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Conceptualising the Moderating Role of Digital Financial Literacy on the Relationship between Digital Financial Services Usage and Digital Financial Inclusion

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Abstract

Technological advancement has led to the digitalisation of business activities in the financial services industry, bridging the physical and virtual realms. Consequently, financial services have transitioned to digital platforms, which are now referred to as digital financial services (DFS). However, several determinants hinder the adoption of DFS, which can subsequently impact digital financial inclusion (DFI). Moreover, society has observed a fundamental transformation in the realm of financial literacy (FL), with the emergence of a new concept known as 'digital financial literacy' (DFL). Given the study's objectives, which required a descriptive research design, we employed an exploratory research approach by reviewing a substantial amount of academic literature. Based on the literature review, this study proposes a conceptual framework to examine various barriers to DFS, understand people's perceptions of DFL and explore its moderating role in the relationship between DFS usage and DFI. The ultimate goal is to foster an inclusive society, facilitating the realisation of the United Nations Sustainable Development Goals (UNSDGs) through financial inclusion (FI) of marginalised, poor and unbanked populations in emerging and underdeveloped economies.

Keywords: Digital Financial Services, Digital Financial Inclusion, Digital Financial Literacy, Sustainability, Barriers, Conceptual Model

Introduction

Financial inclusion (FI) is a critical pillar of developing economies. FI is defined as accessibility to appropriate and inexpensive financial products and services that satisfy the needs of individuals and enterprises while also being delivered sustainably and responsibly (World Bank, 2018). The UNCDF recognises FI as a vital facilitator for achieving other developmental objectives within the 2030 Sustainable Development Goals (SDGs), with related targets appearing in eight of the 17 goals. Moreover, better FI is implied in SDG 17 as a means of boosting implementation, which can improve growth by increasing savings mobilisation for investment and consumption. Given the connection between the FI agenda and UNSDGs, FI should be listed as a UNSDG at the outset (Zetzsche et al., 2019). However, FI is a tool for developing a sustainable future and is not an endpoint.

Due to technological evolution, the financial services industry's business activities have been digitalised and are gradually integrating the physical and virtual worlds. ICT has also been identified as a crucial promoter of FI (Andrianaivo & Kpodar, 2011). Consequently, financial services have been digitalised and are now known as digital financial services (DFS). DFS refers to a group of diverse financial services that can be accessed and delivered through specific digital channels. DFS's innovative technologies enable time savings and increased

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productivity in the supply of financial services at a low cost, especially in the impoverished section of society (Rana et al., 2020). Thus, DFS is more suitable and cost-effective than conventional banking solutions, allowing poor and impoverished individuals in emerging nations to save and borrow in a regulated economy while making financial returns (Durai & Stella, 2019). Additionally, digital innovations in financial services in the form of DFS and payment applications can enhance FI by delivering financial services to the unbanked and improving their quality of life, especially in emerging economies (Patil et al., 2017). Consequently, financial academics and FI advocates have acknowledged DFS as a major facilitator of global FI (Pandya & Budhedeo, 2025; Ozili, 2018). The various varieties of DFS providers and business models, according to the CGAP, have enormous potential for expanding FI and contributing to the UNSDGs. DFS has considerable potential to expand financial service delivery to a broad segment of the general population, including the poor, through the utilisation of innovative technologies such as m-banking, e-money and digital payment systems (DPS) at reasonable costs, in an appropriate mode and in a secure environment (Siddik & Kabiraj, 2019).

