payments pillar is the enhancement of

operational efficiency through the unification of various payment systems that were previously operating independently. This unification has contributed to reducing the time required to process banking transactions, lowering operational costs associated with managing multiple systems, and increasing reliability and security in transaction execution.

- **Enhancing Customer Experience and Service Innovation:** Developing new mobile applications for individuals and companies enabled the bank to offer more extensive and faster digital services. This resulted in an increase in the number of active users of banking applications.

- **Accelerating Digital Transformation through the Adoption of Agile and DevOps Methodologies:** Implementing these methodologies helped the bank shorten the cycle of developing the systems and technological projects, making updates and new product launches faster and more efficient.

- **Building Deeper Customer Relationships through CRM:** By implementing a Customer Relationship Management (CRM) system, the bank managed to have an extensive view of customer behaviors and needs. This resulted in significant outcomes, among which improving customer interaction through the provision of personalized solutions and services, increasing customer retention rates, and reducing complaint rates.

5.3. 3. Alinma Bank

Alinma Bank is considered one of the most prominent Islamic banks in the Kingdom of Saudi Arabia; it demonstrates a strong commitment to the use of financial technology to enhance banking services, support innovation, and advance the goals of Saudi 2030Vision. Since its launch, Alinma Bank has been working tirelessly to realize its vision of becoming the preferred financial partner for all its partners, be they individuals or companies. Furthermore, the bank has succeeded in creating attractive and suitable work environments for its Muslim employees (Khaliq & Dirar, 2021, p. 9).

Alinma Bank employs modern financial technologies for the purpose of developing and enhancing customer experience and improving financial performance. It seeks to develop and offer a wide range of digital banking services to meet the customers' needs. At the level of business sectors of the bank, digital banking is considered a major enabler in providing products, services, and transactions, that are faster, easier, and more effective. This delivers value to customers, employees, and investors alike. In 2023, the bank launched artificial intelligence and digital cross-selling capabilities, in addition to several applications, the most prominent of which are (Alinma Bank, 2024, pp. 55- 58):

- The IZ application: Through this application, the bank introduces a new concept of digital banking services for Saudi youth, providing them with the tools to achieve financial independence in an easy and enjoyable way.

- The Banking as a Service (BaaS) platform, designed for opening up innovative business opportunities and creating new sources of income.

- The launch of payment portals via a smart digital wallet application, licensed by the Saudi Arabian Monetary Authority (SAMA), with the aim of promoting financial extension and technological adoption in the field of financial payments, such as adding funds to accounts, payments to online stores and websites, and completing bookings.

- Performing instant local transfers for receiving money transfers from inside and outside the Kingdom and with drawing cash through Al-Inma Bank Automated Teller Machines.

According to the annual report issued on 2024, the Bank realized significant results at the level of its digital major performance indicators, reflecting the success of its applied digitalization strategy. The operations of digital account openings constituted 86% of all new customer accounts, recording a 66% growth compared to the previous year, with digital fee revenues rising by 23%, while financial transactions executed through digital platforms increased by 25%. Digital sales also witnessed significant growth, with about 20% of the bank's total cards issued digitally.

5.3. 4. Albilad Bank

Albilad Bank adopted an approach that considers innovation and development are the base, through a strategy centered on digital transformation, and thus, involved collaboration with startups in the sector of financial technology to launch innovative new products, in addition to expanding customers' base, strengthening partnerships, and developing human resources, which would contribute to enhancing its vision and realizing its sustainable goals in general. The bank managed to realize significant progress in enhancing the value it offers to its customers and employees, and diversifying its digital services and products (Albilad Bank, 2024, pp. 138- 141).

The report indicated that during 2024, the bank established five new strategic partnerships with financial technology companies within the frame of its cooperation policy and joint innovation. These partnerships would contribute to the development of new digital products and services and enhance the bank's position as an extensive financial platform that would benefit from the third-party technologies in providing innovative banking solutions. Among the prominent technological initiatives are:

- The Bank's reliance on Robotic Process Automation technologies, which enabled faster banking transactions and reduced human errors.
- Core Banking Modernization System, with enhancing its reliance on cloud computing in environments of development and testing, which contributed to the improvement operational performance competency.
- The bank established a Tier 4 data center for the purpose of realizing the highest levels of reliability and security. It also adopted advanced security systems such as Privilege Management and Identity Governance, in addition to developing the Security Operations Center to face cyber threats with more efficiency.

The bank launched a range of new digital products, the most prominent of which are:

- The Digital Visitors Account, to facilitate accounts opening without the need to visit branches.
- "Investment Wakala," product as an investment service compliant with Islamic Sharia.
- "Zood Savings Account," product, in partnership with the Social Development Bank, to encourage digital savings.

The researcher believes that the bank has successfully positioned itself as one of the most prominent Saudi banks in the field of financial innovation. By adopting artificial

intelligence, automation, open banking, and cloud computing technologies, the bank managed to enhance its competitiveness and provide an extensive digital experience for its customers. These initiatives reaffirm the commitment of Bank Albilad to support the digital transformation in the Saudi financial sector, in line with 2030 Vision towards a sustainable and advanced digital economy.

6. Challenges of Using Modern Financial Technologies in Islamic Banks under Study

Major Islamic banks in the Kingdom, such as Al Rajhi, Alinma, Albilad, and Aljazira, are the leading institutions that have adopted modern financial technologies, including artificial intelligence, mobile banking, and open application programming interfaces. Despite the significant progress in this field, the digital transformation process at these banks faces a number of technical, regulatory, and human challenges that require an extensive strategic approach. These challenges include:

- **Regulatory and Sharia Challenges:** One of the most prominent obstacles facing Islamic banks in implementing modern technologies is ensuring compliance with the provisions of Islamic Sharia and the regulatory regulations issued by the Saudi Central Bank. Every new financial innovation, such as digital finance or automated services, requires a detailed Sharia review to ensure it is free from usury (*riba*) or uncertainty (*gharar*).

