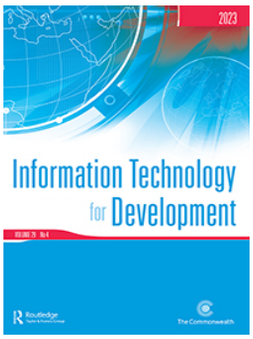

Information Technology for Development

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/titd20

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To cite this article: Himanshu Sharma & Antonio Díaz Andrade (2023) Digital financial services and human development: current landscape and research prospects, Information Technology for Development, 29:4, 582-606, DOI: 10.1080/02681102.2023.2199189

To link to this article: https://doi.org/10.1080/02681102.2023.2199189

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INFORMATION TECHNOLOGY FOR DEVELOPMENT
2023, VOL. 29, NO. 4, 582–606
https://doi.org/10.1080/02681102.2023.2199189

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Digital financial services and human development: current landscape and research prospects

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ABSTRACT

This study explores and analyses the implications of digital financial services (DFS) on human development from a global perspective. Informed by a systematic literature review of studies published in the past two decades, from 2000 to 2020, this research unveils six overarching themes: contextual conditions, technological skills and financial literacy, consistent trust, shaping financial behavior, energizing economic activities, and supporting financial inclusion. Further analysis categorizes these themes into what constitutes the two intertwined dimensions of DFS: foundational conditions and effectual repercussions. We discuss how these dimensions enhance our understanding of the role information and communication technologies play in contributing to human development. We also present practical implications for different stakeholders in the financial sector.

KEYWORDS

Digital financial services; ICT for development; human development; systematic literature review

Introduction

Finance is about managing money, and financial services can make a difference in people's lives. Financial services play a critical role in enhancing people's economic opportunities by connecting them to mainstream economic activities and safeguarding them from adverse life circumstances through access to financial products (Demirgüç-Kunt et al., 2018). In particular, in underserved communities, financial services provide the mechanisms that enhance poor people's resilience and could eventually contribute to increasing their income (Pazarbasioglu et al., 2020). The United Nations' 2016 Human Development report stresses the significance of financial services in people's lives: 'lack of access to finance has been identified as a major constraint to people's economic opportunities and to becoming a part of the inclusive growth process' (Jāhāna, 2016, p. 106). Still, more than 60% of the adult population in developing economies has no access to essential financial services, such as loans, savings, and insurance (Pazarbasioglu et al., 2020).

Digital financial services (DFS) give people access to essential financial services at affordable cost, higher speed and increased security and transparency (Pazarbasioglu et al., 2020). DFS represent a broad spectrum of financial services, including banking and non-banking facilities, delivered through various digital channels such as the Internet, mobile phone devices, automated teller machines (ATMs), point of sale (PoS) terminals, near-field communication devices, chip-enabled debit and credit cards, biometric devices, tablets, phablets and digitally enabled business correspondents.

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Manoj Thomas is the accepting Associate Editor for this paper.

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Previous research on DFS mainly focused on the adoption, use and impact of specific technologies: mobile phones (Duncombe & Boateng, 2009); Internet banking (Alzaidi & Qamar, 2018; Keskar & Pandey, 2018), mobile money (Kim et al., 2018), fintech (Milian et al., 2019). Our aim is different. We focus on the broad spectrum of DFS technologies and their role in human development, from a global perspective, by systematically reviewing the extant literature. Therefore, this study is guided by the overarching research question:

How can digital financial services contribute to human development?

To meet the aim of this study, we provide a comprehensive and contemporary review of the DFS literature and identify the research themes characterizing DFS's contribution to human development.

The remainder of this paper is organized as follows. The next section discusses the research background, the concept of human development and DFS and explains different DFS terminologies. The following section presents the systematic literature review methodology. Then, the next section describes our data analysis technique. The following section presents the findings by describing themes that emerged during the analysis phase. Then, we group the emergent themes into categories that constitute the DFS dimensions. The theoretical contribution and practical implications are presented in the discussion. Following the discussion, we outline the limitations of this review and suggest possible future research. Finally, we present the conclusion.

Research background

Access to financial services has been identified as a critical element for improving people's livelihoods (Jāhāna, 2016). The advantages of financial services go beyond purely monetary issues; access to financial services is crucial for development since it promotes economic participation (Alampay et al., 2017). Financial services enhance individual choices in life in that they help increase and ease the consumption of resources, accumulate savings, get access to credits, manage funds, build assets and protect themselves from future uncertainties.

The trajectory of digitalization in the financial services industry can be traced back to the launch of the first ATM by Barclays Bank in the United Kingdom in 1967 (Arner et al., 2016). Electronic payment systems, which constitute the basis of today's internet and mobile payments systems, known as the Bankers' Automated Clearing Services (BACS) in the United Kingdom and the Clearing House Interbank Payments System (CHIPS) in the United States, were launched in 1968 and 1970, respectively. In 1973, the Society of Worldwide Interbank Financial Telecommunications (SWIFT) was formed in response to the need to integrate domestic payment systems across borders (Arner et al., 2016). In the same year, Seattle's First National Bank started, through its subsidiary Telephone Computing Service, a touch-tone telephone for 'home banking' and offered various financial services, including electronic bill payment, money management and tax calculation services to its customers (Edmunds et al., 1977). Citibank, Chase Manhattan and Manufacturers Hanover introduced early versions of e-banking in the United States in 1980; the Nottingham Building Society in the United Kingdom launched its version in 1983 (Arner et al., 2016; Cronin, 1998). The Security First National Bank launched the world's first 'Internet bank' in the United States in 1995 (Chou & Chou, 2000).

In the mid-1990s, the financial services sector became the largest purchaser of information technology and still maintains its leading position as an information technology buyer. By the late 1990s, financial services had mainly become digital. Technological development and change in financial services have accelerated faster in the twenty-first century than at any other time in history. Online banking was accessible to at least one million customers in the United States by 2001. ING Direct and HSBC Direct, the first direct banks, that is, banks that offer services only via the Internet, email or other electronic means without physical branches, began to appear in the United Kingdom in 2005 (Arner et al., 2016).

The embracing of information technology by the financial sector accompanied the advancement in radio and networking technology, which flared the adoption of mobile phones worldwide at the

dawn of the twenty-first century. In 2002, 1.16 billion cellular customers surpassed 1.09 billion landline phone subscribers. In three years, mobile phone subscribers became almost twice the number of landline customers, with Asia leaving Europe and the Americas behind in mobile phone penetration (Comer & Wikle, 2008). The increasing availability and affordability of digital technology combined with the contextual, usually challenging circumstances in large parts of the world created the perfect conditions for 'tropicalized' financial solutions enabled by digital technology.

The rapid adoption of mobile phones and geographic and demographic challenges of the Philippines contributed to the development of Smart Money, the world's first mobile money service in 2001 by Smart Communications and Banco de Oro, followed by GCash (an SMS-based financial services) in 2004 by Globe Telecom (GSMA, 2012; Hasnain et al., 2016). Almost simultaneously, mobile financial services, a strand of DFS, started paving their way into the African continent. Safaricom launched the mobile money platform M-Pesa (i.e. M for mobile and Pesa for money in Swahili) in Kenya in 2007; M-Pesa became the leading example of mobile money development. Following a successful deployment in Kenya, Tanzania and Uganda also adopted M-Pesa. Currently, while M-Pesa has almost 32 million users across ten countries, mobile money adoption in South Asia has grown 52% in five years (from 2014 to 2018) – the fastest growth rate across all regions (Espinosa-Vega et al., 2020). In 2016, the National Payment Corporation of India introduced the Unified Payment Interface (UPI), a low-cost, around-the-clock mobile-based payment system that enables real-time payments (Gochhwal, 2017). With UPI, payments can be made through aliases, QR codes, and digital payment apps (e.g. Google Pay, PhonePe) using a smartphone or even via feature phones (i.e. without Internet connectivity) 24×7 between accounts (Pazarbasioglu et al., 2020).

Mobile financial services, in the form of mobile money or mobile payment, are now available in almost every part of the world, especially where access to brick-and-mortar financial services is low (GSM Association, 2021). Registered mobile money accounts experienced an increase of 12.7% globally in 2020, accounting for 1.2 billion accounts worldwide. By the end of 2020, there were around 310 mobile financial services in 96 countries (GSM Association, 2021).

