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ASSESSING THE IMPACT OF FINTECH ON FINANCIAL INCLUSION IN ALGERIA: AN ANALYSIS OF DIGITAL FINANCIAL TRANSFORMATION INDICATORS (2016-2022)

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ABSTRACT

This research examines the correlation between financial inclusion and financial technology (fintech), particularly emphasizing how fintech can expedite the digital financial transformation in Algeria. This research examines how individuals and institutions are able to access financial products and services, contributing to broader economic development. The study covers the period from 2016 to 2022, employing a descriptive-analytical methodology and incorporating the deductive method for analyzing economic data derived from official statistics and World Bank reports. According to the World Bank data, the adoption of fintech is slowing down due to the deficiency in financial knowledge of the Algerian banking system. According to World Bank data, the results indicate that Algeria is making slow progress in implementing fintech solutions to enhance financial inclusion. This stagnation is attributed to low financial literacy levels and the underdeveloped banking system. The originality of this paper lies in its focus on the intersection between fintech adoption and financial inclusion in the Algerian context, a relatively underexplored area. The study affirms the need to accelerate the digitization of financial and banking services in Algeria by promoting fintech products, improving software infrastructure, and enhancing network readiness indicators. The research concludes with recommendations for policymakers to improve digital financial literacy and foster innovation in banking technologies to achieve broader financial inclusion.

Keywords: Financial inclusion; fintech; digital financial transformation

INTRODUCTION

The issue of financial inclusion has emerged as a central topic in global economic policy due to its significant role in achieving financial stability and sustainable development. Notably, researchers and policymakers are increasingly focused on mitigating systemic financial risks and ensuring that financial systems play a crucial role in fostering inclusive growth. In numerous emerging and developing economies, including Algeria, central banks and financial regulators have adopted strategies to collect savings and channel them into development projects. In particular, a critical part of these strategies is promoting financial inclusion by ensuring affordable access to financial services for all individuals and institutions, regardless of their socio-economic status. However, achieving financial inclusion requires more than conventional banking. The adoption of financial technology (fintech) has become a key driver in modernizing financial services, offering innovative products that enable faster, more efficient, and secure access to banking. Accordingly, countries worldwide are leveraging fintech solutions to lower operational costs, improve service delivery, and bring marginalized groups into the formal financial system. This study examines the extent to which the Algerian banking sector has integrated fintech and whether this integration contributes to expanding financial inclusion across various segments of society (Moussaoui & Tagrerout, 2023).

In emerging and developing economies, the country's official banks, financial regulators, and finance ministries are focused on gathering savings to invest in beneficial development projects. Financial inclusion pertains to the ability of individuals and businesses to obtain cost-effective financial solutions and services that meet their specific needs. This includes transactional services, payment facilities, savings options, credit opportunities, and insurance coverage delivered in a responsible and sustainable manner (World Bank, 2022).

While Algeria's banking environment has seen some progress in adopting fintech, the pace of change remains slower than in other emerging markets. Although the Bank of Algeria has supported several initiatives to promote fintech adoption, challenges remain, particularly in areas such as cybersecurity and financial literacy. Note that the ongoing development of the payment and settlement system signals positive efforts. However, these advancements are insufficient to address all barriers to financial inclusion (Moussaoui & Tagrerout, 2023).

The study aims to address the following problem statement: To what extent has the Algerian banking sector integrated fintech, and how does this integration promote financial inclusion? Several secondary questions arise from this central issue:

1. What are the current conditions for financial inclusion in Algeria?
2. How effectively is fintech contributing to financial inclusion in the country?

RESEARCH IMPORTANCE

This study fills a critical research gap by exploring the intersection of financial inclusion and fintech adoption in Algeria. This topic has received limited attention in existing literature. While much of the global research on fintech focuses on its economic potential in developed markets, this paper emphasizes Algeria's financial sector's unique challenges and opportunities. Considering the global shift towards digital economies, the Algerian financial sector must adopt fintech innovations to improve service delivery, reduce costs, and expand financial access to underserved populations. Note that the research is timely and relevant as fintech becomes increasingly essential in a rapidly evolving economic landscape.

In conclusion, the significance of this research lies in understanding how Algeria can harness fintech to modernize its financial sector, improve banking services, and promote inclusive economic growth. The findings will provide insights for policymakers and financial institutions, offering recommendations to strengthen network readiness, improve financial literacy, and adopt secure digital platforms.

LITERATURE REVIEW

Most empirical research indicates that financial inclusion contributes to enhanced economic growth and a more resilient banking system (Ahmed & Salleh, 2016). In recent decades, theoretical and empirical research has focused on the effect of financial advancements and innovations on the economy and the financial system (Al-Eitan, Al-Own, & Bani-Khalid, 2022).

