



## THE IMPACT OF DIGITAL FINANCE ON FINANCIAL INCLUSION IN MOROCCO

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### **Abstract:**

This study examines the impact of digital finance on financial inclusion in Morocco. Adopting a quantitative methodology, the study is based on data collected from 454 individual bank customers and data analysis is carried out using structural equation modeling. We examined the relationships between digital finance and users' access, quality, use and financial well-being. The results indicate that digital finance significantly enhances these aspects, thereby facilitating individual inclusion. The study highlights the importance of supporting financial innovation while ensuring consumer protection and the inclusion of vulnerable populations. Implications for policymakers and financial sector players are discussed, highlighting the importance of inclusive strategies to maximize the benefits of digital finance.

**JEL:** F21, F43, O43, O47, O55

**Keywords:** digital finance, access, usage, and quality of financial services, financial well-being, financial inclusion, Moroccan banks

### **1. Introduction**

Financial inclusion is crucial to economic and social development, but it faces a number of obstacles. These include a low bank density index, low banking awareness and culture, and limited financial knowledge. These shortcomings are exacerbated by the growing size of the informal economy, the limited financial inclusion of women, and the rising costs and risks of financial services. Despite these obstacles, financial inclusion has many advantages, notably the provision of credit and microfinance, which encourage investment and risk coverage. These services have a positive impact on savings and the

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financial stability of the economy, strengthening the ability of individuals to integrate into society by using the financial system to start their own businesses, invest in education and manage financial risks (Ozili, 2018). To overcome these challenges and maximize the benefits of financial inclusion, several pillars of reinforcement are needed. It is essential to support the financial infrastructure to meet the requirements of financial inclusion, create an appropriate legal environment, and strengthen geographical coverage by expanding the branch network of financial service providers. The development of payment and settlement systems is also crucial to facilitate the timely execution and settlement of financial transactions. Harnessing technological advances and digitization to extend the provision of digital financial services and mobile payments, as well as providing comprehensive databases, including credit records and mobile assets, also contributes to this goal.

Furthermore, it is vital to protect bank customers against the risks of financial fraud by guaranteeing the integrity and transparency of financial transactions. Policies must ensure that customers, particularly those with limited income and education, benefit from services tailored to their abilities and needs. Digitization plays a central role in achieving the objectives of digital finance. By integrating digital technologies such as online banking, mobile payments and e-wallets, digitization makes financial services more accessible, faster and cheaper. It also eliminates geographical barriers and reduces transaction costs, which has the potential to transform the way individuals and businesses interact with financial systems. Digitization also fosters innovation in the delivery of financial services, facilitating access to alternative sources of finance for small and medium-sized enterprises, and ensuring financial stability through better risk management and regulatory compliance. In sum, the combined efforts to harness digitalization and promote digital finance aim to create a more inclusive, resilient financial system capable of supporting sustainable socio-economic development. By facilitating access to digital financial services, these initiatives aim to improve financial inclusion and diversify economic activity, thereby contributing to more equitable and sustainable development. In this context, digital finance, or fintech, is emerging as a potential solution to fill these gaps. Digital technologies have the potential to transform access to financial services by making them more accessible, faster and cheaper. By eliminating geographical barriers and reducing transaction costs, fintech can play a crucial role in financial inclusion, particularly for segments of the population traditionally excluded from the formal financial system, such as low-income earners, women, rural dwellers and small and medium-sized enterprises (SMEs). However, despite the optimism surrounding digital finance, there is little empirical research on its actual impact on financial inclusion in specific contexts such as Morocco. The central issue of this study is to understand "how digital finance impacts financial inclusion in Morocco". More specifically, it aims to answer the following secondary questions: How does digital finance influence access, use and quality of financial services in Morocco? What is the impact of these services on the financial well-being of individuals? To answer these questions, this study proposes to examine the impact of digital finance on financial inclusion in Morocco. Using a structural equation model (SEM), we will seek to analyze

the relationships between access to financial services, their quality, their use and the financial well-being of individuals. This approach will enable us to understand not only the effectiveness of digital financial services, but also the mechanisms by which they can contribute to financial inclusion.

The study is structured as follows: the first axis deals with the conceptual foundations of financial inclusion and digital finance as well as the state of play in the Moroccan context. The second axis presents a literature review and the development of hypotheses, highlighting previous studies on digital finance and financial inclusion. The third axis details the methodology used for this study, including data collection and analysis. The fourth section presents the results obtained, followed by a discussion. Finally, the conclusion summarizes the main findings of the study and proposes recommendations for policy-makers and financial sector players. Ultimately, this research aims to provide valuable insights into the role of digital finance in promoting financial inclusion in Morocco, while providing practical recommendations for maximizing the benefits of this digital transformation.

## 2. Conceptual Foundations of Financial Inclusion and Digital Finance

### 2.1 Financial Inclusion: Concept, Dimensions, and Benefits

#### 2.1.1 Etymology of the Concept of Inclusion

The term "*inclusion*" comes from the Latin "*inclusio*" (Alain rey, 2012). Over time, the term has evolved to mean the act of incorporating or integrating individuals or groups into a system or organization. In French, "*inclusion*" is often used in social and economic contexts to refer to the integration of marginalized or excluded groups (Larousse, 2015). Semantically, the term "*inclusion*" refers to the "*state of something being included in a whole, a set*". The term derives from the Latin "*inclusio*", meaning "*imprisonment*" (Brigitte Bouquet, (2015); it also means "*action of enclosing, of containing*". In the 19th century, it was reappropriated to mean the act of inserting. Consequently, the term "*inclusion*" has two aspects: segregative inclusion and integrative inclusion. However, the current use of the term is very positive, implying "*a purpose*" (Charles Gardou, 2012). It is closely linked to the processes of social insertion and economic integration (Chamak, 2018), as well as to the quest for social, cultural and civic participation by individuals and social groups. Inclusion has thus become a key frame of reference for public action. We are moving on from the integration society to the "*inclusive*" society, since the usual French conception of this term "*designates the affirmation of the rights of all people to access the various common institutions intended for all, whatever their possible particularities*". The term "*financial inclusion*" first appeared in 1993 in a study by Leyshon and Thrift on financial services in the South East of England. This study looked at the impact of bank branch closures on local residents' access to banking services.