However, there are numerous obstacles to DFS, such as lack of awareness, lack of digital skills, lack of technical clarity, lack of trust, hesitance or resistance, technophobia, transactional security concerns, vulnerability, lack of grievance redressal and cash dependency, which inhibit its adoption or usage, thus affecting DFI. Moreover, the successful use of fintech products is needed to attain a certain level of digital and financial literacy in making informed decisions and preventing expensive mistakes by clients (Lyons & Kass-Hanna, 2021b). FL (Financial Literacy) has long been considered a feasible strategy for reducing inequities in financial markets and promoting FI (OECD, 2015). However, recently, a transformation has occurred in the realm of FL, evolving into what experts now refer to as "digital financial literacy" (DFL). Participants in the digital economy and society must not only possess foundational FL, but also develop the competencies and aptitudes to: (a) navigate digital technologies, including mobile phones, smartphones and tablets; (b) execute financial operations in the digital sphere; and (c) ensure their own protection as consumers within the digital marketplace (Kass-Hanna et al., 2022). Therefore, greater DFL levels are necessary to ensure the successful DFS usage (Morgan et al., 2019). Moreover, many authors argue that mobile apps can help persuade consumers and encourage those lacking digital financial education to make inappropriate decisions.

DFS's latest and substantial progress is improving the affordability and accessibility of financial services and bears the potential of increasing future FI. However, the promotion of DFS as a tool for FI may be risky. Because a lack of understanding and confidence continues to be a key barrier to DFS adoption and usage, particularly among people who have been digitally split and socio-demographically marginalised. These vulnerable populations are not only less prepared to utilise the advantages of innovative financial accessibility and digital technologies, but they also stand to be left behind as digitalisation progresses at a rapid pace. Thus, those who are digitally and financially illiterate are left behind. Therefore, there is a need to study the various challenges of DFS and the role of DFL in the relationship between DFS usage and FI. Thus, this study aims to propose a conceptual framework to study various antecedents of DFS and the perception of people regarding DFL and its moderating role in the relationship between DFS usage and DFI. By promoting an inclusive society, the UNSDGs can be achieved through the FI of marginalised poor and unbanked populations of emerging and underdeveloped economies. Recognising this, the following are the objectives of the present study:

- To highlight the key barriers to DFS.
- To explore the role of DFL in the relationship between DFS and DFI.
- To develop and propose a conceptual framework to address these issues.

This study proposes a conceptual framework by highlighting the various barriers to DFS, such as lack of awareness, lack of digital skills, lack of technical clarity, lack of trust, hesitance, resistance to learning new technologies, technophobia, transactional security concerns, vulnerability to risks, lack of grievance redressal, cash dependency, etc., which inhibit its adoption or usage and thereby impact the DFI. In addition, it suggests the necessity of examining how DFL moderates the connection between the use of DFS and DFI. It also provides theoretical and practical implications for stakeholders implementing DFS for the DFI of marginalised sections of society.

The structure of this paper is outlined in the following manner. The next section provides an in-depth literature review and presents the study's propositions. The following section describes the methodology of this study. The conceptual framework is proposed in the next section. The final section presents the conclusions, implications and limitations.

Review of Literature and Proposition Development

This study proposes an integrated conceptual framework that incorporates various barriers to DFS. In addition, it proposes a moderating role of DFL in the relationship between DFS usage and DFI.

Digital Financial Services (DFS) Usage

DFS provides individuals with cost-effective, expedited and transparent access to vital financial services (Pazarbasioglu et al., 2020). DFS encompasses a wide range of offerings involving both banking and non-banking amenities, including payments, lending, deposits, money transfers and insurance products. It also includes mobile financial services (MFS), branchless banking, e-money and DPS (AFI, 2016). These amenities are disseminated via diverse digital channels, including but not limited to the Internet, smartphones, tablets, phablets, automated teller machines (ATMs), point-of-sale (PoS) terminals, near-field communication (NFC) gadgets, smart cards for credit or debit transactions and biometrics (Sharma & Díaz Andrade, 2023). However, despite many benefits, there is still low adoption of DFS in rural areas of emerging and underdeveloped economies (Hasan et al., 2022). Aziz and Naima (2021) concluded that although DFS have improved accessibility to financial services, they aren't being utilised because of limited internet connectivity, insufficient financial knowledge and limited societal awareness. Gupta and Singh (2023) likewise acknowledged that performing electronic transactions remains challenging in many rural locations. Their study highlighted the primary challenges to electronic transactions in rural locations and aimed to elucidate the broader interactions among these obstacles. Table 1 shows the interplay between DFS and its associated variables as documented in the existing literature.