Jouini (2021) investigated how financial inclusion affects banking sector performance by analyzing the return on assets in 11 Arab nations from 2013 to 2019, utilizing a dynamic panel data methodology. This study encompassed measures of financial inclusion, variables related to individual banks, and wider macroeconomic conditions. The findings indicated that characteristics specific to banks had the most substantial effect on profitability, while macroeconomic factors were less influential. Regarding financial inclusion, the analysis discovered no significant relationship between the availability of Automated Teller Machines (ATMs) or the number of bank branches and return on assets (Mhlanga, 2022). At the same time, this research aimed to explore the question: How does fintech contribute to tackling the challenges and risks linked to climate change in the context of the Fourth Industrial Revolution? The findings suggest that financial inclusion facilitated by fintech could enhance the resilience of households, individuals, and businesses during sudden weather events or gradual changes such as shifting precipitation patterns, rising sea levels, or saltwater intrusion. Thus, tools like insurance, savings, credit, and money transfer services, along with innovative digital distribution channels, can support those affected by climate change and assist in addressing emerging environmental challenges. Moreover, the study advocates advancing financial inclusion through fintech as a vital approach to mitigating climate-related risks and achieving sustainable development goals, engaging development patterns, governments, and civil society. Given this perspective, the contributions of this study to the fields of financial inclusion and fintech are highly valued.

A comprehensive analytical and statistical economic investigation into the effects of fintech applications on the profitability of Algeria's banking sector was conducted from 2010 to 2022 (Benzeid, Kadja, & Ammeni, 2022). This study aimed to investigate how fintech services affect the profitability of the banking sector in Algeria. In particular, it focused on the influence of ATMs on the Return on Equity (ROE) by utilizing annual data from 2010 to 2019 and employing a multiple linear regression model for analysis. Prior to conducting this examination, a statistical review was performed to understand the landscape of fintech services in our country from 2016 to 2022. The findings indicated a significant positive impact of these fintech indicators on the ROE of the banking sector. In order to maximize these benefits, the study recommends that authorities prioritize the development of the banking sector, improve the technical framework, and broaden the availability of suitable fintech solutions.

Overall, while all studies are interconnected through the themes of fintech, financial inclusion, and banking sector performance, this study specifically focuses on integrating fintech to enhance financial inclusion in Algeria, differentiating it from other research. Unlike Jouini (2021), who analyzed financial inclusion's impact on banking performance in multiple Arab countries, this research targets Algeria with the latest data and a detailed examination of digital transformation indicators. While Mhlanga (2022) discussed fintech's role in climate change, this work emphasizes its direct effects on financial inclusion in Algeria's banking sector. Additionally, unlike Benzeid et al. (2022), who focused on bank profitability through ATMs and interbank cards, this study explores a broader range of fintech indicators and their contributions to financial inclusion. This focused approach offers practical guidance for decision-makers and key players in reshaping Algeria's financial sector.

HYPOTHESES

H_1: Financial inclusion pertains to the provision and accessibility of financial services for diverse demographics within Algerian society, including underrepresented groups, via recognized financial institutions.
H_2: Algeria lags in integrating fintech solutions into its financial system, as indicated by key financial inclusion metrics.

METHODOLOGY

This study employs a descriptive-analytical approach alongside a deductive method to examine the correlation between financial inclusion and fintech. In Algeria, the descriptive approach is employed to identify trends and analyze key indicators over the period 2016 to 2022, such as access to financial services and digital payment adoption. Official data from World Bank reports and other public statistics serve as the primary data sources, ensuring reliability.

The deductive method allows the study to apply theoretical frameworks to real-world data, helping to assess whether fintech adoption has effectively promoted financial inclusion. At the same time, qualitative insights, including policy reviews, are also utilized to identify challenges like limited financial literacy and infrastructure weaknesses. This combination of methods provides a broad view of trends and deeper insights into the systemic factors affecting fintech use in Algeria.

Although the focus on secondary data ensures consistency, it limits the research to existing statistics. Therefore, future studies could enhance these findings through primary data collection, such as surveys or interviews. The selected methods enable replication by other researchers using the same data sources and procedures.

This research aims to achieve several key objectives. First, it will provide a comprehensive theoretical framework for understanding financial inclusion and fintech, outlining their definitions and significance. Second, the study will identify and analyze the dimensions and indices of financial inclusion, establishing a foundation for evaluation. Third, we will assess the extent to which fintech contributes to enhancing banking services in Algeria, examining its practical implications. Additionally, the research will analyze the current state of financial inclusion within the Algerian economy, highlighting existing challenges that hinder progress. Finally, the study will emphasize the critical importance of integrating fintech into the development and modernization of Algeria's banking sector, aiming to offer valuable insights for policymakers and industry stakeholders.

THE THEORETICAL FRAMEWORK OF FINANCIAL INCLUSION AND ITS MOST PROMINENT INDICATORS

The term "financial inclusion" delineates the obstacles that hinder individuals from obtaining financial services. The interest in financial inclusion began to develop in developing countries in the early 2000s and has several definitions:

- The Bank of Algeria characterizes financial inclusion as delivering a full range of financial services through official channels to every segment of society. This includes access to bank accounts and savings, payment and transfer services, insurance offerings, financing and credit solutions, and the development of tailored financial products at competitive prices (Bank of Algeria, n.d.).
- According to the World Bank Group, financial inclusion pertains to the provision of effective and reasonably priced financial products and services to people and businesses, addressing their specific needs. This encompasses various offerings, such as transactions, payments, savings, credit, and insurance, all provided in a manner that is both responsible and sustainable (World Bank, 2022).
- Financial inclusion encompasses initiatives to ensure that financial products and services are easily accessible and affordable for everyone, regardless of their personal wealth or business scale. Financial inclusion aims to eliminate obstacles that hinder individuals and enterprises from engaging with the financial sector, enabling them to utilize these services to improve their quality of life.

