



Review article

Digital financial inclusion: A gateway to sustainable development

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ABSTRACT

The covid-19 pandemic revolutionises digital financial services, and hence digital financial inclusion is essential to ensure everyone can access digital financial services and thus promote sustainable economic growth. The development and activities promoting digital financial inclusion must align and help attain 2030 Sustainable Development Goals (SDGs). While the pandemic is anticipated to increase the usage of digital financial services, it has also created challenges for certain countries. Hence, a systematic literature review explores digital financial inclusion across countries. This research finds that developing countries, mainly Asian countries, embrace and improve digital financial inclusion to help reduce poverty. However, the results indicate that in developing countries, a persistent divide exists between gender, the wealthy and the poor, and urban and rural areas regarding access to and usage of digital financial services. At the end of the study, we propose a few recommendations, focusing on improving digital infrastructure, simplifying the complicated banking procedures, and stressing the importance of financial education, enabling the smooth implication of digital financial inclusion across countries.

1. Introduction

The COVID-19 pandemic has caused significant and long-term disruptions to people's livelihoods all across the globe, both in developing and developed countries. Countries have adopted lockdowns and curfews as a preventive way to stop the virus outbreak. As a result, many businesses' revenues are affected as they cannot resume their business operation. In addition, it poses challenges to organisations to maintain a large workforce and thus slashes the employees, which leads to a higher unemployment rate. It is reported that the global economy decreased by 4.3 per cent in 2020, and the global unemployment rate reached its highest level in a decade [1]. All layers of society, especially those from middle-and low-income groups, have felt the most and suddenly found themselves stripped of their economic livelihood. They have now fallen into the new poor group and are trapped in poverty.

Access to financial services is critical during the pandemic, especially for the poor and those who need financing to sustain their business operation or livelihood. Financial inclusion thus remains a key development concern, which has become more acute with the COVID-19 pandemic. At the same time, the COVID-19 pandemic has accelerated the transformation of financial services digitally. Government authorities and health practitioners promote the use of cashless, contactless modes of payment and other digital financial services to

minimise the danger of virus transmission via currency handling, thus providing new possibilities for potential digital financial inclusion adoption. Mobile money services, internet banking, and other financial technology advances could ease small businesses and low-income families' livelihood [2].

Given the disruptions caused by COVID-19, this accelerated drive toward digitising financial services may be an unanticipated advantage for digital financial inclusion. For those isolated and financially underprivileged, digital banking (especially mobile money) has already been shown to be the foundation of financial inclusion in developing countries [3]. In the aftermath of the pandemic, the fast rise in demand for fintech solutions by governments, businesses, and the general public is expected to provide more opportunities for digital channels to promote global financial inclusion. When offered ethically and sustainably in a well-regulated environment, digital financial inclusion encourages development and accelerates progress toward the Sustainable Development Goals (SDGs). However, the concern is that SDG attainment to eradicate poverty across countries needs effort and collaboration from worldwide, be it developed or developing countries. The accessibility and usage rate of essential financial products and online banking by young people in developed countries are almost 90% and above [4]. Meanwhile, individuals who may be unable to use digital financial services, such as rural residents, the poor, the elderly, will slow down the

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progress of digital financial inclusion and thus not be on track to meet the SDGs by 2030.

Digital financial inclusion potentially plays a vital role in mitigating the economic and social impacts of the present COVID-19 issue. Increasing the financial access of low-income families and small enterprises might also contribute to a more inclusive financial recovery. These potentials, however, should not be taken for granted since the pandemic might exacerbate pre-existing concerns of financial exclusion and introduce new dangers to the use of digital financial services [5]. Hence, a mechanism that enables digital financial inclusion for both developed and developing countries is crucial to enhance financial inclusion progress at different stages of development and make meaningful progress toward achieving SDGs.

Thus, the purpose of this study is to provide an overview of how the COVID-19 pandemic has affected digital financial ecosystems by speeding up the broad-based digitalisation process for financial services, which has already partly been carried out in developed and developing countries [6]. Besides, this study also helps to identify the mechanism to support digital financial inclusion. The systematic literature review technique is employed in this study to address the following research questions:

1. What is the present stage of the development of digital financial inclusion in developed and developing countries?
2. What are the essential key elements for a comprehensive digital financial inclusion mechanism?

This study adds to the existing literature by clarifying the present stage of development of digital financial inclusion in developed and developing countries. By reviewing this, policymakers may use the findings of this study to anticipate and mitigate any difficulties connected with the implementation of existing policies and practices to reduce potential disparities in digital financial inclusion resulting from their efforts. A pandemic may create gaps in current and future trends for digital financial services. Hence, incumbent financial service providers such as financial institutions, insurance companies can bridge the gaps by increasing the supply of customised digital financial products and fostering digital financial inclusion.

2. Systematic review protocol

The systematic review follows the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) criteria. The identified articles were screened using the content-centric analysis technique to respond to the study's research questions: (1) the recent financial inclusion revolution and its development across countries; (2) the mechanism of digital financial inclusion to promote SDGs and economic growth. The following three sub-sections describe the search terms, inclusion and exclusion criteria, and search results.

2.1. Database and search terms

In this study, five main databases, namely ProQuest, Scopus, Springer, Science Direct and Emerald, were used to extract articles related to the revolution of digital financial inclusion and the mechanism to develop digital financial inclusion among countries. These five databases were selected as they are reliable databases of peer-reviewed journals. Using search terms ("Financial Inclusion") AND ("Digital" OR "Digital Financial Inclusion") AND ("Factors" OR "Mechanism" OR "Instruments") AND ("COVID-19" OR "COVID-19 Pandemic" OR "Coronavirus Pandemic"), we performed a search of article's title, abstract, and keywords of articles.

