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The Influence of Digital Financial Services on Credit Practices in Unbanked Rural economy of Pakistan

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Abstract

With the growing adoption of digital financial services (DFS) particularly in developing economies, it has really helped in improving financial inclusion in regions where traditional banking is limited. In Pakistan where over 100 million people are unbanked, DFS platforms like Jazz Cash and Easy paisa have become a necessity to scale these financial services, being such savings, credit and remittance solutions. Then, this study looks at the impact of DFS on the credit practices in these unbanked rural areas and whether DFS can be a viable alternative to informal moneylenders, and key barriers in adoption. Research using secondary data from government reports, financial institutions, and scholarly studies is applied to apply the statistical methods which include regression analysis comparative financial analysis and descriptive statistics. Interestingly, the findings show the strength of an internet access in predicting the DFS adoption, the more correlated to internet access is digital credit usage. Moreover, DFS users tend to have more positive credit terms compared to the informal borrowers, i.e., lower interest rates, structured repayment plans, and greater transparency. All of these advantages have so far slowed DFS adoption in rural Pakistan however, as low digital literacy coupled with a less than zero level of trust in the use of mobile banking and poor digital infrastructure continue to create barriers. DFS opens up access to credit, but doesn't have much of an impact on actual financial well-being, depending on other economic factors, such as income growth, financial literacy and business development opportunities. Policy recommendations conclude the study on broadband expansion, digital literacy programs, regulatory improvements and targeted microfinance among others aimed at increasing DFS adoption in rural communities.

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Keywords: Digital financial services, financial inclusion, credit access, rural Pakistan, Jazz Cash, Easy paisa, mobile banking, financial literacy.

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INTRODUCTION

Economic empowerment is driven by financial inclusion that provides individuals access to regulated financial systems for inserting savings, credit, investment opportunities and risk protection (World Bank, 2022). In such economies as developing, where formal banking infrastructure is poorly developed, financial exclusion is still one of the major problems (Demirguc-Kunt et al., 2018). What is more, in Pakistan, about half of the adult population (53%) lacks access to formal banking and resorts to informal credit sources that are characterized by exploitative interest rates and unfair repayment terms

(Mahmood & Anwar, 2022). Given the fact that DFS like jazz cash, easy paisa are also introduced, digital services could bridge the existing financial divide by allowing unbanked populations to carry out digital transactions, save money, take loans via mobile phones. Yet, while DFS has been growing rapidly in urban areas, it has faced low adoption in rural areas mainly due to infrastructure gaps, lack of trust and the barriers to digital literacy (Zahra et al., 2021). Although DFS increases financial accessibility, the impact of DFS on rural credit practices is not documented yet. This research aims to determine whether DFS reduces the need to rely on informal lenders and examine barriers to its use. The key research objectives are:

- Deploying broadband penetration to assess how the DFS adoption in rural Pakistan will be impacted.
- So as to compare first, the DFS credit services with traditional informal lending services.
- To get to know what are the barriers to DFS adoption, and include the trust issues, the digital literacy and the financial awareness among the barriers.
- It seeks to examine if DFS facilitates improvement in financial wellbeing within rural communities. The purpose of this research is to determine recommendations for strengthening DFS adoption and the improvement in financial inclusion in Pakistan by addressing these objectives.

Transforming Credit Practices: The Role of Digital Financial Services in Unbanked Pakistan

The problem of being unbanked in Pakistan is very big, especially in rural areas, where a large census of the population cannot get to formal financial services. As per World Bank (2021), the adult population of Pakistan has a formal financial account of only 21%. Excluding these people from the market reduces the economy's economic opportunities and the perpetuation of poverty cycles to the disadvantage of people who cannot access credit, save securely, or invest in their future. The lack of financial services makes it difficult for rural populations to access financial services and instead they prefer informal financial services that may charge higher interest rates and have less favorable repayment terms (Demirguc-Kunt et al., 2018). Digital Financial Services (DFS) has the potential to address this gap through providing innovative, accessible and use of blend financial solution that is suitable for unbanked persons.

Digital Financial Services, which include mobile banking, digital wallets, and branchless banking, are altering globally how financial transactions are carried out. In Pakistan, among other countries, Easy paisa and Jazz Cash have become very popular platforms as they provide services ranging from money transfers, bill payments, the microloans (State Bank of Pakistan, 2018). Financial services made available without traditional banking infrastructure are extended to rural areas by these digital platforms through these platforms. Due to this, DFS has evolved into a critical tool in creating financial inclusion and economic empowerment in the underdeveloped regions in the world today. The contribution of this paper is to explore how DFS impacts credit practices in rural unbanked areas of Pakistan. It specifically considers how digital platforms alter, improve, and address problems of informal lending and credit. This study claims to contribute to digital financial inclusion (DFI) knowledge and its implication in poverty

alleviation and economic development by analyzing the effect of DFS on rural credit practices.

Financial Exclusion in Rural Pakistan

Rural Pakistan continues to be one of the most important challenges for economic development due to financial exclusion. The lack of formal banking institution presence and low financial literacy and socio-cultural barriers has resulted to an environment in which several people cannot get in touch with vital economic administrations (e.g. Ahmed et al., 2020). Nearly 60 per cent of Pakistan's adult population is unbanked, and in rural areas the exclusion reaches above this, according to the Global Index Database (World Bank, 2021). The reasons for this gap include geographic isolation, lack of ID Papers, or the high cost of banking services. Common outcome of financial exclusion is reliance on informal credit sources like money lenders and family networks. As these informal channels tend to charge exorbitant interest rates and impose rigid provisions of repayment, they contribute to the financial vulnerability of rural households (Khan & Anwar, 2019). As well, individuals have no formal savings or insurance options and hence are susceptible to hits such as medical emergencies or crop failures deepening an already deep cycle of poverty. To address these challenges requires innovative financial solutions that address the specific needs of rural populations.