Overall, we can conclude that financial inclusion pertains to improving the availability of financial services and products for all population segments at an affordable cost, aiming to achieve inclusive economic growth. As a result, there is a broad acknowledgment among government entities and various international organizations regarding the importance of fostering financial inclusion. This can be achieved by developing strategies and establishing frameworks and methodologies that promote and improve the availability of finance and financial services for every segment of society.

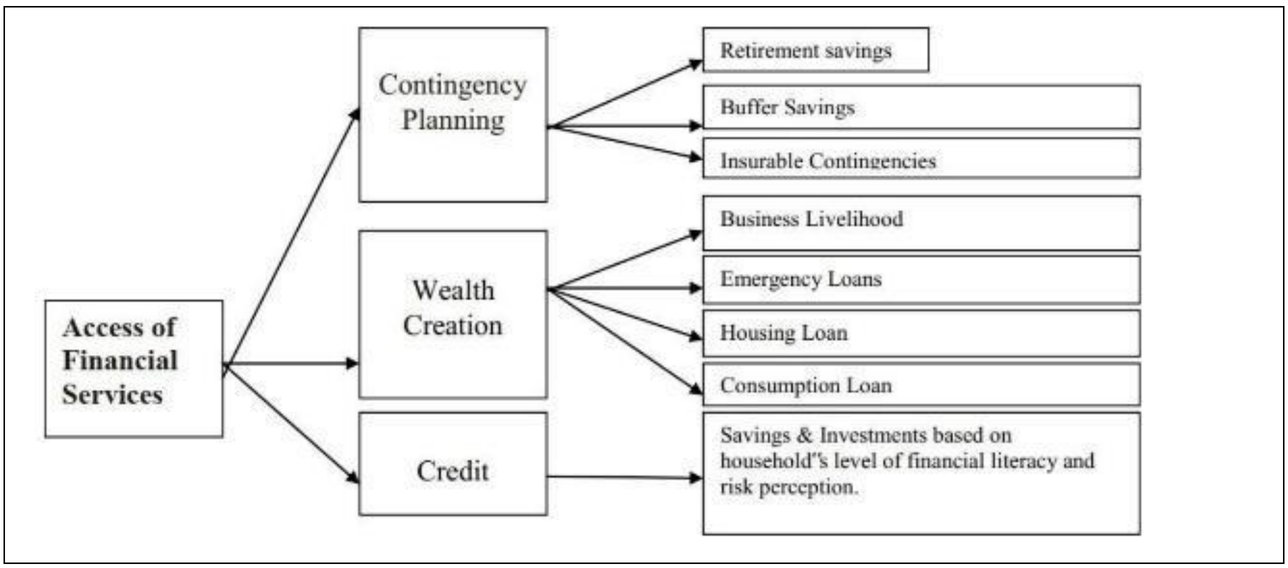
The Importance of Financial Inclusion

Promoting financial inclusion has become one of the most prominent concerns of countries due to its impact on achieving sustainable development and financial stability (Bank of Algeria, n.d.). This highlights that financial inclusion has become a central focus for many governments and regulatory bodies, especially central banks. Research indicates a strong connection between financial inclusion, economic stability, and growth. However, it is challenging to imagine sustainable financial stability when a significant segment of people and businesses is not integrated into the financial system. Thus, by enhancing access to financial services, inclusion fosters competition among financial institutions, compelling them to diversify and improve the quality of their offerings to attract a broader customer base and increase transaction volumes.

Additionally, it encourages the formalization of certain informal financial channels. It has a social dimension, with a greater focus on low-income groups, particularly women. The objective is to facilitate the availability of financial services to individuals, Small and Medium Enterprises (SMEs), and micro-businesses and integrate them into the official financial sector. This makes them available to marginalized groups in the public interest of job creation. This statement suggests that economic growth can lead to a reduction in poverty, improved income distribution, and higher living standards. Figure 1 illustrates the availability of financial services for the households.

Figure 1

The Availability of Financial Services for Households



Source: Singh and Roy (2015)

The Indices of Financial Inclusion

Indicators include a wide variety of payment methods and access points. The main account utilized for transactions can be maintained at a bank, a financial institution, or an electronic money account. Payments may be conducted online, via mobile phones or Wi-Fi-enabled devices, or through Point-of-Sale (POS) terminals. Accordingly, government statistical agencies can collect this data to evaluate the progress and gaps in the utilization of Digital Financial Services (DFS), as well as the technology and supportive environment necessary for their effective utilization. Meanwhile, financial inclusion is evaluated across three aspects: the provision of financial services, the utilization of financial services, and the quality of the products and the provision of services.