2.2. Criteria for article inclusion and exclusion

The following inclusion and exclusion criteria were developed to help filter the articles and identify the most related works: (1) Papers must be

written in English, and (2) articles must be published in peer-reviewed journals or relevant reports from official website, (3) articles should discuss the revolution/development of digital financial inclusion and/or mechanisms to develop digital financial inclusion, and (4) full text of the identified articles should be open access for further study and analysis.

2.3. Search results

The search results yielded 111 articles via a search of the title, abstract, and keywords of articles indexed by ProQuest, Scopus, Springer, Science Direct, and Emerald (Figure 1). After considering the first and second inclusion criteria, the search was restricted to English-language journal articles and official reports, producing 80 results. Two authors reviewed the title and abstracts of 80 identified articles based on exclusion and inclusion criteria. Some articles were resolved by consensus after discussion among all authors during the reviewing process. The initial screen, based on titles and abstracts, yielded 39 articles. Eight articles were eliminated on the next screen due to not fulfilling the inclusion criteria and lack of full-text availability. Lastly, three articles were added by checking the references of previously included articles. In total, 34 articles relating to the revolution/development of digital financial inclusion and mechanism to promote digital financial inclusion were discovered.

Figure 2 below shows the number of cited journals based on year. The cited journals from five main databases show an upward trend from 2015 to 2021. The results reaffirm the importance of financial inclusion. It has received increasing attention from researchers and policymakers in the past six years as a potential source of benefits to the economy.

Table 1 summarises the distribution of 34 reviewed articles based on gender issues and developed/developing countries.

Thirteen articles related to gender issues. Meanwhile, 18 articles covered only developing countries, two articles covered only developed countries while 11 articles covered both developing and developed countries. Nevertheless, three articles are general review papers that describe financial inclusion, indicator formation and its contribution in achieving respective SDGs.

To date, 1.7 billion people around the globe remain unbanked and 56% of the total unbanked adults are women [14]. Compare to men, adoption of digital payment and internet banking is lower for women [7, 14]. In addition, women are more likely to be financially excluded especially those working in informal sector e.g., homebased worker [14]. Besides that, women who possess higher level of trust in banking system increases their bank account ownership [11]. Interestingly, past study revealed that firm financial performance is much better if it is led by women [14].

Developing countries are facing issues such as low awareness on cashless policy [37]. As such, leaders of developing countries should include financial innovations into national policy to help alleviating poverty and achieve SDGs [9]. For example: people should be encouraged to adopt cashless payment which provides safer payment mode while financial institutions should invest in FinTech services which would yield higher returns [9]. Increasing reliance on informal source of financing in developing and developed countries is attributed by public mistrust in financial institutions [17]. In addition, a person's reliance on informal source of financing increases when he or she records low credit rating which further leads to refusal in dealing with banks [34]. Since financial inclusion is a lubricant for the entire economic system, it is suggested that in developing countries, bank should extend and promotes updated financial products and services especially to people in rural area and SMEs [23]. Financial literacy, infrastructure, financial tools which enhanced security protection, and local government support are crucial for developing country like China to ensure its nation to be financially included [28].

3. The review of digital financial inclusion

The flow of writing of this study has three main sections to simplify future referencing to different readers or researchers while achieving the research objectives simultaneously.

