
Advancements in Fintech and AI: Transformations in the Arab Financial and Banking Sector

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Abstract:

Digital evolution is driving the future of the financial and banking sectors as customer preferences shift towards electronic applications and intelligent solutions. AI and Fintech hold potential to transform traditional financial services. Fintech innovations promise faster, more cost-effective, secure, transparent, and accessible financial services, especially for those excluded from traditional banking. However, the rapid advancement of fintech and the rise of innovative fintech startups pose challenges that require regulatory measures to ensure the integrity, security, and stability of the financial sector. Fintech represents both opportunities and challenges for banks and financial institutions.

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1. Introduction:

In recent years, the financial technology sector has significantly transformed both global and Arab financial systems. Fintech startups have introduced a broad spectrum of financial services, including digital payments, cryptocurrencies, money transfers, lending, crowdfunding, wealth management, and insurance. This rapid advancement presents both opportunities and challenges to traditional financial services. As a result, banks and financial institutions are striving to adapt their business models by integrating advanced technologies, investing in updated infrastructure, and exploring partnerships with fintech startups to enhance their competitive edge and utilize modern technological solutions in service delivery. Establishing comprehensive legislative, regulatory, and supervisory frameworks is essential for facilitating the development and implementation of fintech and AI business models in the financial sector. Such frameworks support regulatory authorities in managing risks and creating growth opportunities within a competitive environment, while also ensuring financial safety and stability.

The use of AI in financial and banking services promises to reduce operational costs and enhance the performance and profitability of financial institutions. Consequently, most institutions are investing in modern fintech applications and financial AI tools. According to PwC, AI is expected to contribute approximately \$15.7 trillion to the global economy by 2030, with \$6.6 trillion from increased productivity rates and \$9.1 trillion from higher consumption due to improved product quality. In the Arab region, AI applications are projected to contribute around \$320 billion to the Middle East's economy by 2030, equivalent to 11% of the total GDP (Arab Bank Group, 2018, p. 56)

Therefore, artificial intelligence is the culmination of 2,000 years of philosophical traditions, theories of perception and learning, and 400 years of mathematics leading to theories in logic, probability, and computing (Yassin, 2011, p. 34).

There are numerous areas where AI skills are applied, ranging from learning and perception to planning. General intelligence (or "strong AI") remains a long-term goal for some researchers in the field. Thus, it is essential to provide an understanding of human intelligence, the sole competitor of artificial intelligence and its source, in order to understand the role played by human intelligence in the development of artificial intelligence.

1.1 The Study's Problem

The widespread adoption and application of Artificial Intelligence (AI) in contemporary society raises significant concerns about its implications for various domains. This study addresses the challenge of understanding how AI's rapid development affects the financial sector and broader societal contexts. It aims to explore the balance between the potential benefits of AI and the risks associated with its implementation,

examining how these factors influence both the advancement of financial technologies and the overall development of human society.

1.2 Study Questions

Building upon the aforementioned context, this study seeks to address the following research questions:

- What is Artificial Intelligence (AI), and what are its various types, characteristics, and significance?
- How can Artificial Intelligence be effectively utilized to advance human development and enhance the development of financial services?

1.3. Study Objective

The objective of this research is to trace the historical evolution of the concept of Artificial Intelligence (AI), define its fundamental principles, and explore its significant applications across diverse fields. The study aims to investigate the impact of AI on education and various aspects of human life, and to project future trends regarding the challenges and benefits associated with AI advancements.

1.4. Importance of the Study

This research is significant for its exploration of the domains of Artificial Intelligence (AI) technology and its potential applications within financial and educational systems. It seeks to identify existing applications of AI in media and education, as well as to forecast the future evolution of systems impacted by AI technology, with a particular focus on the banking and educational sectors. Furthermore, this study aims to contribute to the development of knowledge societies from multiple perspectives.

1.5. Methodology

This study employs a descriptive research methodology, which involves a comprehensive review and analysis of relevant studies, research papers, books, and journals. The aim of this methodological approach is to develop a theoretical foundation for understanding the applications of Artificial Intelligence (AI) in the banking sector and to explore its potential benefits and challenges.