Financial Inclusion within Emerging Economies

Financial inclusion is vital for economic development, especially in promoting economic growth while addressing inequality and alleviating poverty levels in any nation. Although challenging to quantify, financial inclusion significantly improves the capacity of low-income families to access financial services. This increased accessibility enables both individuals and businesses to boost their incomes and foster self-sufficiency, thereby contributing to the country's economic growth. On the other hand, limited access to formal financial products and services can lead to lost developmental opportunities, heightened poverty rates, and increased costs of obtaining financial resources. In particular, countries with well-established and accessible financial systems tend to experience beneficial effects on savings behaviour, sustainable growth rates, investment decisions, and the progression of technological innovations (Van & Linh, 2019).

THE REALITY OF FINANCIAL INCLUSION IN ALGERIA

In February 2018, the Governor of the Bank of Algeria, Mohammed Loukal, underscored the need to endorse and acknowledge the initiatives undertaken by the Algerian government to enhance financial inclusion. He highlighted that since 2012, all citizens have been granted the right to open a bank account. Furthermore, Article 43 of the 2015 Finance Law facilitates the participation of new entrants in the financial market to channel financial resources into productive ventures by incorporating new economic agents, such as individual institutions.

- Enforcing arbitrary protocols within banks to tackle money laundering and terrorist financing while avoiding the requirement for documentary proof.
- In 2018, legislation was enacted requiring banks to obtain additional documentation from customers holding accounts for foreign currency transfers, especially when dealing with large amounts (Benaini & Metair, 2022).

Strategies for Establishing Accounts in the National Currency

The executive decrees enacted by the government in 2005, 2010, and 2015 mandated the use of legal payment methods for transactions exceeding 50,000 DZD, 500,000 DZD, and 1,000,000 DZD, respectively. Nevertheless, some of these decrees were repealed, and others did not fulfil their intended purposes due to a lack of strict enforcement of the laws or insufficient capacity to utilize the designated payment methods.

Due to the significance of hard currency accounts for the national economy, which totals 407 million accounts amounting to approximately $0.5 billion, account holders encounter numerous challenges within certain banking institutions (Benyoub & Boufelfel, 2023).

Some Financial Sector Indicators for Algeria

World Bank research indicates that Algeria's financial inclusion rate ranges from 24% to 62%. The analysis covers several factors, including the concentration of bank assets. Key metrics considered include the number of ATMs per 100 people, ownership of accounts at formal financial institutions, access to accounts with mobile money providers, usage of accounts for business transactions, government payments, receipt of remittances, and wage payments. The text maintains clarity, objectivity, and a formal tone, following standard structure and formatting conventions while being free from grammatical errors. To assess a nation's banking sector, several indicators are employed, such as the average cost of sending remittances, the Bank Z-score, the number of bank branches per 100 individuals, the ratio of bank capital to assets, levels of bank concentration, the cost-to-income ratio, the credit-to-deposit ratio, and the deposits-to-gross domestic product (GDP) ratio (World Bank, 2022).

- ***Household:*** Although the state has made efforts to promote financial inclusion, a significant number of Algerians are still excluded from the formal banking sector. According to the World Bank, recent years have seen improvements in the proportion of adults with accounts at financial institutions. However, financial inclusion continues to pose a considerable challenge for authorities, particularly due to the substantial amount of cash still circulating outside the banking system. Additionally, BRS Consultants Sekak indicates that around one-third of the money supply not held by banks is either being traded or saved in cash.
- ***Small and Medium Enterprises (SMEs):*** Advanced technologies are reshaping the financial industry and tackling issues that may help bridge the funding shortfall for SMEs. In the wake of the financial crisis of 2008, lenders significantly decreased their support and certain retail clients due to heightened capital requirements and efforts to reduce debt. In response, new business models emerged to improve efficiency, meet customer needs, foster innovation, and reach out to previously underserved markets.

FINTECH AND FINANCIAL INCLUSION

Fintech refers to the integration of software, algorithms, and applications into computer and mobile tools designed to enhance, digitize, or transform traditional financial services. This sector is experiencing rapid growth, with credit cards and ATMs serving as prominent examples of technological innovation in finance. Puschmann (2017) described fintech as the convergence of finance and technology.

Conceptual Framework

Fintech pertains to the application of technological innovations to deliver enhanced financial services. Although advancements in information technology have significantly reduced costs and improved efficiency in various sectors, the unit expense associated with financial intermediation has exhibited a remarkable consistency. In the United States, this cost has hovered around 2% for the last 130 years. Nevertheless, fintech promises to reveal more affordable solutions to tackle financial contracting challenges and lower the expenses related to financial services, ultimately improving consumer welfare (Naili & Lemouchi, 2022).