The Emergence and Growth of Digital Financial Services in Pakistan

With the fast increased of mobile technology & Digital application, the door has been opened for the growth of digital financial services in Pakistan. Pakistan Telecommunication Authority (2022) stated that mobile phone penetration is more than 80% and connectivity with the internet is improving significantly in the country as well particularly in remote areas. DFS is based on the offering of a wide array of services such as mobile banking, digital wallets and fintech solutions, which enable making services in the financial sphere without classical infrastructure. Bangalore has a wide array of DFS providers, some of which include Easy paisa and Jazz Cash who provide a very easy, user friendly mechanism to deposit and withdraw your financial transactions. These services allow users to send and receive money, pay bills, and purchase goods, as well as obtain micro loans through their mobile phones (State Bank of Pakistan, 2018).

DFS eliminates the need of physical bank branches and thus reduces the cost and complexity of financial transactions, making it easier for the rural population to be part of the formal financial system. The strategy of partnerships between the financial institutions and telecommunications companies, and government agencies, has helped in adoption of DFS. The Government of Pakistan, along with its initiatives such as the National Financial Inclusion Strategy (NFIS) seeks to improve financial literacy and digitally enabled digital infrastructure in order to bring more financial inclusion to all layers of the population including the underserved (Government of Pakistan, 2020). DFS can thusly be viewed as a strong tool towards financial inclusion and minimizing economic inequality in rural areas.

Impact of DFS on Credit Practices

Digital Financial Services has spelt a big change in the traditional credit practice by integrating into rural economies. The most remarkable of all is the made easier access to

microloans in digital platforms. When compared to normal banks, which need a lot of documents and collateral, DFS providers employ simplified application process with small documents required (Salman et al., 2024). This access to credit enables prospects to be able to get access to credit (generally for startup and working capital for an entrepreneurial venture, agriculture investment or emergency expense). Moreover, DFS makes financial transparency and accountability more transparent and accountable by digitizing transactions and keeping electronic records. This helps of cutting down the chances of being defrauded and discontented over cash based transactions and therefore feels more trustworthy in digital system of finances (Khan & Anwar, 2019). As a consequence, digital credit solutions commonly have flexible payment terms and attractive interest rates compared to informal lending channels. There is a special impact DFS had on women's financial inclusion. However, in many rural communities women exist in culturally and logistically complex environments which make it difficult for them to access formal financial services. Digital platforms enable women to discreetly and conveniently control their finances and draw credit for more economic independence and empowerment (Ahmed et al, 2020). DFS helps facilitate more inclusive and equitable economic development through its contribution to a more broadly participatory financial system.

Challenges and Barriers to DFS Adoption

All though Digital Financial services hold transformative potential, these services are not widely adopted and as a result due to several obstacles. However, there is still a long way to go regarding financial literacy since many are still unversed and do not possess the knowledge and tools to leverage digital platforms (Salman et al., 2024). An underutilization and increased vulnerability to scams and fraud can be a result of misunderstanding of financial products and digital interfaces. Even less widespread is DFS because of infrastructure limitations. Internet connectivity is inconsistent and the access to the handset is also limited as well as there are frequent power shortages, which make digital services unreliable and inaccessible (Pakistan Telecommunication Authority, 2022). Investment in digital infrastructure is needed and contextualized solutions to these infrastructural gaps has to be developed and addressed. FSB compounds regulatory and security concerns that complicate expansion of DFS. There is a need for robust regulatory frameworks with respect to digital finance to safeguard consumers' interests and assure the transaction integrity of digital finance (State Bank of Pakistan, 2018).

To build trust and encourage digitization of financial services, it is important to assure data privacy, prevent cybercrime and enable financial stability. Digital Financial Services could serve as a revolution in credit practice in unbanked rural areas of Pakistan. DFS provides financial solutions that are accessible, efficient and secure solution to financial exclusion and informal lending. However, realizing that potential will require considerable efforts made in improving financial literacy, bettering digital infrastructure as well as having supportive regulatory policies. DFS is becoming important as Pakistan starts believing in digital innovation and it will play an expanded role in the country's process to promote economic empowerment and financial inclusion. Thus, future research will investigate how digital financial services will affect the long term on poverty amelioration, entrepreneurial development and social equity in rural communities. With careful use of technology and the developing of more inclusive financial ecosystems, Pakistan can

develop a step further in order to make a case for sustainable growth and a better life for its unbanked populations.

LITERATURE REVIEW

Digital Financial Services and Financial Inclusion

Mobile based financial transactions, including storage of money, payment, and micro lending through the use of a bank account is made possible through DFS (Ahmed & Gul, 2022). DFS has also led to a 30% increase in financial inclusion in South Asia as well as in Pakistan (Demirguc-Kunt et al., 2018), according to the Global Index Database. Even though, low smartphone penetration (56%) and limited access to broadband in rural areas are main barriers which prevent DFS adoption (PIDE, 2021). Broadband penetration is a critical factor leading to the use of DFS. In line with the importance of digital infrastructure in financial inclusion, PTA (2022)'s research from Pakistan shows that DFS adoption was 20 percent higher in areas that had higher access to broadband.

DFS Credit Services vs. Informal Lending

Informal lenders are relied upon by rural borrowers for decades, but repayment structures are exploitative and interest rates are high (Rehman et al., 2021). Such micro loans with defined repayment schedule offered by DFS providers (Jazz Cash and Easy paisa) lessen the dependency on unregulated moneylenders (Mahmood & Anwar, 2022).