The rapid advancement in the digitalization of financial services over the past few decades that has made financial services accessible to people worldwide (Azevedo et al., 2016; World Bank, 2018) warrants an examination of the role DFS play in the context of human development.

Before we proceed further, it is imperative to discuss the interplay between human development and information and communication technology (ICT) and provide a conceptual understanding of DFS.

Human development and ICT

Development is about the betterment of societies and communities. However, development models are not universal (Escobar, 2012); development initiatives must respect local culture and traditions (Díaz Andrade & Urquhart, 2012). Traditionally, the focus of development was on material growth. In 1990, the United Nations Development Programme revisited the meaning of development. While keeping some of the traditional – and somewhat narrow – materialistic view of development, a fresh conception of human development emphasized the idea of creating an enabling environment for people to enjoy long, healthy and creative lives (Sen, 1999). Human development was explicitly recognized as 'a multidimensional and multidisciplinary process of expanding people's choices' (Hamel, 2010, p. 1). Choices, conceived as *freedoms*, presuppose having access to resources necessary for maintaining a good standard of living and include political, economic and social liberties that an individual may value to live a respectful life (Sen, 1999).

Previous research has demonstrated that access to and use of ICT can positively impact human development when examined in terms of its core dimensions: health access, education opportunities, civic participation, political liberties and economic facilities (Hamel, 2010; Heeks, 2010). For example, healthcare capabilities of people can be expanded by creating digital records for disease diagnosis and treatment (Clerici et al., 2022) and by enabling remote consultation where

medical facilities are difficult to reach (Goodridge & Marciniuk, 2016). Similarly, ICT has expanded education opportunities by reaching populations with slim prospects of furthering their learning (Van Brakel & Chisenga, 2003). ICT has also provided solutions to governments of developing nations to enable residents to register for public services and receive social benefits. One significant example of such ICT-enabled development is the implementation of Aadhaar, which provides Indian citizens with a unique identity and contributes to reducing rampant corruption in the social benefit system (Sathe, 2011). Moreover, embracing mobile phone-based technologies has enhanced farm entrepreneurship by allowing farmers to connect with modern agricultural knowledge and improve their farming outputs (Uduji et al., 2019). For financial services, mobile money adoption not only helps households recover from life's shocks, such as illness, crop failure and job loss (Jack & Suri, 2014) but also stimulates savings, enabling people to pay for their education and healthcare (Karlan et al., 2014).

These examples suggest that ICT is an essential tool that drives human development by enabling individuals, communities, societies and governments to address human development challenges, including poverty, inequality, hunger and corruption across the world (Heeks, 2017; Walsham, 2017). Against this backdrop, we believe that DFS constitute critical tools that enable people access to necessary financial products such as savings, investments, credits and insurance that further allow them to access education, healthcare services, income, markets and other resources to live a decent and respectful life.

Towards a conceptual understanding of DFS

Financial services, in general, have a pivotal role in the functioning of individuals in society, support business development and contribute to the economic growth of regional or national economies. Recent ICT developments, especially advances in the Internet and mobile-based communications, have supported the expansion of the financial sector and the availability of financial services worldwide. Developments in financial technology have facilitated consumers to familiarize themselves with new financial products and services to meet their demands (Jayawardhena & Foley, 2000).

DFS are ICT-based services that 'rely on digital technologies for their delivery and use by consumers' (Pazarbasioglu et al., 2020, p. 1). People can avail of DFS through various channels to complete their transactions electronically – e.g. remitting money, paying utility bills, receiving wages or social securities, investing and savings. At this juncture, it is worth distinguishing between FinTech and DFS. FinTech, a portmanteau of finance and technology, is about using digital technology to develop 'innovative business models in the provision of financial services' (Alliance for Financial Inclusion, 2016, p. 3). This definition clearly positions FinTech on the supply side of financial services – i.e. well-established and emerging financial institutions that use digital technology creatively to offer new services (Feyen et al., 2021). On the other hand, DFS focus on the demand side – i.e. the end-user of financial services. While our attention is on how end-users interact with DFS, we also pay attention to trends in FinTech since it constitutes the source of services available to end-users.

DFS, an umbrella term, encompass services that rely on digital technologies, which demand further clarification. DFS typically involve services such as business correspondent, electronic banking, electronic money, electronic funds transfer, electronic payment, mobile banking, mobile financial services, mobile money, mobile payment and mobile wallet. Although not mutually exclusive, each service has unique characteristics that deserve an explanation. Table 1 presents a definition of these services.

The information presented in Table 1 reveals that mobile phones, including basic feature phones and smartphones (the latter possess computing capabilities and are typically internet-enabled), constitute a crucial tool for delivering DFS. In recent years, there has been a high penetration of mobile phone ownership across the globe. Statistics show that there are 5.2 billion unique mobile users and 4 billion mobile Internet users, representing 67% and 51% of the global population, respectively

Table 1. Definitions of digital financial services.

Business Correspondent (BC)
The BC (also known as the mobile money agent) is an agent who provides financial services (e.g. cash withdrawal, deposit, transfer, bill payments, insurance, loans and bank account opening) outside traditional bank branches using biometric card readers or point of sale terminals. BCs generate income through fees charged to the customer and commissions for each transaction by banking institutions (Unnikrishnan et al., 2019).
Electronic Banking (E-Banking)
E-Banking refers to the delivery of a range of financial services by banking institutions using electronic and telecommunication networks. E-banking services include opening a bank account, transferring money, checking account balance and applying for debit/credit cards (Alliance for Financial Inclusion, 2016).
Electronic Money (E-Money)
E-Money is a monetary value stored or transmitted electronically. It is issued upon receiving a value of no less than the issued E-Money. It can be stored on a digital device such as a mobile phone or chip-enabled payment card. E-money can also be converted into cash (Alliance for Financial Inclusion, 2016).
Electronic Funds Transfer
Electronic Funds Transfer is the transfer of monetary value from one bank account (or E-Money account) to another electronically using a computer system, mobile phone or chip-enabled payment card (Alliance for Financial Inclusion, 2016).
Electronic Payment (E-Payment)
E-Payment is the transfer of funds via electronic means to pay for a product or a service (Alliance for Financial Inclusion, 2016).
Internet Banking
Internet banking uses an application on a digital device (e.g. mobile phone, laptop or tablet) to access and execute various financial services, such as balance inquiries, bill payments and money transfers (Espinosa-Vega et al., 2020).
Mobile Financial Services
Mobile Financial Services involve using a mobile device (e.g. feature mobile phones or smartphones) to access both transactional and non-transactional financial services (Alliance for Financial Inclusion, 2016).
Mobile Banking (M-Banking)
M-Banking refers to the process of performing transactional (e.g. transferring funds) and non-transactional (e.g. viewing financial information) financial services using mobile devices such as feature mobile phones or smartphones (Alliance for Financial Inclusion, 2016).
Mobile Money (M-Money)[3]
M-Money is a form of electronic money that can be stored in a digital wallet application installed on a digital device (e.g. feature phone or smartphone) and used to perform online financial transactions. Users do not need a bank account to use mobile money; the only prerequisite is a basic mobile phone (Espinosa-Vega et al., 2020).
Mobile Payment (M-Payment)
M-Payment is an electronic payment completed through mobile digital devices such as smartphones, tablets, or laptops (Alliance for Financial Inclusion, 2016).
Mobile Wallet
Mobile Wallets are mainly apps installed on mobile devices, such as smartphones. Customers can use them to make in-store purchases, online payments and peer-to-peer transfers, among others, by storing credit or debit card information, coupons or bank account information (Espinosa-Vega et al., 2020).

(GSM Association, 2021). This high penetration of mobile phones makes them particularly important for delivering DFS to unbanked and underserved individuals (Pazarbasioglu et al., 2020).

Recent data on mobile money accounts show greater adoption of DFS, particularly in low-income countries. Between 2019 and 2021, mobile money accounts per 1,000 adults increased by about 30%, and agents per 100,000 adults almost doubled (from 450 to 880), primarily driven by growth in Africa and Asia (Beyene et al., 2022). Data also show that sending or receiving digital remittances, paying online bills or making online purchases has expanded in lower-middle-income countries globally (Khera et al., 2021). At the same time, Europe experienced the largest decline in ATM availability, likely due to the rapid adoption of online banking (Beyene et al., 2022).