According to studies conducted by Leyshon and Thrift between 1995 and 1996 on financial exclusion, it is possible to identify the mechanisms by which financial institutions have structurally shaped and amplified inequalities by systematically privileging wealthy and influential populations (Leyshon and Thrift, 1995; 1996). By

discriminating against certain less-favored socio-economic groups, the financial system gradually widened the gap, accentuating the phenomenon of financial exclusion. Since then, numerous studies have been published on the difficulties encountered by certain categories of the population in accessing financial services, whether banking or non-banking. In 1999, the term "*financial inclusion*" was used for the first time in a broader sense to describe the determinants of people's access to financial services.

### **2.1.2 Definition of financial inclusion**

There are many definitions of financial inclusion. It is defined by the G20 and the Global Alliance for Financial Inclusion (GAFI) as "*access by all segments of society to financial services and products tailored to their needs in a responsible, transparent and affordable manner*" according to the World Bank, it refers to "*useful and affordable access by individuals and enterprises to financial products and services that meet their needs - transactions, payments, savings, credit and insurance - in a responsible and sustainable manner*". This means that individuals and businesses, whatever their income level or geographical location, have the opportunity to use these services effectively to manage their finances, invest in their future and protect themselves against financial risks. For the OECD and the International Network on Financial Education (INFE), it is defined as "*the equitable, secure and efficient access to and use of formal financial services by all individuals and enterprises, including vulnerable and marginalized populations*". This definition emphasizes equity, security and efficiency in access to financial services, underlining the importance of ensuring that all segments of society have the opportunity to participate fully in the financial system. Similarly, the United Nations defines financial inclusion in terms of its key objectives, namely: access to a wide range of financial services at a reasonable price for all households and businesses; sound institutions guided by adequate internal management systems, sector performance standards and performance monitoring; financial and institutional sustainability, as a means of ensuring access to financial services over a long period of time; and diversification of financial service providers, in order to offer customers a range of varied, low-cost alternatives.

As for the Council of Governors of Arab Central Banks and Monetary Institutions (CGBCIMA, 2017), it has characterized financial inclusion as "*the provision of the full range of financial services and their use by different categories of society, including its institutions and individuals, particularly the most marginalized, through formal channels, including bank savings accounts, payment and transfer services, insurance and financing, as well as the innovation of more adapted financial services at competitive prices*". According to Bank Al-Maghrib (BAM), financial inclusion is defined as "*the process that enables individuals and businesses to access financial services (savings, payment, credit, fund transfers, etc.) at lower cost, adapted for efficient use and transparency. This concept covers several main dimensions*". Based on these definitions; we can conclude that financial inclusion is "*the process of ensuring that all individuals and businesses have equitable and responsible access to a full range of financial services that meet their needs in a transparent, affordable and secure manner, enabling them to manage their finances effectively, invest in their future and protect themselves against financial risks, regardless of their income level or geographical location*".

### 2.1.3 The dimensions of financial inclusion

Financial inclusion is made up of several dimensions, the importance of which varies according to the context of each country. These dimensions include:

- **Access:** This refers to the ability to use the financial services and products offered by formal institutions.
- **Quality:** corresponds to the ability of financial products or services to meet consumers' needs, reflecting their experience through their attitudes and opinions towards the products and services available.
- **Utilization:** This dimension measures the regularity with which financial services or products are used.
- **Well-being:** This represents the impact of using financial products or services on consumers' quality of life.

### 2.1.4 The benefits of financial inclusion

- Financial inclusion fosters sustainable and equitable economic growth by enabling more people to participate actively in the economy. By reducing inequality and strengthening economic resilience, it contributes significantly to economic stability (BAM, 2021; WB, 2011; OECD 2019; IMF 2022);
- In addition, the reduction of socio-economic disparities is fostered by financial inclusion, which offers equitable access to financial services to the entire population. This process helps to reduce wealth gaps between different segments of society, leading to a more equitable distribution of economic resources (BAM, 2021; Collins *et al.* 2009; Karlan, 2011; Piketty, 2020; Beck *et al.*, 2008);
- Furthermore, increased accessibility to financial services fosters innovation in the financial sector, leading to the development of new products and services better adapted to consumer needs. This expansion also strengthens the competitiveness of the financial sector by encouraging the creation and continuous improvement of offerings, enabling a more effective response to market developments (BAM, 2021; Qamruzzaman, 2023; Ezzahid, 2017; Beck *et al.*, 2008);
- In addition, access to formal financial services, such as bank accounts, enhances financial security by securing savings and transactions, thereby reducing the risks inherent in using informal financial services (BAM, 2021. Demirgüç *et al.*, 2012; Cull *et al.*, 2014).

## 2.2 The concept of digital finance

Various definitions have been developed to better grasp the concept of digital finance. Digital finance is defined as financial services provided via cell phones, personal computers, internet cards or cards linked to a trusted digital payment system (Ozili, 2018). According to the latter, financial services made accessible through digital platforms aim to decrease poverty rates and promote financial inclusion in developing economies. According to Gomber *et al.* (2017), Digital finance includes a diversity of innovative financial products, financial companies, software associated with finance, as well as new ways of communicating and interacting with customers, offered by FinTech

companies and innovative financial service providers. Thus, digital finance can be defined as the set of financial products and services enabling individuals and businesses to access payments, savings and credit facilities online without the need to visit a bank branch or deal directly with financial service providers (El-Hariry, 2021). According to El Ghadouia *et al.* (2022), although there is no universally accepted definition of digital finance, it is widely recognized that it includes all products, services, technologies and infrastructures enabling individuals and businesses to access payments, savings and credit facilities via the internet, without requiring a physical visit to a bank branch or financial services provider. It is necessary to consider other parameters, such as social, cultural and behavioral factors, likely to exert an influence on the adoption of digital finance. He and Li (2019) have highlighted the importance of social interaction, particularly online, in enhancing participation in digital finance, leading to an improvement in its effectiveness of use (cited by El-Hariry, 2021). It is essential, too, to pay special attention to young technophiles, as they show a high propensity to use digital finance services, particularly for recharging phone credit, paying school fees and settling salaries (Amoah *et al.*, 2020, cited by El-Hariry, 2021).