- **The problem of adapting modern technologies to Islamic jurisprudence:** The issue of adapting modern financial technologies to Islamic law is one of the most significant challenges facing Islamic banks. Innovations such as blockchain and smart contracts do not easily align with traditional Islamic contracts like *Murabaha* and *Mudaraba*. This raises questions about whether these technologies can be considered new contractual forms or whether they should be adapted within existing Islamic legal frameworks, especially in the absence of a clear consensus among Islamic scholars.

- **The problem of the legitimacy of digital currencies:** The legitimacy of cryptocurrencies like Bitcoin remains highly debated due to their lack of intrinsic value, high volatility, and potential for use in illicit activities. Scholars differ on whether they constitute legitimate money under Islamic law and whether trading in them is permissible, creating uncertainty for Islamic banks regarding their dealings with such assets.

- **The problem of interest (*riba*) in some applications:** The issue of usury is one of the most prominent Sharia-related challenges in financial technology applications, as models such as digital lending and crowdfunding may involve explicit or implicit interest. The main challenge lies in ensuring that these innovations fully comply with the principles of Islamic law.

- **Technical Infrastructure and Integration Challenges:** Some banking systems are still based on old technological infrastructures, which would complicate integration with modern digital platforms or artificial intelligence applications.

- **Cybersecurity and Data Protection:** The growth of digital transactions and the increasing volume of sensitive data make cyber security one of the most prominent challenges. This requires continuous investment in monitoring and protection systems against cyber attacks.

- **Shortage of Digital Competencies and Technical Skills:** Lots of Islamic banks suffer from a shortage of specialists in artificial intelligence, data analytics, and cyber security. Challenging specialized talents' attraction is considered one of the most significant obstacles to digital transformation.

- **Weak Customer Adoption of Digital Services:** Despite the high rates of the use of electronic services, some groups of customers still prefer traditional channels because of the lack of trust or limited knowledge of modern technologies. Directing customer behaviors towards full reliance on digital services requires more awareness campaigns and improvements to the user experience.

- **Cost and Return on Investment:** Implementing modern technologies requires significant capital investments in infrastructure, human resource training, and system development, while the financial return becomes apparent only in the long term.

7. Conclusion:

Financial technology is considered one of the outcomes of the Fourth Industrial Revolution, which emerged as a result of tremendous technological advancements, making the modern era an age of digitalization that penetrated all aspects of public and private life. One of the sectors impacted by technology is the financial sector, where startups have begun deploying advanced technologies to serve the financial sector. The Kingdom of Saudi Arabia's experience within the framework of 2030 Vision for digital transformation included the integration of financial technologies into the Islamic banking sector as part of a transformative strategy to enhance and develop the sector in line with global standards. Within this framework, numerous Islamic financial transactions emerged adopting financial technology.

The present study concludes with several key findings, the most prominent of which are:

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- Financial technology relies on combining financial services with the latest technologies to develop and innovate new financial services, and hence, the 2008 global financial crisis paved the way for the development and spread of this phenomenon.

- Islamic banks can make use of financial technologies to enhance their operations and retain their customers, particularly through partnerships with financial technology companies.

- The Kingdom of Saudi Arabia has made significant progress in the field of financial technology and startups, achieving numerous improvements in various aspects, reaching a wider range of investors and companies, and reducing the cost of business. It has also turned towards modern financial technologies such as blockchain, artificial intelligence, cloud computing etc...

- The Islamic banks under study are moving steadily towards digital transformation, benefiting from the strong support provided by the Kingdom's Vision 2030 and its programs that relate to digital economy.

- Balancing the requirements of Islamic Sharia with the demands of technological innovation is one of the most prominent challenges these banks are dealing with, with caution and flexibility at the same time.

- The ongoing challenges related to legacy technological infrastructure within Islamic banks hinder full integration with modern financial technology systems.

- The shortage of specialized competencies in financial technologies is one of the major obstacles to rapid innovation within Islamic banks.

- The complexities of managing partnerships with the providers of financial technology services need clearer and more rigorous governance frameworks.

Based on these findings, the following recommendations can be made:

- The Saudi Central Bank should develop a regulatory framework that integrates Sharia and technical requirements, taking into account the specific characteristics of Islamic financial products that based on modern technologies such as blockchain and smart contracts. This includes establishing clear standards for managing uncertainty and technical risks, ensuring that innovation complies with Sharia principles.
- Setting advanced standards for the governance of financial technologies, including mechanisms for monitoring algorithms, managing data , and ensuring transparency in smart contracts, in accordance with the principles of Islamic Sharia, particularly with regard to fairness and avoiding uncertainty and usury.
- Issuing clear instructions on digital currencies and crypto assets by establishing a clear framework for trading digital currencies, identifying currencies which are permissible and classifying them according to the level of legitimate risk, while setting conditions for use and investment that ensure full compliance with Islamic law.
- A unified strategy for digitalization in Islamic banking must be developed, based on coordination between banks, Sharia and regulatory authorities, and financial technology companies.
- Islamic banks must gradually update their main banking systems to guaranty effective integration with artificial intelligence applications and cloud services.
- Cyber security programs must be strengthened by investing in security monitoring centers and training local staff on the latest digital protection tools.
- Human capital must be invested in by creating digital banking academies specialized in artificial intelligence, data, and financial analytics.
- Digital awareness campaigns must be carried out for customers to increase their trust and adoption of electronic banking services.

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