In line with this observation, a recent study shows that economic value, measured as savings in cost and time to complete transactions, is a significant predictor of the intention to use digital banking (Windasari et al., 2022). Furthermore, an International Monetary Fund (IMF) survey indicates that mobile and internet banking usage is higher in high-income countries and rapidly increasing in low- and middle-income countries (Espinosa-Vega et al., 2020). Also, the BC model has helped banking institutions reach the unbanked and underbanked populations in different parts of the world. There are approximately 2.9 million active BC agents in 90 countries (Khera et al., 2021). The survey data show that BC outlets have also made significant inroads in the East Asia Pacific, Latin America and South Asia (Espinosa-Vega et al., 2020). For instance, according to Brazil's

central bank, there has been a dramatic increase in financial access through a vast network of about 400,000 BC agents (Unnikrishnan et al., 2019). Similarly, the Indian banking sector has witnessed a 40% compound annual increase in BCs from 2012 to 2016 (Unnikrishnan et al., 2019).

Recent data from IMF, spanning the 2004–2021 period, about financial access in 189 economies suggest that some low-middle-income economies lack a consistent growth pattern in mobile money services (i.e. the number of money agent outlets and active mobile money accounts) and mobile and internet banking services (i.e. the number of mobile and internet banking transactions) (IMF, 2022). The IMF data indicate fluctuating DFS usage trends in mobile money services and mobile and internet banking services usage for 18 low-middle-income countries. These economies include Burkina Faso, Ecuador, Fiji, Jordan, Lebanon, Mali, Madagascar, Mauritius, Namibia, Niger, Pakistan, Philippines, Rwanda, Samoa, Solomon Islands, South Africa, Tonga and Zimbabwe. As we observed, unfortunately, the IMF survey does not have any records about mobile money services and mobile and internet banking services usage for 33 emerging and 16 developed economies – refer to Appendix 1.

Understanding these services' functions and geographical presence gives a common base for developing the arguments we present in this paper.

Methodology: systematic literature review

We conducted a systematic literature review to reveal the research themes characterizing DFS and identify potential research directions. Guidelines by Okoli (2015) inspired our systematic literature review.

Once both authors had defined the purpose of the systematic review on DFS and formulated the research question, we developed and agreed on the review protocol (see Appendix 2) we would follow. We defined a road map that included the identification of search databases, record keeping method, reference management, information search flow, information extraction strategies and data analysis techniques. These agreed procedures proved crucial for maintaining consistency in conducting the review. We defined inclusion and exclusion parameters for the search and screening criteria. We included academic works published in English in peer-reviewed, indexed journals and presented in recognized conferences accessible electronically through institutional subscriptions to databases available on the web.

Determining a search timeline is critical for the practical and feasible screening of the relevant papers across the vast pool of published research (Okoli, 2015). We acknowledge that the technological transformation of the financial sector went a few decades back; the first ATM in 1967 (Arner et al., 2016), the first use of touch-tone telephones for 'home banking' in the 1970s (Chou & Chou, 2000) and early versions of e-banking at the beginning of 1980s (Cronin, 1998). However, it was not until the first decade of this century that technological developments made the emergence of innovative financial services possible (Claessens et al., 2002). This observation led us to restrict our search to a period that could give us meaningful material that could be analysed in depth (Okoli, 2015; Petticrew & Roberts, 2008). Therefore, we decided on our search timeline from 2000, the beginning of the twenty-first century characterized by the dot-com euphoria, to 2020, when we commenced this study. This period ensured a comprehensive search of contemporary data that allowed us to conduct rigorous qualitative analysis.

In our search, we did not impose restrictions on methodological approaches, as studies in different subject areas may follow different research designs or methodologies. We included academic articles and conference proceedings in our search. However, we excluded book chapters and dissertations for master's and doctoral degrees. This exclusion was not because we doubted the quality of information this material could provide but founded on practical grounds; we could not guarantee a comprehensive search of book chapters, dissertations and theses. Naturally, we excluded material published in predatory journals (typically, those appearing in Beall's list of predatory journals[1]). We also excluded grey literature (e.g. opinion/commentary pieces, commercial

reports, working papers, government documents, white papers, newsletters and bulletins) to avoid chances of publication biases (Templier & Paré, 2015). This broad yet selective search guarantees the quality of the reviewed literature (Levy & Ellis, 2006; Webster & Watson, 2002).

The actual search involved four levels, from a high-level Boolean search (level 0) to a refined search of the content of the selected papers (Paré, 2018). We searched six databases: *EBSCOhost, Web of Science, Scopus, ACM Digital Library, IEEE Xplore* and *Sage*. The combined use of these databases offers the advantages of good coverage, recall and precision (Gusenbauer & Haddaway, 2020). To produce a comprehensive base for our analysis, we followed a backwards-and-forwards search technique using keywords related to DFS as we progressed in our literature review (Levy & Ellis, 2006; Okoli, 2015; Webster & Watson, 2002). Our initial search started with the following keywords: 'digital financial service', 'internet banking', 'online banking', 'branchless banking', 'e-banking', 'm-banking', 'mobile financial services', 'm-money', 'mobile payment', 'mobile credit', 'mobile insurance' and 'fintech'. As we were gathering material, we observed that the issue of financial inclusion appeared repetitively. Thus, we expanded our search and included the following keywords: 'financial inclusion', 'economic empowerment', 'economic development', 'economic growth', 'economic stability', 'poverty reduction', 'social inclusion' and 'financial growth'. In the course of our search, we used the 'AND' and 'OR' Boolean operators, along with filters, according to the pre-defined exclusion and inclusion criteria, to retrieve relevant results while truncating non-relevant records.

We used an MS Excel spreadsheet to manage the vast information we collected. Our repository was organized into four levels, as shown in Figure 1.

- Level 0. Our initial search yielded 1470 records. These records were screened by scanning each study title and keywords to check their relevance to DFS use for human development; irrelevant records were dropped. We were left with 380 publications after this filtering. Then, we created a spreadsheet consisting of different fields: 'study title', 'publication year', 'author', 'abstract', 'journal/conference', 'publisher', and 'database index'. In transferring the 380 filtered records to the spreadsheet, we identified and removed 58 duplicate records, leaving us with a sample of 322 documents.
- Level 1. We added two new fields to the spreadsheet: 'abstract screening' and 'publication standard'. We screened our sample further by carefully reading each abstract to decide their relevance to our research goal. While reading abstracts, we also paid attention to the study's

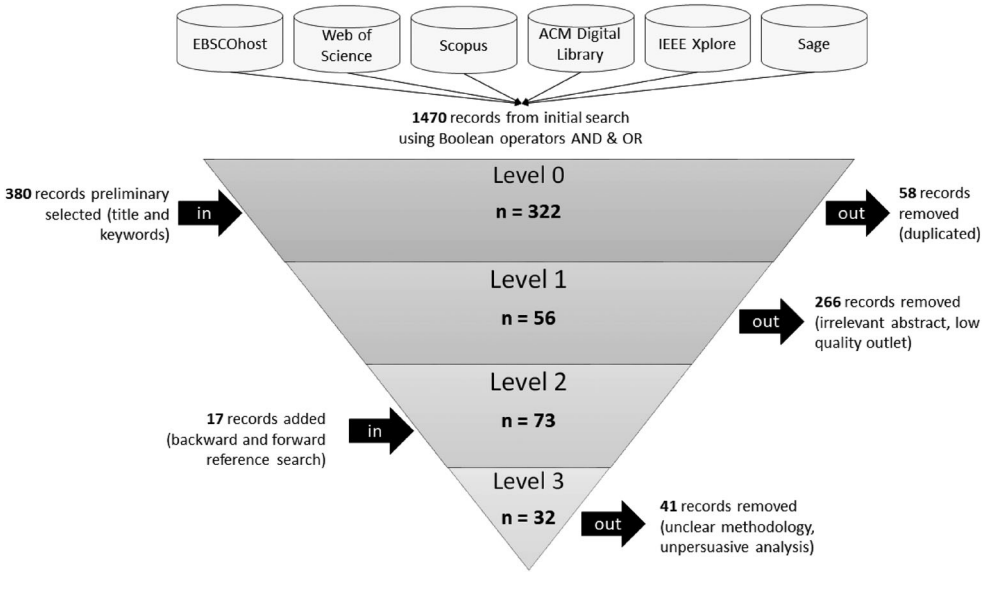

Figure 1. Literature review search process.

nature and removed non-empirical studies (e.g. conceptual research or comprehensive review). We also checked the journal's quality standards; that is reputable outlets as recognized by the Australian Business Deans Council (ADBC) and Academic Journal Guide (AJG). We excluded material published in predatory journals – i.e. journals in Beall's list. After this screening process, we dropped 266 records and were left with a sample of 56 studies.