1.6 Defined Terms

- **Artificial Intelligence (AI):** A specialized field of computer science dedicated to developing advanced techniques for performing tasks and making decisions that emulate human intelligence under specific constraints (Abdelmajeed, 2009, p. 15).
- **Narrow Artificial Intelligence:** A form of AI designed to perform specific tasks or functions within a particular domain, such as the banking sector.
- **Financial Technology (FinTech):** Innovations in financial services that utilize technology to develop new business models, applications, processes, or products with a significant impact on financial markets and institutions. FinTech innovations are driven by advancements in technologies such as Big Data, Distributed

Ledger Technology, and Cryptography, as well as increased smartphone and internet usage, shifting consumer preferences towards efficiency, accessibility, and cost-effectiveness, and the complex regulatory landscape including anti-money laundering laws, counter-terrorism financing regulations, FATCA, Basel III, Know Your Customer (KYC), and Customer Due Diligence (CDD).

2. Theoretical Framework of the Research:

2.1. First Subtitle

2.1.1. Origins and Evolution of Artificial Intelligence:

A thorough understanding of artificial intelligence (AI) necessitates exploring its historical development and foundational principles. By examining the origins and evolution of AI, we can grasp the core concepts and methodologies that have shaped this dynamic field. The initial aim of AI was to replicate human cognitive abilities through computer programs designed to exhibit intelligent behavior.

The seminal moment in AI history occurred with the publication of Alan Turing's influential paper, "Computing Machinery and Intelligence," where he introduced the Turing Test. This test proposed that a computer could be considered intelligent if a human judge could not reliably distinguish between a human and a computer based solely on their responses during a text-based interaction.

In 1956, the Dartmouth Conference marked a significant milestone in AI development, showcasing innovative programs and theories for machine intelligence (al-louzi, 2012)

The field witnessed substantial growth in the 1980s with expert systems—programs designed to emulate human expertise in specific domains. The 1990s and early 21st century saw AI's expansion into diverse applications, including logistics, data mining, and medical diagnostics (Abu Bakr et al., 2019).

2.1.2. The historical evolution of artificial intelligence:

The historical development of AI spans decades of technological and intellectual progress. Here is an overview of the key stages:

- **Stage 1:** Initiated in 1950 under Claude Shannon's leadership, this stage focused on creating computational models for games like chess. The core components of this stage involved defining initial game states, developing strategies, and applying rules to achieve desired outcomes.
- **Stage 2:** From 1963 through the 1970s, this stage saw advancements in data representation frameworks developed by Marvin Minsky, and the creation of systems to understand and process English language texts, spearheaded by Winograd. (Afifi, 2014, p. 50) .
- **Stage 3:** Starting from the mid-1970s, this phase marked a golden era of technological achievements in AI. Significant advancements in the design, functionality, and support of systems that sought to replicate and extend human intelligence characterized it.

2.2. Principles of Artificial Intelligence:

AI operates on two foundational principles:

- **Data Representation:** This principle focuses on how data and problems are symbolically represented in computer systems for effective processing and output generation.
- **Search:** This principle involves the computational exploration of various options and evaluation against predefined criteria to determine the most suitable solutions.

2.3. Most Famous Artificial Intelligence Technologies:

- **Machine Learning (ML):** ML advances AI from rule-based systems to models that learn from data, enabling systems to identify patterns and make decisions based on historical information.
- **Deep Learning (DL):** A subset of ML, DL involves complex algorithms that learn from large datasets without manual intervention, leveraging significant computing power for tasks such as image and speech recognition.
- **Natural Language Processing (NLP):** NLP enables machines to understand and interpret human language, using large text corpora to provide context, grammar, and semantic analysis.
- **Technological Singularity:** This hypothesis posits that future super-intelligent AI could lead to rapid, uncontrollable technological advancements with profound societal impacts (Kheiry, 2021, p. 61).