Table 1: Existing Literature on the Drivers and Barriers of DFS

Drivers/Barriers of DFS	*Sources*
Lack of awareness	Aziz and Naima (2021); Balakrishnan and Shuib (2021); Elali et al. (2024); Gupta and Singh (2023); Tiwari et al. (2021)
Lack of digital skills	Adam and Dzang Alhassan (2020); Baudat and Henchoz (2023); Danladi et al. (2023); Gautam et al. (2022); Khando et al. (2023); Rana et al. (2023)
Lack of trust	Al Karim et al. (2023); Bhatt et al. (2023); Lian and Li (2021); Rahman et al. (2024); Rana et al. (2023)
Technical complexities	Chauhan and Sharma (2024; Cavus et al. (2023); Lin and Chen (2023)
Technophobia	Almaiah et al. (2023); Chukwu and Idoko (2021); Lee (2021); Palash et al. (2022)
Transactional security	Abbott and Patil (2020); Almaiah et al. (2023); Eriksson et al. (2021); Norbu et al. (2024); Tsai et al. (2022)
Vulnerability to risk	Jain and Raman (2023); Littler and Melanthiou (2006). Liu et al. (2019); Ofori-Okyere et al. (2023); Ramtiyal et al. (2022); Yang et al. (2015)
Ineffective grievance	Khan et al. (2023); Kumar and Thakur (2019); Kumar et al. (2020); Kumar et al. (2018); Patil et al. (2020)
Cash dependency	Aggarwal et al. (2023); Cham et al. (2022); Demirgüç-Kunt et al. (2013); Kashyap and Kumari 2021); Pazarbasioglu et al. (2020); van Klyton et al. (2021)
Digital financial literacy	Azeez and Akhtar (2021); Bansal (2019); Chhillar et al. (2024); Hasan et al. (2023); Kumar et al. (2023); Morgan et al. (2019); Lyons and Kass-Hanna (2021a, 2021b); Prasad et al. (2018); Ravikumar et al. (2022).

Lack of Awareness and DFS Usage

Rogers (2014) states that "*consumers go through a process of knowledge, persuasion, decision, and confirmation before they are ready to adopt a product or service*". The extent to which an individual understands a novel innovation and develops a general awareness of its implications is referred to as awareness (Dinev & Hu, 2007). Awareness is crucial in technology adoption, as it provides information regarding the technology's existence, usage, advantages and shortcomings (Aloudat et al., 2014). Consumers' awareness and perception of a product determine whether it is accepted or rejected (Tiwari et al., 2021). This is because an elevated degree of digital awareness diminishes the perceived potential risks and impediments linked to the implementation of fintech products. This suggests that through a greater comprehension of channels, consumers could be highly receptive to accepting FinTech e-payment systems (Elali et al., 2024). Thus, consumer awareness of an innovation is thought to be a key component affecting their intentions to utilise it, and as a result, awareness serves as a predecessor to the development of a consumer's cognition (Balakrishnan & Shuib, 2021). A lack of awareness regarding various DFS is critical in an emerging economy such as India, where nearly 70% of the nation's population resides in rural regions and therefore does not utilise such a convenient means of financial transactions (Gupta & Singh, 2023). Thus, a lack of awareness may negatively impact consumer adoption or usage of DFS.

P1: Lack of awareness has a negative effect on DFS usage.