- Level 2. We expanded our spreadsheet by adding more fields: 'analytical approach' (i.e. qualitative, quantitative and mixed), 'data source' (i.e. primary, secondary or both), 'research location', 'participant type' (e.g. rural, urban, agents, SMEs, etc.), 'theoretical lens/model', 'research problem' and 'comments'. We scanned the 56 articles to fill in these newly added fields. At this level, we also performed backwards-and-forward searches. While scanning the 56 articles, we identified some interesting references in the sampled articles. We used Google Scholar to locate these references (i.e. study abstract) for further consideration in our review. We also performed the forward search of references using the 'cited by' option of Google Scholar to review other relevant and recent research. The pre-defined screening criteria were used to add them to the final sample. This process yielded 17 relevant articles. We then added these new articles to the 56 records from Level 2, resulting in a sample of 73 records.
- Level 3: We scrutinized the sample of 73 records to appraise their quality and relevance. We paid particular attention to each record's research methodology, data collection and analysis techniques, and findings sections. Studies with unclear research methodology and irrelevant findings to literature review goals were deemed unfit for further analysis. We found that 41 were unfit for our research, leaving us with 32 records for analysis – see Appendix 3. Our sample includes 18 quantitative, 11 qualitative and three mixed-method studies. Twenty-eight studies were published in journal articles and four were in conference proceedings. Regarding geographical location, 46% of studies were conducted in African countries, approximately 31% in Asian countries, nearly 15% in European countries and about 8% in South America. A few studies focused on multiple countries across different continents.

It is important to mention that the reviewing process (i.e. screening the quality of articles and conference papers at different levels) was conducted jointly by both authors, followed by discussions to verify each other's ratings and judgements to maintain consistency based on the standards set in the review protocol (Okoli, 2015). The following section presents the analysis of the 32 records included in our review.

Data analysis

The 32 selected records were thematically analysed (Braun & Clarke, 2006). Our thematic analysis process consisted of five stages. In the first stage, we split the list of records into two; each researcher was allocated a set of 16 studies. We individually reviewed the assigned records and produced a summary of the findings. Then, we convened to discuss the individual assessments and agree on the outcomes of the first stage. In the second stage, we individually produced initial codes as preliminary conceptual descriptions of the records analysed. The third stage involved the joint scrutiny of the initial codes we had created individually. Some codes remained as they were; others were merged and split as we moved to a higher level of abstraction that captured the essence of the analysed records. In the fourth stage, we jointly looked over patterns emerging from the codes and produced initial themes, which involved further refinement of the already identified codes. In the fifth and last stage of our thematic analysis, we revisited the initial themes to ensure a truthful conceptual representation of the analysed records; some themes had to be renamed. Appendix 4 depicts the construction of the themes from the codes.

The thematic analysis resulted in six themes. These themes were: contextual conditions, technological skills and financial literacy, consistent trust, shaping financial behavior, energizing economic activities and supporting financial inclusion.

Findings

In this section, we conceptually elaborate on each of the identified themes.

Contextual conditions

Although digital financial services play an essential role in expanding the financial reach worldwide, contextual situations affect how individuals embrace and derive value from DFS. With more or less emphasis, the reviewed literature inevitably acknowledges that local factors influence the nature and extent of DFS use. In contexts where the informal economy is prevalent, individuals are less inclined to use DFS; cash transactions are preferred (De Koker & Jentzsch, 2013). Unlike the traceability of digital transactions, cash transactions are not subject to the scrutiny of tax collection agencies. We are not passing judgement on the morality of this type of practice. However, we take note of De Koker and Jentzsch's (2013) advice that implementing DFS in specific environments[2], where a large portion of the population uses formal and informal financial services in parallel, is engaged in informal employment and prefers cash payments instead of mobile payments to gain cost-benefits, is not necessarily conducive to financial inclusion.

Interestingly, Wang's (2020) study in China goes in a different direction. The findings suggest that the use of mobile payment facilities is associated with the transition from agricultural labor paid in cash to the establishment of registered self-employed businesses and even the development of some informal businesses (e.g. market stall vendors, street musicians), which may be considered the first step in the financial inclusion process. In addition, socio-cultural aspects are critical in shaping DFS access and use. For instance, in predominantly patriarchal societies, rigid cultural norms impose significant constraints on women's financial decision-making, including access to and use of DFS (Ibtasam et al., 2018). Regardless of the apparent differences in these studies, there is a typical pattern: context matters.

Our literature review also reveals the crucial role of BCs in providing DFS to underserved communities. Ghosh (2013) provides a vivid illustration of how some BCs in a context characterized by financial constraints in India go above and beyond their prescribed duties (e.g. using their mobile phone numbers instead of customers' to complete transactions, keeping customers' money during network downtime). These actions make the BCs more than a mere transaction point; BCs become central actors in the community network. The Indian example corroborates the necessity for the BC model to be enmeshed in the complex social and cultural environment they operate in to fulfil their potential customers' particular needs. That is why BC model designers and implementers must consider flexibility as an essential feature so that multiple actors can benefit from the BC system as per their idiosyncratic needs (Leonardi et al., 2016).

Furthermore, a recent study shows the positive effect of the contextual differences between those who develop DFS solutions and those who use them. These differences foster scalable and dynamic trajectories of innovation that are constantly shaping and simultaneously responding to local needs (Oborn et al., 2019). For instance, the migration phenomenon from the countryside to the city and the solid communal links have facilitated the transfer of money from users in urban areas to their relatives, who decided to stay in their rural settlements. Also, the existence of DFS have opened the opportunity for local people to access micro-credits to support their personal commitments and entrepreneurial activities and businesses.

Technological skills and financial literacy

This theme has emerged from studies that identify technological skills and financial literacy as significant drivers of financial inclusion. Technological skills and financial literacy go hand-in-hand; they operate as a dyad in DFS that plays an essential role in people's lives. Technological skills help people

access financial services digitally anytime, anywhere. Financial literacy enables people to understand, avail and control the financial products and services that meet their financial goals.

People's inability to understand and operate DFS is naturally a significant barrier to financial inclusion (Ibtasam et al., 2017). Similarly, a lack of financial education constrains individuals from understanding basic financial procedures, policies and publicly provided financial information. This knowledge deficit appears as an obstacle to people's participation in economic activities and financial inclusion (Diniz et al., 2012). The consequences of this obstacle can be serious; research demonstrates that detachment from the formal financial sector affects adaptation to changes in the financial system. For instance, a lack of understanding about changes in currency denomination affects people's competencies to use new currency (e.g. conducting businesses or sales and purchases in new money) and their confidence in conversions between old and new currency denominations (Dzokoto et al., 2018).

Limited digital skills or financial knowledge (or the lack thereof) could negatively influence an individual's belief system. Agwu (2021) describes it as 'word-of-mouth syndrome', by which individuals accept as valid negative stories about DFS, resulting in reduced DFS use, if not rejecting them entirely. On the contrary, familiarity with financial products and services and an understanding of the functioning of digital financial applications promote DFS use, which ultimately has the potential to create economic opportunities for the individual (Rastogi & Ragabiruntha, 2018).

Consistent trust

Since digital financial transactions are largely cashless transactions performed virtually through mobile banking or internet banking technologies, trust between consumers and service providers is perceived as the critical dimension of digital financial services. Ethics, accuracy, convenience, security and privacy influence consumers' trust in DFS. This trust in DFS further affects users' satisfaction (Joseph et al., 2005) and commitment (i.e. degree and length of the relationship and sense of belonging) towards their DFS use (Mukherjee & Nath, 2003). Additionally, past research shows that anywhere-anytime access, safety and efficiency features add more value to cashless money transfers (Laukkanen, 2005).