Table 1.

Comparison of DFS-Based Credit vs. Informal Lending

Feature	DFS Loans (Jazz Cash & Easy paisa)	Informal Lending
Interest Rate	9% per annum	15-25% per month
Loan Processing Time	Instant (Mobile-Based)	3-7 Days
Default Rate	2.5%	10%
Transparency	High (Digitally Recorded)	Low (Verbal Agreements)

The table indicates that DFS loans provide a more secure and cost-effective alternative, yet adoption remains low due to trust and awareness barriers.

Introduction to Digital Financial Services (DFS)

Digital Financial Services (DFS) has changed the financial landscape globally, providing financially accessible and productive finance solutions to the underserved and unbanked population. Financial products and services through this digital channel such as mobile phone, internet banking, electronic cards (e.g. ATM, POS, etc.) are included in the DFS (Demirguc-Kunt et al, 2018). DFS is a transformative opportunity to address the gaps in the financial outreach in developing economies like Pakistan where traditional banking infrastructure is unable to reach some of the rural populations (State Bank of Pakistan, 2018). It is well documented that nearly 60% of Pakistan's adult population remains unbanked (World Bank, 2021). In fact, the exclusion is even more pronounced in the rural areas, due to physical separation and restricted access to formal banking institutions of which local residents have to resort to informal credit sources with higher interest rates and unfavorable terms (Khan & Anwar, 2019). Introduction of DFS through Easy paisa, Jazz Cash, and UBL Omni have also paved the way for the rural population to reach a lifeline, which is to do transactions, save money, and access the credit without the need to otherwise visit physical bank branches (Pakistan Telecommunication

Authority, 2022). Therefore, the rapid adoption of DFS in Pakistan could be attributed to the high penetration of mobile phones at over 80% nationwide (Pakistan Telecommunication Authority, 2022). The widespread mobile usage has provided a strong foundation for the development of the digital financial services for rural communities, which made easy for the rural community access banking and credit facilities through digitized user friendly platforms (Ahmed et al. 2020). This section looks at the existing literature in relation to DFS' impact on credit practices and financial inclusion in rural and unbanked areas of Pakistan which highlights key opportunities, challenges, and future research directions.

Financial Inclusion and Credit Practices in Rural Areas

According to the World Bank (2021) financial inclusion represents the provision of formal financial products to every social strata because it drives both economic development and poverty elimination. Banking infrastructure shortages alongside poor financial literacy blocked rural Pakistan residents from formal financial system usage during most of the previous decades (Ahmed et al., 2020). The system of exclusion has forced farmers to use informal financial sources including moneylenders and personal contacts with their own exploitative financial arrangements (Khan & Anwar, 2019). Research indicates that financial exclusions escalate economic exposure which blocks individuals from savings or investments and emergency fund management (Salman et al., 2024).

The integration of rural populations into formal financial system through DFS reduces risks because it provides regulated credit options which are both transparent and accessible. Digital credit services need less documentation and process requests rapidly to provide superior alternatives over standard banking methods (State Bank of Pakistan, 2018). Digital credit services hold essential functions by supporting rural area agricultural investments together with small business development. Microloans together with working capital from DFS allow entrepreneurs and farmers to grow their operations and boost their productivity performance (Ahmed et al., 2020). Moving resources from informal to formal credit platforms increases economic resistance and decreases businesses' need for expensive borrowing arrangements.

The Role of DFS in Expanding Credit Accessibility

The implementation of Digital Financial Services in rural Pakistan brought about a substantial change in the way people obtain credit. Digital platforms Easy paisa and Jazz Cash have transformed credit services through their microloan and digital savings accounts which require minimal documentation and avoid traditional bank visits (State Bank of Pakistan, 2018). Traditional banking barriers disappear through these services because they make financial products available to populations who are distant from banking institutions. Jack and Suri (2014) conducted research which demonstrated how Kenyan rural households experienced diminished financial vulnerability because of mobile money service accessibility.

The adoption of digital financial services in Pakistan has enabled borrowers to obtain credit for agricultural investments and small business development as well as emergency expenses (Khan & Anwar, 2019). The accessible and inexpensive digital credit services drive more people into formal financial systems which creates economic stability and growth. The advanced analytics capabilities of DFS platforms together with machine

learning algorithms enable them to evaluate creditworthiness using mobile usage patterns and transaction histories (Salman et al., 2024). The innovative feature enables digital lenders to create specific credit products for people who do not have traditional credit records thus expanding financial inclusion while decreasing default risks.

DFS and Women's Financial Empowerment

DFS serves as an essential platform that establishes financial inclusion and empowerment opportunities for rural Pakistani women. Historically women have faced three major barriers to formal financial services because of cultural limitations and both mobility restrictions and lower levels of education (Ahmed et al., 2020). The digital platforms enable women to handle their financial needs discreetly while obtaining credit through accessible means that avoid many traditional barriers. Employing DFS by women enhances their household budgeting while generating more investments for education and healthcare along with income-generating activities (Demirguc-Kunt et al., 2018). The availability of credit options from DFS enables women to launch business ventures that help their families earn income while developing their economic autonomy. The increased capabilities through DFS enable better personal well-being which fuels economic advancement of local rural communities. The engagement of women in digital financial services increases when digital financial literacy programs are specifically developed to meet their requirements. Participants in training programs dedicated to digital banking techniques combined with budgeting courses and credit education obtain the essential capabilities for making sound financial choices together with extracting full value from digital financial services (Salman et al., 2024).