Lack of Digital Skills and DFS Usage

The term digital skills refers to the competence of a person to effectively interact with digital devices and online platforms for various goals (Deursen & Dijk, 2014). A number of studies have emphasised digital skills as the underlying factor that ensures FI through the utilisation of DFS. There is a high tendency for those who are more digitally literate to use online banking, e-payments and fintech services successfully. For example, Rana et al. (2023) cited a lack of digital literacy as an important barrier to the widespread use of mobile wallets in India. According to a study by Gautam et al. (2022), digital literacy is the leading enabler for individuals accessing DFS and may also be related to the use of technology. Baudat and Henchoz (2023) emphasise that those who possess higher digital skills display more tendencies to use online banking services and mobile payment (m-payment) platforms than those with low digital skills. Possessing a high degree of digital literacy empowers consumers to navigate digital interfaces, understand security standards and use numerous sophisticated functions. This, in turn, fosters increased autonomy and assurance in utilising the DFS, potentially encourages more frequent usage, and ultimately develops trust and confidence in the DFS, resulting in establishing financial resilience (Kass-Hanna et al., 2022). Research by Adam and Dzang Alhassan (2020) and Danladi et al. (2023) underline the importance of multidimensional policy interventions, emphasising the importance of digital learning and the development of skills required, especially in the deprived region, to reduce the digital gap and pursue the goal of inclusive economic prosperity. According to Khando et al. (2023), the higher the digital literacy levels of individuals, the greater the chances are that they will welcome newer technologies such as mobile wallets, Unified Payments Interface (UPI) and e-wallets, which consequently results in larger digital financial ecosystems. Thus, we propose the following proposition:

P2: Lack of digital skills has a negative effect on DFS usage.

Lack of Trust and DFS Usage

According to Yousafzai et al. (2003), "customers' trust in e-banking is defined as *a' psychological state that leads to the willingness of the customer to perform banking transactions on the Internet, expecting that the bank will fulfil its obligations, irrespective of the customer's ability to monitor or control the bank's actions*." Trust has been identified as a factor that determines a user's desire to accept various DFS. One of the primary reasons individuals decline to use DFS is a lack of trust (Lian & Li, 2021). Existing research indicates that consumer trust mitigates apprehensions and concerns regarding the security of e-banking operations and secrecy of confidential data (Rahman et al., 2024). Rana et al. (2023) also report that in emerging economies such as India, customer trust in electronic wallets is comparatively lower than that in paper money. Thus, it can be inferred

that one of the reasons individuals avoid DFS is a lack of trust (Al Karim et al., 2023; Bhatt et al., 2023).

P3: Lack of trust has a negative effect on DFS usage.

Technical Complexity and DFS Usage

As businesses strive for transformation, they have begun to realise that the complexity of their technological advances, processes and data systems has rendered the secure and efficient execution of evolution extremely difficult and that fostering innovation on an extensive level is becoming even more formidable (DeBrusk, 2021). Technical complexities, such as complicated registration processes, authentication methods, and navigational issues, are key factors that discourage users from embracing DFS (Chauhan & Sharma, 2024; Cavus et al., 2023). Technical complexities stem from sluggish processing rates, repeated interruptions, or unstable network connectivity (Coutinho et al., 2023; Shih et al., 2023). These obstacles impede the availability and functionality of DFS, particularly for people living in rural or isolated regions. Differences in device types, applications and display dimensions also create technological complexities that affect the accessibility and functionality of DFS. Additionally, incompatibilities can occur when consumers attempt to access services on multiple gadgets or platforms, resulting in less-than-ideal experiences and operational restrictions. Research highlights the need for flexible layouts and interoperability across platforms to cater to various customer tastes and devices (Bianchi et al., 2023). Thus, for DFS to be truly efficient, its interface should be uncomplicated to facilitate tasks and enhance usability (Lin & Chen, 2023).

P4: Technical complexities have a negative effect on DFS usage.