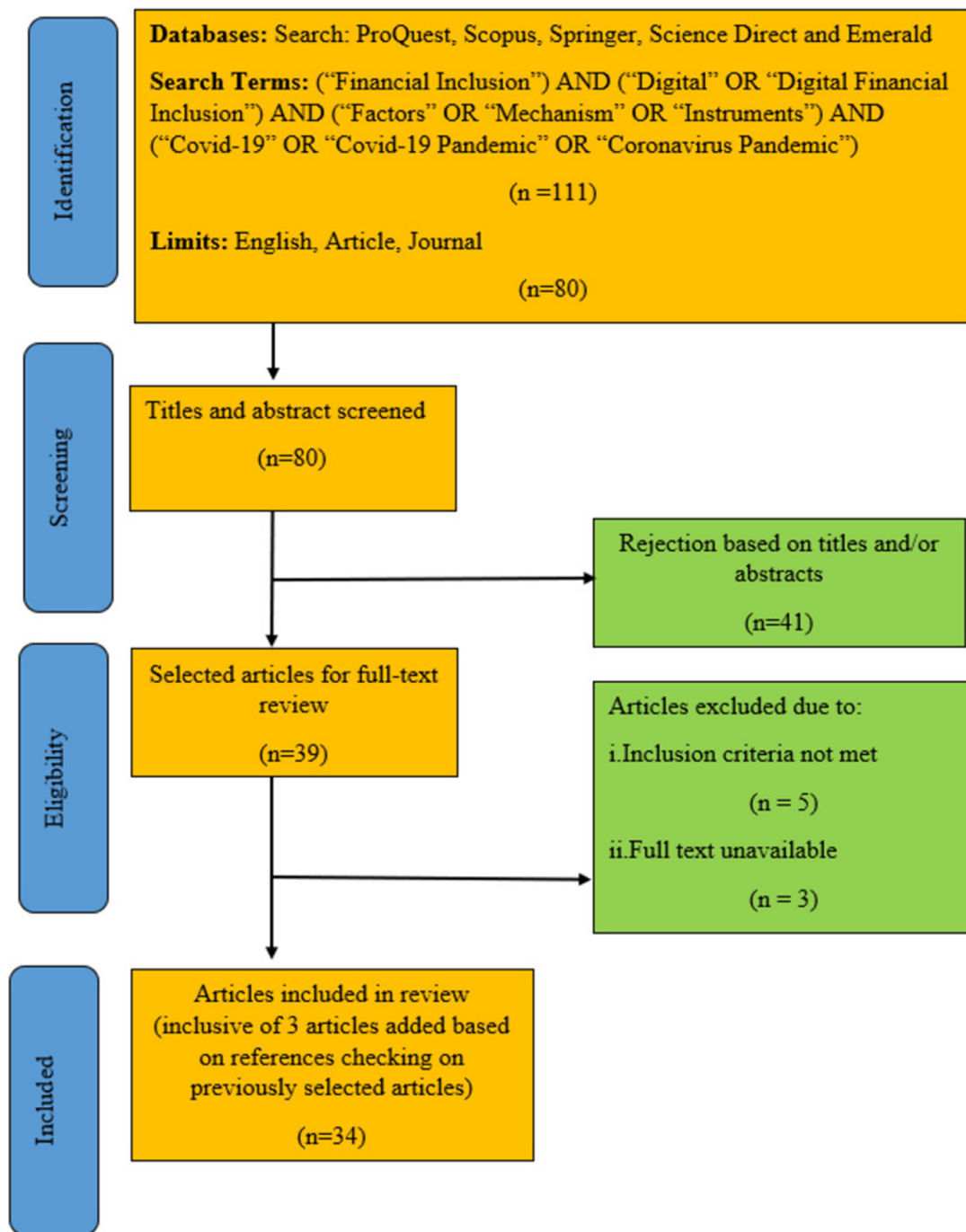


Figure 1. Flow diagram of the article search and selection process.

3.1. The background of digital financial inclusion

This section defines financial inclusion and digital financial inclusion, including an overview of digital financial inclusion. At the same time, this section will also discuss the significance of digital financial inclusion and its impact on a country's economic objectives and sustainable development goals (SDGs). This section also emphasises the effect of digital financial inclusion on vulnerable groups such as the rural population and the poor.

3.1.1. Definitions of digital financial inclusion

Financial inclusion is known as a process of encouraging the accessibility and utility of formal financial services among public users

and companies. Besides, financial inclusion also ensures that formal financial services are accessible and used by people and companies [38]. Additionally, the objective of financial inclusion targets vulnerable communities, including low-income groups, to be financially included while having accessible financial services. Financial services include credit, insurance, and other forms of equity [39]. On the other hand, financial inclusion is also defined as formally possessing an account from a recognised financial institution [40]. Individuals and companies may use the financial account to perform regular savings and borrowing and insurance and payment services. Therefore, financial inclusion must be part of a country's economic growth while assisting disadvantaged communities by improving their income and job opportunities.

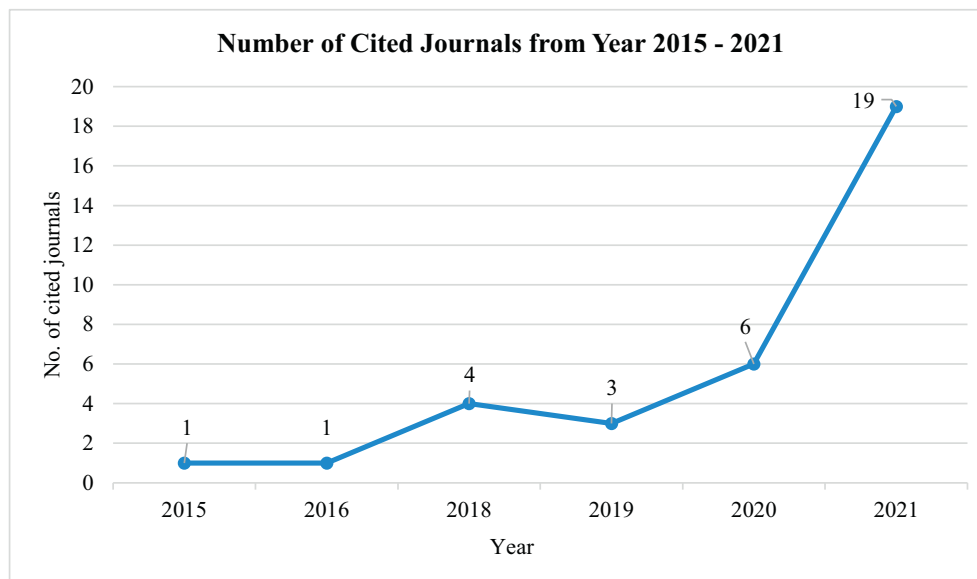


Figure 2. Number of cited journals from 2015 – 2021.

In 2014, financial industry policymakers identified digital financial inclusion's "game-changing" potential. Digital financial inclusion is a low-cost digital means of providing formal financial services to previously underserved populations [41]. At least 80 countries have initiated state-of-the-art digital financial services using mobile devices [42]. The initiative aims to reassure the confidence of underserved individuals to embrace digital financial services entirely rather than cash-based transactions. Customisation on digital financial inclusion to a specific and compelling programme could help serve former underserved populations if they understand and believe the full benefits of digital financial inclusion. The programme could also be designed to be supplied at a sustainable cost for service providers, making it more affordable for customers [32].

