

Financial Technology from Theory to Practice: A Review of International and Arab Experiences in FinTech Applications

التكنولوجيا المالية من النظرية إلى التطبيق: مراجعة للتجارب الدولية والعربية في تطبيقات التكنولوجيا المالية

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Date of Receipt: 31/03/2026		Date of Acceptance: 13/05/2026	Date of Publishing: 01/06/2026

Abstract

This research paper aims to examine financial technology (FinTech) by linking its theoretical foundations with practical applications. The theoretical section addresses the fundamental concepts related to FinTech, highlighting its main areas of application and underlying technologies. The applied section is devoted to presenting a set of international experiences, such as those of the United States, China, and India. It also reviews selected Arab experiences, including Egypt, Saudi Arabia, and Algeria. The study concludes that financial technology (FinTech) is an effective tool for enhancing the efficiency of financial services. However, the success of its implementation depends on the availability of an enabling environment that effectively integrates innovation with regulation. The study also recommends strengthening and developing the regulatory and legislative framework, reinforcing digital infrastructure, and benefiting from leading international experiences.

Keywords: Financial Technology (FinTech), Digital Transformation, Financial Innovation, International Experiences, Arab Experiences.

JEL Classification: G20, G21, O33, O32, F36.

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ملخص

تهدف هذه الورقة البحثية إلى دراسة التكنولوجيا المالية من خلال الربط بين التأصيل النظري والتطبيق العملي، حيث تم التطرق في الجانب النظري إلى المفاهيم الأساسية المتعلقة بالتكنولوجيا المالية، مع إبراز أهم مجالات استخدامها وتقنياتها، أما الجانب التطبيقي فقد تم تخصيصه لعرض مجموعة من التجارب الدولية كالولايات المتحدة الأمريكية والصين والهند، كما تم عرض بعض التجارب العربية كتجربة مصر والسعودية والجزائر. ولقد خلصت الدراسة إلى أن التكنولوجيا المالية تعد أداة فعالة لتحسين كفاءة الخدمات المالية، إلا أن نجاح تطبيقها مرهون بمدى توفر بيئة ملائمة تجمع بين الابتكار والتنظيم. كما أوصت هذه الدراسة بضرورة تطوير الإطار التنظيمي والتشريعي مع تدعيم البنية التحتية الرقمية، بالإضافة إلى الاستفادة من التجارب الدولية الرائدة.

كلمات مفتاحية: تكنولوجيا مالية، تحول رقمي، ابتكار مالي، تجارب دولية، تجارب عربية.
تصنيف JEL: G20, G21, O33, O32, F36.

Introduction

Over recent decades, the world has undergone profound transformations across various economic and financial sectors, driven by the rapid and continuous advancement of FinTech and communication. The financial sector has been among the most significantly affected sectors by these changes. In this context, the term “*financial technology*” (*FinTech*) has emerged as one of the most prominent features of the digital transformation of “contemporary financial systems”, which refer to the innovative use of modern technology aimed at improving and developing financial services and products in a manner that enhances efficiency, facilitates access to these services, and reduces operational costs.

In light of these transformations, interest in financial technology has extended beyond its practical applications to encompass its theoretical grounding of its concepts and frameworks, enabling a deeper understanding of its role in improving financial efficiency and promoting financial inclusion. Accordingly, many countries -both developed and developing- have adopted strategies to support financial innovation and implementation of FinTech solutions, recognizing them as key drivers of economic growth, especially in an increasingly competitive and innovation-driven global environment.

Based on the foregoing, the central research problem of this study can be formulated as follows:

To what extent has financial technology succeeded in transitioning from a theoretical framework to practical application, and what is the current state of its implementation at both the international and Arab levels?

From this main question, a set of sub-questions emerges as follows:

- What is meant by Financial Technology, and what are its principal theoretical foundations?
- What are the main fields of FinTech application, and what are its key technologies?
- What are the most prominent leading international experiences in the use of FinTech?
- What is the current state of FinTech adoption in Arab countries?

The significance of this study derives from the growing importance of FinTech, which has become a fundamental pillar in the development of contemporary financial systems. The value of this research lies in providing an analytical framework that facilitates an understanding of the evolution of FinTech and its areas of application, while highlighting its role in enhancing the efficiency of financial services and reducing costs. It also reviews both international and Arab experiences in order to draw relevant lessons learned.

To address the research problem and its associated sub-questions, this study adopts both descriptive and analytical approaches. The descriptive approach is employed to present the key concepts related to FinTech, while the analytical approach is used to examine various international and Arab experiences in FinTech applications. Accordingly, this research paper is structured into three main sections as follows:

1. The theoretical grounding of FinTech.
2. A review of international experiences in FinTech.
3. A review of Arab experiences in FinTech.

1. Theoretical Grounding of FinTech

FinTech, which began to spread at the end of the first decade of the twenty-first century, has constituted a revolution in global financial systems due to its ability to make financial and banking services faster, less costly, and more secure and transparent.

FinTech is a product of technological advancement within the financial domain, as it introduced a new paradigm for banking and financial services embodied in start-ups that have posed a challenge to conventional financial institutions. These technologies have become able to cover a wide range of needs and services related to financial and banking services through advanced methods that strongly compete with conventional financial services, particularly in terms of speed and cost and effort reduction. Moreover, FinTech has contributed to improving the quality of financial and banking services and facilitating their dissemination by offering diverse services to users across various sectors using innovative and cost-effective technologies that better meet client needs.