Technophobia and DFS Usage

Technophobia, defined as fear of or aversion to technology, plays a significant role in the adoption of DFS. Several academic studies have explored the relationship between technophobia and the uptake of various types of DFS, including online banking, m-payments and e-wallets. Technophobia often acts as a barrier to the adoption of DFS (Lee, 2021), particularly among older adults and individuals with limited exposure to technology (Chukwu & Idoko, 2021). Ayyagari et al. (2011) found that individuals exhibiting higher levels of technophobia are less likely to adopt digital technologies, citing concerns such as security risks and complexity of use. Technophobia is closely linked to trust and perceived risk of DFS. Palash et al. (2022) highlighted that technophobic individuals tend to perceive greater risks associated with online transactions, including concerns about privacy breaches and identity theft. This heightened perception of risk diminishes trust in digital platforms, thereby impeding adoption (Almaiah et al., 2023). Thus, technophobia is a significant barrier to the widespread adoption of DFS.

P5: Technophobia has a negative effect on DFS usage.

Transactional Security and DFS Usage

Transactional security plays a pivotal role in shaping consumer trust and confidence in DFS utilisation. Several recent studies have underscored its significance in influencing user adoption and engagement with various digital financial platforms. Almaiah et al. (2023) highlighted that perceived security significantly influences users' trust in DFS. Users are more likely to adopt platforms that offer robust transactional security measures, such as encryption protocols and multifactor authentication. Abbott and Patil (2020) emphasised the importance of balancing transactional security with user experience. Although stringent security measures are essential, overly complex security procedures can hinder their adoption. Hence, optimising security without compromising usability is crucial for fostering adoption. Emerging technologies, such as blockchain and biometrics, offer promising avenues for enhancing transactional security in DFS. Norbu et al. (2024) examined the significance of trust and its predecessors in DPS adoption. This study highlights the potential of blockchain-based authentication mechanisms and biometric identifiers to bolster security and foster adoption. They suggest that security, among other critical elements, has a substantial impact on customers' trust in digital payments (DFS) because customers want to be convinced that their monetary operations are confidential and reliable. Furthermore, customers' trust in the security of their confidential data affects their desire to embrace and utilise blockchain technology in DFS. The adoption of m-payments varies between developed

and developing countries, with lower adoption rates observed in developing countries than in developed ones. This difference may be attributed to concerns regarding the confidentiality of private information and transaction security (Tsai et al., 2022). Eriksson et al. (2021) investigated resistance to m-payments and discovered that perceived transaction security and personal data security were significant factors, which also explains the lower diffusion frequency of m-payments in developing nations. Thus, transactional security has emerged as a critical determinant of user trust and the adoption of DFS. By leveraging technological innovation, optimising user experience and leveraging social influence, stakeholders can effectively enhance transactional security and drive the widespread adoption of digital financial platforms.

P6: Transactional security has a significant effect on DFS usage.

Vulnerability to Risks and DFS Usage

Vulnerable populations, such as those with low incomes or limited access to traditional financial services, face significant barriers in accessing DFS (Ofori-Okyere et al., 2023). Risk perception plays a crucial role in consumers' decision-making processes regarding the adoption of new financial technologies (Littler & Melanthiou, 2006). Liu et al. (2019) defined perceived risk (PR) as a subjective expected loss, encompassing both security/privacy loss and financial loss. They investigated how risk perception influences consumers' adoption of m-payments and found that PR significantly impacts individuals' intentions to adopt m-payments. In addition, Yang et al. (2015), PR is a multifaceted concept. They delved into a five-dimensional assessment of PR in m-payments, which included time, psychological, performance, privacy and financial risks. According to their findings, these elements significantly reduce the likelihood of accepting m-payment. Moreover, Jain and Raman (2023) investigated the connection between DFS adoption and variations in risk perception in a generational cohort. Using a survey-based approach, they found that PR negatively influenced consumers' intentions to adopt DFS. Specifically, concerns about performance, security and financial risk were identified as significant barriers to adoption.