3.1.2. Overview of digital financial inclusion

Digital financial inclusion is the fourth stage of the financial revolution after developing microcredit, microfinance, and financial inclusion [28]. Compared to financial inclusion, digital financial inclusion places more importance on technology to broaden the accessibility to formal financial services. Initially, the term "microcredit" refers to a small loan offered by financial institutions to businesses and individuals. In the 1990s, the word "microcredit" had been replaced by "microfinance," which covers more immense scopes of financial services such as savings, mutual funds, insurance, and loans. Another significant revolution is shifting from "microfinance" to "financial inclusion". Financial inclusion is a concept that seeks to guarantee that formal financial services are accessible to all people. However, microcredit, microfinance, and financial inclusion initiatives are manual and field-based operations [13]. Thus, it limits the effectiveness of helping the poor. Lately, ICT has led financial inclusion to advance to the fourth stage: digital financial inclusion. This radical innovation has the potential to transform the lives of those at the bottom of the economic ladder.

Digital financial inclusion aims to eradicate obstruction to encourage individuals' participation in the financial services offered by financial institutions and benefiting from it. Due to fast technological advances, cell phones and social media have a very high penetration rate in today's internationally linked economy. Many nations across the globe have a tremendous potential to enhance their countries' economic development and financial stability by embracing financial inclusion via mobile payment systems [17, 32, 23].

3.1.3. The role of digital financial inclusion in meeting the SDGs

Financial inclusion plays a role in ensuring all nations' accessibility and usage of financial products to avail economic benefits [11]. As new digital payment and mobile phone technologies have developed in recent years, the formal financial system has been re-engineered [7]. An inclusive digital finance goal is to provide financial services in mobile money, internet banking, electronic transfers, insurance, and loan and a combination of these and newer fintech apps that reach out to previously excluded populations [10]. Everyone should be part of the economy where financial services are customised to specific needs and demands at a reasonable cost [9].

The delivery of financial services via digital platforms promotes financial inclusion. In addition, digital financial inclusion is also one of the stepping stones to attain the Sustainable Development Goals (SDGs) by 2030. Effective execution of digital financial inclusion helps to reach 13 out of 17 SDGs. Table 2 provides the 13 listings of SDGs that describes how digital financial inclusion could help achieving the respective SDGs and the relevant articles.

G20 leaders, the Alliance for Financial Inclusion (AFI), the Consultative Group to Assist the Poor (CGAP), and the International Finance Corporation (IFC) committed to launch a Global Partnership for Financial Inclusion (GPFII) to strengthen the development of financial inclusion around the world. GPFII will serve as an action to coordinate and implement financial inclusion systematically. Furthermore, the Financial Inclusion Expert Group (FIEG), formed in 2010, aims to provide a forum for peer learning, information exchange, policy setting, and synchronisation on financial inclusion for all G20 and developing countries [24].

During the G20 meeting in May 2010, the FIEG, finance ministers, and central bank governors from G20 countries released a set of principles to foster financial inclusion. The guidelines to improve financial inclusion implementation worldwide are based on nine key aspects, which are stated in Table 3 with its relevant articles.

Financial inclusion is assessed on three dimensions: (i) access to financial services, (ii) financial service use, and (iii) product and service quality. In addition, financial inclusion also includes some essential characteristics such as financial literacy and competency, market conduct and consumer rights, and overcoming impediments to financial measure usage. The fundamental principles of digital financial inclusion serve as the foundation for digitising financial services. Additionally, they conform to the GPFII's standards and other widely recognised documents.

Table 1. Distribution of articles based on gender, developed/developing countries.

Source	Year	Gender Issues	Country	
			Developing	Developed
Asongu, Biekpe & Cassimon [2]	2021		✓	✓
Aziz & Naima [7]	2021	✓	✓	
Emara & Moheildin [8]	2021	✓	✓	✓
Feghalia, Moraa & Nassifb [9]	2021	✓	✓	✓
Frączek & Urbanek [10]	2021			✓
Ghosh [11]	2021	✓	✓	
Gutiérrez-Romero, & Ahamed [12]	2021	✓	✓	
Hasan, Le, & Hoque [13]	2021	✓	✓	
Huang, Kale, Paramati & Hesary [14]	2021	✓		✓
Kanungo & Gupta [15]	2021		✓	
Lu, Niu & Zhou [16]	2021	✓	✓	✓
Lutfi, Al-Okaily, Alshirah, Abutaber, & Almarashdah [17]	2021		✓	
Malik, Md Isa, Jais, Rehman, & Khan [18]	2021		✓	✓
Pradhan, Arvin, Nair, Hall, & Bennett [19]	2021	✓	✓	
Safari, Bisimwa, & Armel [20]	2021	✓	✓	
Shen, Hu, & Hueng [21]	2021		✓	✓
Tram, Lai, & Nguyen [3]	2021		✓	
Undale, Kulkarni, & Patil [22]	2021	✓	✓	
Vo, Nguyen, & Van [23]	2021		✓	✓
Bede Uzoma, Omankhanlen, Obindah, Arewa, & Okoye [24]	2020		✓	
Kitzmann [25]	2020		✓	✓
Li, Wu, & Xiao [26]	2020		✓	
Soekarno, Mambua, & Setiawati [27]	2020	✓	✓	
Wang & He [28]	2020		✓	
Xu [29]	2020		✓	✓
Ferrata [30]	2019	✓	✓	✓
Naumenkova, Mishchenko, & Dorofeiev [31]	2019		✓	
Nguyen [32]	2019		✓	✓
Dawei, Anzi, & Gen [33]	2018		✓	
Kabakova & Plaksenkov [6]	2018		✓	
Ozili [34]	2018	General review		
UNSGSA [35]	2018	General review		
GPFI [36]	2016	General review		
Bayero [37]	2015		✓	

In addition, the remote model also needs interoperability, payment systems accessibility and communication infrastructure, and compliance with regulations for the security of clients' data and financial institution information (Naumenkova, Mishchenko & Dorofeiev, 2019). In 2016, GPFI presented a revised version of the G20 financial inclusion indicators by adding digital component measurements to ensure financial inclusion, such as cashless transactions, digital payments, debit card ownership, and access to the digital infrastructure [36].