1.1. Basic Concepts of Financial Technology

FinTech is an innovative mechanism for improving systems and processes within the financial services sector. It is a term that integrates the technological and financial aspects, resulting in a field concerned with financial transactions through the utilization of modern technological advancements such as smartphones, communication networks, e-commerce, and digital currencies. These technologies have been directed toward the development of banking services, which are currently provided by companies that leverage technology within the service sector.

A decade ago, the term Financial Technology, or FinTech, was not widely used among individuals. However, its proliferation began toward the end of the first decade of the twenty-first century, marking a transformative shift in global financial systems.

1.1.1. Definition of Financial Technology

Financial Technology, commonly abbreviated as *FinTech* is used to describe new technologies that aim to improve and automate the delivery and use of financial services. At its core, FinTech is employed to help companies, business owners, and clients better manage their financial operations through the use of specialized software and algorithms increasingly deployed on computers and smartphones. (author, 2019)

The Basel Committee on Banking Supervision defines Financial Technology as “any technology or financial innovation that could result in new business models or new products with a material effect on financial markets and institutions.”

Similarly, the Financial Stability Board defines it as “financial innovations enabled by technology that could result in new business models or applications with a material effect on financial markets and institutions, and consequently on the provision of financial services.” Such financial innovations are evident across various areas of finance, including retail and wholesale payments, financial market infrastructure, investment management, insurance, credit provision, and capital raising.

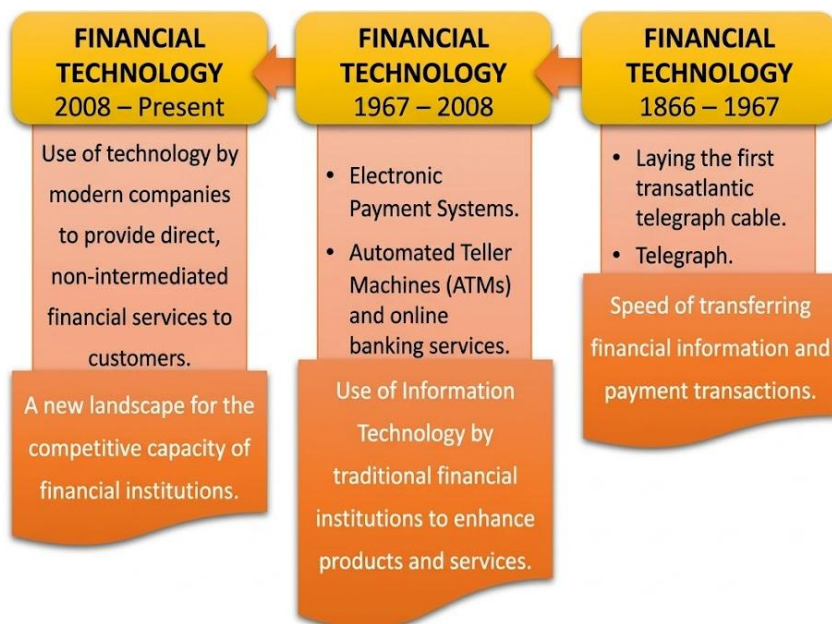
The Digital Research Institute in Dublin defines FinTech as “modern technological inventions

and innovations in the financial sector, encompassing a range of digital software used in banking operations, including clients transactions and financial services such as money transfers, currency exchange, calculation of interest rates and profits, and forecasting investment returns, among other banking operations” (Bakhti, 2020, p. 98).

According to the FinTech report issued by Wamda Lab and Payfort, it defines it as: "products and services that rely on technology to improve the quality of traditional financial services." (Bakhti, 2020, p. 97)

The most important advancements in FinTech can be summarized in the stages shown in the following figure:

Figure 01: Historical development of FinTech.



Source: Anjan V. Thakor, **FINTECH AND BANKING : What do we know?** , *Journal of Financial Intermediation*, Washington University in St. Louis, CFAR, 2019, p. 3

1.1.2. Importance of FinTech and its Characteristics

FinTech achieves many benefits, the most important of which are the following: (Saihi, 2018)

- Promoting financial inclusion and diversifying economic activity through innovations that help provide financial services to those who do not deal with the banking system.

–Facilitate the availability of alternative sources of financing for SMEs.

–Achieve financial stability through the use of technology to ensure regulatory compliance and risk management.

–Facilitate trade and remittances of overseas workers by providing efficient and effective mechanisms for cross-border payments.

The use of electronic means of payment results in increasing the efficiency of government operations, which will require further reforms to bridge the gaps in regulatory, consumer protection and information security frameworks.

The benefits of fintech for clients can be summarized in the following points: (author, 2017)

- FinTech products are characterized by rapid delivery, as they are provided online, enabling faster access to clients while offering greater convenience.

- FinTech products provide clients with a wider range of choices, allowing them to select and use the products that best suit their needs.

- FinTech companies do not require significant investment in physical infrastructure, such as branch networks, which enables offering more cost-effective solutions to clients.

- FinTech companies collect and store client data, thereby facilitating the provision of personalized products and services.

The main characteristics of FinTech can be summarized as follows: (Zawawid, 2018, p. 66)

- FinTech is a set of financial and banking knowledge, skills, methods, and approaches.

- Technology in its various concepts is not an objective itself, but rather a means used by financial and banking institutions to achieve their objectives.

- Financial and banking services constitute the primary field for the application of technology.

- The application of technology is not limited to the provision of financial and banking services, but also extends to administrative approaches.

