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Abstract

The paper defines digital financial inclusion, and highlights the goal of digital financial inclusion, the components of digital financial inclusion, the providers of digital financial services, the instruments for digital financial inclusion, the benefits of digital financial inclusion, the risks of digital financial inclusion, and the regulatory issues associated with digital financial inclusion. It also suggests ways to make digital financial inclusion work for the good of all. The paper concludes by offering some implications for policy making and practice in the digital finance ecosystem.

Keywords: digital finance, artificial intelligence, financial inclusion, digital financial inclusion.

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1. Introduction

The purpose of this paper is to discuss digital financial inclusion. The paper presents everything that needs to be known about digital financial inclusion. Over the years, the number of digital applications that offer financial services have increased and continue to grow. Many of the digital applications used to offer financial services are developed by technology companies or financial technology companies for themselves or for banks to serve their customers.

In the literature, many studies on digital financial inclusion have emerged. In the year 2021 alone, many studies examined digital financial inclusion in relation to economic growth (Ahmad et al, 2021), entrepreneurship (Baker, 2021), urban-rural income gap (Ji et al, 2021), poverty reduction (Wang and Fu, 2021), investment diversification (Lu et al, 2021), complex systems (Dai, 2021), research and development (Sun et al, 2021), etc.

Despite the increasing number of studies on digital financial inclusion, digital financial inclusion – in terms of its meaning, goal, components, instruments and regulatory issues – is not generally understood. There is a diversity of views on what digital financial inclusion is among scholars and researchers in policy and academic circles. Also, those who do not know the meaning of digital financial inclusion form their own abstract meanings of digital financial inclusion. Others regard digital financial inclusion as nothing but a means of digital surveillance by the State. Still, many others continue to enroll into the digital financial system because their peers have joined the digital financial system - they have no clue about what they will find in the digital financial system when they join whether good or bad.

What does this potential lack of understanding mean for digital financial inclusion and for its future? Is there anything new or special about digital financial inclusion? Can digital financial inclusion improve the wellbeing of the poor? And where is digital financial inclusion going to in the future? Is digital financial inclusion merely a fad that will disappear as other schemes have done in the past? Or, does digital financial inclusion have a bright future? Is digital financial inclusion a topic worth investing one's research career into? Many questions like these have been raised. This paper provides answers to some of

these questions by highlighting the meaning of digital financial inclusion, the goal of digital financial inclusion, the components of digital financial inclusion, the instruments for digital financial inclusion, and the regulatory issues associated with digital financial inclusion.

The remainder of the paper is structured as follows. Section 1 presents the definition of digital financial inclusion. Section 2 presents the definitions and goal of digital financial inclusion. Section 3 presents the components of digital financial inclusion. Section 4 presents the providers of digital financial inclusion, and the instruments for digital financial inclusion. Section 5 identifies some important digital financial inclusion research. Section 6 presents the benefits of digital financial inclusion. Section 7 presents the risks and regulatory issues of digital financial inclusion. Section 8 presents a discussion of how to achieve digital financial inclusion. Section 9 presents the limitations of digital technology in promoting financial inclusion. Section 10 presents the conclusion.

2. Definition and goal of digital financial inclusion

2.1. Definition of digital financial inclusion

Digital financial inclusion involves bringing unbanked adults into the formal financial sector by offering financial services to unbanked adults using devices that have a digital interface such as a mobile phone or other digital devices. Digital financial inclusion involves offering digital financial services to the financially excluded and underserved populations, and using a mobile phone or other digital devices to increase access to digital financial services (Ozili, 2018). Digital financial inclusion involves providing access to affordable formal financial services to the excluded population using existing digital technologies (Ozili, 2021b). Digital financial inclusion is the sustainable provision of affordable digital financial services that bring the poor into the formal financial sector of the economy.

2.2. Goal of digital financial inclusion

The goal of digital financial inclusion is to offer financial services via digital channels to all individuals, households, firms and governments, thereby, contributing to poverty reduction, increase in financial intermediation, and contributing to the attainment of the sustainable development goals. Digital financial inclusion seeks to provide a range of digital financial services that provide opportunities to access funds, transfer funds, grow capital, save funds and reduce risk.