From these definitions, we can deduce that digital finance refers to the impact of digital technologies on financial services. It is defined as "*a set of products, applications, processes, as well as new ways of communicating and interacting with customers with the aim of promoting financial inclusion and bringing benefits to businesses and consumers, including, in particular, improving access to online financial services (payments, savings and credit facilities), broadening the options available and increasing the efficiency of operations*".

### **2.3 Financial inclusion in Morocco: the current situation**

Morocco's National Strategy for Financial Inclusion (SNIF), launched in 2019, aims to improve access to financial services for vulnerable populations, including those in rural areas, small and medium-sized enterprises (SMEs), women and young people. This initiative is supported by the Moroccan government in partnership with Bank Al-Maghrib and various public and private sector players. SNIF focuses on four main areas: developing alternative financing models tailored to the needs of target populations; strengthening traditional financing models to promote financial inclusion; improving risk management tools for excluded populations; and promoting the use of financial products, notably through the digitalization of services. This strategy, part of a medium-term vision, aims to strengthen economic resilience and reduce inequalities. It also includes a digital component to support the country's digital transformation. In the face of the health crisis, the relevance of SNIF has been demonstrated by its ability to facilitate the distribution of economic aid and support SMEs affected by the pandemic. Since 2019, the World Bank has mobilized over \$2 billion to support these reforms, including financing for financial inclusion and digital. To assess financial inclusion in Morocco, in addition to data from Bank Al-Maghrib reports (2018, 2019, 2020, 2021, 2022) and Findex 2021 data published by the World Bank in 2022, access to and use of banking services are analyzed on the basis of data collected from banks.

### 2.3.1 Financial inclusion indicators in Morocco

#### 2.3.1.1 Measuring the "Access" dimension

Opening a current account is the first step towards financial inclusion, improving people's well-being. In Morocco, by 2022, the number of access points to financial services has increased by 18%, reaching 31,515 points compared with 26,771 in 2021. This growth is mainly attributable to the expansion of the Payment Establishment network, which rose from 19,751 in 2021 to 24,511 in 2022, an increase of 24%. The Automated Teller Machine (ATM) network has also contributed to this increase, growing by 24% to 627 ATMs in 2022, compared with 506 in 2021. Since 2013, when the evaluation system was set up, the number of access points has risen by 254%, from 8,913 to 31,515 in 2022. With regard to the evolution of access points to financial services, although the density of the banking network and Payment Institutions has increased significantly in recent years, territorial disparities persist. Gaps between urban and rural areas continue to widen. National banking density has improved significantly, rising from one access point for every 1,009 adults in 2021 to one for every 870 in 2022. However, in rural areas, banking density remains low, with one access point for every 4,811 adults (compared with 5,643 in 2021), compared with one access point for every 538 adults in urban areas (compared with 624 in 2021). This situation reflects the high concentration of access points in urban areas, partly explained by the business model of traditional bank branches, which is not adapted to the low density and low incomes of rural areas, requiring a minimum number of customers to cover fixed costs. In terms of rural coverage, the percentage of rural communities with at least one access point has increased from 32.9% in 2021 to 34.3% in 2022, mainly thanks to the expansion of the Payment Institution network.

#### 2.3.1.2 Measuring the "use" dimension

In 2022, the number of retail deposit accounts with banks fell by 3% to 28.3 million. However, total deposits increased by 7% to almost 800 billion dirhams. Outstanding bank loans to individuals reached 311 billion dirhams in 2022, up 2.1% on 2021. The "Grand-Casablanca Settat" region maintains its dominant position, covering 32% of the volume of deposit accounts and 31% of their overall value, followed by the "Rabat - Salé - Kénitra" region with 14% in terms of volume and 16% in terms of value. In terms of average outstanding deposits, the "L'Oriental" region stands out with an average of 40,243 dirhams, followed by the "Tanger - Tétouan - Al Hoceima" region with 31,591 dirhams.

The "Eddakhla - Oued Eddahab" region came last, with an average outstanding amount of 15,849 dirhams. In terms of bank loans to individuals at the end of 2022, the "Grand-Casablanca Settat" region stands out with the highest outstanding amounts, despite having recorded a 15% drop compared with 2021.

- **Bank account ownership rate:** The holding rate, defined as the number of resident individuals with at least one active bank account as a proportion of the resident adult population, remained at 53% at the end of 2022, the same as in 2021. The number of individuals with at least one active bank account increased by 2%, reaching 14.5 million in 2022, compared with 14.2 million in December 2021. At the same time, the adult population grew by 1.4%, reaching 27.4 million in 2022.