1.2. Areas of Application of Financial Technology

FinTech is utilized to assist companies, entrepreneurs, and consumers in managing their

financial operations and daily financial activities more effectively through specialized software and algorithms increasingly deployed on computers and smartphones. As a result, consumers are becoming more aware of FinTech as an integral part of their everyday lives. At its core, FinTech refers to new technologies aimed at improving the use of financial services. Broadly, FinTech encompasses the following areas: (Oukasim, 2019, pp. 354-355)

1.2.1. Banking Services: FinTech applications in the banking sector include:

- **Personal Finance:** Concerned with managing spending, savings, credit, and taxation through technological solutions that provide clients with integrated databases.
- **Payments/Transactions:** FinTech enables the transfer of value of any size, at any time, across the globe through specialized firms, thus relying on secure and precise distribution technologies based on cryptocurrencies and blockchain.
- **Lending:** Technology is used to serve both new and existing customer segments, including small and medium-sized enterprises (SMEs), through big data analytics.

1.2.2. Insurance (InsurTech): FinTech contributes to the rapid development of the insurance industry across its various stages through:

- **Products with Innovative Solutions:** Leveraging data analytics, the Internet of Things (IoT), and Artificial Intelligence (AI), leading to on-demand insurance products, including peer-to-peer (P2P) insurance platforms.
- **Digital Distribution Platforms.**

1.2.3. Asset and Wealth Management: In this domain, FinTech provides the following services:

- **Distribution:** Offering wealth and investment management services to individuals through user-friendly digital platforms.
- **Advisory Services:** Providing data-driven recommendations through algorithm-based solutions.
- **Robo-Advisors:** Delivering automated advisory services as a cost-effective alternative to expensive traditional financial advisors.
- **Portfolio Management:** Utilizing AI and machine learning to manage clients'

investment portfolios.

1.2.4. Other fields: FinTech also contributes to additional fields, including:

- **Capital Markets:** Providing alternative forms of financial intermediation traditionally dominated by banks and intermediation firms.
- **FinTech** develops technological service solutions tailored to companies and financial institutions, such as software used in financial operations that enhance client's financial security, including blockchain technology.
- **Regulatory Technology:** Facilitating and improving regulatory compliance through the use of advanced technologies such as big data analytics and machine learning (ML).

1.3. Technologies Used in Financial Technology

A wide range of technologies underpin FinTech, attracting significant attention within digital and technological spheres. Among the most prominent of these technologies:

1.3.1. Artificial Intelligence (AI): The term Artificial Intelligence was coined by John McCarthy, often referred to as the "father of AI," in 1956. He defined it as the science of engineering and creating intelligent machines, particularly computer programs. AI involves designing devices and systems capable of thinking in a manner similar to the human brain—learning, reasoning, and making decisions in ways that mimic human behaviour. In this sense, AI represents the simulation of human intelligence through computer systems, aiming to replicate human thinking patterns and decision-making processes by studying human behaviour through experimentation and observation of their reactions in these situations, and subsequently modelling the human thinking processes via complex computational patterns. (Abdelwahab Sakhri, 2021, p. 407)

1.3.2. Cloud computing: Cloud computing is a model for supplying and providing information and communication technology (ICT) resources. It enables network connectivity to a shared pool of readily configurable computing resources, which can be provided with minimal effort in management and service provider interaction. Therefore, it is a type of computing that offers simple, on-demand access to a pool of highly flexible computing resources, allowing users to obtain virtually limitless services efficiently, with advantages such as reduced costs, increased

transaction trust, and ease of use.

1.3.3. Internet of Things (IoT): IoT is defined as the connection between devices and the internet, enabling them to capture, send, and receive data. These devices encompass virtually every conceivable device, from alarm systems and wearables to thermostats, ATMs, and even washing machines, refrigerators, and more. The value of the IoT lies not only in its ability to collect available data, but also in its capacity to fully utilize it, due to reliance on a robust infrastructure. This has generated significant global interest, prompting major corporations and start-ups alike to develop innovative devices.

1.3.4. 3-D Printing: Invented by the scientist Emmanuel Sachs, is considered one of the most advanced forms of manufacturing. It involves creating a three-dimensional object by depositing successive thin layers of material on top of one another. This technology is characterized by its speed and ease of use compared to other manufacturing technologies. It enables the production of complex, interlocking components, as well as parts made from diverse materials with varying mechanical and physical properties. Moreover, it can produce models that closely replicate the appearance, texture, and functionality of the original product. In recent years, its application has expanded, and it became applicable in small and medium-sized enterprises (SMEs).

1-3.5. Block Chain: Blockchain is a revolutionary technology that introduces a new concept for verifying various types of transactions involving financial transfers, as well as the exchange of tangible and intangible assets, in addition to related request and approval procedures. It also provides facilitation and solutions for transactions while ensuring credibility, reliability, and high security standards. Blockchain can be defined as an encrypted information system responsible for creating a unified record of electronic transactions and ensuring their integrity and authenticity through a secure network that operates without the need for intermediaries or centralized systems, as is the case in conventional systems. (Abdelwahab Sakhri, 2021, pp. 408-407)

1-3.6. Big Data: Big Data refers to extremely large datasets that can be computationally analyzed to reveal patterns, trends, particularly those related to human behavior and interactions. These large and complex datasets are difficult to process using traditional computing applications and tools. Their size, complexity, and diversity present significant

challenges in terms of structuring them for effective utilization, as well as determining how they can be optimally used. (Layan, 2019, p. 38)

2- Reviewing International Experiences in the Field of Fintech

FinTech is considered a revolution in modern global financial systems, as it enables the delivery and coverage of financial services through rapid and efficient methods that overcome the constraints of traditional financial services. The United States and the United Kingdom are regarded as leading countries in this field. However, in recent years, significant progress has also been observed in several Asian countries, particularly China, which has ranked among the top nations in the adoption of FinTech and the provision of a supportive ecosystem.