3. Components of digital financial inclusion

Digital financial services may be provided by banks, non-bank financial institutions, financial technology (Fintech) companies and technology companies. The components of digital financial inclusion include the following:

- **Digital devices.** Customers, or users of digital financial services, need to have a digital device., e.g. a mobile phone, a smart phone, a laptop or a computer, that permits the transmission of electronic information or instruments.
- **Retail agents.** Retail agents are vendors or agents that have a digital device that is connected to a communications infrastructure. The retail agents are able to transmit and receive financial transaction details which enables customers to convert cash into electronically stored value and to transform stored electronic value back into cash.
- **Additional financial services.** This refers to the add-on financial services offered to customers by banks, non-banks or financial technology companies. They include credit products, savings products, insurance products, investment products, mortgage products and risk management services.
- **A digital transactional platform.** This refers to the interface that connects the customer with the financial institution offering specific financial services. The digital

transactional platform may be a bank application, a digital software, an internet website or a retail agent.

- **The backend server.** This refers to the digital telecommunications infrastructure that stores data and electronically validates customers' details held with financial institutions before permitting digital financial transactions to take place. It is responsible for storing and organizing data, and ensuring everything on the frontend interface works well for users. The backend server communicates with the frontend. It sends and receives information to be displayed on the frontend user interface. When customers fill in their login details or want to make a digital transfer, the frontend application sends a request to the backend server, which returns information in the form of frontend code that the frontend application can interpret and display.
- **The customers.** The customers in a digital financial inclusion programs are mainly individuals, corporations and governments. The individuals include young adults, older adults, households, poor individuals, low-income individuals, middle-income individuals and high-income individuals. The corporations include small business, small and medium scale enterprises (SMEs) and large corporations. Governments include municipal agencies, boroughs, and other government agencies.

4. Providers and instruments for digital financial inclusion

4.1. Types of digital financial services providers for digital financial inclusion

There are four broad types of providers of digital financial services for digital financial inclusion. The first provider is a **full-service bank** that offers a basic transactional account for digital payments, digital transfers, and digital value storage through digital devices such as a mobile device, payment card or point-of-sale (POS) terminal. A full service bank provides an unlimited range of digital financial services. The second provider is a **limited-service bank** that offers specific financial services through a mobile device, a payment card or via a POS terminal. A limited-service bank provides a very limited set of digital

financial services such as providing digital financial services to a region. The third provider is a ***mobile network operator (MNO) e-money issuer***. The fourth provider is a ***nonbank (non-MNO) e-money issuer***. These four providers of digital financial services for digital financial inclusion require three components to function effectively, namely, (i) a digital transactional platform, (ii) an agent network, and (iii) the customer's access device. With these three components in place, digital financial services can be offered to excluded and underserved customers.

4.2. Instruments for digital financial inclusion

Some tools or instruments for digital financial inclusion include:

- i. e-money accounts
- ii. debit cards
- iii. credit cards
- iv. mobile money
- v. internet banking
- vi. retail point of Sale (PoS) terminals
- vii. agent networks

5. Important digital financial inclusion research

Shen, Hueng & Hu (2020) investigate the channels through which financial inclusion can be achieved in China. They find that the level of financial literacy and the use of digital financial products, which are advanced by popularity of the Internet, greatly increased the level of financial inclusion in China.

Ozili (2021a) examines whether high levels of financial inclusion are associated with greater financial risk using a diverse global sample of 79 countries. In the study, Ozili (2021a) controlled for the use of digital financial services such as debit cards and credit cards and electronic payment channels. The study finds that the increase in the use of debit cards, credit cards and digital finance products helped to reduced risk in the financial

sector of developed countries but not for transition economies and developing countries. Also, the combined use of digital finance products with increased formal account ownership improved financial sector efficiency in developing countries. The implication of the findings is that digital financial inclusion also benefits the financial system not only the excluded population.