Fintech encompasses a wide range of sectors, including lending, deposits, capital raising, payment processing, services for clearing and settling transactions (digital currencies), managing investment, and insurance. A key element of fintech is blockchain technology. The primary aim of this technology, along with other innovations, is to achieve several goals, such as lowering the costs associated with matching parties in transactions, leveraging economies of scale to effectively gather and utilize extensive data, enabling more affordable and secure data transmission, and decreasing the costs related to verification (Berentsen & Schär, 2018). It is believed that the evolution of fintech can be divided into three distinct stages, with the current stage being the third. Moreover, fintech encompasses the utilization of technology in the financial sector. Over the past decade, advancements in cloud computing, smartphones, and high-speed Internet have fuelled remarkable growth in this field. Today, fintech signifies a transformative period for digital finance globally, integrating technologies like artificial intelligence (AI), big data, machine learning, biometric identification, and blockchain. Among these innovations, mobile money stands out, enabling users to access electronic funds via their mobile devices. A prime example is M-Pesa, launched by Vodafone in Kenya, which has achieved remarkable success. In Algeria, the E-rselli service operates as an online payment platform, allowing users to recharge prepaid and postpaid mobile lines and settle bills conveniently from home using card transactions. The true promise of fintech lies in developing a holistic digital financial framework designed to fulfil the requirements of people and SMEs, marking a crucial advancement toward achieving financial inclusion for all (Tahraoui, 2022).

Areas of Financial Technology

There are three areas of fintech:

- The utilization of blockchain in the realms of commerce and finance.
- The application of technology in financial services, such as peer-to-peer lending, online lending, and robo-advising.
- The utilization of big data in the field of finance.

1-Blockchain Mechanisms: Used to record financial transactions and other data packages. It allows for the distribution of digital information without the ability to copy or change it. In particular, blockchain is a decentralized digital ledger that records financial transactions and other data packages. Although the technology was initially created for Bitcoin, it has potential for other uses (Manta, 2018)**.** Blockchains operate as distributed ledgers within peer-to-peer networks, offering a decentralized approach to securely verify and transfer ownership. This technology can streamline monetary transactions, support distributed computing, and represent different securities or assets within the financial industry. Each block in a blockchain consists of digital data, which is specifically divided into three components (Biais, Bisière, Bouvard, & Casamatta, 2019).

- Blocks hold transactional information, including the date, time, and amount of the latest purchase. However, it is crucial to highlight that this example is purely illustrative, as Amazon retail does not currently utilize blockchain technology.
- Blocks store details about the individuals involved in a transaction. For instance, a block associated with a purchase from Amazon would document the buyer's name along with Amazon.com, Inc. Hence, to ensure anonymity, the buyer's name is substituted with a unique digital signature.
- Blocks contain a unique code called a 'hash' that distinguishes them from other blocks. This code is similar to a name that distinguishes individuals from one another. Hashes are created using cryptographic algorithms. For instance, if an individual makes a purchase on Amazon and decides to buy another item while the first one is in transit, each block will have a different hash. Despite the resemblance of the transaction details to the previous purchase, the blocks can still be distinguished by their distinct codes.

2-Crowdfunding: The process of gathering capital from various individuals through social media and dedicated platforms to finance a business venture allows startups to secure funding without relinquishing control to venture capitalists. In return, investors are typically offered the chance to obtain an equity share. However, critics of crowdfunding express concerns that the funds may be diverted to purposes other than those initially stated or that the tax regulations surrounding e-commerce lack clarity, particularly in instances of cross-border funding. On December 23, 2023, Algeria's Minister of Finance announced the official introduction of crowdfunding as a novel financing option for startups (Manta, 2018).

***3-A Ledger that is distributed.*:** This refers to distributed data synchronized and shared across various sites, institutions, or locations, with the consensus of all participants. This structure allows for the presence of public verifiers in transactions, making cyberattacks more difficult. Each node within the network has access to the shared records, and any modifications or additions made to the ledger are automatically replicated to all members involved.

4-Virtual Currencies: Value tokens are created by private entities and are typically denominated in their own units of measurement. These tokens can be acquired, stored, accessed, and transferred electronically, serving various purposes as long as all parties involved in the transaction agree to their usage. The term "virtual currencies" encompasses a broad range of items, such as online coupons, airline loyalty miles, and digital currencies like Bitcoin. On the occasion of the 60th anniversary of the Bank of Algeria, this milestone was commemorated with a celebration. Prime Minister Aimen Abderrahmane announced the decision to adopt a digital currency issued by a central bank. The currency, called the 'digital dinar,' will be developed, issued, managed, and controlled by the Bank of Algeria (Kahlan, 2023).

5-Sustainable Finance: Algeria faces significant challenges due to its limited infrastructure for sustainable finance. The country's financial system may face challenges in effectively incorporating factors related to Environmental, Social, and Governance (ESG) criteria. These challenges include the absence of ESG uniform reporting, a limited range of green financial products, and insufficient tools for measuring and reporting impact. Note that such gaps could impede Algeria's efforts to attract responsible investments, leading to missed opportunities for financing sustainable initiatives and potentially slowing the country's progress toward a more sustainable economy (Hammiche, 2023).