2.1. The Experience of the United States of America

The United States of America is among the leading countries according to the latest rankings of the FinTech Hubs Conference in 2018. The conference identified three leading FinTech regions in the United States among the top ten globally, placing the country at the forefront of the ranking after China, particularly in terms of financial sector digitization. Most FinTech industries are concentrated in two major regions: San Francisco, near Silicon Valley, which ranks third globally in terms of the number of leading FinTech companies, with funding amounting to USD 13.1 billion, and also ranks third in terms of top universities and research institutions specializing in FinTech; and New York, which fosters financial innovation, such as Wall Street hub" (Oukasim, 2019, p. 340)

The development of FinTech sectors in the United States primarily encompasses blockchain, regulatory technology, payments and lending, digital banking services, and cryptocurrencies. (Report, 2018, p. p24).

As of 2018, the United States constituted approximately 57% of the FinTech market. Consumers in the country identified key benefits of FinTech innovations, including convenience, security, simplicity, transparency, and personalization. The total transaction value reached USD 880 billion in 2018. The U.S. market has demonstrated the highest level of adaptability to FinTech solutions, owing to early adoption across most applications and the presence of leading market players in the region. For instance, Mastercard experienced rapid growth in Europe

through its partnership with Master Start Path, headquartered in London, which serves as a digital alternative to traditional large banks. Moreover, North and South America held the largest share of global FinTech investments, totaling USD 12.9 billion, with the United States dominating the market, particularly in start-up lending and insurance services purchase. (The North American financial technology market)

Among the most prominent FinTech-related start-ups in the United States—out of approximately 214,006 start-ups—the following stand prominent: (Review of start-ups in USA)

2.1.1. E-cigarette Manufacturer: Established in 2007, the company manufactures e-cigarettes, where the company uses a smart heating mechanism that creates a spray and reduces combustion, and its product can be recharged via a USB port, which is a cartridge mounted on top of a device containing nicotine, benzoic acid, flavors, and others, based in San Francisco, California, with a financing of 15.07 billion US dollars.

2.1.2. Consumer Goods and Food Delivery Company (Gopuff): Established in 2013, the Company is an online platform that provides on-demand food and grocery delivery services, in which companies provide snacks, beverages, fruits, vegetables, frozen foods, and other goods. Users can browse and order online via the mobile application and get the products delivered. It has a loyalty program where users are awarded reward points that can be redeemed for prizes, and it is available on Android and iOS platforms, and the company has successfully raised \$5.14 billion in funding with the participation of a group of investors.

2.1.3. A company specializing in displaying licensed sportswear (Fanatics): Established in 2011, the company offers licensed sports products such as shirts, shoes, socks, hats and keychains, and has successfully raised \$30.4 billion in funding with the participation of several investors, the most important of which are Fidelity Investments, Black rok, MSD Capital.

2.1.4. American Satellite Communications Company (Ligado): Established in 2011, the company provides satellite transmission to mobile networks as well as telephone services, and the company has successfully raised \$4.21 billion in funding with the participation of a group of investors.

2.1.5. Autonomous Driving Technology Company (Argoai): Established in 2017, the company develops references, hardware, mapping and cloud-enabled infrastructure for autonomous driving, where companies integrate their technology with vehicles to develop autonomous transport and delivery vehicles, with a funding estimated at USD 3.70 billion with the participation of several investors.

2.1.6. Cloud-based data science platform: Established in 2013, the company provides a data and artificial intelligence platform whose features include data analytics, enterprise security, dashboard, integration, and business insights analytics, and is used in many industries such as energy, gaming, media, entertainment, financial services, etc., with an estimated funding of USD 3.60 billion.

As of 2018, the United States represents 57% percent of the FinTech market, and digital payments is the leading sector in the market, with a total transaction value of USD 880 billion in 2018. (The North American financial technology market)

2.2. China's Experience

China extensively employs advanced technologies in Financial Technology, particularly Big Data and Artificial Intelligence, thereby encouraging banks and major technology firms to innovate and achieve excellence at both the domestic and global levels.

2.2.1. Drivers of FinTech Development in China

The key factors underpinning the development of Financial Technology in China can be summarized as follows: (Yesaad, 2023, pp. 193-194)

- **Advanced Digital Technology Capabilities:** China possesses the largest companies producing digital and smart financial services, which has enabled it to take the lead in innovation and invention.
- **Big Data:** China is gradually transitioning toward a cashless economy due to the rapid growth of mobile payments through applications such as WeChat Pay and Alipay, which are widely used for payments across the country.
- **Artificial Intelligence:** AI is widely utilized in the financial industry. For instance, Ping

An Bank has incorporated AI into its customer service operations, while major e-commerce platforms such as Taobao and JD.com employ AI combined with data analytics to predict customer behavior.

- **Ease of Access to Data:** China currently hosts the world's largest e-commerce sector, facilitating extensive availability of financial data. The widespread use of smartphones, particularly among younger generations, has significantly increased the use of online micro-lending services.

- **Large User Base and Product Diversity:** Given China's massive population, FinTech applications have achieved broad penetration across all six major financial sectors: payments, lending, retail, banking, insurance, wealth management, and trading. This contrasts with the United States, where FinTech is more concentrated in high-frequency trading and selected key markets.

- **Government Support for Innovation:** The Chinese government actively promotes all types of financial innovation by combining governmental support for financial inclusion with the expansion of private-sector activities in the FinTech realm.