Ramtiyal et al. (2022) conducted a study examining how risk perception influences Indian retailers' adoption of m-payments and the interrelationships among different forms of PR, revealing social and security risks, in addition to the five dimensions of PR previously mentioned by Yang et al. (2015). The findings from their moderating variables indicate that PR affects respondents regardless of their age or gender. Moreover, from a situational or contextual viewpoint, facilitating conditions and usage context have a greater influence on the relationship between PR and behavioural intention than consumer attributes. Overall, while vulnerability to risks presents significant challenges to the adoption of DFS, addressing these challenges through targeted interventions and inclusive designs can unlock the potential of DFS to promote DFI and empowerment among vulnerable populations.

P7: Vulnerability to risk negatively affects DFS usage.

Ineffective Grievance Redressal Mechanism and DFS Usage

Negative experiences with technology can significantly undermine consumer confidence and hinder the continued adoption of digital services, thereby impacting loyalty towards service providers (Oliveira et al., 2023). Grievance redressal (GR) is one of the processes designed to address clients' grievances, challenges and difficulties and is addressed by m-payment service providers (Patil et al., 2020). This ensures that consumers can report fraud and foster trust (Kumar et al., 2018). To establish user trust and confidence, GR mechanisms are essential in the event of unsuccessful and fraudulent transactions and their time-bound resolutions (Kumar et al., 2020). Ineffective complaint resolution systems can consistently deter users from using DFS, as inadequate grievance handling adversely affects consumer trust and, thereby, the adoption of mobile wallets (DFS) (Kumar & Thakur, 2019). The literature suggests that companies should prioritise efficient GR systems regarding DFS to build trust and confidence among users. Moreover, considering grievance resolution as a post-purchase behaviour, Khan et al. (2023) hypothesised that it positively influences consumers' usage behaviour of m-payment systems. However, deficiencies in handling grievances discourage users from using mobile banking services.

P8: Ineffective grievance redressal mechanisms negatively affect DFS usage.

Cash Dependency and DFS Usage

The term 'cash dependency' refers to the reliance of individuals or economies on physical currency for transactions (Aggarwal et al., 2023). Numerous studies have identified cash dependency as a significant barrier to DFS adoption, particularly in emerging economies. Individuals accustomed to cash transactions may hesitate to transition to digital platforms because of concerns about security, trust and familiarity with traditional methods (Cham et al., 2022). Cash dependency is often associated with financial exclusion (Kashyap & Kumari, 2021), as it excludes individuals without access to conventional banking services. DFS offers opportunities to overcome this barrier by providing financial tools and services through mobile phones and other digital devices (Demirgüç-Kunt et al., 2013; Pazarbasioglu et al., 2020). However, despite a significant increase in digital payments, cash remains the preferred transaction method in India (Kashyap & Kumari, 2021). Thus, the preference for cash may stem from perceptions of enhanced security and privacy associated with physical currency (van Klyton et al., 2021).

P9: Cash dependency has a negative effect on DFS usage.

DFS Usage and Digital Financial Inclusion (DFI)

DFS has played a crucial role in promoting FI by reaching underserved populations, particularly in rural or remote areas where access to traditional banking services is limited (Malady & Buckley, 2015). Platforms such as mobile money have expanded access to financial services for millions of unbanked individuals, bridging the gap between the formal financial system and marginalised communities (Arner et al., 2018). By providing access to formal financial services, DFS has the potential to stimulate economic development by enabling individuals and businesses to save, invest and manage risks more effectively (Demirguc-Kunt & Klapper, 2018). Research indicates that DFS can contribute to poverty alleviation by equipping individuals with tools to better manage their finances, withstand economic shocks and invest in income-generating activities (Lee et al., 2023). For instance, DFS has been linked to increased household savings and resilience to financial crises (Sakyi-Nyarko et al., 2022; Yadav & Shaikh, 2023). Thus, utilising DFS can help vulnerable populations maintain financial stability and improve their overall welfare by integrating it into the formal financial system (Fundira et al., 2024).