3.1.4. The impacts of digital financial inclusion on vulnerable groups

To make a living, everyone has to have access to financial services. However, financial exclusion continues to be a significant issue, particularly among the most vulnerable. A vulnerable group refers to people who lack the financial capability, documentation, or the opportunities (economic, physiological, psychological, and cultural) to access financial services [25]. Groups at the risk of financial exclusion are overindebted, homeless, unemployed, women, elderly, migrants, and prison inmates.

The study related to financial inclusion has been examined in many developing countries [24]. The research discovered a significant disparity in the level of accessibility to formal financial products between the wealthy and underprivileged, sub-urban and city populations, and women and males. The report also claimed the majority of the poorest 40% of people in developing nations lack official accounts and that 35% of new businesses struggle to get bank financing. With nearly all

sovereign countries requiring comprehensive integration of inclusive financial security and economic development by 2030, it is critical to close the growing gap between the rich and poor, especially in suburban regions.

A study conducted in Indonesia on the gender dimension in digital financial inclusion showed that women in Indonesia tend to have digital financial inclusion in their daily life [27]. The authors also suggested that digital financial education is critical for women to achieve digital financial inclusion. Apart from that, digital money and mobile technologies enable small transactions cheaper, benefiting small companies and vulnerable populations [33, 22]. Many developing countries, including Brazil, India, Nigeria, and other African countries such as Kenya and Zimbabwe, have adopted digital technology to combat the issue of financial exclusion [37].

3.2. Evidence of digital financial inclusion across countries

This section exhibits a different level of progress of digital financial inclusion in developing and developed nations (as depicted in Table 4). This section will also highlight the lack of procedures for implementing digital financial inclusion and its impact on the countries. Lastly, this section also emphasises the increased use of digital financial services during the Covid-19 pandemic and the opportunities and challenges incumbent service providers and consumers face.

Table 2. The contributions of digital financial inclusion towards sustainable development goals (SDGs) and relevant articles.

Sustainable Development Goals (SDGs)	Contributions of Digital Financial Inclusion towards Sustainable Development Goals (SDGs)	Articles
SDG 1: No poverty	Low-cost digital financial services (e.g., credit, payments, wages, pensions or even allow government transfer) could help low-income households increase the standard of living and fuel business models.	[2, 7, 24, 8, 9] [30, 11, 12, 13] [14, 6, 25, 26] [16, 17, 18, 31] [34, 19, 20, 3, 23, 28, 29]
SDG 2: Zero hunger	Digital financial services could help vulnerable groups (e.g., the poor, farmers, immigrants, etc.) to produce greater productivity, safer and more reliable social transfers or remittances.	[7, 24, 8, 30, 25] [26, 31, 23, 28]
SDG 3: Good health and well-being	Digital financial services may assist families in preparing for and dealing with unexpected healthcare costs in the event of a health emergency. Besides, promoting low-cost digital public and private micro health insurance makes healthcare insurance more viable to the poor.	[8, 10, 9, 12] [15, 18, 31, 20]
SDG 4: Quality education	Lower-income families may better manage their education costs using digital finance, while institutions and national education systems can enhance their financial management. As a result, digital finance may aid in allocating funds for instructors, resources, and technology that improve educational outcomes.	[7, 8, 10, 9], [13, 14, 15, 16], [19]
SDG 5: Gender equality	Women may have more control over their money and develop assets with the help of digital financial services. Gender equality and economic development are aided by increased financial power.	[7, 8, 9, 11] [14, 16, 19, 27]
SDG 6: Clean water and sanitation	Water and sanitation providers may now provide services to low-income households via digital financing, which lowers operating expenses while simultaneously promoting the long-term development of power networks into rural areas.	[25]
SDG 7: Affordable and clean energy	Digital finance and digital payments could offer low-income households, especially those in Africa and Asia countries with low cost, prepaid, or pay-as-you-go services that help to increase financial viability.	[14, 25]
SDG 8: Decent work and economic growth	Digital financial services power low-cost business strategies. (e.g., digitising salary, trade payments, credit) especially for micro, small and medium enterprises (MSMEs), potentially creating 95 million new jobs and increasing the global GDP by 6% by 2025.	[8, 10, 11, 12] [13, 14, 6, 26] [31, 32, 34, 19] [21, 3, 23, 29]
SDG 9: Industry, innovation and infrastructure	Small businesses may use digital financing to develop, innovate., enter new markets, and attract more young talent to the digital economy.	[10, 13, 14, 15] [26, 32, 19]
SDG 10: Reduced inequalities	Digital finance can create an equalising force giving low-income households to access low-cost digital finance and improve financial resilience.	[2, 7, 8, 9, 12] [14, 6, 25, 26]
SDG 11: Sustainable cities and communities	Cities that still rely on cash transactions on public services such as public transit are inefficient and costly. As a result, digitising payments may aid in the reduction of unnecessary expenses.	[37, 33, 22]
SDG 13: Climate action	Individuals, communities, companies, and governments may benefit from digital finance in combating and preparing for the harmful impacts of climate change, primarily through increasing resilience and encouraging sustainable investments.	None
SDG 16: Peace, justice and strong institutions	Digital payments significantly improve the transparency of government transactions. As a result, this may increase the accountability of the government and other parties on the usage of public funds.	[8, 6, 25, 31]

Source [35].

Table 3. The nine keys aspects to foster financial inclusion.