2.2.2. The most prominent FinTech companies in China: these companies include:

2.2.2.1. Ant Financial

Ant Financial was established in 2014 in China by Alipay, which holds 33% of the shares of the company, alongside three major partner companies. It provides comprehensive FinTech services, including payments, insurance, wealth management, credit, and lending. The company relies on Big Data technologies, facial recognition, cloud computing, risk monitoring technologies, and Artificial Intelligence. Its value is estimated at approximately USD 60 billion. (Yahyaoui, 2023, pp. P 170-171)

2.2.2.2. Alipay: A leading online payment company in China, with an estimated 80 million transactions per day as of the end of 2013.

2.2.2.3. Alipay wallet: Its mission is to provide shopping, credit card payment, money transfer and bill payment services via mobile phones, and as of 2014 it has more than 190 million active users annually.

2.2.2.4. Yu'e Bao: The world's largest online money market fund, launched in 2013 with other companies, it has raised nearly USD 570 billion and about 125 million users.

2.2.2.5. Zhao.Cai.Bao: An open platform for investments, products, financial services and third-party financial institutions, providing convenient and secure online financing services for individuals and MSMEs, in addition to insurance against all risks.

2.2.2.6. Ant crédit: It provides micro online loans to small and micro enterprises and individual entrepreneurs online, and is evaluated based on big data and is concerned with credit loans, online merchant loans, etc.

2.2.2.7. My Bank Ant Financial: A private bank called (my bank) (Shanghai fosun Industrial Technology) was established in 2014, part of a pilot program launched earlier that year, where it is used in online big data analysis to serve the financial needs of small and micro enterprises, as well as individual clients.

2.3. India's Experience

In its pursuit of digitizing services, India adopted the "Aadhaar" digital identity system in 2009. This electronic identity encompasses all user data in addition to fingerprints and iris scans, serving as a reliable and tamper-proof means of personal identification. The number of registered identities reached approximately 1.2 billion during the period 2010–2019 (Government of India, 2022). With regard to digital financial services, India offers a wide range of services, including instant payment services and bill payment systems, among others.

The process of digital transformation in India began in 2009, and between 2010 and 2015 the country witnessed the establishment of 1,216 start-ups in the FinTech sector. The number of start-ups increased from 210 to 454 during the period 2014–2015, eventually reaching 2,174 FinTech start-ups. Their activities are distributed across several segments, including 405 companies in payments, 365 in lending, 313 in wealth technology, 173 in personal finance management, 111 in insurance technology, 58 in regulatory technology and cybersecurity, and 784 across other segments (Belkalla, 2021, pp. 444-445)

Among the key factors that contributed to the spread of FinTech in India are the following

(cirine, 2023, p. 427):

- The establishment of a robust digital identity system
- The reduction of paper-based transactions and their replacement with digital alternatives.
- The transition toward a less cash-dependent economy
- Enabling financial institutions to access digital innovation platforms (DigiLocker, GSTIN, VPI)
- The development of digital infrastructure through collaboration between the government and stakeholders

3. Review of Arab Experiences in FinTech

In light of the significant transformation witnessed globally in the development of financial services through FinTech, and the advantages it has achieved, particularly in enhancing financial stability, reducing costs, and accelerating transactions, Arab countries have, in recent years, begun to make serious efforts to advance the FinTech trajectory within their economies, especially in relation to financial services. FinTech has experienced noticeable growth across the Arab region, as reflected in the increasing number of companies operating in this field.

In 2016, there were 105 FinTech companies distributed as follows: 29% in North Africa, 43% in the Gulf Cooperation Council (GCC) countries, and 29% in the Levant. The United Arab Emirates ranked first with a total of 30 companies, followed by Egypt with 17 companies, Jordan and Lebanon with 15 companies each, Morocco with 8 companies, Kuwait and Saudi Arabia with 6 companies each, Tunisia with 3 companies, Algeria with 2 companies, and Bahrain, Oman, and Qatar with one company each. No FinTech companies were recorded in Iraq (FinTech Reaches Arab Countries, 2017).

The main drivers behind the adoption of FinTech in the Arab world can be summarized as follows (Leading Start-ups in the Arab World, n.d.), (Harfouche, 2019, p. 73) :

- The widespread prevalence of financial exclusion, which imposes significant costs on both individuals and governments, coupled with the rapid increase in smartphone penetration, nearly threefold outside GCC countries, and the growing need for digital payment solutions.

- The necessity of developing innovative solutions for financing small and medium-sized enterprises (SMEs), which account for only 8% of total lending, despite their critical role in the regional economy. This underscores the need for direct lending platforms and crowdfunding mechanisms for social and creative projects, which have demonstrated strong popularity across the region.
- The relatively low contribution of e-commerce to GDP in GCC countries, approximately five times lower than in other high-income countries, largely due to consumer reluctance to use credit and debit cards and their preference for cash-on-delivery payment methods.

3.1. The Egyptian Experience

In March 2019, the Central Bank of Egypt launched a comprehensive strategy aimed at advancing the FinTech ecosystem in Egypt and positioning the country as a regional hub for the FinTech industry (Egypt, 2019). According to the “FinTech Egypt” report on the development of FinTech in Egypt by the end of 2021, the following results were achieved (Financial Technology in Egypt, n.d.):

- FinTech investments exceeded USD 159 million across 32 deals.
- The number of start-ups supporting FinTech increased to 112 companies by the end of 2021.
- Expansion into 14 innovative FinTech sub-sectors, including payments and remittances, capital markets, lending, and alternative finance.
- A total of 24 companies expanded regionally and internationally in the FinTech domain.
- Approximately 9 million customers benefited from the services of FinTech start-ups.
- Around 70% of FinTech start-ups deployed technological solutions in the market.
- The payments and remittances sector accounted for 29% of the total sub-sectors.