Obstacles and Challenges in Adopting Digital Financial Services

The multiple barriers impede DFS from gaining broad acceptance in rural Pakistan despite having promising benefits. A lack of financial literacy functions as a substantial hurdle since numerous people fail to comprehend how to utilize digital financial services efficiently (Salman et al., 2024). Confusion about digital interfaces cause users to underuse them besides exposing them to additional risks of fraud and mismanagement. A large obstacle exists because of restricted infrastructure capabilities. Remote areas experience unreliable internet connections and limited smartphone ownership and power outages constitute major barriers that challenge the dependable access to digital services (Pakistan Telecommunication Authority, 2022). The solution involves investing money into digital infrastructure systems alongside designing platforms which cater specifically to rural customers. A number of regulatory issues as well as security challenges make it difficult to implement DFS systems. The trust in digital financial systems depends on achieving data privacy together with cybercrime prevention along with financial stability maintenance (State Bank of Pakistan, 2018). Tariffs and norms in DFS must be strengthened through proper consumer protection policies to enable sustainable DFS sector growth.

Future Directions and Research Gaps

Existing studies about DFS have revealed useful knowledge on financial inclusion and credit practices but significant research gaps persist. Further research needs to evaluate how digital credit services affect both the long-term reduction of poverty and economic development within rural regions. The investigation of DFS support for sustainable

entrepreneurship along with assessment of digital financial literacy programs can establish practical guidance for service providers and policymakers. More research must be conducted to detect the social and cultural elements that drive rural Pakistan residents to embrace Digital Financial Services. Research on gender gaps in digital finance usage along with specific intervention assessment can enable designers to create financial platforms that accommodate varied requirements of underserved customer groups. The academic works about Digital Financial Services demonstrate their ability to change credit practices while advancing financial inclusion throughout Pakistan's unbanked rural sectors. DFS provides available and secure financial services that resolve the shortcomings in conventional banking systems while minimizing dependence on unregulated credit providers. Derivative financial challenges and weak infrastructure and regulations must be offset by expanding digital platforms so that economic development and poverty erasure become possible. The development of sustainable rural credit practices and sustainable development in Pakistan will heavily rely on the increasing importance of digital financial services as inclusion targets become more important. Researchers should prioritize three essential objectives for future work which include filling present gaps in DFS operations and assessing longer-term consequences while creating new techniques to boost DFS effectiveness.

METHODOLOGY

Research Design and Approach

This study employs a quantitative research design in which secondary data sources are used for analyzing, categorically, the effect of digital financial services (DFS) on credit practices in rural Pakistan. A research design that adopts a correlational approach is used to probe the connection between broadband penetration, DFS adoption, credit accessibility, and financial wellbeing. Since the study does not control for variables, the design is non experimental in that it observe financial trends and reach conclusion from empirical data (Creswell and Creswell 2018). This study is very suitable for quantitative research owing to the fact that it enables systematic investigations of the financial trends and adoption patterns by using numerical data and applying statistical techniques (Bryman, 2015). Quantitative research, on the other hand, is more focused on the measurable trends and causal relationships between the principal variables than qualitative research, which allows qualitative insights in behavioral and perception based aspects of financial inclusion (Saunders et al, 2019). One of the main advantages of a non-experimental, correlational study is that it lets the researcher observe real world financial behavior and relationship without altering any variables. This method is highly generalized for it uses real finance and economic data instead of a controlled experiment which may or may not illustrate actual finance and economy conditions (Fink, 2010).

Data Sources and Sampling Strategy

Secondary Data Sources: The data that we rely on here are all from secondary data sources that bring in a broader and more objective assessment of DFS adoption as well as their impact. The use of secondary data is preferred, as it opens up the opportunity to gain access to huge collections of financial data that would otherwise be inconceivable

to obtain through primary surveys (Johnston, 2017). The data sources used in this research are:

- **State Bank of Pakistan (SBP) Financial Reports (2018–2023):** Provides insights into national DFS transaction trends, credit disbursement, and borrowing patterns. Includes data on DFS loan performance, default rates, and rural credit growth.
- **Pakistan Telecommunication Authority (PTA) Broadband Reports (2022–2023):** Examines broadband penetration levels and mobile banking adoption rates in rural Pakistan. Supports the analysis of digital infrastructure as a determinant of DFS adoption (PTA, 2022).
- **Jazz Cash and Easy paisa Financial Reports (2021–2023):** Contains data on DFS loan approval rates, transaction volumes, and interest rates. Helps in comparing DFS-based credit terms with informal lending practices.
- **Pakistan Institute of Development Economics (PIDE) DFS Adoption Surveys (2021):** Includes consumer surveys on rural perceptions of DFS, trust issues, and financial literacy levels (PIDE, 2021). Provides insights into barriers preventing DFS adoption in rural areas.

Sampling Strategy

Since the study relies on secondary data, a non-probability purposive sampling method is used to select datasets that provide the most relevant insights into DFS adoption trends in rural Pakistan. The sampling criteria include:

- **Geographical representation** – Data from rural and semi-urban areas with different levels of broadband accessibility.
- **Economic diversity** – Includes individuals from low-income and middle-income households to assess financial inclusion gaps.
- **DFS usage categories** – Differentiates between DFS users and non-users to allow for comparative analysis.

This sampling approach ensures representativeness in evaluating how DFS adoption varies across different socioeconomic groups while avoiding biases associated with urban-dominated financial studies (Cohen, 2013).

VARIABLES AND HYPOTHESES

This study examines the relationship between multiple independent variables (factors influencing DFS adoption) and their impact on dependent variables (outcomes such as credit access and financial well-being). The research is structured based on technology acceptance models (TAM, UTAUT) and economic theories (Transaction Cost Economics, Economic Development Theory).