Vernor Vinge" views it as a general explosion in intelligence, and reality gradually confirms this assertion (El-Sheishi, 2020, p. 20)

2.4. Applications of Artificial Intelligence:

AI's applications span several domains:

- **Gaming:** AI is used to create sophisticated game characters and adversaries, simulating human-like intelligence (Kheiry, 2021).
- **Speech Recognition:** This technology converts spoken language into text, enabling applications from automated call routing to data entry (Taher, 2021).
- **Expert Systems:** These systems mimic human expertise to perform tasks autonomously, such as diagnostic or advisory roles. (Taher, 2021)
- **Financial Technology (Fintech):** AI is applied in areas like market analysis, risk management, credit scoring, and automated payment processing.
- **Healthcare:** AI supports patient data analysis, innovative medical solutions, and future scenarios where AI might replace or assist doctors.
- **Engineering:** AI facilitates high-efficiency map design and other engineering applications.
- **Education:** AI automates tasks like grading and generates electronic tests, enhancing educational efficiency.
- **Business:** AI improves customer service, manages data, and develops marketing strategies.

2.5. Characteristics of Artificial Intelligence:

- **Symbolic Representation:** AI systems use symbols to represent various types of information.
- **Optimistic Trial-and-Error:** AI employs iterative problem-solving methods that allow for flexible approaches to achieve satisfactory outcomes. (Kheiry, 2021)
- **Handling Uncertain Data:** AI systems are designed to provide solutions even with incomplete or uncertain information (Hamza, 2021).

Therefore, it can be generally stated that artificial intelligence possesses several characteristics and advantages, including:

- Using intelligence to solve presented problems despite insufficient information.
- The capability for reasoning and perception.
- The ability to handle difficult and complex scenarios (Taher, 2021)

2.6. Major Types of Artificial Intelligence and Their Objectives:

There are four types of artificial intelligence systems or AI-based systems: Interactive Machines, Limited Memory Machines, Theory of Mind, and Self-Aware Artificial Intelligence (Abdelkader, 2012)

- **Interactive Machines:** Basic AI systems without memory capabilities, exemplified by IBM's Deep Blue.
- **Limited Memory:** These systems utilize historical data to improve decision-making.
- **Theory of Mind:** A conceptual stage of AI that involves understanding human emotions and thoughts.
- **Self-Awareness:** The theoretical ultimate stage of AI, where machines possess self-awareness.
- **Artificial Narrow Intelligence (ANI):** The current prevalent form of AI with specialized, task-specific capabilities.
- **Artificial General Intelligence (AGI):** A form of AI with human-like cognitive abilities across various tasks.
- **Artificial Superintelligence (ASI):** A future possibility of AI surpassing human intelligence and capability.

2.7. Goals of Artificial Intelligence:

The goals of artificial intelligence are numerous and diverse, and they can be summarized into the following two points (Afifi, 2014) :

- **Enhance Machine Problem-Solving:** Achieve human-like problem-solving abilities through parallel processing.
- **Simulate Human Intelligence:** Understand and replicate human cognitive processes to develop intelligent systems.

3. Applied Framework for Research:

3.1 Global and Arab Investments in Financial Technology and Artificial Intelligence:

Global investments in the fintech sector have seen rapid growth in recent years. The total global funding for fintech companies reached \$24.7 billion in 2016 (with \$13.6 billion from venture capital investments), up from \$46.6 billion in 2015. By the end of 2017, total investments in fintech companies amounted to around \$29 billion through 1,134 deals. The cumulative investment in financial technology globally exceeded \$100 billion by November 2016, across more than 8,800 companies, and was expected to surpass \$150 billion by the end of 2017.

In the Arab region, startups in the fintech sector secured investments exceeding \$100 million over the past decade, including announced and undisclosed deals and acquisition transactions, primarily from global venture capital funds and business accelerators, and more recently, banks. According to reports, these companies aimed to raise \$50 million in 2017, marking a 270% increase from \$18 million in 2016. The number of announced investment deals in fintech startups in Arab countries increased from 5 deals in 2013 to 10 deals in 2016.

Regarding artificial intelligence, according to the International Data Corporation (IDC), global spending on AI was expected to reach \$19.1 billion by the end of 2018, up 54.2% from 2017. It is projected to reach \$52.2 billion by 2021, with a compound annual growth rate (CAGR) of 46.2%. Currently, the retail sector is the largest spender on AI, followed by the banking sector.