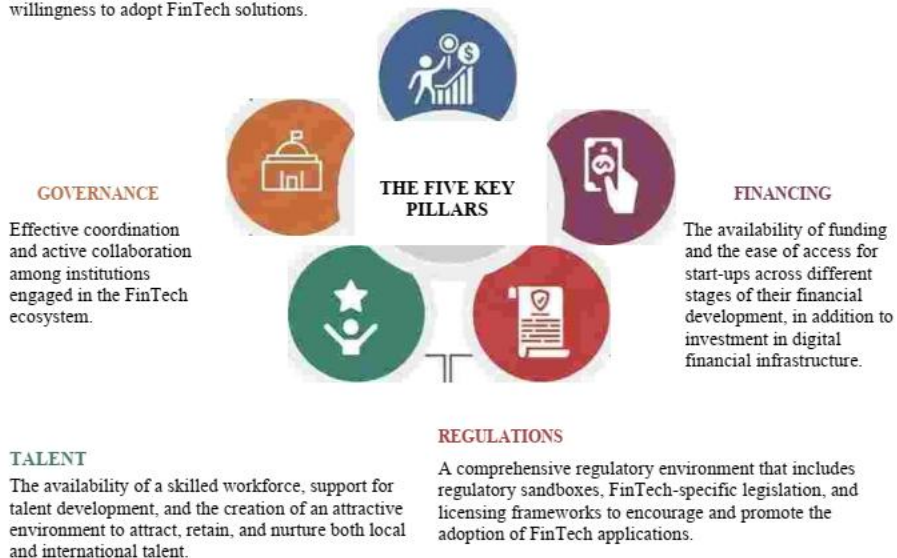
3.1.1. FinTech Strategy in Egypt

The Central Bank of Egypt developed a FinTech and innovation strategy based on five main pillars, as illustrated in the following figure:

Figure (02): FinTech and Innovation Pillars in Egypt.

DEMAND

The needs of consumers, SMEs, and financial institutions, as well as their level of digital readiness and willingness to adopt FinTech solutions.



Source: Egypt FinTech Landscape Report, 2021, p. 9.

3.1.1.1. Demand

This pillar refers to the needs of consumers, SMEs, and financial institutions, as well as their level of digital readiness and willingness to adopt FinTech solutions. It can be assessed based on the following:

- The development of FinTech start-ups and their supporting ecosystem, as illustrated in the following figure:

Figure (03): Development of FinTech Start-ups.



Source: Egypt FinTech Landscape Report, 2021, p. 10.

- The educational background of founders, as presented in the following table:

Table (01): Educational Background of Founders.

Educational Background	Doctoral Degree	Master’s Degree	Bachelor’s Degree	Non-Technical Education	Technical Education
Percentage	3%	33%	64%	52%	48%

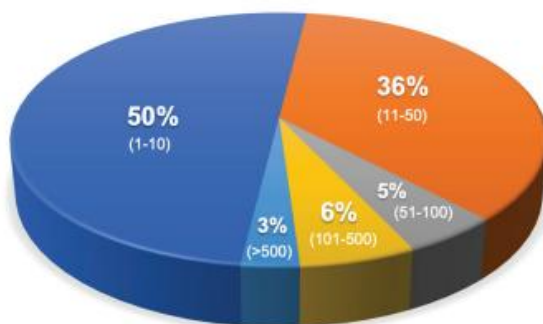
Source: (Egypt FinTech Report, 2021, p. 34).

The table indicates that more than half of entrepreneurs hold a bachelor’s degree (64%), while PhD holders account for only 3%, and master’s degree holders represent approximately 33%. It is also observed that there is a near balance between technical and non-technical educational backgrounds. This reflects a workforce that combines two competitive advantages, technological expertise and business management, which positively contributes to sustainable growth.

3.1.1.2. Talent and Workforce in Start-ups

As illustrated in the following figure:

Figure (04): Employment Size in Start-ups.



Source: (Egypt FinTech Report, 2021).

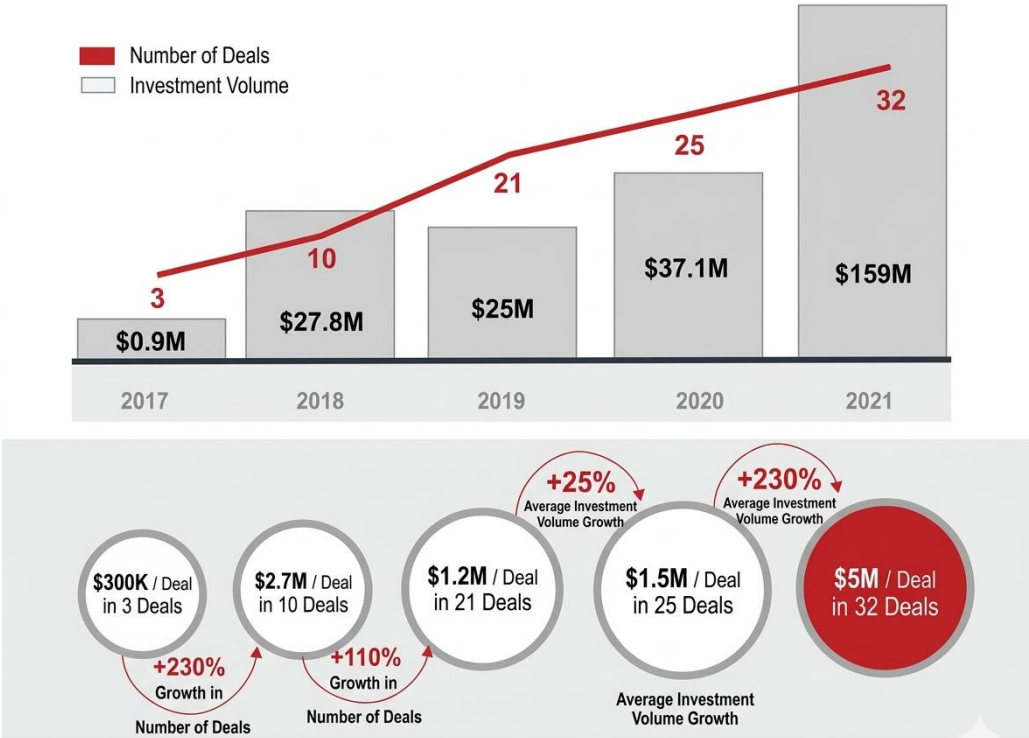
The figure shows a significant increase in the number of FinTech start-ups, reaching 112 companies by 2021, compared to only two companies in 2014. This upward trend is expected to continue. Furthermore, approximately half of these start-ups employ between 1 and 10 employees, while around 36 companies have between 11 and 50 employees. It is noteworthy that workforce size is closely linked to the nature of production and the stage of business development, as these companies typically introduce innovative solutions within the Egyptian market.