- **Segregation by gender:** In terms of gender, the number of men with at least one bank account stood at 8.8 million at the end of 2022. Women, meanwhile, numbered 5.7 million, representing 39% of those with at least one bank account.
- **Breakdown by age group:** Available data show that, as in previous years, bank account penetration remains low among young adults at the end of 2022. In fact, only 9.2% of accounts are held by people aged 15 to 24, while this age group represents 22% of the adult population. The 25-34 age group, representing 21% of the adult population, holds 22.4% of accounts. The financial exclusion of young people is strongly linked to their high unemployment rate, which stands at 32.7% for the 15-24 age bracket, according to the HCP. An international comparison of the rate of financial inclusion among young people shows that the higher their unemployment, the greater their financial exclusion. This situation is exacerbated by the level of education, as account ownership is lower among less-educated adults, who are often poorer, contributing to lower banking penetration.
- **Using mobile payment:** Mobile payment, or "M-wallet", is an application installed on a telephone, linked to a payment account at a Payment Institution (PE) or to a bank account. This application enables instant, secure and interoperable payments to be made, regardless of the beneficiary's account. Mobile payment activity continues to grow, with 22 M-wallet offers available on the market by the end of 2022, including 14 issued by payment institutions. The overall number of M-Wallets issued increases significantly in 2022, from 6.3 million at the end of 2021 to 7.7 million at the end of 2022, with subscriptions up by almost 25%. Payment institutions issued 73% of all M-wallets, with 5.8 million M-wallets at the end of 2022 (compared with 4.8 million at the end of 2021). Regarding the structure of transactions carried out by M-wallets issued by payment institutions, bill payments account for the largest share of transactions by number, at 71% (versus 74% in 2021), followed by Mobile-to-Mobile transfers (22% versus 19% in 2021) and merchant payments (7%, similar to the level recorded in 2021). For M-wallets backed by bank accounts, the structure of transactions by number differs bill payments by M-wallet predominate at 66% (versus 71% in 2021), followed by transfers (21% versus 18% a year earlier) and ATM withdrawals (12% instead of 11% in 2021). Merchant payments remain low (just 1%). Analysis of the breakdown by value shows a predominance of transfer transactions on M-Wallets backed by bank accounts, with a 54% share, followed by ATM withdrawals (28%) and bill payments (18%). For payment institutions, bill payments accounted for 60% of transactions, compared with 36% for transfers, 3% for merchant payments and 1% for ATM withdrawals.

### 2.3.1.3 Service quality measurement

At the end of 2022, the IPSB stood at 130.72, up 1.8% on 2021. Commissions on "Package", "account maintenance" and "bank card" offers accounted for 82% of total commissions, strongly influencing IPSB (BAM, 2022). Furthermore, the 1.8% increase in IPSB compared with 2021 is essentially due to the 3.6% increase in "Package" fees and the 1.2% increase



in "Bank card" fees, which offset the 1.6% decrease in "Account maintenance fees" compared with 2021. Analysis of the banking services basket reveals a largely stable structure, with a decline in the share of account maintenance fees in favor of package fees. What's more, the basket has remained dominated by three services since 2011: packages, account maintenance and bank cards, which accounted for 80% of the total, rise to 81% in 2022 and 82% a year earlier. Thus, any change in the pricing of these three services, particularly by the banks that dominate the banking market, has a significant impact on the level of IPSB. Since 2016, three services have become free of charge: stop payment on stolen or lost cheques, stop payment on bank cards and internet banking subscription fees. Bank Al-Maghrib has published a list of 22 banking services offered free of charge, including, among others, opening an account, issuing a chequebook, and withdrawing cash from the bank's ATMs (BAM, 2022). In conclusion, although the Moroccan financial market has seen strong growth in volume and value in recent years, access to and use of formal financial services remain limited.

### 2.3.2 Barriers to financial inclusion in Morocco:

Despite progress, financial inclusion in Morocco faces several major challenges. The FINDEX survey identifies the main obstacles as economic and cultural (FINDEX 2017 and BAM report 2018):

- *Low income:* 72% of adults without a bank account see insufficient funds as an obstacle, and 48% say that lack of money is the only reason they do not have an account.
- *Offerings not adapted to the needs of low-income segments:* Although the financial sector has developed a high-quality traditional financial offering, it is lagging behind in the development of alternative offerings adapted to low-income segments, such as payment accounts, micro-savings and micro-insurance.
- *High use of informal financial services:* 21% of the population use savings solutions, but over 2/3 of this population use informal solutions. Similarly, 26% of Moroccans use financing solutions, 88% of them via informal services.
- *Socio-economic status:* Women are more financially excluded than men, particularly among the self-employed (35% for men, 21% for women) and the unemployed. Young people are also highly financially excluded, due to their high unemployment rate and low level of financial education. The pass rate for the World Bank's financial literacy test is 41% in Morocco, compared with rates of over 50-60% in countries such as Zambia, Mozambique and Senegal, despite Morocco's higher literacy rate (SNIF n°3 2021).
- *As far as young people are concerned,* financial exclusion is strongly linked to the high level of unemployment among this segment of the population. A comparison of the financial inclusion rate of young people with other countries shows that the higher the level of unemployment among young people, the greater their financial exclusion.
- Moreover, financial exclusion is exacerbated by the *low level of financial education*, which can only be partly explained by the illiteracy rate. In fact, the pass rate for

the World Bank's financial education test is lower in Morocco (41%) than in other countries such as Zambia, Mozambique and Senegal (rates in excess of 50-60%), even though Morocco has a higher literacy rate than these countries (SNIF n°3 2021).

After defining the key concepts of financial inclusion and digital finance and presenting the current situation in the Moroccan context, it is imperative to explore the theoretical and empirical literature concerning the relationship between these two variables. This process is essential for developing our underlying hypotheses and constructing our conceptual model.

### **3. Literature review and development of hypotheses**

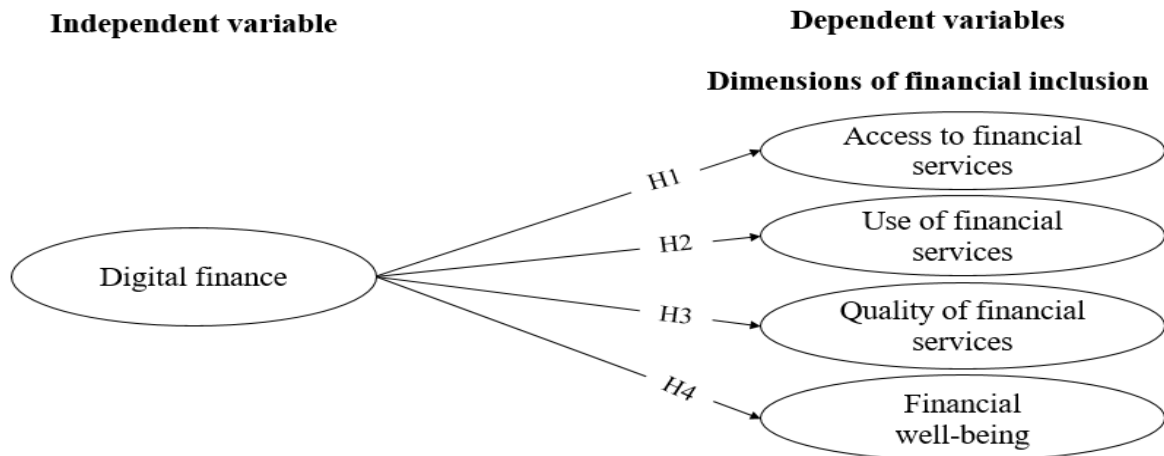
#### **3.1 Digital finance and financial inclusion**