Extant research on the relationship between DFS and trust in business activities indicates some contradictory conclusions. On the one hand, some results suggest that businesses with simple requirements for straightforward operations rely on cash transactions rather than digital transactions. Mutual trust based on personal relationships between business owners and their customers explains this preference for cash transactions (Donner & Tellez, 2008). On the other hand, some findings suggest that small-scale entrepreneurs trust and rely on digital transactions because DFS enable them to increase their sales and profit (Amegbe et al., 2017; Dziwornu et al., 2018). In any case, for the individual user, trust is perceived as a significant factor influencing their use of mobile payment applications. For instance, the Government of India's promotion of a mobile wallet, Bharat Interface for Money (BHIM), leads to increased trust in digital payment apps and their use for cashless transactions among individuals (Pal et al., 2020).

Shaping financial behavior

A thought-provoking theme emerges from the reviewed literature on DFS. It is about the relationship between DFS access and use, and financial behavior. Studies show how DFS shape spending and saving behaviors. An experimental investigation by Aker et al. (2016) in Niger, a country that consistently occupies the lowest position regarding human development indicators (UNDP, 2011), is particularly illustrative. They observe that mobile money cash transfer (as opposed to manual cash transfer) to women in impoverished Nigerien villages resulted in household consumption of higher protein and energy food compared to those villages that continued with manual cash transfer. It seems that the 'limited visibility' of mobile money affects intra-household decision-making,

giving the female recipients more control over expenditure decisions. Also, this purchasing behavior can be explained by the more straightforward, safer and more convenient transfer of mobile money; recipients of mobile transfers do not need to travel – often long distances – to collect cash (Munyegera & Matsumoto, 2018; Ouma et al., 2017).

Like the case of women in Niger, Morawczynski (2009) shows how female users in Kenya take advantage of M-Pesa to hide their savings from their oppressive partners. Beyond empowering female users, M-Pesa helps local people develop their livelihood strategies (e.g. savings to reduce financial vulnerability) and recover from life shocks (e.g. illness). Mobile money savings, in some cases, are used to cover the cost of unexpected life situations, such as health treatments and funerals, among others or planned events, such as weddings and new babies, among others (Van Hove & Dubus, 2019).

Energizing economic activities

The reviewed literature documents how DFS have facilitated the activation and promotion of economic activities, especially among mobile money agents and small-scale business owners. A study by Peša (2018) suggests that frugal innovations like mobile money can stimulate entrepreneurship and economic growth among Zambian mobile money agents. In the case of small Ghanaian entrepreneurs, typically operating in the informal economy, using mobile money to complete e-commerce transactions has improved their customer base, sales and profits (Amegbe et al., 2017). Furthermore, the use of DFS supports the transition to and consolidation of formal business activities. Islam et al.'s (2018) study of small and medium enterprises in Kenya, Uganda and Tanzania shows that business owners extensively use mobile money to purchase fixed assets, buy raw materials, pay labor wages and utility bills, make payments to suppliers and receive payments from their customers.

There seems to be a correlation between digitalization (e.g. internet penetration, mobile penetration) and the financial sector development at the country level. Moreover, financial sector development and ICT mutually contribute to economic growth, as Jayaraman and Makun (2019) demonstrate in their analysis of quarterly observations for India's 2003–2015 period. Along this research vein, Asongu and Nwachukwu (2019) examined ICT, financial sector development and economic activity using data from 53 African countries for the 2004–2011 period. Their research indicates that users' mobile money can be utilized in the formal banking sector to stimulate financial activity by generating interest in users' money and also using that money to provide credits to other users. Moreover, the mobile subscriber identity module (SIM) card can be used as a virtual bank card to make instant payments digitally. Also, the internet-enabled mobile phone can be used as a PoS system because it can establish communication with financial institutions (e.g. to request transaction authorization). Increased digital financial activities are further correlated with the country's economic prosperity.

Supporting financial inclusion

DFS play a significant role in reaching the unbanked and swathes of society historically excluded from mainstream economic activities (Pazarbasioglu et al., 2020). While lack of access to financial services constrains people's socio-economic development (Jāhāna, 2016), DFS provide people with a smooth environment to manage their personal finances and obtain credit for their business endeavors (Chatterjee, 2020). For instance, even though farmers are important actors in the food supply chain, they often belong to the most economically challenged communities, especially in the developing world. Access to financial services is crucial for their sustainable development since it would allow them to manage their income and control their consumption proactively (Wang & He, 2020). The extant research reveals that farmers' extensive use of DFS reduces their

vulnerability to poverty and protects them from unpredictable events such as floods or drought (Wang & He, 2020).

Rapid developments in digital technology have increased the availability of mobile and internet financial services worldwide. Expanding these services creates opportunities for traditionally marginalized segments of society – and affluent segments, too – to participate in the broader economic system through DFS. The almost universal ownership of mobile phones and the 24/7 availability of mobile-based financial services play an essential role in the financial inclusion of people in the developing world (Lenka & Barik, 2018). Moreover, in communities living in regions where delivery of financial services through traditional channels such as brick-and-mortar bank branches or ATMs is impracticable (due to remoteness, for example), digital financial services connect people with mainstream finance. For instance, the riverine population of Marajó Island in the Brazilian Amazon region, notorious for exhibiting one of the world's lowest human development indexes, has been slowly coming out of the financial exclusion vacuum thanks to a mobile riverboat bank that brings essential financial services (Joia & dos Santos, 2019). Creative solutions, like providing financial services over a floating platform connected to the Internet, contribute to improving financial inclusion (Akhter & Khalily, 2020).

DFS dimensions and human development

The six themes that resulted from our analysis comprise the underlying dimensions of DFS identified in the relevant academic literature for the last two decades. We categorize these themes into two groups: foundational conditions and effectual repercussions, as shown in Figure 2. We distinguish these two categories for analytical purposes; in reality, they are empirically inextricably intertwined. We elaborate on these categories and their themes.

Foundational conditions

The foundational conditions describe the arrangements in place that set the basis for the operation of DFS: contextual conditions, technological skills and financial literacy, and consistent trust.

The reviewed literature converges in showing the influence of contextual conditions on DFS use and their consequences. Culture is a significant aspect that shapes the extent and ways of DFS use. However, as the reviewed literature shows, similar cultural situations do not inevitably lead to the same result. On the one hand, rigid cultural norms in patriarchal societies may constrain women's access to DFS and somewhat limit their financial choices (Ibtasam et al., 2018). On the other hand, DFS can be seen as an escape valve for women in such societies, allowing them to acquire some degree of financial freedom (Aker et al., 2016; Morawczynski, 2009).

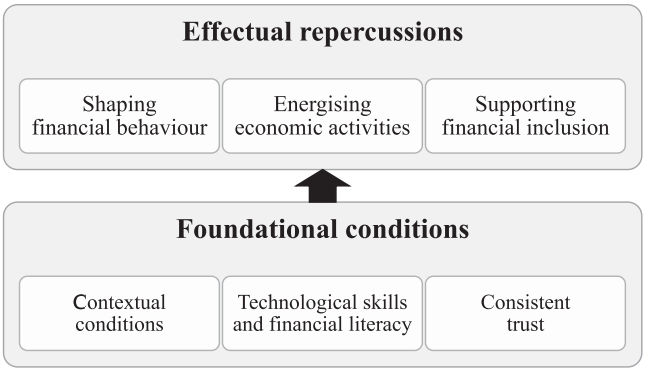

Figure 2. The interrelationship between foundational and effectual themes.

The reviewed literature also discusses the role of the informal economy in shaping DFS use. The preponderance of an informal economy in certain contexts can be a barrier to DFS adoption. In contexts characterized by an informal work environment where cash is preferred over digital money, there will be little inclination to use DFS, even if they are widely available (De Koker & Jentzsch, 2013). In particular, tax regulations in place might act as a deterrent to engaging in digital transactions for casual laborers and daily wagers; they might want to protect every cent of their already meagre income. Still, recent research suggests that DFS can effectively contribute to formalizing economic activities, as in the case of market stall vendors in China who registered their businesses to enjoy the benefits of DFS (Wang, 2020).