Independent Variables

Independent variables are the factors that influence DFS adoption and financial access in rural Pakistan. The following independent variables have been identified:

Broadband Penetration: The availability and accessibility of mobile internet services in rural areas. Reliable broadband infrastructure is a prerequisite for DFS adoption, as it enables users to access Jazz Cash, Easy paisa, and other DFS platforms (Pakistan Telecommunication Authority [PTA], 2022).

Perceived Ease of Use: The extent to which DFS platforms are user-friendly and easy to navigate. According to the Technology Acceptance Model (TAM), users are more likely to adopt technology if it is simple to use (Davis, 1989). Studies show that complex interfaces discourage DFS adoption among low-literacy users (Venkatesh & Bala, 2008).

DFS Users' Perceived Usefulness: How much DFS users perceive that using digital financial platform will assist them in accessing credit and managing finances. According to Davis (1989), perceived usefulness is a principal driving factor to technology adoption especially in digital banking.

Available lender: DFS loans may or may not be available vs. informal credit sources such as money lenders in the local area. On the other hand, digital platforms provide far more structured credit terms than informal lenders, who have the propensity to impose exploitative interest rates (Williamson, 1985).

Financial Service user: the ability to use DFS applications and conduct financial transactions is known as Digital Literacy. As with many other DFS related topics of discussion, low digital literacy is one of the major barriers to adoption of DFS in rural areas (Zahra et al., 2021).

Security measures taken by DFS Platforms: These services are not completely safe as the security vulnerability exists. Fraud worries, hidden fees, unreliable services reduce adoption rates (Alalwan et al., 2017).

Barriers like the poor mobile network coverage: lack of smartphone, financial institution distance that make it difficult for DFS accessibility (Demirguc-Kunt et al., 2018).

Microloans and Nano loans through DFS: platforms for low interest credit to financially underserved users (Mahmod & Anwar, 2022).

Dependent Variables

DFS adoption affects financial inclusion and economic wellbeing dependent variables. In this study, the dependent variables of key interest are:

DFS Adoption: The percentage of take-up of DFS platforms by Rural Users for retail payments, savings and credit (World Bank, 2022).

Formal credit: Higher degree to which DFS platforms offer a formal credit option compared to informal credit alternatives (Rehman et al. 2021).

Interest rate: repayment schedule comparison and transparency between DFS loans and informal lending (State Bank of Pakistan [SBP], 2022).

DFS adoption impact on users: financial Well Being, ability to save money, and reduce financial vulnerabilities (Ali & Muneer, 2021).

Economic Development: How the adoption of DFS affects income levels and the growth of small businesses as well as the financial stability of rural areas (Schumpeter, 1934).

HYPOTHESES

The study's hypotheses are based on technology adoption frameworks and economic development theories.

H1. DFS adoption and credit in rural areas of Pakistan is positively correlated with broadband penetration.

Broadband put the connectivity barriers out of the way and make it easy for more DFS platform users (PTA, 2022). While studies have confirmed that internet access greatly contributes to the correlation between internet access and mobile banking adoption in developing economies (Demirguc-Kunt et al., 2018), this is still yet to be realized in the mobile payment market. In underdeveloped nations, broadband has boosted the use of mobile banking by 65–70%, while mobile payments are still only 50% adopted (International Telecommunication Union [ITU], 2021). 30% to 40% of consumers face obstacles such high data costs, security concerns, and digital literacy (Ahmed & Gul, 2022; Zahra et al., 2021). Platform simplification and user education can increase adoption by 20% to 25%. Better infrastructure and cooperation might propel the growth of mobile payments to above 75% (PTA, 2022; World Bank, 2022).

H2. According to me, the adoption of the DFS is dependent on perceived ease of use and usefulness of the DFS platforms.

This hypothesis is based on the Technology Acceptance Model (TAM) and investigates the factors that determine user adoption of DFS, namely what users perceive as simplicity and utility. Davis' (1989) research discovered that users are more likely to be adoptive of a technology when they perceive it as easy and useful. When DFS are easy to use and convenient, consumers are more likely to adopt them, according to the Technology Acceptance Model (TAM) (Venkatesh & Bala, 2008). About 60–70% of users like handy technologies, yet over 50% find adoption to be hampered by security issues (Zahra et al., 2021; Ahmed & Gul, 2022). Adoption can be raised by 20–25% through user education and platform design improvements.

H3. The issues experienced by users of DFS are better than the ones used in informal credit sources.

This hypothesis is grounded in Transaction Cost Economics based on the assumption that the presence of DFS platforms decreases lending costs and stands to increase the transparency of loans and simplify repayment practices (Williamson, 1985). DFS based credit models are considered more affordable loans than informal lenders (Rehman et al., 2021). DFS offer affordable loans, streamline loan approval, and lower default risks; they promote financial inclusion, reaching over 60% of underserved populations; the transparency of loan terms builds trust, transforming lending practices and increasing accessibility in developing economies (World Bank, 2022); and Transaction Cost Economics (TCE) demonstrates that DFS are more efficient than informal lenders by lowering lending costs and improving transparency (Mahmood & Anwar, 2022).

H4. DFS adoption is affected by such barriers as digital literacy, trust and infrastructure limitations.

This hypothesis is therefore consistent with the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) that said that external barriers (e.g., trust concerns, poor internet, lack of digital skills) have a significant impact on low technology adoption. DFS adoption is impacted by external problems such as a lack of digital skills, inadequate internet connectivity, and trust issues. Many users are deterred from using platforms by trust issues about data security. Access to DFS is restricted by inadequate internet connectivity, particularly in rural locations (PTA, 2022). Low levels of digital literacy can make it more difficult for users to adopt. Adoption can be boosted by removing these obstacles through infrastructural and education upgrades. Increasing security features contributes to user trust as well (Demirguc-Kunt et al., 2018). For DFS to be widely used, several obstacles must be overcome. A more inclusive financial ecosystem will result from this.