Bachas, Gertler, Higgins and Seira (2018) examine how a specific digital financial product, e.g., a debit card, affects financial inclusion. They study a natural experiment in which debit cards tied to existing savings accounts were rolled out geographically over time to beneficiaries of the Mexican cash transfer program 'Oportunidades'. After receiving the debit cards, beneficiaries continue to receive their benefits in the savings account, but can access their transfers and savings at any bank's ATM. They can also check their balances at any bank's ATM or use the card to make purchases at point-of-sale terminals. During the natural experiment, they observed that debit cards lower transaction costs by reducing the distance to access bank accounts. They find that account holders respond to the reduction in transaction costs by changing the method of transport they use to access their bank account, with a decrease in transportation by bus and an increase in walking.

Senou, Ouattara, and Acclassato Houensou (2019) assess the role of digital technologies using mobile phone penetration and the Internet in promoting financial inclusion. They use data collected from the Central Bank of West African States (BCEAO) and the International Telecommunication Union (ITU) from 2006 to 2017. They find that the joint use of mobile phones and the Internet are significant determinants of financial inclusion for countries in the West African Economic and Monetary Union.

6. Benefits of digital financial inclusion

Digital financial inclusion offers a wide range of benefits. They include:

- i. Providing access to all kinds of formal financial services – payments, transfers, savings, credit, insurance, securities, etc;
- ii. Encouraging digital payments, transfers, savings, credit, insurance and investments;
- iii. Encouraging government-to-person digital payments, such as conditional cash transfers and unconditional cash transfers
- iv. Lower cost of digital transactions for customers and providers of digital financial services;
- v. Permitting financial services that are tailored to meet poor customers' needs and their financial circumstances (Ozili, 2020). For instance, permitting digital transfer of tiny amounts of money (e.g. \$1.86 cents) and saving tiny amounts of money (e.g. \$0.50 cent), which would be difficult using cash;
- vi. Reduced risks of loss, theft and other financial crimes posed by cash-based transactions;
- vii. Reduced cost associated with transacting in cash and using informal providers;
- viii. A reduction in counterfeit money being circulated to poor individuals and households;
- ix. It promotes economic empowerment by enabling asset ownership and capital accumulation;
- x. It increases economic participation for women;
- xi. It promotes growth and stability for the economy through increase in aggregate spending and increase in tax revenue collections.

7. Risks and regulatory issues of digital financial inclusion

7.1. Risks of digital financial inclusion

Digital financial inclusion poses some risks. They include:

- i. The rising cost of digital devices (e.g. mobile phone, laptops, etc) and the rising cost of internet connectivity in developing and poor countries can make it difficult for people to remain in the digital financial system for a long time;
- ii. Permitting non-financial firms to offer financial services may give rise to new problems;
- iii. New digital financial services will require different regulatory treatment and could make the regulatory ecosystem become too complex;
- iv. Increase in digital transaction costs will affect poor customers who have very low income;
- v. Data privacy and data security issues will arise due to the use of new kinds of data;
- vi. Customers that are not familiar with digital financial services are susceptible to exploitation and abuse;
- vii. There may be agent-related risks. Rogue agents can offer digital financial services to desperate customers and they disregard existing consumer protection laws that apply to banks and other traditional financial institutions;
- viii. There are digital technology-related risks arising from unexplained loss of Internet connectivity, breakdown of telecommunications infrastructure, privacy or security breach which can a major disruption in the use of digital technology;
- ix. There also risks associated with the digital transactional platform being used.

7.2. Regulatory issues

Digital financial inclusion will present many issues to regulators, particularly the bank regulator and telecoms regulator. They will face new challenges when promoting digital financial inclusion. Multiple regulators will need to communicate and collaborate with one another to find solutions to the regulatory issues. Some regulatory issues include the following:

- i. Ensuring that digital agent networks do not exploit customers seeking retail digital financial services in remote locations;
- ii. Challenges in developing strong anti-money laundering (AML) laws;
- iii. Challenges in developing laws to counter the financing of terrorism;
- iv. Regulatory loopholes in the regulation of e-money and digital currencies;
- v. Consumer protection issues;
- vi. Weak payment system regulation;
- vii. Dealing with unfair competitive practices between banks and non-bank players in the digital finance ecosystem.
- viii. The presence of rogue and unregulated digital players in the market for digital financial services.