In recent years, financial inclusion has attracted growing international interest, with the Group of Twenty (G20) adopting it as one of the key levers of its economic and financial development agenda (Omer, 2022). Digital finance is seen as a promising route to achieving and enhancing financial inclusion, offering opportunities for extended access to financial services for populations traditionally excluded from the financial system (Youness, 2022; Adil & Fadi, 2022). The diversity of digital financial services, including online banking and mobile payment platforms, contributes significantly to the development of financial inclusion, enabling a substantial reduction in transaction costs for users (Elouaourti & Mhamdi, 2022). In addition, the use of digital financial products, such as mobile wallets and online banking applications, broadens access to financial services to a wide range of consumers and organizations, thereby enhancing financial inclusion and the ability to bear the costs of financial services (Ezzahid & El Ammari, 2021). These digital tools also facilitate access to finance for all sections of the population, particularly those excluded from the traditional financial system, and help reduce service costs for banks and financial technology companies by using a technology-based banking system without the need for physical branches (Burt, Khmiri, & Snoussi, 2023). A subsequent study by Tadjousti and Bensouda (2018) concluded that online banking, mobile banking, and other forms of digital finance have a positive impact on financial inclusion, facilitating access to financial services. Digital currencies and mobile technology are identified as particularly stimulating financial tools to facilitate this access (Bousalam & Elhadi, 2015). Zarfi (2022) has confirmed that the emergence of digital financing is helping to promote financial inclusion by granting funds to the majority of small and medium-sized enterprises that often find themselves excluded from traditional sources of funding. Financial inclusion is also crucial for vulnerable categories, such as the elderly suffering from visual impairments or blindness, highlighting the need to integrate voice-assistance software into digital finance services to enable them to use these services (Bausch *et al.*, 2017). However, digital finance faces challenges, including the risks associated with its use and the lack of consumer trust. Adil and Fadi (2022) emphasized that digital consumer protection is essential to promote financial inclusion

and encourage the adoption of financial technologies. Based on the above, the following hypotheses can be formulated:

- H1:** Digital finance is having a significant impact on access to financial services.
- H2:** Digital finance is having a significant impact on the use of financial services.
- H3:** Digital finance has a significant impact on the quality of financial services.
- H4:** Digital finance has a significant impact on financial well-being.

**Figure 1:** Conceptual research model



**Source:** Compiled by the authors on the basis of the literature

#### 4. Methodology

This study adopts a quantitative approach to examine the impact of digital finance on financial inclusion in the context of financial services in Morocco. The use of a structural equation model (SEM) makes it possible to assess the causal relationships between latent and observed variables and simultaneously test the proposed research hypotheses. The structural equation model used in this research is designed to analyze the effect of digitalization on financial inclusion. The model comprises independent variables (digital financial services) and the dependent variable (financial inclusion). The hypothesized relationships between these variables will be tested through direct paths and interactions. The target population for this study is Moroccan users of financial services. The sample will consist of participants recruited through online platforms, banks and financial institutions offering digital services. Sampling will be stratified to ensure that different regions and demographics are represented, enabling more accurate generalization of results. Data will be collected using a structured questionnaire, distributed both online and in person. The questionnaire will include validated scales to measure the use of digital financial services, as well as the degree of financial inclusion. These scales will be adapted to the Moroccan context to ensure their relevance and accuracy. Data collection will take place over a three-month period, in order to achieve a sufficiently large sample for statistical analysis (in our case, 454 responses). Responses to the questionnaire will be analyzed using SPSS and AMOS software. Statistical processing will include descriptive

analyses to characterize the sample, followed by confirmatory factor analysis to validate the questionnaire structure. Relationships between variables will be assessed using SEM analysis, and moderation effects will be tested through multi-group interactions to examine differences between sub-groups within the sample. This study will respect ethical standards for research involving humans, including informed consent from participants, confidentiality and anonymity of responses. The research protocol will be submitted to an ethics committee for approval before data collection begins.

## 5. Results and discussion

This section presents and discusses the results obtained from the analysis of data collected from participants. These data were segmented according to several demographic, financial and educational criteria, and analyzed with structural equation models to determine significant relationships.

### 5.1 Sample demographics

Our sample consists of 454 individual bank customers. Demographic analysis of the sample is a crucial step in understanding the dynamics of digital financial services use. This section describes the composition of our sample in terms of age, length of relationship with the bank, level of education and salary bracket, allowing us to appreciate how these different demographic factors may influence financial behavior.

**Table 1:** Age distribution (n=454)

Age category	Workforce	Percentage (%)
Under 30	121	26,65%
30 years - 40 years	155	34,14%
40 years - 50 years	107	23,57%
Over 50 years old	71	15,64%

**Source:** Realized by the authors.

The majority of participants, 34.14%, were in the 30 to 40 age bracket, indicating a predominance of mid-career adults. This age group may represent a population with relative financial stability, as well as increased familiarity with digital banking technologies due to their professional and personal needs. The under-30 category also represents a significant share, with 26.65% of participants, reflecting the inclusion of young adults who are often more inclined to adopt new financial technologies. Participants aged between 40 and 50 and those over 50 represent 23.57% and 15.64% of the sample, respectively. These groups, although smaller in number, are crucial to understanding how different generations access and use financial services, particularly in the context of increasing digitalization.

**Table 2: Duration of relationship with the bank (n=454)**

Duration category	Workforce	Percentage (%)
Less than 3 years	101	22,25%
3 years - 10 years	181	39,87%
10 years - 15 years	91	20,04%
Over 15 years	81	17,84%

**Source:** Realized by the authors.

The majority of participants have a long-term relationship (3 to 10 years) with their bank, indicating a high level of loyalty and confidence in traditional banking services.