Furthermore, access to DFS through BCs stimulates local economic activities in rural settings (Ghosh, 2013). Indeed, BCs equipped with digital banking devices offer villagers financial services at their doorsteps, sparing them the need for long journeys while leaving their farms unattended. In recognition of the uniqueness of local contextual conditions, Leonardi et al. (2016) advocate for flexible banking systems design instead of centrally devised rules and policies, which are not always aligned with local realities and needs, to boost economic activities in their area of influence. In addition to the BCs, digital money transfers – either in the form of remittances or informal loans – from family members who migrated to the city can trigger local economic activities (Oborn et al., 2019).

Both technological skills and financial literacy are essential for the deployment and use of DFS. If any of them is missing, the benefits of DFS cannot be realized. As expected, the reviewed literature corroborates that inadequate technological skills or lack of financial awareness decisively affect people's beliefs about DFS and, consequently, hampers their use (Agwu, 2021; Rastogi & Ragabiruntha, 2018). Engaging in DFS use might be perceived as daunting if the individual lacks any of these two dimensions. Technological skills alone are not enough if the individual cannot anticipate the value derived from financial products or services (Diniz et al., 2012). Moreover, limited financial knowledge may lead to unfavorable financial decisions (Rastogi & Ragabiruntha, 2018). Our analysis shows that the lack of technological skills or limited financial literacy invariably results in the financial exclusion of particular groups (Ibtasam et al., 2017). The consequences can be particularly damaging for underserved communities. Even more, these limitations can affect the development of the financial sector of a nation (Dzokoto et al., 2018). On the contrary, combining digital skills and financial literacy can amplify individuals' benefits by allowing convenient access and informed decision-making.

According to the reviewed literature, trust is essential for business transactions regardless of the medium of exchange, whether in traditional cash or more contemporary digital money. Traditionally, cash transactions fulfilled business payment requirements. Trust between the seller and the buyer is at the heart of any commercial exchange of a product or service for cash (Donner & Tellez, 2008). With the rapid development that the financial sector has experienced in recent years, the medium of exchange is now digital money. Consequently, trust is no longer just between the concerned parties; trust now involves the medium. Research conducted in the context of developmental studies suggests businesses and consumers perceive digital transactions as safer and more reliable than cash-based transactions (Munyegera & Matsumoto, 2018; Ouma et al., 2017). The increasing volume of digital transactions that trust in cashless payments supports has brought other benefits. Research shows that DFS provide businesses, mainly small and medium entrepreneurs, with a robust and reliable digital environment to streamline their operational activities, enhancing sales and profits (Amegbe et al., 2017; Dziwornu et al., 2018). DFS facilitate electronic transactions with different stakeholders (e.g. online wages to employees) throughout the supply chain (e.g. online purchases of raw material from suppliers, online payments from customers) while keeping records of these transactions (Islam et al., 2018). Furthermore, research suggests that trust in government-promoted DFS increases people's inclination to use DFS, as is the case in India, whose government's ultimate goal is to promote financial inclusion through DFS (Pal et al., 2020).

Effectual repercussions

The effectual repercussions represent the materialization and consequences of DFS on different facets of economic life: shaping financial behavior, energizing economic activities, and influencing financial inclusion. These themes flow from the foundational conditions; whereas the latter delineates the background in which DFS operate, the former constitutes manifestations of DFS in practice.

The analysis conducted on the reviewed literature unambiguously points in one direction: DFS shape the financial behavior of their users. These behaviors are as diverse as the users' needs. In some cases, DFS are used to obtain credit (Chatterjee, 2020); in others, they show an inclination for savings (Morawczynski, 2009; Van Hove & Dubus, 2019). In other instances, DFS users adjust their consumption behavior according to their unique circumstances (Aker et al., 2016). In all cases, these studies indicate the potential of DFS for enhancing people's opportunities for making decisions about the financial aspects of their lives.

The apparent association between DFS use and the activation of economic activities found in the reviewed literature is equally encouraging. This energizing effect can be observed at different levels. At the micro-level, the evidence shows how small and medium entrepreneurs that rely on DFS to conduct their business activities have experienced growth (Islam et al., 2018). At the macro level, the reviewed literature reveals how an increase in the penetration of DFS seems to have a positive effect on the country's economy in the developing world (Asongu & Nwachukwu, 2019; Jayaraman & Makun, 2019). These findings corroborate the link between economic activities and a country's overall economic health that research in economics postulates (cf. Almodóvar-González et al., 2020; Sautet, 2013).

The existing literature on DFS presents an overall positive outlook on the role DFS play in supporting financial inclusion by providing affordable and uncomplicated access to financial resources to unprivileged communities (Chatterjee, 2020; Lenka & Barik, 2018). In general, the reviewed literature hints at a virtuous cycle. In this virtuous cycle, DFS act as a vehicle that connects otherwise isolated individuals with mainstream finance networks, establishing their eligibility for financial products and services (Joia & dos Santos, 2019) and furthering opportunities for business growth (Wang & He, 2020).

Whether it is about supporting personal financial decision-making, expanding possibilities for small and medium entrepreneurs, contributing to the country's economic growth or giving access to financial services to individuals from underserved communities, the literature signals an overall positive outlook for DFS.

Discussion

We believe that our findings offer a theoretical contribution with practical implications.

Theoretical contribution

By focusing our analysis on the implications of DFS on people's lives, our study adds to our theoretical understanding of the role of ICTs in human development. We opened this article by alluding to financial services' fundamental and most obvious benefit: managing money. The prospects that digital technology offers to bring these services to those living on the margins (e.g. disenfranchized individuals, remote communities) decisively expand their opportunities to manage and control an essential aspect of human life: finances. We are by no means putting money at the center of human existence. However, we recognize that without the opportunity to participate in legally recognized economic activities, people's chances to enhance their material wellbeing are limited; they are condemned to live under conditions of material deprivation (De Soto, 2000).

Access to DFS can pave the way for those living in poverty to enjoy economic independence and the economic benefits that the instruments of law guarantee; these material gains open up opportunities for further enhancing their choices in other aspects of life (e.g. health access, education enhancement, civic engagement, political liberties). The reviewed literature shows that access to DFS has enabled people to cope with life's uncertainties, such as illness, crop failure and job loss

(Jack & Suri, 2014), shape their spending and saving behaviors (Aker et al., 2016; Morawczynski, 2009), help develop livelihood strategies (Van Hove & Dubus, 2019), and provide a safer and convenient way to benefit essential financial services, for example, without travelling long distances (Munyegera & Matsumoto, 2018; Ouma et al., 2017).

Practical implications

Our research findings have some critical implications for policymakers, financial institutions and DFS designers.

Our research shows that cultural settings, religious beliefs, work activities and gender roles can be significant barriers limiting DFS use. Therefore, policymakers may consider developing regulatory frameworks to respond to these barriers to provide inclusive and uninterrupted financial services to people from different segments of society. Arguably, the most important action to boost DFS use is to develop a tax culture, which involves explaining the rationale of a tax system that supports the collective development of welfare. However, we acknowledge that this could be challenging in societies where corruption is rampant.

Financial institutions can also play a role in encouraging people, mainly vulnerable sections of society, to use DFS to meet their financial needs by developing support strategies. These support strategies can focus on cash discounts on digital transactions, lower premiums on life, health and travel policies purchased online, and instant credits facility. They could also develop training programs to enhance their customers' financial and digital skills. These programs can focus on essential aspects of financial planning, such as knowledge of retirement or pension schemes, insurance and investment products. Also, since trust is an unequivocally necessary element for people to embrace DFS, financial institutions should provide a trustworthy financial service environment.

DFS designers, in turn, need to recognize the importance of contextual factors and tailor DFS accordingly. For instance, these contextualized DFS solutions may include personalized financial products and services that meet individual's personal or business needs, ensure safety and transparency as well as privacy, monitor and prevent financial fraud and provide time-bound grievance redressal mechanism, and develop consumer-friendly document verification process to make DFS more attractive. Also, concerning trust, designers should ensure that DFS systems are robust and reliable.