6-Application of Big Data in Finance: The term "big data" pertains to datasets that are often too vast or intricate for conventional data processing methods to manage efficiently. However, big data techniques can reveal patterns, trends, and correlations, offering valuable insights into fintech-related research questions. Advances in technology and computing have facilitated the collection of detailed indicators on business fundamentals, such as real-time transaction data and satellite imagery displaying parking lot activity at large retail stores. This type of information interests investment professionals, often influencing stock prices. Furthermore, big data has become a critical factor in nearly all business sectors, particularly finance. It plays a pivotal role in areas such as financial management, risk assessment, financial analysis, and overseeing financial application data. In addition, the integration of big data is driving significant changes in the business frameworks for financial institutions and reshaping financial management practices (Mhlanga, 2022).

FINTECH'S CONTRIBUTION TO FINANCIAL INCLUSION IN ALGERIA

Algeria is advancing in the promotion of fintech innovations and the development of DFSs. However, there is still room to enhance awareness of these services and encourage their adoption. Broadening the availability of DFSs can boost economic activity and improve citizens' daily lives, helping them build assets or invest productively. Accordingly, financial inclusion is measured across three dimensions: the first assesses access to financial services, the second focuses on the utilization of these services, and the third evaluates the quality of products and delivery of services by utilizing data from both the supply and demand sides. Table 1 summarises selected data from the World Bank Indicators (Delorte & Poupaert, 2021).

Table 1

The Financial Inclusion Index Quantifies the Level of Financial Inclusion in Algeria

Index \ Age	+15	15-34	35-59	+60
Availability of mobile phones	85.9	89.5	84.8	70.3
The provision of Internet access.	56.5	69.2	44.9	27.3
Deposited wages or government benefits into an account	14.3	9.9	18.3	24.7
Either borrowed from a financial institution or utilized a credit card.	5.0	3.8	7.2	3.3
Made or received digital payments in the past year	26	21.1	32.4	29.3
Used a mobile phone or the Using the Internet to monitor account balances	3.6	4.3	3.1	1.4
Set aside funds for retirement	12.4	6.2	18.0	26.3

Source: The authors' elaboration is based on the World Bank data.

There are various indicators exist regarding mobile phone and internet access, financial transactions, and digital service usage among different age groups. The indicators encompass mobile phone access, home internet connectivity, receiving government transfers directly into an account, conducting or receiving digital payments, and checking account balances via mobile phones or the Internet. The analysis reveals that individuals aged 15 and older, as well as those in the 15-34 age group, exhibit the highest levels of access, usage, and quality across these indicators. Younger individuals in these categories mainly use mobile phones to account for financial services. For instance, Mobiles in Algeria launched e-payment services. Although mobile phone penetration is high in Algeria, adopting DFS remains below regional and global benchmarks. In the country, only 16% of adults and 11% of women utilize digital payments. In comparison, within the MENA region, these figures increase to 23% for adults and 18% for women. Meanwhile, in rising markets and developing economies, digital payment usage stands at 36% of adults and 32% of women.

To measure financial inclusion, several indicators were used, including the number of ATMs and commercial bank branches per 100,000 adults, the domestic credit-to-GDP ratio, and the number of depositors in commercial banks per 1,000 adults. The first two indicators relate to the accessibility of banking products and services, while the latter three focus on the utilization of banking services. These dimensions were then utilized to build the financial inclusion index, as suggested by Sarma (World Bank, 2022).

ATMs in Algeria

As of 2021, Algeria had 9.3046 ATMs by 100,000 adults. The World Bank compiles development metrics obtained from verified and authoritative sources. Between December 2004 and 2021, the average quantity of ATMs by 100,000 adults was 6.360. In 2018, this figure peaked at 9.54, marking an all-time high, while the lowest recorded value was 1.268 as shown in Table 2. According to the World Bank, the availability of ATMs by 100,000 adults remains actively monitored in CEIC data. A slow development in the establishment of ATMs has been observed, which is attributed to the additional expenses incurred by the bank.

Table 2

The Number of Automated Teller Machines per 100,000 Adults from 2016 to 2021

YEAR	2016	2017	2018	2019	2020	2021
ATMs/ 100,000 adults	8.57	9.13	9.54	9.33	9.31	9.30

Source: Adapted from World Bank. (n.d.). *ATM per 100,000 adults*. World Bank Data. Retrieved from https://data.worldbank.org/indicator/FB.ATM.TOTL.P5

The present surge in the digital payments market can be linked to the rising popularity of e-commerce and mobile payment solutions, along with the rise of contactless payment methods prompted by the COVID-19 pandemic. Consumers are increasingly turning to digital wallets and mobile payment applications like PayPal, Venmo, and Cash App for smooth and secure transactions. Additionally, the market has experienced expansion due to the proliferation of fintech startups and the incorporation of blockchain technology into payment systems.

Online food delivery services are available in Algeria.

- The market is expected to achieve revenues of US$229.30 million by 2024, with a Compound Annual Growth Rate (CAGR) of 15.64% from 2024 to 2028, leading to an estimated market volume of US$410.10 million by 2028.
- The grocery delivery market is also expected to expand, with projected revenues of US$162.30 million in 2024 and an anticipated growth rate of 28.0% in 2025.
- The grocery delivery sector is anticipated to grow to 9.2 million users by 2028. By 2024, the expected user penetration rate for grocery delivery services in Algeria is projected to be 14.9%.
- The market for online food delivery in Algeria is expanding swiftly, driven by rising demand for convenience and a population that is adept with technology (Statista, 2024).