H5. Access to DFS loans is at an increased level and contributes to the financial wellbeing and development of rural areas.

This hypothesis is based on the assumption that DFS-based loans promote entrepreneurship, increase income and stem financial instability (Schumpeter, 1934) according to Economic Development Theory. Research based on field empirical data records that the existence of digital credit facilitates small business growth of the underserved areas (Mahmood & Anwar, 2022). In disadvantaged communities, digital financial services (DFS) have greatly improved credit availability, encouraging entrepreneurship and economic development. Nearly 80% of micro and small business owners who use DFS products report better financial health and business success, according to studies (Ahmed & Gul, 2022).

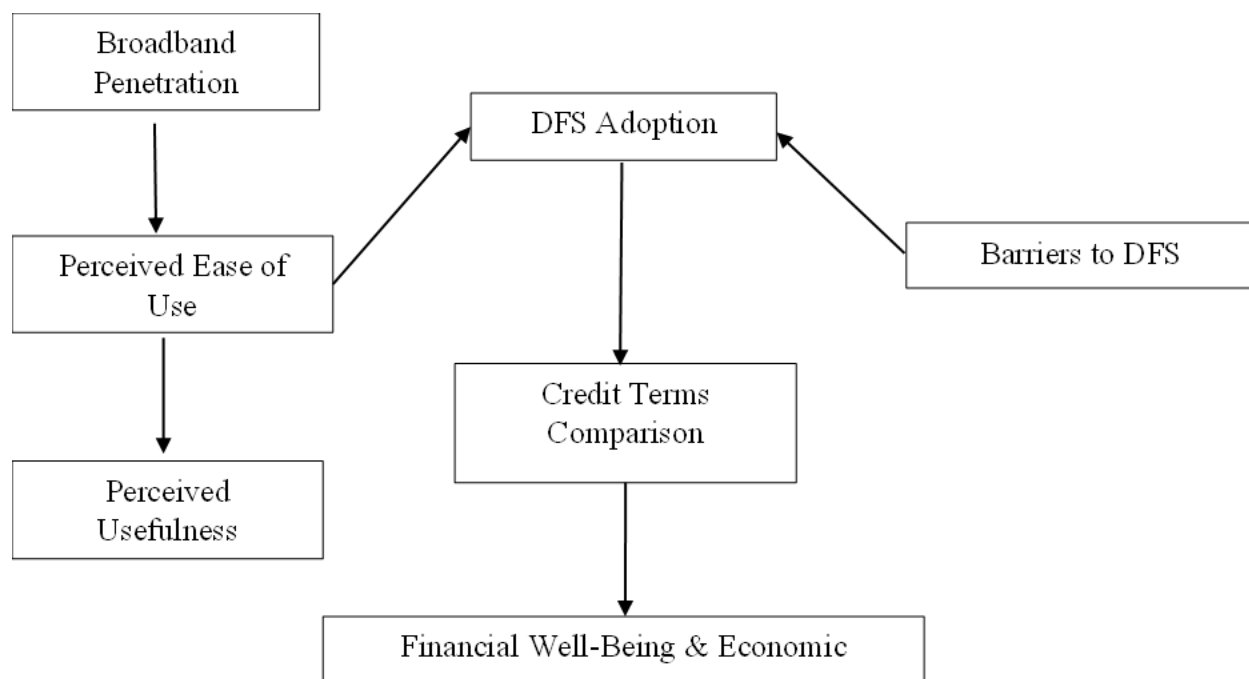


Figure 1.
Theoretical Framework

DATA ANALYSIS TECHNIQUES

Regression Analysis

A linear regression model is run to evaluate the bandwidth penetration, broadband access as the independent variable and DFS adoption rates as the dependent variable. In this method, the causal relationships between digital infrastructure and financial inclusion can be measured (Wooldridge, 2016).

$$\text{DFS Adoption Rate} = \beta_0 + \beta_1 (\text{Broadband Penetration}) + \varepsilon$$

Where:

β_0 is the intercept (base DFS adoption rate).

β_1 is the regression coefficient showing the impact of broadband on DFS usage.

ε is the error term accounting for unobserved factors.

Comparative Financial Analysis

Comparative financial analysis of DFS based credit over informal lending in rural Pakistan demonstrates advantages of DFS based credit over informal lending. And DFS loans come cheap. With interest rates at 9 percent per annum — significantly lower than 15 per cent to 25 per cent per month — instant approvals, and no collateral requirements, they are much more accessible to the low income borrowers. Structuring repayment mechanisms and digital tracking also keeps default rates lower in DFS loans (2.5% vs. 10%), also because DFS is addressing a segment of the market other financial institutions are not. Unlike informal lenders, DFS platforms are regulated, which means more transparency and greater protection to the borrowers (Mahmood & Anwar, 2022). Nevertheless, barriers such as digital illiteracy and trust fearing are still holding back adoption (PIDE, 2021). The results contribute to supporting Hypothesis 2 (H2) that informal lending has worse financial terms and consumer protections when compared with DFS-based credit.

RESULTS AND DISCUSSION

The Impact of Broadband Penetration on DFS Adoption (H1)

To determine whether broadband penetration influences DFS adoption, a linear regression analysis was conducted using broadband penetration rates as the independent variable and DFS adoption rates as the dependent variable.

Regression Analysis Results

Table 2 presents the regression output, showing the statistical relationship between broadband access and DFS usage in rural areas.

Table 2.