3.1.1.3. Financing

This pillar can be analysed as follows:

A. Evolution of Financing Over the Period (2017–2021)

Figure (05): Financing Development During the Period (2017–2021).



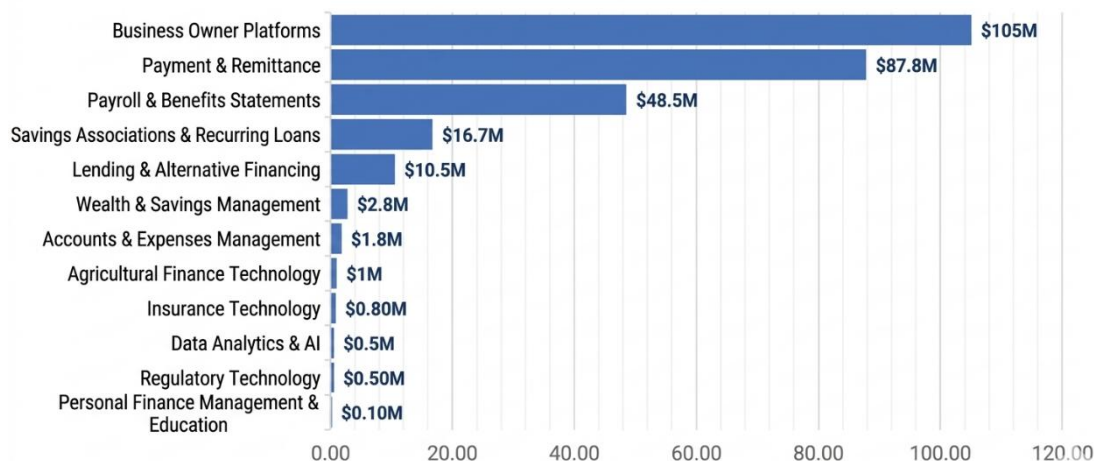
AVERAGE INVESTMENT VOLUME PER DEAL

Source: (Egypt FinTech Report, 2021, p. 42).

The figure indicates that approximately USD 250 million was invested in the Egyptian FinTech start-up market during this period. Investment volume increased significantly, reaching USD 59 million compared to only USD 0.9 million in 2017. This reflects the substantial growth rates achieved by FinTech start-ups during the period under study.

B. Distribution of Investments by Sub-sectors

Figure (06): Distribution of Investments by Sub-sectors.



Source: (Egypt FinTech Report, 2021, p. 42).

The figure shows that the majority of banking FinTech investments are concentrated in business platforms, followed by payments and remittances, then payroll and benefits, and subsequently rotating savings and credit associations. Conversely, relatively limited attention is directed toward regulatory technology, personal finance management, financial literacy, data analytics, artificial intelligence, insurance technology, and agricultural FinTech.

3.1.1.4. Regulatory Framework

This pillar reflects the initiatives undertaken by the Central Bank of Egypt to support the regulatory environment for FinTech. These include a set of laws and regulations, notably:

- Law No. 18 of 2019 regulating the use of non-cash payment methods and its executive regulations
- Law No. 194 of 2020 concerning the Central Bank and the banking system
- The law regulating alternative finance activities
- Regulatory rules governing digital financial services

3.2. The Saudi Experience

The FinTech sector in Saudi Arabia has experienced steady growth in recent years. The number of start-ups increased from only 10 companies in 2018 to a total of 155 start-ups in 2020, with funding amounting to USD 130 million, compared to USD 23 million raised by the sector during the period 2015–2020 (– Zayekh, 2022, p. 760)

According to the *Fintech Saudi* report (2021), there has been a dynamic increase in the number of active start-ups, with a growth rate of 37% in 2021 compared to 2020, and an increase of approximately 14.7 times over the period 2018–2022 (KPMG, 2018)

3.2.1. Distribution of FinTech Companies in Saudi Arabia

Table (02): Distribution of FinTech Companies in Saudi Arabia.

Sectors	Percentage
Payments and Foreign Exchange	32%
Lending and Finance	19%
Personal Finance	13%
Private Fundraising	10%
Business Solutions and Information Services	12%
Financial Markets	7%
Banking and Infrastructure	22%
Other	5%

Source: (KPMG, 2018).

The table indicates that FinTech companies are most active in the payments and foreign exchange sectors, followed by lending, personal finance, and treasury management. Additional activities include business solutions and information services. The leading position of payments and foreign exchange can be attributed to the need to meet financial demands arising from the COVID-19 pandemic, as well as the launch of numerous new payment solutions, such as the “Mada Atheer” service and the expansion of mobile payment services.