Establishing a current account for adults is important

The analysis explores the number of individuals aged 15 and older who possess an account at financial institutions, broken down by gender, education level (primary or lower, secondary or higher), income level (top or bottom of the pyramid), and geographic location (urban or rural). In 2017, 43% of the Algerians over fifteen had established a bank account with a formal institution.

Employ electronic payment solutions.

The delivery of DFSs serves as a key driver in advancing financial inclusion. Many developing nations are leveraging the widespread adoption of mobile phones to offer financial services that can assist in alleviating poverty. Consequently, initiatives aimed at digital financial inclusion strive to ensure that financial services are accessible to all, compatible across various service providers, and reliably available. In Algeria, only 2% of adults have utilized the Internet for bill payments in the past year, while 5% have engaged in online transactions. Furthermore, Algeria exhibits a similar pattern to Tunisia and Morocco compared to its neighbouring countries. However, the volume of digital payments and online transactions in Algeria is considerably lower than the global average and even trails behind nations with higher average incomes (World Bank, 2021).

Evolution of the Number of Bank Cards in Algeria's

Carte Interbancaire (CIB) is Algeria’s national interbank payment card system, a personal-use electronic card based on a bank account, a local interbank payment and withdrawal card issued by one of the authorized banks in Algeria, whether public or private, registered in the interbank financial network, used at all ATMs. This includes payments for goods and services at merchants via electronic payment terminals, as well as 24-hour payments online and at merchants registered in the network.

The number of bank payment cards in circulation in Algeria during the first two years (2016-2017) was significantly lower than in subsequent years. However, by the end of 2018, the number of bank cards in circulation had increased by more than 780%, reaching 7.8 million. This positive growth continued at semi-stable rates in the following years, reaching its peak at the end of 2021 with a growth rate of 20%. The number of electronic payment cards in circulation in Algeria increased from 9.6 million in 2020 to 11.7 million in 2021, representing a 22% increase. An additional 2.1 million cards were in circulation by the end of 2021 compared to the same period in 2020. This includes CIB payment cards.

Network Readiness Index Ranking of Algeria

Algeria is ranked 103rd among the 134 economies included in the NRI's "Network Readiness Index" 2023. Its primary strength pertains to individuals. However, the area with the most potential for enhancement is impact.It reflects substantial growth or stability, exemplified by a robust stock market index or positive economic indicators. Conversely, the 'weakest index' represents underperformance or turmoil, characterized by falling indices or negative economic signals (Portulans Institute, 2023). Table 3 highlights the strong and weak indicators.

Table 3

Highlight of Strong and Weak Indicators for Algeria in 2023

Ranking of Key Indicators	Ranking of Least Effective Indicators
3.2.4 E-commerce regulations. 01	4.3.2 SDG 4 : Quality of Education 74
3.3.5 The rural gap in the utilization of digital payments. 03	3.1.3 Access to financial accounts through digital means. 123
1.2.4 scientific publications of AI. 28	4.2.2 The right to make life choices. 125
2.1.1 The flow of mobile broadband internet traffic across the country. 32	1.3.4 The expense of computer software. 126
4.1.5 The gig economy is widely prevalent. 33	3.2.1 Regulatory quality 130
1.1.5 International internet bandwidth capacity. 36	
4.1.4 Size of the domestic market. 40	
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The Challenges to Achieving Financial Inclusion

As outlined in this list, there exist numerous challenges that can be addressed by maximizing the utilization of traditional credit data, including restricted availability of financial services, insufficient financial knowledge and education, unstable financial policies, and an absence of conventional credit data.
DFSs are intended to enhance accessibility and promote financial inclusion.

1. There are programs focused on financial literacy and education aimed at teaching personal financial management skills.
2. Microfinance and peer-to-peer lending offer accessible financial services and credit options.
3. Utilizing alternate data that complements conventional data.

Key Pillars to Promote Financial Inclusion in Algeria

It is imperative that multiple measures are taken to promote financial inclusion efforts, with a particular emphasis on enhancing them:

The payment system should be modernized: Modernizing the payment system requires the development of infrastructure, particularly a payment platform, to improve the efficiency of processing interbank and financial market transactions. For example, mobile banking through smartphones and the Internet, as well as the use of electronic signatures, have been successfully adopted in various countries.

The promotion of digital innovation: Digital innovations are a potent means of broadening access to financial services for populations that are difficult for banking networks to reach.

Improving transparency in pricing and service quality: Increasing clarity in pricing structures and enhancing financial information are essential for facilitating quicker access to financial products. This includes the establishment of a National Plan for financial inclusion.