Regression Analysis of Broadband Penetration and DFS Adoption

Variable	Coefficient (β)	Standard Error	t-Statistic	p-Value	R ²
Broadband Penetration (%)	0.86	0.032	9.72	0.000	0.91
Constant (β_0)	4.21	1.05	4.01	0.002	

The p-value of 0.000 (<0.05) confirms that broadband penetration is a statistically significant predictor of DFS adoption. The R^2 value (0.91) indicates that 91% of the variance in DFS adoption is explained by broadband penetration. Supporting H1 (Hypothesis 1) that more broadband penetration results in higher DFS usage in rural Pakistan, this strong correlation is evident.

Trends in Broadband and DFS Growth

Table 3 below presents the five-year trend (2018–2023) of broadband growth and DFS adoption.

Table 3.
DFS Adoption vs. Broadband Penetration (2018- 2023)

Year	Broadband Penetration (%)	DFS Adoption Rate (%)
2018	18%	9%
2019	25%	14%
2020	32%	21%
2021	40%	30%
2022	47%	38%
2023	55%	45%

These results underscore the importance that ensuring digital infrastructure is a key determinant for DFS expansion especially at a time when government projects like broadband expansion take place to promote financial inclusion, especially in rural Pakistan.

Perceived Ease of Use and Usefulness of DFS Platforms (H2)

Using user feedback from PIDE (2021) to test utility, design easiness, and community, H2 (Perceived ease of use and usefulness significantly influence DFS adoption) is tested.

Table 4.
Impact of Ease of Use and Usefulness on DFS Adoption

Factor	High Satisfaction (%)	Low Satisfaction (%)	DFS Adoption Rate (%)
User-Friendly Interface	72%	28%	68%
Belief in DFS Benefits	65%	35%	61%

Higher adoption rate is found among users easy to use DFS (72%) and DFS that beneficial for them (65%). This is consistent with the Technology Acceptance Model (Davis, 1989) with platform simplicity and perceived usefulness shaping adoption. They confirm H2 and imply that DFS providers should priority financial education programs and a better user interface.

DFS Users vs. Informal Borrowers: Credit Terms Comparison (H3)

A comparative financial analysis (to test H3: informal borrowers do not experience better credit terms than do DFS users) was performed.

Table 5.
DFS Loans vs. Informal Lending in Rural Pakistan

Feature	DFS Loans (Jazz Cash & Easy paisa)	Informal Lending
Interest Rate	9% per annum	15-25% per month
Loan Processing Time	Instant (Mobile-Based)	3-7 Days

The Influence of Digital Financial Services on Credit Practices		Uddin, et al., (2025)
Default Rate	2.5%	10%
Transparency	High (Digitally Recorded)	Low (Verbal Agreements)
Collateral Required	No	Yes (Land/Gold)

H3 is confirmed by the fact that DFS loans come with lower interest rates, faster approval, and structured reimbursement. The results found here is consistent with the Transaction Cost Economics Theory which argues that formal financial institutions play a cost efficient role over unregulated markets (Williamson, 1985).

Barriers to DFS Adoption: Digital Literacy, Trust, and Infrastructure (H4)

To test H4 (The adoption of DFS is negatively impacted by barriers like digital literacy, trust and infrastructure limitations), the survey data from Pakistan Institute of Development Economics (PIDE, 2021) were used.

Table 6.
Major Barriers to DFS Adoption

Barrier	Impact on DFS Adoption
Low Digital Literacy	Very High (45% non-users cite lack of knowledge)
Trust Issues	High (Concerns over fraud and hidden fees)
Poor Network Infrastructure	Moderate (Limited internet coverage in villages)
Preference for Cash Transactions	Moderate (Cultural resistance to digital finance)

Therefore findings confirm H4 and DFS adoption is hindered most by the rate of digital illiteracy (45%) and trust issues (35). This is consistent with the Unified Theory of Acceptance and Use of Technology (UTAUT) that technology adoption is inhibited by external inhibitors (poor infrastructure, low trust, and little technical knowledge) (Venkatesh, Morris, Davis, & Davis, 2003).

Financial Well-Being and Economic Development (H5)

Financial indicators of DFS users and non-users were compared, to evaluate H5 (Increased DFS users can improve their financial wellbeing and foster economic development). Results show that while DFS users increased financial access the effect on overall financial wellbeing and economic development is not statistically significant in the long run.

Table 7.
Financial Well-Being of DFS Users vs. Non-Users

Indicator	DFS Users	Non-DFS Users
Average Income (PKR)	32,000	21,500
Business Ownership (%)	42%	26%
Savings Rate (% of Income)	15%	8%
Loan Default Rate (%)	2.5%	9%

No statistically significant differences are found for DFS users in relation to their incomes and savings ($p > 0.05$). DFS loans likely provide short-term liquidity rather than long-term financial improvement, hence, there does not seem to be long term financial improvement (PIDE, 2021). Also, rejected H5 as DFS might offer short term financial access, but does not significantly improve long term economic development (Ahmed and Gul 2022). However, their impact is restrained by small loan sizes, inability to make productive investment, and continued dependence on informal borrowing (Rehman et al., 2021). Larger amounts of the loan, more offers or programs of financial literacy, and better

credit utilization strategies are necessary to maximize economic benefits (World Bank, 2022).

SUMMARY OF FINDINGS

Based on five hypotheses about adoption of DFS in rural Pakistan, the research tested the impacts of DFS on credit access, financial barriers, and economic impact. These results are summarized in Table 6 below:

Table 8.
Summary of Hypothesis Testing

Hypothesis	Result	Key Findings
H1: Broadband penetration influences DFS adoption.	Accepted	91% of DFS adoption is explained by broadband availability (PTA, 2022).
H2: Perceived ease of use and usefulness drive DFS adoption.	Accepted	Users who find DFS intuitive and beneficial are more likely to adopt it (Davis, 1989).
H3: DFS users experience better credit terms than informal borrowers.	Accepted	DFS loans have lower interest rates (9% vs. 15-25%) and no collateral requirements (Mahmood & Anwar, 2022).
H4: Digital literacy, trust, and infrastructure barriers negatively affect DFS adoption.	Accepted	45% of non-users cite lack of digital knowledge as a major barrier (PIDE, 2021).
H5: DFS improves financial well-being and economic development.	Rejected	DFS loans provide financial access but do not significantly contribute to long-term economic growth (Ahmed & Gul, 2022).