**Table 3: Academic qualification (n=454)**

Education level	Workforce	Percentage (%)
Less than baccalauréat	58	12,78%
Baccalaureate	92	20,26%
Bac+2	91	20,04%
Bac+3	71	15,64%
Bac+5	81	17,84%
Bac+5 and above	61	13,44%

**Source:** Realized by the authors.

Table 3 shows a varied distribution of educational levels among study participants, highlighting the potential impact of education on access to and use of financial services. The data show a relatively even distribution of education levels, with a slight predominance of baccalaureate (20.26%) and Bac+2 (20.04%) graduates. This educational panorama suggests that the majority of participants have achieved a secondary or post-secondary level of education, which may influence their comfort with digital financial services. Participants with education levels of Bac+5 and above, representing 31.28% of the total, are likely to have a better understanding of complex financial products, which could facilitate wider and more effective adoption of financial technologies. On the other hand, 12.78% of participants with less than a bachelor's degree could face barriers to optimal use of these services, underlining the importance of financial inclusion strategies that target lower levels of education.

**Table 4: Monthly salary in Dhs (n=454)**

Salary band	Workforce	Percentage (%)
Less than \$3,000	138	30,40%
3 000 - 6 000	164	36,12%
6 000 - 9 000	106	23,35%
More than \$9,000	46	10,13%

**Source:** Realized by the authors.

Table 4 reveals the distribution of participants' monthly salaries, offering a glimpse of the economic diversity within the sample studied. The majority of participants earn between 3,000 and 6,000 Dhs per month, representing 36.12% of the sample. This income bracket, considered intermediate, could indicate a moderate ability to access and use available

financial services, particularly those that are digital. Participants with a salary of less than 3,000 Dhs, who make up 30.34% of the sample, represent the lowest-paid segment. This group could face particular challenges to financial inclusion, such as barriers to accessing advantageous financial products or participating in the digital economy due to budgetary constraints. On the other hand, 23.35% of participants earn between 6,000 and 9,000 Dhs, and only 10.13% exceed 9,000 Dhs monthly. These higher segments may have easier access to diversified financial products and perhaps a greater propensity to invest or use advanced financial services.

## 5.2 Reliability and validity tests

The quality of measurement instruments is crucial to ensuring the validity and reliability of results in any empirical research. In this section, we explore the internal consistency of the scales used to measure the various constructs in our study of digital financial services. We use Cronbach's Alpha to assess the internal consistency of the items in each scale, while indices such as Composite Reliability (CR), Average Variance Extracted (AVE), Maximum Shared Variance (MSV), and Maximum Reliability (MaxR(H)) are employed to examine the convergent and discriminant validity of the constructs. The results presented in the tables in this section reflect high levels of scale reliability, as indicated by Cronbach's Alpha values above 0.7, which is generally considered acceptable in behavioral research. For example, the "Digital Finance" construct displays an Alpha of 0.911, signalling strong internal consistency of the items that measure it. Measurement validity is also supported by high Composite Reliability and Mean Variance Extracted values for each construct, exceeding recommended thresholds, indicating that the items on each scale reliably and validly measure their respective constructs. Furthermore, the Maximum Shared Variance values are lower than the AVE values, reinforcing the discriminant validity of the constructs by confirming that they are distinct and measuring different concepts. This rigorous assessment of reliability and validity is essential to support the robustness of the conclusions drawn from this study. The interrelationships between the constructs, explored through significant correlation coefficients, illustrate strong and relevant conceptual links, enabling a better understanding of the complex dynamics within the use of digital financial services. The analyses that follow will detail these interrelations and their impact on various aspects of individuals' financial lives, based on a structural equation model that incorporates these robust measures.

**Table 5:** Cronbach's alpha test

Scale Name	Coding	Cronbach's Alpha	Alpha Based on Standardized Items	Number of Items
Digital finance	DF	0.911	0.912	4
Quality of financial services	QFS	0.763	0.786	4
Access to financial services	AFS	0.909	0.910	4
Financial well-being	FWB	0.925	0.926	4
Use of financial services	UFS	0.931	0.932	5

**Source:** Realized by the authors on SPSS AMOS.

Reliability and validity tests, including Cronbach's Alpha, show high levels of internal consistency for the scales used, indicating high reliability of the measures. For example, the digital finance scale obtained a Cronbach's Alpha of 0.911, confirming the robustness of the items in this scale.