In the Middle East and North Africa (MENA) region, spending on cognitive and artificial intelligence systems is expected to increase from \$37.5 million in 2017 to over \$114 million by 2021, growing at an annual rate of 32%. The greatest AI opportunity in the region lies in the financial sector, where an estimated \$28.3 million is expected to be spent on developing AI solutions, representing 25% of total AI investments, followed by public services such as education and healthcare, and then the manufacturing sector (Arab Banks Union, 2018).

3.2. Uses of Financial Technology and Artificial Intelligence:

According to the Basel Committee on Banking Supervision, financial technology is associated with three main sectors directly related to core banking services:

- Credit, Deposits, and Capital Accumulation.
- Payments, Clearing, and Settlement.
- Investment/Wealth Management.

The evolution stages of financial technology are divided into two waves. The first wave includes payment solutions and lending solutions. The second wave includes the introduction of technology into international financial transfers, insurance (Insurtech), and wealth and investment management. Another emerging phenomenon in the fintech sector is blockchain technology, which serves as a decentralized digital ledger used to

record transactions in cryptocurrencies. The year 2017 was marked by the entry of cryptocurrencies into global financial markets, with Bitcoin being the most famous digital cryptocurrency trading tool, lacking physical existence and regulatory control.

The uses of artificial intelligence in the banking sector are diverse and include:

- **Financial Technology and Blockchain:** Integration into market operations, pricing decisions, hedging, predictive capabilities.
- **Risk Management:** Identification and anticipation of risks, intelligent interaction with customers.
- **Credit Scoring:** Assessment of creditworthiness, risk profiling, and pricing of insurance contracts using complex algorithms.
- **Data Analysis:** Collection and analysis of vast and complex market information and real-time updates.
- **Investment Management:** Anticipating client needs, analyzing financial instruments, conducting market simulations for innovative financial tools.
- **Automated Payment Processing:** Facilitating automated payment methods to save time and cost for customers.

Globally, notable examples of AI applications in banking include Santander Bank using robots to interact with customers since 2010 in Spain, UBS employing Amazon's digital assistant "Alexa" for customer service, Morgan Stanley establishing an AI unit to monitor fraud operations, and HSBC announcing wide-scale AI deployment for customer digital assistants, fraud detection tools, and risk management analytics, particularly in combating money laundering and terrorism financing (World Bank, 2020)

3.3.Challenges Hindering the Spread of Financial Technology and Artificial Intelligence in the Arab World:

The adoption and expansion of fintech startups in the Arab world face several significant challenges and obstacles:

❖ Lack of Customer Trust and Data Privacy Frameworks:

- Customers are hesitant due to concerns about fraud and hacking, exacerbated by inadequate consumer protection laws and data privacy regulations in many countries.
- Only seven countries in the region (Algeria, Egypt, Oman, Morocco, Qatar, Tunisia, and the United Arab Emirates) have specific legislation addressing electronic crimes and information security.

❖ Regulatory Hurdles for Fintech Startups:

- Difficulty in establishing and launching startups due to stringent regulations governing licensing for financial services companies.
- Limited availability of venture capital funding critical for fintech startups in the technology sector.

❖ **Competitiveness Challenges for Fintech Startups:**

- Fintech startups struggle to compete without adopting business models that involve collaboration with Arab banks.
- Arab banks enjoy strong customer trust and loyalty, especially with the major banks moving towards innovative digital financial transactions strategies.

❖ **Barriers to AI Adoption:**

- In addition to concerns about hacking and electronic fraud, significant investments are required to access and store the vast amounts of data needed by companies and banks.
- There is a substantial skills gap in AI capabilities in the region, with a shortage of qualified professionals to manage and implement AI initiatives.
- This skills gap hinders companies in their digital transformation efforts to integrate AI into their core operations.

These challenges collectively hinder the progress of fintech and AI adoption in the Arab world, impacting the region's ability to capitalize on technological advancements in the financial sector (Arab Banks Union, 2018, p. 61).