Key Aspect (s)	Descriptions	Articles
Leadership	Strong leadership helps in implementing numerous financial regulations and payment security rules. Simultaneously, financial education is critical for ensuring consumer safety and, as a result, broader financial inclusion.	[30, 18, 23]
Diversity	Financial inclusion is associated with various channels (e.g. microfinance offerings, the role of information communication technology (ICT) and conventional banks, as well as the role of the government in establishing financial laws) and instruments that facilitate and encourage entrance into the financial system.	[37, 24, 30, 26, 16] [32, 19, 28]
Innovation	It refers to technical, institutional, and infrastructural progress, which benefits by removing physical barriers connected with distances and lowering associated costs.	[2, 7, 37, 24, 10] [9, 13, 14, 6] [15, 25, 26, 17] [19, 20, 22, 28]
Protection	To protect customers from fraud and abuse, focusing on human and technological safeguards. It also entails the establishment of sufficient infrastructure, adopting laws that enhance pricing and service transparency, and the nomination of a consumer-protection-minded institutional figure.	[8, 25, 18, 22] [29]
Empowerment	To fully utilise these instruments ' potential based on their specific requirements, basic financial knowledge must be provided to customers and comprehend financial products and services.	[11, 13, 25, 27]
Cooperation	Various government entities, including central banks and ministries, should collaborate and form partnerships with private and public institutions to facilitate decision-making on financial inclusion-related issues.	[2, 7, 11, 12, 6] [18, 32, 34, 19] [21, 23]
Knowledge	The necessity to gather and analyse data generated by financial inclusion initiatives, assess the efficacy of financial inclusion policy implementation and provide suggestions and feedback.	[10, 12, 13, 14] [15, 25, 26, 17] [31, 32]
Proportionality	In constructing a new regulatory model capable of protecting the present financial system, the pursuit of balance is essential.	[36, 31]
Framework	The ability to develop a regulatory framework in compliance with international money laundering and transaction tracing requirements	[7, 33, 8, 9] [12, 13, 25, 26] [18, 31, 34, 23]

Source [30].

Table 4. List of reviewed articles.

Source	Year	Database	Description	Journal Ranking	
				Australian Business Deans Council (ABDC)	Scopus
Asongu, Biekpe & Cassimon [2]	2021	Science Direct	This study investigates the connection between the growth of mobile money and financial inclusion.	C	C
Aziz & Naima [7]	2021	Scopus	By establishing a comprehensive framework for digital financial inclusion, the study aimed to bridge the divide between financial inclusion discourse assumptions and notions of access to and use of digital technology.	C	C
Emara & Moheildin [8]	2021	Science Direct	The research conducts an empirical examination of the relationship between financial inclusion, governance, and economic growth in the MENA region.	NA	NA
Feghalia, Moraa & Nassifb [9]	2021	Science Direct	The research emphasises the effect of a broad definition of financial services on financial stability due to incorrect financial inclusion measures.	NA	NA
Fraczek & Urbanek [10]	2021	Science Direct	This study explains the growth of digital payments in passenger transport and analyses the different variables that influence the degree of digital ticketing and payment adoption in this sector.	C	C
Ghosh [11]	2021	Science Direct	The research examines the critical role of trust in financial inclusion.	A	A
Gutiérrez-Romero, & Ahamed [12]	2021	Science Direct	The study explores to what extent financial inclusion could help mitigate the increase in poverty	A	A
Hasan, Le, & Hoque [13]	2021	Springer	This study sought to ascertain the impact of financial education on financial access through banking, microfinance, and fintech.	NA	NA
Huang, Kale, Paramati & Hesary [14]	2021	Science Direct	This research aims to ascertain the impact of financial inclusion and trade openness on economic development in the 27 member nations of the European Union (EU).	B	B
Kanungo & Gupta [15]	2021	Science Direct	The study investigated the impact of digitalisation on overall social and economic well-being among Indian communities and socially excluded.	A	A
Lu, Niu & Zhou [16]	2021	Science Direct	The study focuses on individualism, one of the most prominent cultural characteristics, on household financial inclusion.	NA	NA
Lutfi, Al-Okaily, Alshirah, Alshira'h, Abutaber, & Almarashdah [17]	2021	ProQuest	This study determined the factors that led to Jordan Mobile Payment (JoMoPay) using a modified TAM model.	NA	NA
Malik, Md Isa, Jais, Rehman, & Khan [18]	2021	Science Direct	This research analyses the effect of governance quality on maintaining financial stability and promoting financial inclusion in Asian countries using the stakeholder theory.	NA	NA
Pradhan, Arvin, Nair, Hall, & Bennett [19]	2021	Science Direct	From 1991 through 2018, the research analyses the short- and long-run economic growth trends, financial inclusion initiatives, and ICT infrastructure development in twenty Indian states.	A	A
Safari, Bisimwa, & Armel [20]	2021	Emerald	This research looks at consumers' views and intentions regarding online banking in the banking industry.	NA	NA
Shen, Hu, & Hueng [21]	2021	Science Direct	The study investigated the economic impact of digital financial inclusion in 105 countries.	NA	NA
Tram, Lai, & Nguyen [3]	2021	Science Direct	This study aims to develop a composite financial inclusion index (FI index) by including data linked to "mobile money" into the three dimensions of financial inclusion to represent a country's financial inclusion level accurately.	NA	NA
Undale, Kulkarni, & Patil [22]	2021	Emerald	The purpose of this research is to determine the impact of demographic factors such as gender and income on the perceived "security worry" and "comfort" associated with the use of an e-Wallet.	NA	NA
Vo, Nguyen, & Van [23]	2021	Science Direct	This research examines the link between financial inclusion and financial market stability using 3071 bank datasets.	NA	NA
Bede Uzoma, Omankhanlen, Obindah, Arewa, & Okoye [24]	2020	ProQuest	The purpose of this research is to determine if financial innovation enabled by digital inclusion may assist 27 Sub Saharan African (SSA) nations in achieving the Social Development Goals of hunger elimination, poverty reduction, and job creation.	NA	NA
Kitzmann [25]	2020	Articles added by cross-references	This article emphasised the issues of financial exclusion, over-indebtedness, and the implications for some of our society's most vulnerable groups, which have gotten worse since the pandemic.	NA	NA
Li, Wu, & Xiao [26]	2020	Science Direct	The research investigated the effects of digital financial inclusion on household spending and its mechanisms. The findings indicate that digital financial inclusion can increase household spending.	A	A
Soekarno, Mambea, & Setiawati [27]	2020	ProQuest	The purpose of this study was to examine the influence of gender in Indonesia's digital financial inclusion.	NA	NA
Wang & He [28]	2020	ProQuest	This research examined the effect of digital financial inclusion on farmers' vulnerability in China using survey questionnaires.	NA	NA