Limitations and future research avenues

Although we conducted a rigorous literature review, we identified two limitations. Firstly, our systematic literature review spanned the 2000–2020 period. This coverage period did not capture the rapid changes in DFS delivery that happened in the last few years, some of them prompted by the Covid-19 pandemic. Secondly, our inclusion criteria excluded grey sources such as opinion/commentary pieces, commercial reports, working papers, government documents, white papers, newsletters and bulletins to avoid biased perspectives. However, we acknowledge that grey literature can still offer valuable, reliable information. Including these grey sources can expand the information sources and provide deeper insights into the DFS research as long as researchers take this material with a pinch of salt. We stress that academic research is a never-ending activity; future work will inevitably engage with the most recent and more diverse literature to add valuable and deeper knowledge to the DFS research domain.

That said, this review opens opportunities for future research to explore the role DFS play in human development. We outline three possible research avenues that scholars may want to pursue.

Firstly, informal economies are global and widespread, with millions of people, about 60% of the world's population, participating in various occupations in the informal sector. Most of this population lives in emerging and developing economies (ILO, 2018) and works as minibus drivers in Africa, street vendors in Latin America (IMF, 2021) and daily-wagers in South Asia (SARTUC, 2020). However, advanced economies also host informal activities, typically gig workers, construction

laborers and domestic servants (IMF, 2021). Future research can help us better understand the role of DFS in expanding choices for workers in the informal sector and to what extend DFS facilitates the transition from informal practices to formal activities.

Secondly, recent statistics reveal that, as of 2019, there were 169 million people recorded as migrant workers globally (ILO, 2021). Migrant workers leave their hometowns and countries for better employment opportunities to accumulate savings and support their families by remitting money back to their place of origin; these remittances can constitute a sizeable portion of some countries' economies (OECD, 2017). By recognizing the positive contribution migrants make to their hometowns' and home countries' economies, the 2030 Agenda for Sustainable Development recommends reducing remittance transaction costs and eliminating expensive remittance corridors (UN, 2015). Researchers may explore the role of DFS in facilitating remittances and supporting development.

Thirdly, the focus of past research has been on issues related to people's lack of digital skills to access DFS (Ibtasam et al., 2017), knowledge deficit as an obstacle to people's financial inclusion (Diniz et al., 2012; Rastogi & Ragabiruntha, 2018), and the negative influence of limited financial knowledge on an individual's belief system (Agwu, 2021). However, how DFS help individuals make well-informed financial decisions about their daily and long-term financial requirements, which should result in increasing their participation in economic activities and well-being, has yet to receive more attention. Therefore, we suggest this area is critical for future research.

Conclusion

Our work offers a conceptual understanding of the implications of DFS on human development based on the systematic review of the extant literature published in the last two decades – from 2000 to 2020. We followed Okoli's (2015) recommendations to support this systematic literature review; the selected articles were thematically analysed. Our thematic analysis unveiled six overarching themes categorized into two groups: foundational conditions and effectual repercussions. While foundational conditions reflect the insights of DFS operations shaped by contextual settings, literacy levels and trust in technology, the effectual repercussions constitute the actualization and implications of DFS on different economic aspects of life such as financial behavior, participation in economic activities and, ultimately, human development.

Notes

1. Jeffrey Beall, a librarian at the University of Colorado in the United States, maintains a list of open-access and non-open-access journals that publish articles without honest peer reviews as long as the authors pay a fee. The list of predatory journals, known as Beall's list, and the criteria for determining them can be accessed at https://beallslist.net.
2. De Koker and Jentzsch (2013) administered a household survey in Botswana, Kenya, Namibia, Nigeria, South Africa, Tanzania, Uganda and Zambia.
3. It is important to distinguish mobile money from other digital financial services, such as mobile and internet banking and mobile wallets. While mobile money does not require customers to have a traditional bank account, other services do (Espinosa-Vega et al., 2020).

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Appendix 1. List of economies with fluctuating DFS usage trends (from 2004 to 2021) and without DFS usage data (IMF, 2022).

Low- and middle-income economies that experience fluctuating trends in *mobile and internet banking transactions*	Low- and middle-income economies that experience fluctuating trends in *active mobile money agent outlets*	Low- and middle-income economies that experience fluctuating trends in *active mobile money accounts*
Burkina Faso, Ecuador, Lebanon, Mali, Rwanda, Samoa	Fiji, Jordan, Namibia, Niger, Pakistan, Philippines, Samoa, Solomon Islands, South Africa, Tonga	Madagascar, Mauritius, Niger, Philippines, Samoa, Solomon Islands, Tonga, Zimbabwe
Advanced economies that experience fluctuating trends in *mobile and internet banking transactions*	Advanced economies that experience fluctuating trends in *active mobile money agent outlets*	Advanced economies that experience fluctuating trends in *active mobile money accounts*
Norway	N/A	N/A
Low- and middle-income economies without DFS usage data related to *mobile money services* and *mobile and internet banking services*		
Belize, Bhutan, Bolivia, Bosnia and Herzegovina, Burundi, Djibouti, Dominica, Equatorial Guinea, Ethiopia, Grenada, Iran	Kenya, Kiribati, Kyrgyzstan, Laos, Libya, Marshall Islands, Micronesia, Nigeria, Palau, Papua New Guinea, Peru	São Tomé and Príncipe, Sierra Leone, South Sudan, Sri Lanka, St. Lucia, St. Vincent and Grenadines, Syrian Arab, Tajikistan, Ukraine, Uzbekistan, Yemen
Advanced economies without DFS usage data related to *mobile money services* and *mobile and internet banking services*		
Australia, Bahamas, Canada, Germany, Greece, Iceland	Ireland, Israel, Italy, Japan, New Zealand	San Marino, Singapore, United Arab Emirates, United Kingdom,]United States

Appendix 2. Literature search and review protocol

Databases/Search Engines
ACM Digital Library, EBSCOhost, IEEE Xplore, Sage, Scopus (ScienceDirect), Web of Science and Google Scholar (for backward and forward reference search).
Record Searching and Screening Methods
Level 0: *Searching and screening academic published records on web databases using relevant keywords and inclusion criteria*.Step 1. Build search queries based on the following keywords using the 'AND' OR' Boolean operators, filter options offered by the database search page, and criteria set by reviewers (i.e. authors).

Digital Financial Services	Financial Inclusion
Internet Banking	Economic Empowerment
Online Banking	Economic Development
Branchless Banking	Economic Growth
E-Banking	Economic Stability
M-Banking	Poverty Reduction
Mobile Financial Services	Social Inclusion
M-Money	Financial Growth
Mobile Payment	
Mobile Credit	
Mobile Insurance	
FinTech	

Inclusion criteria

- ♣ *Subject Area:* business, management, accounting, economics, finance, social sciences.
- ♣ *Study type* – journal article and conference paper.
- ♣ *Publication format* – electronic.
- ♣ *Publication year* – between 2000 and 2020 (inclusive.
- ♣ *Geographic location* – not restricted to any particular country or region.

Step 2. Initial results/records are further screened by scanning each study's title and keywords for their relevance with pre-defined DFS search terms.

Step 3. Transfer information of search records to a spreadsheet consisting of different fields: 'study title', 'publication year', 'author', 'abstract', 'journal/conference', 'publisher', and 'database index'.

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Continued.

Databases/Search Engines

Step 4. Identify and remove duplicate records.

Level 1: *Screening abstracts and publication standards*.

Step 1. Add two new fields to the existing data spreadsheet: 'abstract screening' and 'publication standard'.

Step 2. Carefully read each abstract to decide their relevance to our research goal and drop the study based on the following criteria.

Exclusion criteriaDrop study if:

- ♣ abstract DOES NOT present information/issues related to digital financial services, people's inclusion, development, empowerment, adoption, satisfaction, etc.
- ♣ it is a non-*empirical* study (e.g. conceptual research and comprehensive review).
- ♣ the quality of the publication outlet is not satisfactory.
  - ○ its journal is NOT listed in the Australian Business Deans Council (ADBC) and Academic Journal Guide (AJG) rankings.
  - ○ published in predatory journals listed by Beall (available at https://beallslist.net/)

Level 2: *Extracting information from the sample of records*.
Step 1. Expand the data spreadsheet by adding more fields: 'analytical approach' (i.e. qualitative, quantitative and mixed), 'data source' (i.e. primary, secondary or both), 'research location', 'participant type' (e.g. rural, urban, agents, SMEs, etc.), 'theoretical lens/model', 'research problem' and 'comments'.
Step 2. Scan each article to find the information to fill in the spreadsheet's newly added fields.
Step 3. Look for important references cited in articles and perform backwards-and-forward searches for the relevant references. Use Google Scholar to extract references and the scanning criteria employed in the previous steps. Studies that qualify the scanning criteria are added to the existing data spreadsheet.