P10: DFS usage has a positive effect on DFI.

Digital Financial Literacy (DFL)

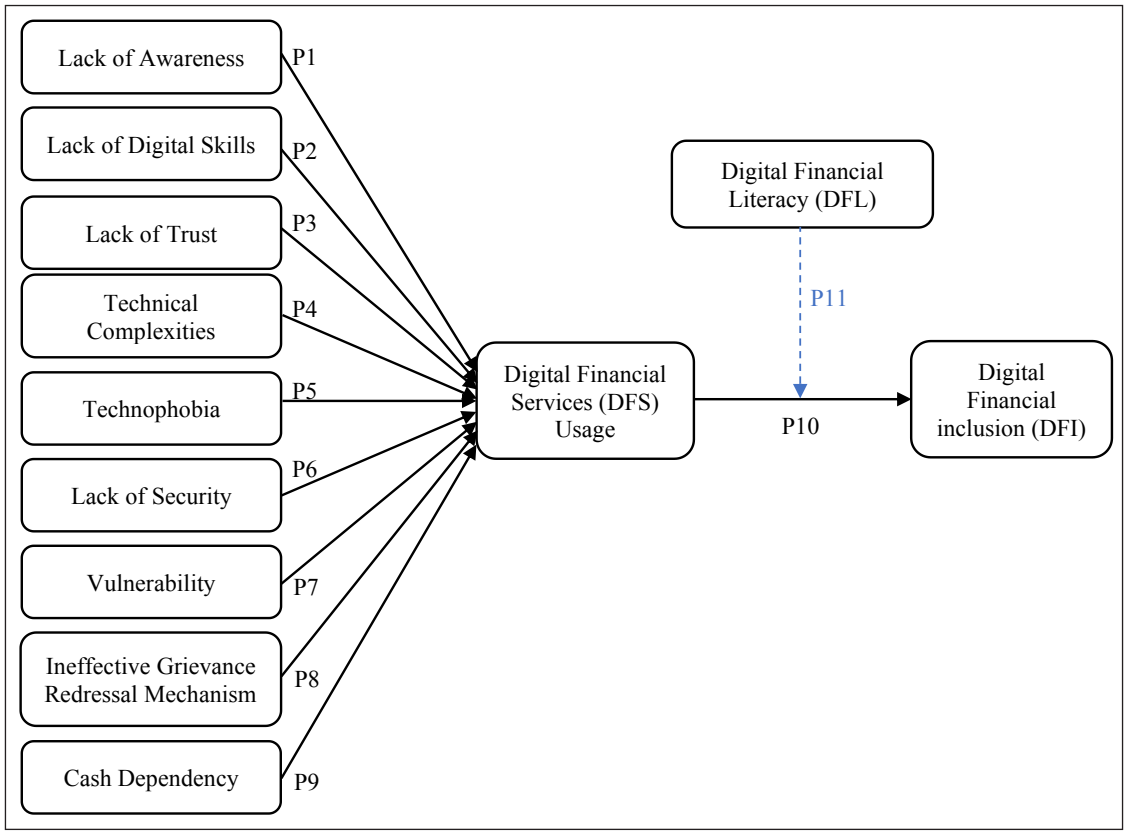
In the current digital era, DFL has emerged as an essential competency owing to the pervasive use of DFS (Chhillar et al., 2024). DFL is defined as "acquiring the knowledge, skills, confidence, and competencies to safely use digitally delivered financial products and services, to make informed financial decisions, and to act in one's best financial interest as per an individual's economic and social circumstance" (Alliance for Financial Inclusion, DFSWG and CEMCWG, 2021). In other words, DFL is a novel concept that refers to the intersection of FL, financial capacity and digital literacy (Alliance for Financial Inclusion, 2021). Therefore, individuals require both financial and digital literacy to conduct digital financial transactions through DFS (Hasan et al., 2023). Moreover, some authors suggest that mobile apps may influence consumers and potentially lead those lacking digital financial education to make unwise decisions (Kumar et al., 2023). Researchers have assessed DFL from various perspectives, including understanding DFS, awareness of the risks linked to DFS, proficiency in mitigating such risks and understanding customer rights and grievance resolution methods (Morgan et al., 2019). Lyons and Kass-Hanna (2021a) propagated a more rigorous and exhaustive assessment of DFL and identified five crucial components of FL and DL: fundamental knowledge and skills, awareness, practical know-how, decision-making, and self-protection (Lyons & Kass-Hanna, 2021b). DFL is enabled by literacy, numeracy, access, consumer awareness and design (FinEquity, 2021). Based on the literature, it is clear that DFL is a novel concept that is continually evolving. There is limited research on DFL in India (Azeez & Akhtar, 2021; Bansal, 2019; Prasad et al., 2018; Ravikumar et al., 2022).