(continued on next page)

Table 4 (continued)

Source	Year	Database	Description	Journal Ranking	
				Australian Business Deans Council (ABDC)	Scopus
Xu [29]	2020	Science Direct	The research investigates the relationship between social trust and financial inclusion using financial inclusion data from the Global Findex database and trust measures from the World Values Survey.	A	A
Ferrata [30]	2019	ProQuest	Financial inclusion, defined as access to financial services, allows the most disadvantaged to contribute to the SDGs' achievement and improve their living conditions, as shown in this study.	NA	NA
Naumenkova, Mishchenko, & Dorofeiev [31]	2019	ProQuest	This study determines the effect of Ukraine's present stage of economic digitalisation on financial inclusion.	NA	NA
Nguyen [32]	2019	Emerald	This study aims to assess the sensitivity of production and prices to interest rates (IR) in emerging countries with varying degrees of financial inclusion (FI) from 2007 to 2017.	NA	NA
Dawei, Anzi, & Gen [33]	2018	Scopus	This research emphasised the critical significance of digital currency and mobile technology in enabling low-cost, small-scale transactions that benefit small businesses and disadvantaged people.	NA	NA
Kabakova & Plaksenkov [6]	2018	Science Direct	This research aims to analyse the ecosystems of 43 countries to identify which ecosystem components promote financial inclusion and which contribute to financial exclusion.	A	A
Ozili [34]	2018	Science Direct	This study discusses several issues concerning digital money and ascertains the impact of digital finance on financial inclusion and system stability.	NA	NA
UNSGSA [35]	2018	Articles added by cross-references	This study details how digital financial inclusion can accelerate progress toward the Sustainable Development Goals and have a long-lasting social and economic impact on millions worldwide.	NA	NA
GPFI [36]	2016	Articles added by cross-references	This article aims to provide a complete list of financial inclusion indicators produced by the Global Partnership for Financial Inclusion (GPFI) to increase awareness of the financial inclusion landscape.	NA	NA
Bayero [37]	2015	Science Direct	The research investigates how a cashless policy based on a few chosen variables contributes to Nigeria's financial inclusion.	NA	NA

3.2.1. Evidence of digital financial inclusion in developing countries

Digital financial inclusion has been a critical determinant or driver of financial inclusion in many countries in recent years. However, previous studies show that there are given various determinants in fostering the financial inclusion process across countries, which is either in low-income countries, developing countries or developed countries.

There are enormous numbers of people in low or middle-income level countries that remain unbanked [31]. Based on the finding, financial inclusion was found to have a positive relationship with ICT diffusion, while a negative relationship was found between poverty and inequality [43]. Respective countries' governments must promote information and communication platforms and the facilities to equip the nation for a higher saturation in digital financial inclusion.

Studies showed a significant relationship between enhancement in financial inclusion and institutions [44, 45, 46]. Financial inclusion is recognised internationally as a factor to sustainable development due to a more efficient and safer financial transaction; providing the poor with an opportunity through educating them in managing financial risk will help eradicate poverty [47, 38, 12]. Acquisition by most adults on such financial services has positively impacted the economy's financial system [21]. However, such privileges are only apparent in developed countries as most developing countries are inaccessible to the formal financial system. A study showed that the adult population of developing economies that do not own any accounts at financial institutions amounts to 37%, further emphasising the importance of financial inclusion for developing countries [38].

Moreover, it is significant to research the relationship between digital financial inclusion and ICT bridging the financial infrastructure gap. According to research, Bangladeshi commercial banks made a substantial investment in technology infrastructure to ensure a better flow of transactions and client access [7]. In addition, developing countries with higher digital financial inclusion can reduce poverty and provide a higher financial inclusion rate in society.

In recent years, the digital banking industry has come up with nearly 85% of digital platforms innovations, showing that access to banking is progressing in the emerging markets (Van Der Boor et al., 2014). Banks have an imperative role in advocating financial inclusion, especially in developing nations [48, 20]. Moreover, developing countries will boost inclusive growth and continue development through the benefits of technological innovations [49]. The empirical results demonstrate a high interdependence between ICT infrastructure development and financial inclusion programs. The results indicate that strong economic growth together with financial inclusion initiatives will significantly impact ICT infrastructure development in the Indian states in the long run [15, 19].

Mobile banking and e-payments have recently increased financial inclusion among developing countries [50]. For example, as a developing country, China found that digital financial inclusion has accelerated the emergence of financial inclusions through household consumption such as online shopping and digital payments (Li, Wu, & Xiao, 2020). Nonetheless, despite many developing countries having achieved revolutionary financial inclusion, the e-payment system must evolve further to solve challenges such as consumer protection, data inequality, and regulatory arbitrage [16].