3.4. Opportunities and Risks Arising from the Application of Financial Technology and Artificial Intelligence in Banking Operations:

In the Arab world, despite their small size and limited spread, fintech startups do not typically act as direct competitors to Arab banks. Instead, many fintech startups in the Arab region seek partnerships and collaboration with banks. Selecting the appropriate fintech technology and successfully implementing it remains a challenge for banks, especially those with a weak innovative culture. Thus, partnerships with specialized fintech startups, as seen in Lebanon for example, can help banks maintain their market share by offering innovative banking products to their customers.

3.4.1 Opportunities Provided by Financial Technology for the Financial and Banking Sector:

- **Enhancing Financial Inclusion:** Financial technology can broaden access to financial services for underserved populations.
- **Providing Better and More Convenient Banking Services:** Fintech can improve customer experience by offering more efficient and tailored banking services.
- **Positive Impact on Financial Stability:** Increased competition spurred by fintech innovations can potentially enhance financial stability.
- **Regulatory Technology (RegTech):** Technology can improve compliance processes within banks, enhancing regulatory efficiency and effectiveness.

3.4.2 Risks Associated with the Application of Technology in Banking Operations:

- **Strategic Risks:** Potential challenges in aligning fintech strategies with overall business objectives.
- **Operational Risks:** Risks related to the operational integration and maintenance of fintech solutions.
- **Compliance Risks:** Risks associated with adhering to regulatory requirements, especially in dynamic regulatory environments.
- **Dependency on External Sources:** Reliance on external technology providers can pose risks related to service continuity and quality.
- **Cyber Risks:** Increased vulnerability to cyber threats due to digital transformation and reliance on technology.
- **Liquidity and Funding Risks:** Challenges related to liquidity management and funding in the context of rapid technological change.

Within this framework, artificial intelligence (AI) is expected to reshape the banking landscape in the near future. KPMG suggests that banking activities may eventually become less visible, with transactions handled entirely through virtual assistants without direct involvement of bankers. However, this scenario is not entirely realistic; instead, AI is likely to be used to provide more intelligent solutions to customers by improving decision-making efficiency and enhancing employee capabilities, rather than completely replacing human interaction. In conclusion, while financial technology and AI present numerous opportunities for the banking sector in the Arab world, they also bring forth significant challenges that need to be addressed through strategic partnerships, regulatory alignment, and technological innovation management (World Bank, 2020).

4. CONCLUSION

Based on the findings of this research, we draw several conclusions summarizing the challenges and opportunities related to the application of financial technology (fintech) and artificial intelligence (AI) in the banking sector:

- **Methodological Challenges:** One of the primary challenges lies in the inconsistency of data used in AI systems, similar to many translation programs, where the output data often contradicts the input data.
- **Social Challenges:** There is a need for understanding the technological implications. Software developers often strive to provide advanced solutions across various impactful areas of people's lives, but their lack of adequate background in fields beyond computer science frequently leads to various problems—be they psychological, ethical, or social.
- **Balancing Innovation and Safety:** Despite the manifold benefits of fintech and AI on bank operations and customer experience, it's crucial not to compromise the safety and stability of banks. Central banks, regulatory bodies, and financial institutions must strike a balance between risk aversion and the global trend towards

digital innovation and AI. They should ensure that new technological innovations do not become tools for fraud, hacking, money laundering, or terrorism financing, thereby threatening financial stability.

These conclusions underscore the importance of responsible innovation and regulatory vigilance in leveraging fintech and AI to enhance banking operations while safeguarding consumer protection and information security.

Recommendations:

To leverage fintech and AI for future banking advancements, we recommend taking the following actions:

- **Establish Legal Frameworks:** Develop comprehensive legal frameworks for fintech to support technological innovations and financial inclusion.
- **Invest in Modern Technologies:** Focus on adopting technologies like blockchain to advance electronic financial services.
- **Training and Development:** Invest in training programs for fintech and AI technologies to meet the developing sector needs.
- **Central Bank Support:** Encourage central banks to support AI and digital transformation initiatives.
- **Increase AI Expenditure:** Boost investments in AI to enhance banking services.
- **Legislative Frameworks:** Address legislative gaps related to electronic transactions and data protection.

These recommendations aim to foster a supportive environment for fintech and AI innovations, promoting economic growth, financial stability, and customer satisfaction in the Arab banking sector.

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