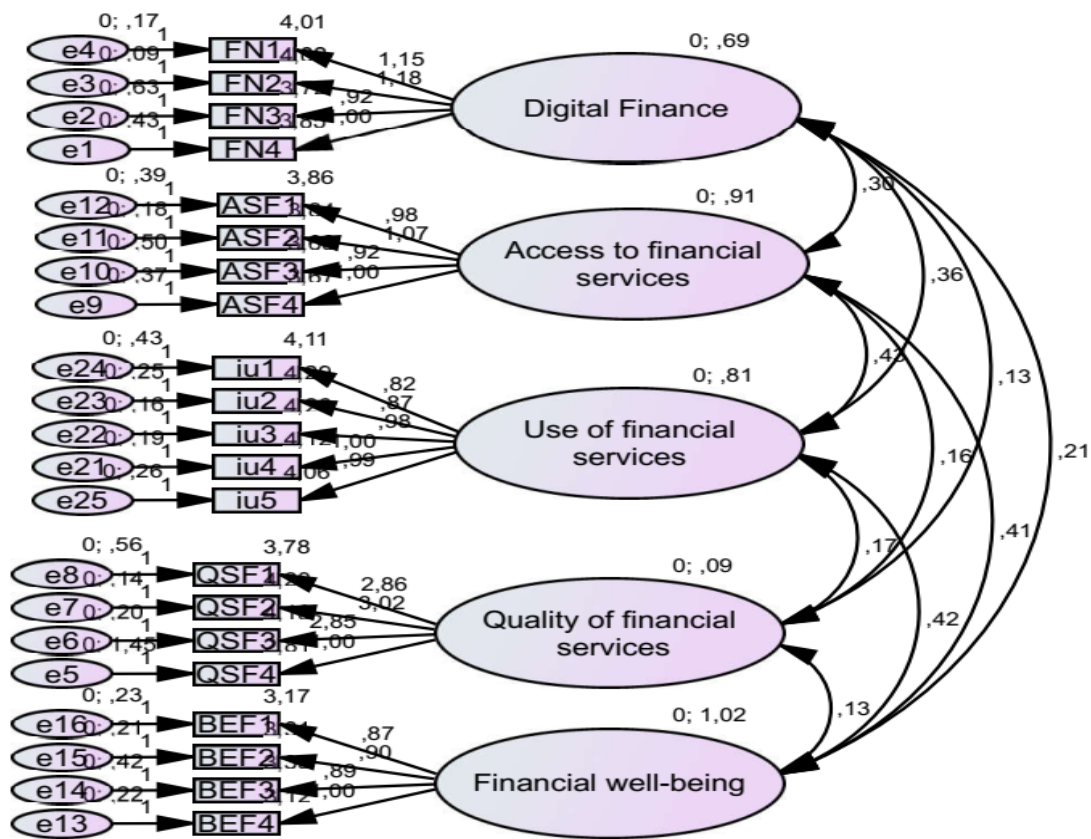
**Table 6:** Reliability test

	CR	AVE	MSV	MaxR(H)	DF	QFS	AFS	FWB	UFS
<b>DF</b>	0,907	0,713	0,262	0,948	<b>0,844</b>				
<b>QFS</b>	0,824	0,573	0,379	0,919	0,512***	<b>0,757</b>			
<b>AFS</b>	0,91	0,716	0,294	0,924	0,382***	0,542***	<b>0,846</b>		
<b>FWB</b>	0,927	0,761	0,215	0,932	0,247***	0,418***	0,430***	<b>0,872</b>	
<b>UFS</b>	0,932	0,735	0,379	0,941	0,479***	0,616***	0,494***	0,463***	<b>0,857</b>

**Source:** Realized by the authors on SPSS AMOS.

The table presented is a summary of reliability and validity measures for the different scales used in the study. All constructs show a CR above 0.8, indicating excellent internal reliability of the scales. This suggests that the items in each construct are consistent in the measurement of their respective variables. AVE values are all above 0.5, with particularly high scores for FWB (0.761) and UFS (0.735). This indicates that the majority of item variance is attributable to the constructs they are designed to measure, confirming good convergent validity. MSV values are well below AVE values for each construct, which is a positive indicator of discriminant validity. This means that the constructs are statistically distinct from each other, reinforcing the structural validity of the model. These scores are very high, all above 0.9, reinforcing the reliability of the constructs measured in the study. Correlation coefficients between constructs show moderate to strong relationships, with significant values indicating relevant interdependencies. For example, the relationships between DF (Digital Finance) and other constructs such as QFS (Quality of Financial Services) and AFS (Access to Financial Services) are significant, suggesting that trust in financial services may play a central role in the perception of their quality and accessibility.

Figure 2: Pathways and interdependencies between variables



Source: Realized by the authors on SPSS AMOS.

This structural equation model is crucial for understanding the underlying dynamics in the use of digital financial services and their impact on various aspects of people's financial lives. By identifying leverage points, such as improved access to financial services, interventions can be better targeted to improve overall financial well-being. These results are crucial for validating the study's theoretical model. The high reliability and validity of the constructs ensure that the conclusions drawn from the data analysis are based on robust measures. Significant interrelationships between constructs provide a solid basis for exploring causal relationships and potential mediators in further analyses, such as structural equation models.

### 5.3 Structural model estimation results

In this section, we present the results obtained from estimating a structural equation model that explores the relationships between digital finance and various aspects of financial services relating to inclusion. This model quantifies the influence of financial digitalization on the quality, access, use and financial well-being of users.

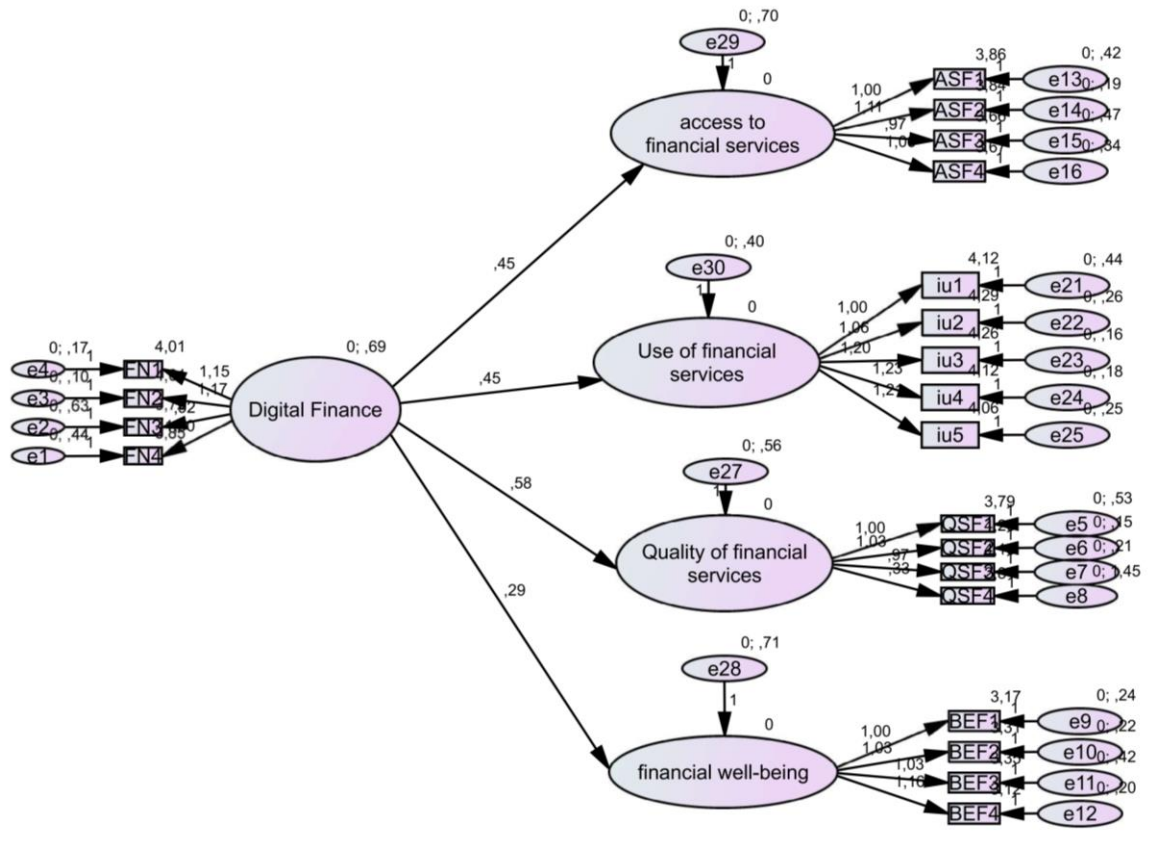
Assumptions		Estimate	S.E.	C.R.	P	GIS
Access to financial services	<--- Digital Finance	,452	,065	6,947	***	Accepted
Quality of financial services	<--- Digital Finance	,583	,065	8,972	***	Accepted
Use of financial services	<--- Digital Finance	,451	,054	8,303	***	Accepted
Financial well-being	<--- Digital Finance	,293	,061	4,813	***	Accepted