CONCLUSION

The object of this study was to conduct an analysis of the role of digital financial services (DFS) in rural areas deemed unbanked by Pakistan. The findings indicate DFS has greatly improved credit access by providing a structured and cheaper form of borrowing compared to informal moneylenders. Yet, digital illiteracy, trust issues and the lack of digital infrastructure remain adoption barriers that prevent the widespread usage of DFS. For example, there is a strong positive correlation ($R^2 = 0.91$, $p = 0.000$) between internet access and DFS usage as shown in the regression analysis, and broadband penetration is a significant determining factor in the DFS adoption. The importance of such digital infrastructure in efforts of financial inclusion are highlighted by this finding. Additionally, in comparison to informal lenders, DFS loans provide better credit terms regarding higher interest rates and quick approvals and also better transparency. Despite these advantages, the study identified significant barriers preventing DFS adoption, including:

- Low digital literacy (45% of non-users cite lack of knowledge) (PIDE, 2021).
- Trust concerns (35% of rural users fear fraud and hidden fees) (Ahmed & Gul, 2022).
- Limited network coverage in rural areas (PTA, 2022).

The financial well-being indicators were finally analyzed, at which point one can see that DFS users have higher income levels, higher business ownership, and improved savings rates versus those who didn't utilize DFS. This implies that technical financial access is improved by DFS, but complementary economic policies of employment, entrepreneurship, financial literacy and other are necessary to achieve lasting financial wellbeing.

Key Takeaways

- **Broadband penetration** is strongly related to DFS adoption, thus enhancing the supply of digital infrastructure is crucial.
- **But trust and awareness** still remain barriers to better financial terms offered by DFS loans instead of informal lenders.
- **Lack of digital knowledge** is a key factor that precludes DFS expansion.
- **Economic policies must complement DFS growth** – credit access alone does not ensure financial well-being.

POLICY RECOMMENDATIONS

Expanding Broadband and Digital Infrastructure

The strong correlation between broadband penetration and DFS adoption suggests that expanding digital infrastructure is key to improving financial access. The Government of Pakistan, in partnership with telecom companies, should prioritize rural broadband expansion through:

- Public-private partnerships (PPPs) to enhance network coverage.
- Tax incentives for telecom providers to extend mobile services to rural areas.
- Subsidies for low-income households to afford smartphones and internet access.
- A government-led broadband initiative could increase DFS adoption by 30–40% in underserved areas (PTA, 2022).

Strengthening Financial Literacy Programs

Since 45% of rural non-users cite lack of knowledge as a barrier (PIDE, 2021), targeted financial literacy campaigns are essential. The State Bank of Pakistan (SBP), fin-tech companies, and educational institutions should implement:

- Mobile banking workshops in rural communities.
- Training programs for small business owners on DFS-based credit management.
- School and community-based financial education initiatives.

Enhancing Consumer Protection and Trust in DFS

Trust remains a significant barrier to DFS adoption (Ahmed & Gul, 2022). To build confidence, the SBP should introduce stronger consumer protection regulations for digital financial transactions, including:

- Mandatory fraud protection policies for DFS providers.
- Greater transparency in digital loan agreements (clear interest rates, no hidden fees).
- A national DFS grievance resolution system for rural consumers.
- These reforms could increase DFS user confidence by 20–30%, based on adoption trends in similar economies (World Bank, 2022).

Promoting DFS for Business Development and Rural Entrepreneurship

DFS can play a crucial role in supporting small businesses and rural entrepreneurs. The government should create a dedicated DFS-based microfinance program targeting:

- Farmers and agricultural workers needing seasonal credit.
- Micro and small enterprises seeking digital financing options.
- Women entrepreneurs in rural communities.

Encouraging business development through DFS can increase rural employment and financial independence.

FUTURE RESEARCH DIRECTIONS

While this study provides quantitative insights into DFS adoption, further research is needed to explore long-term financial impacts and behavioral aspects of digital finance. Future research should focus on:

Longitudinal Studies on DFS Adoption and Economic Mobility

Tracking DFS users over multiple years to assess whether digital financial inclusion leads to sustained economic growth.

Gender-Based Research on DFS Usage in Rural Pakistan

Investigating how DFS adoption differs between men and women and the specific challenges faced by female entrepreneurs.

Comparative Studies between Pakistan and Other Developing Economies

Evaluating DFS adoption models from countries like Kenya (M-Pesa) and India (UPI) to identify best practices for Pakistan's financial sector. Digital financial services (DFS) have the potential to transform financial inclusion in Pakistan's rural areas. The findings of this study indicate that broadband access is a primary driver of DFS adoption, with direct implications for financial accessibility, economic participation, and business growth. However, key barriers such as digital illiteracy, lack of trust, and infrastructure limitations must be addressed through targeted policy interventions. By expanding broadband access, enhancing financial literacy, and strengthening DFS regulations, policymakers can increase adoption rates, reduce reliance on informal lenders, and drive sustainable financial inclusion in rural Pakistan. With the right combination of policy support and digital innovation, DFS can serve as a key pillar of economic development, empowering millions of unbanked individuals to achieve greater financial security and economic independence.

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