8. Digital financial inclusion: making it work

Some steps can be taken to achieve digital financial inclusion.

- i. There is a need to ensure that digital payment is widely accepted by merchants and their customers;
- ii. Develop some reliable identification systems for the purpose digital financial inclusion;
- iii. Increase the security of, and trust in, digital financial services;
- iv. Financial sector regulators should be supportive of the growth of Fintech companies so that they can contribute to increasing the level of digital financial inclusion;
- v. Reduce barriers to entry in the Fintech industry. Reduce licensing requirements for entry into the digital finance ecosystem for Fintech firms;
- vi. Reduce the cost of digital services. Compared to traditional banking, digital banking services should be cheaper to manufacture and distribute. This should lead to cost savings that make digital banking services more cost-effective and affordable to those who need them;

- vii. Regulators should constantly renegotiate the fee structures for using a digital transactional platform as this will go a long way to make more people willing to use digital financial services;
- viii. Use artificial intelligence to remove the systemic biases that are largely responsible for financial exclusion in the financial system. With proper scrutiny and oversight, artificial intelligence tools can be used to remove biases from processes, systems and decisions that marginalize unbanked adults based on their low incomes, ethnic origin or race;
- ix. Agents of digital financial inclusion must provide digital financial services that are easy to access and easy to use;
- x. Providers of digital financial services should have internal security measures that mitigate against data theft, identity theft, or loss of money perpetrated by bad actors and cybercriminals;
- xi. Providers of digital financial services should offer data-driven insights to customers. Providers of digital financial services should use the large volume of digital data at their disposal, and with permission, to educate and advise customers on the need to improve their saving habits, and the affordability of purchases before they are made;
- xii. Regulators should embrace open banking and new payments models as it can expand the breadth and depth of digital financial services in ways that support digital financial inclusion.

9. Limitations of digital technology in promoting financial inclusion

1. It lacks the human touch

Digital financial inclusion removes the frontend human intermediary, or the human touch, between the customer and the provider of financial services. Rather than talking to a real person when performing financial transactions, people will interact with an app that offers very limited options and may not have the options that customers want. This will reinforce their desire to speak to a human representative of financial institutions as a lot of people

value and cherish the opportunity to speak with a customer care representative who can guide them when performing financial transactions, and who can help them resolve their complaints. A fully digitalized financial system will completely remove the human touch using artificial intelligence, and the implication for digital financial inclusion is that unsophisticated users of digital financial services may not get the human assistance they need.

2. A garbage-in-garbage-out (GIGO) approach to financial inclusion

Many digital finance applications adopt a garbage-in-garbage-out (GIGO) system in promoting financial inclusion. Households using digital financial services can make a mistake in the input data by adding extra zeros e.g. making a digital transfer of \$100,000 when the intention was to transfer only \$1,000. Due to the garbage-in-garbage-out (GIGO) nature of digital transactional platforms, such errors can be very costly as individuals or businesses may be required to pay a fee to reverse transactions made in error, thereby imposing additional costs to individuals and businesses.

10. Conclusion

The paper revisited the digital financial inclusion agenda to provide extensive insights into what digital financial inclusion is all about. The paper defined digital financial inclusion, and then highlighted the goal of digital financial inclusion, the components of digital financial inclusion, the providers of digital financial services, the instruments for digital financial inclusion, the benefits of digital financial inclusion, the risks of digital financial inclusion, and the regulatory issues associated with digital financial inclusion, among others.

The implication of the discussion in this paper is that digital financial inclusion is more of a journey than a destination. A great deal of progress need to be made, and it will require the use of existing and new innovative digital technologies to adapt financial services to meet the needs of everyone towards financial inclusion. Policy makers should be careful

in choosing a national strategy for digital financial inclusion. After choosing a strategy, there should be continuous evaluation of the effectiveness of the strategy. Also, seeing that digital financial inclusion is not without problems, policy makers must understand the challenges of digital financial inclusion, and the limits of digital technologies in promoting financial inclusion.

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