Source: Realized by the authors on SPSS AMOS.



The results show that digital finance has a significant impact on all aspects of financial services studied. Path coefficients indicate that digital finance positively influences access to financial services ( $\beta = 0.452, p < 0.001$ ), quality of financial services ( $\beta = 0.583, p < 0.001$ ), use of financial services ( $\beta = 0.451, p < 0.001$ ) and financial well-being ( $\beta = 0.293, p < 0.001$ ).

**Figure 3:** Structural equation model estimation results



Source: Realized by the authors on SPSS AMOS

**Table 13:** Multiple squared correlations

	Estimate
Use of financial services	0,260
Access to financial services	0,169
Financial well-being	0,077
Quality of financial services	0,294

Source: Realized by the authors on SPSS AMOS.

## 6. Discussion of results

### 6.1 The impact of digital finance on financial inclusion in Morocco

The results of this study significantly demonstrate the positive influence of digital finance on various aspects of financial inclusion in Morocco. In particular, digital financial services have a substantial effect on access to financial services, their quality and use, as well as on users' financial well-being. This section examines these impacts in detail and discusses their implications for stakeholders.

## 6.2 Access to financial services

Data analysis reveals that digital finance significantly improves access to financial services ( $\beta = 0.452$ ,  $p < 0.001$ ). This result is consistent with the work of Zarfi (2022), who demonstrated that financial technologies enable greater inclusion of small and medium-sized enterprises often excluded from traditional financing systems. Improved access is particularly beneficial for rural and marginalized populations, who can now access banking services via mobile platforms without the need for a physical presence at financial institutions.

## 6.3 Quality of financial services

The quality of financial services is also positively influenced by digital finance ( $\beta = 0.583$ ,  $p < 0.001$ ). This finding is in line with the study by Elouaourti and Mhamdi (2022), which points out that online and mobile banking reduce transaction costs and improve the efficiency of financial operations. In addition, the introduction of technologies such as e-wallets and mobile banking applications has simplified transaction processes and increased user satisfaction, thus improving the perceived quality of services.

## 6.4 Use of financial services

The use of financial services showed a significant increase due to digital finance ( $\beta = 0.451$ ,  $p < 0.001$ ). The results confirm the findings of Tadjousti and Bensouda (2018), who reported that digital banking facilitates access to financial services and encourages their use. The ease of access and improved quality of digital financial services encourage more people to adopt these technologies, increasing their daily use for a variety of transactions, such as bill payments, money transfers and online purchases.

## 6.5 Financial well-being

Finally, the study shows that digital finance has a positive impact on users' financial well-being ( $\beta = 0.293$ ,  $p < 0.001$ ). This result is particularly relevant in the context of the work of Bausch, Khoury and Oswald (2017), who highlighted the importance of integrating assistive technologies for vulnerable people. Improved financial well-being can be attributed to better personal financial management, and easier access to credit and financial planning services accessible via digital platforms.

## 7. Conclusion: Implications, limitations, and research directions

This study has highlighted the significant impact of digital finance on financial inclusion in Morocco. By analyzing the relationships between digital financial services and various aspects of financial inclusion, we were able to demonstrate that the digitization of financial services significantly improves access, quality, use and financial well-being for users. Our results confirm that financial technologies offer effective solutions for overcoming traditional barriers to financial inclusion. Easy access to services via digital platforms, combined with reduced transaction costs and improved service quality, has led to increased adoption of digital financial services. The results of this study have

important implications for policymakers, financial institutions and financial technology companies. To maximize the impact of digital finance on financial inclusion in Morocco, policymakers need to invest in digital infrastructure and develop inclusive policies to support vulnerable groups. Financial institutions should innovate by offering adapted products, reducing transaction costs, and collaborating with fintechs to overcome traditional barriers. It is essential to strengthen consumer protection through appropriate regulations and financial education programs. Fintechs must develop tailored solutions, raise user awareness, and work with regulators to ensure compliance and trust. Together, these efforts will create a more equitable and accessible financial system, stimulating economic and social development. Although this study provides valuable insights, it does have certain limitations. The sample, while representative, could be expanded to include greater geographic and socio-economic diversity. Future research should consider longitudinal studies to examine the long-term effects of digital finance on financial inclusion. Future studies should explore the long-term effects of these technologies, and examine differences in impact across specific financial technologies. It is also essential to include a greater diversity of samples to obtain more generalizable results.

### **Conflict of Interest Statement**

I certify that I have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript.

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