3.2.2. Saudi Efforts to Support and Develop FinTech Companies

Saudi Arabia’s efforts are clearly reflected through the initiatives of the Saudi Central Bank,

FinTech Saudi, and the Capital Market Authority (— Kadri, 2022), as follows:

3.2.2.1. Saudi Central Bank Initiatives

- The launch of *FinTech Saudi* in partnership with the Capital Market Authority in 2018, as a strategic initiative to foster the development of the FinTech sector in the Kingdom.
- The introduction of a regulatory sandbox in 2018 aimed at attracting both local and international FinTech companies.
- The launch of the Open Banking Project in January 2021 to support the development of the Kingdom's financial sectors in alignment with Vision 2030.

3.2.2.2. Capital Market Authority Initiatives

- The establishment of the FinTech Lab in 2018, which receives applications from both domestic and international participants to obtain authorization and test financial products and services related to securities activities. These solutions are designed to meet market needs through innovative and test-ready business models within a controlled experimental environment.

3.2.2.3. FinTech Saudi Initiatives

- The FinTech Sector Guide, which provides comprehensive answers to questions related to local regulations and outlines available options for international companies interested in entering the Saudi market.
- The FinTech Training Program, an annual initiative launched in 2018, aimed at equipping participants with new skills and practical experience through placements in financial institutions or FinTech companies within Saudi Arabia.
- The FinTech Tour, one of the major initiatives in the Middle East, designed to promote knowledge dissemination in FinTech by hosting experienced speakers from around the world.

3.3. The Algerian Experience in FinTech

The Algerian government has acknowledged that, despite the significant contribution of traditional financing to the economy, it does not adequately meet the financing needs of small and start-up enterprises. Consequently, the state adopted the model of equity crowdfunding

platforms and authorized them to operate legally in financing projects, in accordance with Article 45 of the Supplementary Finance Law of 2020. These platforms were designated as “participatory investment advisors” (— Bouzana, 2021, p. 106).

Although Algeria is considered one of the seven countries in the Middle East and North Africa region with legislation addressing cybercrime, it has only two active companies in the FinTech sector, according to “MAGNiTT” statistics reported in the Middle East and North Africa FinTech report (— Bouzana, 2021, p. 105). As for Algerian banks, they remain relatively underdeveloped in their use of digital tools, despite several initiatives in this field, including (—Azenag, 2022, pp. 90-91).

3.3.1. N’investi: The first crowdfunding platform in Algeria, designed to connect young entrepreneurs with individuals willing to invest in innovative projects.

3.3.2. Belyn: A technology company specializing in the design of IT-based banking solutions aimed at improving customer relationships, digitizing operations, and enhancing data management.

3.3.3. Twiza.com: A platform launched and operated by a young start-up established in 2011 and funded by its founders. It represents a modern approach to financing creative, innovative, social, scientific, artistic, and sports projects through participatory crowdfunding.

3.3.4. Algeria Donation Crowdfunding: A platform that serves as a link between donors willing to contribute to charitable causes and individuals in need of assistance through modest capital injections. It has a social dimension, as it helps address the needs of Algerian citizens who lack access to financial resources.

3.3.5. Chricly: A crowdfunding platform that meets the growing demand for investment capital while alleviating pressure on banks and traditional financial institutions.

Conclusion

This study demonstrates that FinTech is no longer merely a theoretical concept but has become a practical reality that is increasingly shaping modern financial systems. It has contributed to transforming financial services from their traditional formats into innovative

digital models characterized by speed, efficiency, and flexibility, while reducing costs and expanding access to financial services.

The international experiences reviewed in this study have shown considerable success in adopting these technologies, largely due to the availability of flexible regulatory environments, advanced digital infrastructure, and strong governmental support for innovation. In contrast, the analysis of Arab experiences reveals ongoing efforts to adopt FinTech; however, these countries remain in a transitional phase as they strive to keep pace with global developments. This is primarily due to challenges related to regulatory frameworks, insufficient infrastructure, and limited digital awareness.

Based on the foregoing, the transition from the theoretical framework to the practical implementation of FinTech requires cooperation and integration among various stakeholders, including financial institutions, regulatory bodies, and start-ups. Such collaboration is essential to maximize the benefits of these technologies and support economic development.

This study has reached the following key findings:

- FinTech is an effective tool for enhancing the efficiency of financial services and reducing associated costs.
- FinTech contributes to strengthening financial inclusion by narrowing the gap between populations with and without access to financial services.
- The successful implementation of FinTech depends on the availability of advanced digital infrastructure and a flexible regulatory and legislative framework.
- Despite progress in Arab countries, they continue to face structural and regulatory challenges that hinder the widespread adoption of FinTech, as they remain in a growth and expansion phase compared to global experiences.
- There is a clear gap in the level of FinTech adoption between developed countries and Arab countries.

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

- Develop regulatory and legislative frameworks that both encourage innovation and ensure user protection.

- Invest in digital infrastructure, particularly in Arab countries, to enhance the readiness of financial systems for digital transformation and to support FinTech applications.
- Strengthen the role of start-ups in the FinTech sector through funding and incubation mechanisms.
- Promote digital awareness by disseminating financial literacy and encouraging the use of electronic financial services.
- Encourage partnerships between traditional financial institutions and FinTech start-ups to achieve integration.
- Leverage successful international experiences and adapt them to the specific characteristics of the Arab context.
- Integrate FinTech into national economic strategies to achieve sustainable development.

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