3.2.2. Evidence of digital financial inclusion in developed countries

A study found that the development in terms of financial inclusion is raised from the technology and governance in tune with society and education needs, which is applied in Brazil and South Korea, respectively [8, 51]. Developed countries such as South Korea are provided with a higher financial inclusion and competitiveness than Brazil, categorised as a developing country.

Due to the obvious anticipated benefits of financial inclusion and digital finance, governments in several developed countries have used ultimatums to compel individuals, businesses, and bank account holders to use digital financial services, such as setting limits on daily cash withdrawals, charging high fees for cash withdrawals exceeding a certain

amount, and so on. Certain groups of people, however, continue to be voluntary financial exclusion. It is a group that is often described as an unwillingness or reluctance to use online, fintech, or virtual cards to perform financial transactions due to intense practice and habits of "cash-in-hand" or ex-post data security issues [34]. The study further said that introducing a forced financial inclusion strategy in the country will prompt governments in developed countries to establish financial requirements through a regulator, therefore normalising the usage of digital financial services among financial service consumers [34].

Some studies have analysed and discussed the factors promoting digital financial inclusion in EU countries. According to a survey, EU countries are classified into high-income and low-income EU countries, old and new EU countries [14]. This distinction provides the study with a more solid and practical policy implication. Consequently, they found a more significant positive economic effect of financial inclusion on lower-income, old-EU countries than new-EU countries with higher pay. Apart from that, the increased financial transaction cost is one of the factors discouraging the process of accelerating financial inclusion in the region, especially in low-income EU countries and newly joint EU countries.

Besides that, a study shows that enhancing digital skills and the affordability of digital tools for people can promote a higher digital inclusion rate in Australia [52]. Moreover, a positive linkage was found between financial inclusion and poverty reduction and significantly increased institutional quality. However, the influence of institutional quality on poverty reduction through financial inclusion is more visible in developing countries [53].

3.3. Discussion and future research recommendations

The worldwide expansion of financial and digital technology has allowed vulnerable people to benefit from greater financial inclusion via more efficient and affordable digital financial services, which are becoming more widely available. Today, many countries work on digital financial inclusion and setting it as a priority goal. Both the developing and developed countries are aware of the contribution of digital financial inclusion towards reducing poverty and boosting up country's economy. Besides, over 50 countries' leaders and members of global financial sector standard-setting bodies (SSB) are dedicated to the global and local agenda for digital financial inclusion [1].

Although all these efforts have been made, developing countries are still challenged with issues such as many populations remaining unbanked and low acceptance rates from the community due to the absence of technological framework, loose financial inclusion policy, the worries of ex-post data security issues that may contribute to insufficient a) support from key stakeholders; b) holistic policies and regulations, and consumer protections; c) ICT infrastructure, and d) engagement from financial institutions.

When the Covid-19 pandemic struck, lockdowns and curfews were imposed in many countries. It brings an awareness of the use of advanced technology in the financial system. Due to the pandemic, apparent changes have occurred from all perspectives, and digital access to financial services is an urgent priority [54]. Substantial inequalities in developed and developing countries across vulnerable groups such as the poor, women, and the rural population still face low digital skills and financial incapability to own and use digital financial services [27]. Thus, worldwide cooperation between policymakers, regulators, and financial institutions is essential. The suggestions are listed as below:

Suggestions for government, regulators and policymakers:

1. Financial inclusion does not get sufficient attention in the government's policy framework. The government should examine the factors contributing to each country's degree of digital financial exclusion and implement a systematic plan for digital financial inclusion;
2. Since most ICT policies are top-down and supply-driven, pro-poor financial goods and services should be customised based on people's needs.

3. Government initiatives on ICT should prioritise digital inclusion initiatives that guarantee affordable and fast Internet access in rural areas [7];
4. The government should prioritise a digital financial inclusion strategy based on digital skills and financial literacy. Having the proper digital skill and understanding of the use of each financial service and product will significantly affect financial opportunity access, particularly the growth of the usage of financial services other than saving and withdrawing money [13].

Suggestions for financial institutions or financial service providers:

1. The need to establish a one-to-one financial service agent mentorship programme and to target vulnerable groups to teach them basic abilities for mobile and online engagement to combat financial fraud and related risks;
2. To reduce transaction costs, which encourage low-income individuals to use financial services;
3. Reassess banking rules considering the rural consumers. Complicated banking procedures (such as identifying papers and maintaining a minimum balance in an account) often prevent rural consumers and previously excluded groups from accessing relevant financial services.

4. Conclusion and future research scope

To conclude, digital financial inclusion refers to a situation where all societies could enjoy cost-saving financial services or products digitally. In a simpler term, digital financial inclusion allows the country's financial system to serve a community from all walks of life, particularly the poor or previously financially excluded people. Effective financial systems encourage new and existing businesses to grow. In addition, the accessibility rate of financial services may stimulate economic growth and development. Although the COVID-19 pandemic exacerbates the demand for and acceptance of digital financial inclusion, obstacles like poor digital financial literacy and weak ICT infrastructure, which is reciprocity to digital financial inclusion, continue to impede nations' adoption of digital financial services.

The more financially inclusive the country is, the more likely the vulnerable groups do not opt for informal financial services, which leads to bumpy economic growth. Hence, an integrated framework that needs cooperation from government, regulator, policymakers and financial institutions are required to provide greater clarity and connection to the ideas and multifaceted elements of digital financial inclusion. A country's financial system should provide localised financial services to fit into local settings. With this respect, digital financial inclusion can benefit the community, country and economy as a whole.

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Author contribution statement

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