DISCUSSION OF RESULT

The study revealed a significant positive relationship between financial inclusion and fintech, highlighting its crucial role in improving the well-being of underserved groups, including low-income households, SMEs, and rural communities. These findings align with those of Kshetri (2021). The author comprehensively examined how blockchain technology and digital currencies can enhance financial inclusion in emerging markets. However, reaching unbanked populations remains challenging. Moreover, although fintech offers promising solutions, its adoption within the Algerian banking sector is in its infancy. Currently, the main fintech services available are ATMs and the BaridiMob mobile payment app. Nonetheless, these solutions are insufficient to meet the needs of all segments of the people. Notably, Algeria has progressed in areas like e-commerce legislation and narrowing the rural-urban gap in digital payment usage. However, weaknesses persist in key areas such as regulatory quality, digital participation, and the availability of online financial services, highlighting the need for further development of digital infrastructure and legal frameworks.

The study's hypotheses are supported by the findings:
H^1: Financial inclusion holds great significance in providing a diverse range of financial services, including but not limited to savings, credit, and payment solutions, to diverse demographic groups. The expansion of financial inclusion aids in alleviating poverty and fostering shared prosperity, corroborating the notion that inclusive financial services are essential.
H^2: Algeria's slow adoption of fintech across key indicators confirms that it lags behind in financial inclusion, validating the second hypothesis.

The gradual integration of fintech is vital for Algerian banks to enhance efficiency, streamline bureaucracy, and provide superior customer service. This perspective is in accordance with the findings of Demirguc-Kunt, Klapper, Singer, Ansar, and Hess (2018), prominent lead researchers at the World Bank who have co-authored several influential reports. Their report illustrated how mobile banking and fintech innovations have significantly broadened global access to financial services, particularly for low-income people. The research also underscored the pivotal role of digital solutions in reaching populations that have traditionally been left out of formal financial systems. To facilitate this shift, the legal and regulatory environment needs to evolve, supported by stronger information security measures and improved ICT infrastructure. Note that these changes are critical for fintech to unlock its full potential in Algeria.

Additionally, emerging technologies such as crowdfunding platforms present new opportunities by enabling entrepreneurs to access alternative financing while offering investors the chance to support promising startups. Thus, encouraging the use of such fintech tools would further enhance innovation and financial inclusion across the country. While fintech holds great potential for transforming Algeria's financial sector, progress remains slow. Nevertheless, in order to maximize the benefits of fintech, clear policies and regulations must be established, as well as investments in infrastructure and cybersecurity. With these enhancements, fintech has the potential to augment the efforts of conventional financial institutions, driving financial inclusion and fostering economic growth.

RECOMMENDATIONS

It is crucial to address the issue of involuntary exclusion as a critical concern. In order to promote financial inclusion for the excluded group, it is recommended that Algerian policymakers consider the following:

1. The ongoing growth of financial inclusion is improving the lives of many people, especially those in vulnerable situations. Prioritizing financial inclusion as a policy is essential, and continuous efforts must be made to engage the unbanked population, including the poor, small and medium-sized enterprises, and rural communities across Algeria.
2. By offering financial security to clients who seek transparency, quality, guidance, cost-effectiveness, and clear information about the chances and risks linked to each product or service
3. Fintech companies and banks need to focus on creating innovations and products that prioritize the needs of clients, especially those from financially underserved communities. With the growing importance of mobile money, fostering healthy competition between traditional banks and fintech firms is essential to advance financial inclusion.
4. According to Kshetri (2018), to enhance financial inclusion in Algeria, it is advisable to leverage crowdfunding and blockchain technology. These innovations can provide underserved populations with access to capital without facing traditional barriers. Hence, by adopting crowdfunding platforms, Algeria can lower entry costs and increase transparency, enabling individuals and small businesses to raise funds directly from a global pool of investors.
5. Incorporating blockchain technology can significantly aid in the tokenization of assets, allowing for fractional ownership and broadening access to investment opportunities for a larger audience, as noted by Catalini and Gans (2016). By encouraging community participation and enhancing financial literacy, these technologies can empower individuals to manage their financial futures effectively Narayanan (2016). Moreover, embracing these digital innovations could greatly contribute to economic growth and financial empowerment for the people of Algeria.
6. The growth of electronic money, driven by the widespread adoption of fintech, is essential for enhancing banking services. Considering this perspective, Algerian banks need to embrace this trend to ensure faster service delivery and minimize administrative challenges.

CONCLUSION

The integration of fintech in Algeria is poised to significantly enhance financial inclusion, benefiting various societal groups and driving economic growth. This requires active participation from stakeholders, including government entities, to address obstacles and allocate substantial funding for fintech initiatives. Key measures of financial inclusion, such as the number of ATMs per 100,000 adults and the percentage of borrowers per 1,000 adults, demonstrate room for improvement. This is particularly true with regard to being impacted by financial illiteracy and the economic repercussions of the COVID-19 pandemic. Although fintech innovations, like crowdfunding platforms, offer new financial solutions, they also necessitate robust cybersecurity measures and regulatory frameworks. Therefore, prioritizing fintech advancement is crucial for the financial system's robustness and Algeria's economic development, ultimately improving the quality of life for millions, especially within marginalized communities.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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