Level 3: *Thorough scrutiny of the records*
Step 1. Carefully read articles (e.g. research methodology, data collection and analysis techniques, and findings) and provide comments.
Step 2. Drop unfit studies if reviewers (i.e. authors) perceive that the research methodology is unclear or the findings irrelevant to literature review goals.

Search Query Example

The following search query (with FILTERS) is used on the Scopus database to retrieve relevant results.'digital financial service' OR 'internet banking' OR 'online banking' OR 'branchless banking' OR 'e-banking' OR 'm-banking' OR 'mobile financial services' OR 'm-money' OR 'mobile payment' OR 'mobile credit' OR 'mobile Insurance' OR 'fintech' AND 'financial inclusion' OR 'economic empowerment' OR 'economic development' OR 'economic growth' OR 'economic stability' OR 'poverty reduction' OR 'social inclusion' OR 'financial growth' AND (LIMIT-TO (PUBYEAR, 2020) OR LIMIT-TO (PUBYEAR, 2019) OR LIMIT-TO (PUBYEAR, 2018) OR LIMIT-TO (PUBYEAR, 2017) OR LIMIT-TO (PUBYEAR, 2016) OR LIMIT-TO (PUBYEAR, 2015) OR LIMIT-TO (PUBYEAR, 2014) OR LIMIT-TO (PUBYEAR, 2013) OR LIMIT-TO (PUBYEAR, 2012) OR LIMIT-TO (PUBYEAR, 2011) OR LIMIT-TO (PUBYEAR, 2010) OR LIMIT-TO (PUBYEAR, 2009) OR LIMIT-TO (PUBYEAR, 2008) OR LIMIT-TO (PUBYEAR, 2007) OR LIMIT-TO (PUBYEAR, 2006) OR LIMIT-TO (PUBYEAR, 2005) OR LIMIT-TO (PUBYEAR, 2004) OR LIMIT-TO (PUBYEAR, 2003) OR LIMIT-TO (PUBYEAR, 2002) OR LIMIT-TO (PUBYEAR, 2001) OR LIMIT-TO (PUBYEAR, 2000) OR LIMIT-TO (PUBYEAR, cp) OR LIMIT-TO (PUBYEAR, english) OR LIMIT-TO (PUBYEAR, repository) OR EXCLUDE (PUBYEAR, busi OR limit-to AND subjarea) OR EXCLUDE (PUBYEAR, soci OR limit-to AND subjarea) OR EXCLUDE (PUBYEAR, t AND limit-to AND pubstage) OR EXCLUDE (PUBYEAR, t AND limit-to AND doctype))

Grey Literature

- ♣ Any materials and research produced by organizations outside academic publishing, such as commercial reports, working papers, government documents, white papers, surveys, newsletters and bulletins, may have publication biases. Therefore, they have been excluded from this literature review.

Appendix 3. Studies included in the systematic literature review

S. No.	Study	Analytical approach	Data source	Research location	Participant type	Theoretical perspective
1	Agwu (2021)	Mixed	Secondary	Nigeria	Rural and urban residents	Financial inclusion for rural development
2	Aker et al. (2016)	Quantitative	Primary	Niger	Households in 96 villages	Mobile payment system for financial inclusion

(*Continued*)

Continued.

S. No.	Study	Analytical approach	Data source	Research location	Participant type	Theoretical perspective
3	Akhter and Khalily (2020)	Quantitative	Secondary	Bangladesh	Rural and urban households	Financial inclusion
4	Amegbe et al. (2017)	Quantitative	Primary	Ghana	Small-scale and individual entrepreneurs	Technology acceptance model and innovation diffusion theory
5	Asongu and Nwachukwu (2019)	Quantitative	Secondary	Multiple	Panel data of 53 African nations	ICT-driven financial sector development and financial access
6	Chatterjee (2020)	Quantitative	Secondary	Multiple	Panel data from International Monetary Fund and ITU	Financial inclusion
7	De Koker and Jentzsch (2013)	Quantitative	Secondary	Multiple African countries	General customers of financial products	Transparency of financial services; financial inclusion
8	Diniz et al. (2012)	Qualitative	Both	Brazil	Owners and employees of local stores, micro-entrepreneurs, union reps and citizens	Structuration theory
9	Donner and Tellez (2008)	Qualitative	Primary	India	Owners of small enterprises	Mobile banking adoption for businesses
10	Dziwornu et al. (2018)	Quantitative	Primary	Ghana	Female entrepreneurs	Mobile financial services
11	Dzokoto et al. (2018)	Qualitative	Primary	Ghana	Study 1: 66 poor individuals / Study 2: 35 poor and 35 non-poor individuals	Knowledge gap hypothesis
12	Ghosh (2013)	Qualitative	Primary	India	Customers, agents, bank employees	Mobile banking for financial inclusion
13	Ibtasam et al. (2017)	Qualitative	Primary	Pakistan	Rural and urban users of mobile money (daily wage laborers, security guards, vegetable vendors, farmers)	Financial inclusion
14	Ibtasam et al. (2018)	Mixed	Both	Pakistan	Women	Financial inclusion – affordability, authority, and technology access
15	Islam et al. (2018)	Quantitative	Secondary	Kenya, Tanzania and Uganda	Business owners and managers	Mobile money and its effect on investment
16	Jayaraman and Makun (2019)	Quantitative	Secondary	India	Indian residents over the age of 15 years	Financial sector development (FSD) for economic growth
17	Joia and dos Santos (2019)	Qualitative	Primary	Brazil	Customers and employees of the floating bank and employees of partner organizations	Dynamic info-inclusion model
18	Joseph et al. (2005)	Mixed	Primary	United Kingdom	e-Banking customers	Banking-services delivery performance
19	Laukkanen (2005)	Qualitative	Primary	Undefined	e-Banking customers	Use and adoption of internet banking
20	Lenka and Barik (2018)	Quantitative	Secondary	Multiple	Panel data from the International Monetary Fund and World Bank	Financial inclusion
21	Leonardi et al. (2016)	Qualitative	Both	Brazil	Bank correspondents	Multiplex appropriation
22	Morawczynski (2009)	Qualitative	Primary	Kenya	M-Pesa users, non-users and agents	Mobile money as a transformational technology

(*Continued*)

Continued.

S. No.	Study	Analytical approach	Data source	Research location	Participant type	Theoretical perspective
23	Mukherjee and Nath (2003)	Quantitative	Primary	India	Online banking users (students, professionals, self-employed, and housewives)	Commitment-trust theory of relationship marketing
24	Munyegera and Matsumoto (2018)	Quantitative	Secondary	Uganda	Rural households	Financial inclusion
25	Oborn et al. (2019)	Qualitative	Primary	Multiple	Developers, managers, agents and users of a mobile payment system	Innovation trajectories
26	Ouma et al. (2017)	Quantitative	Secondary	Multiple African countries	Households	Financial sector development
27	Pal et al. (2020)	Quantitative	Primary	India	Mobile payment users (Executive MBA students, their friends and colleagues)	Facilitators and barriers to continued usage of mobile payment services
28	Peša (2018)	Qualitative	Primary	Zambia	Mobile-money agents	Frugal innovation for economic growth
29	Rastogi and Ragabiruntha (2018)	Quantitative	Primary	India	Households in southern India	Financial inclusion
30	Van Hove and Dubus (2019)	Quantitative	Secondary	Kenya	Individuals	Adoption, use and impact of M-Pesa
31	Wang and He (2020)	Quantitative	Secondary	China	Rural households (farmers)	Digital financial inclusion for poverty reduction
32	Wang (2020)	Quantitative	Secondary	China	Households	Mobile payments

Appendix 4. The construction of codes and themes