P11: DFL moderates the relationship between DFS usage and DFI.

Research Methodology

This study conducted an exploratory research study by reviewing a significant amount of academic literature on DFS and its antecedents, as well as on DFL and DFI, based on previously published studies from academic journals, magazines, periodicals and tabloids. The objectives of this study required a descriptive research methodology. This study relies heavily on secondary data. This study aimed to identify several determinants of DFS and its impact on DFI and to explore the moderating role of DFL on the relationship between DFS and DFI.

Conceptual Framework



Source: Author's own conceptualisation by compiling Technology Acceptance Model and relevant existing literature.

Fig. 1: Conceptual Framework

Conclusion, Implications and Limitations

FI offer numerous benefits to individuals. However, several obstacles can hinder people from accessing and utilising financial services. DFS serves as an essential tool for promoting FI, especially in rural areas where traditional banking services face challenges (Ghosh & Chaudhury, 2020). DFS not only addresses these challenges effectively but also reduces corruption. Nonetheless, consumers with limited digital and financial literacy may find it challenging and risky to use DFS. Therefore, this study proposes a conceptual framework that integrates various barriers to DFS and examines the moderating role of DFL in the relationship between DFS usage and DFI. Andrianaivo and Kpodar (2011) noted a positive correlation between FI and mobile phone penetration, suggesting that increased mobile phone usage enhances credit allocation and financial system participation.

The proposed conceptual framework can serve as a foundation for future empirical research to validate the relationships and factors that influence DFS adoption and, thereby, FI. Since this framework emphasises a multidimensional approach that incorporates DFL, it could

involve carrying out quantitative research to determine the impact of DFL education programmes on DFS adoption and usage across various socio-demographic populations.

The anticipated results of this study can guide banks and governments in designing and executing FL and awareness campaigns, particularly those targeting marginalised and rural populations. Recognising the varying levels of digital and financial literacy among consumers, banks and other financial institutions can help customise their DFS offerings and develop user-friendly platforms. This will aid policymakers in implementing DFS-supportive policies to promote FI and foster inclusive economic growth.

This study aimed to help policymakers assess the impact of DFL education programmes on the intention to adopt DFS among vulnerable populations. It also seeks to identify the challenges faced by unbanked and marginalised individuals in adopting various DFS offered by banks and financial institutions. This understanding can inform the development of inclusive policies tailored to address the perceived or actual challenges rural populations encounter when adopting DFS in their daily lives. Such policies are crucial for meaningful development and transformation, as they encourage the use of innovative DFS for FI (Dwivedi et al., 2022).

The limitations of this study stem from its exploratory research design, which reviews a substantial amount of academic literature on DFS, its antecedents, DFL and DFI based on previously published studies from academic journals, magazines, periodicals and tabloids. Future research should empirically investigate the factors outlined in this study's conceptual framework to enhance its generalisability.

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