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Assessing Financial Exclusion in Rural India: The Role of FinTech in Driving Inclusion

Barkha Rani[1,*] and Chandan Singh Dochania[1]

[1] *Department of ABST, University of Rajasthan, India*

Abstract: Financial inclusion is a crucial driver of economic development, enabling individuals to access essential financial services, manage risks, and invest in their future. However, rural India continues to face financial exclusion due to inadequate banking infrastructure, digital illiteracy, and systemic barriers. Financial Technology is a disruptive technology that has challenged the whole system of traditional banking, enabling banking at hand through mobiles and other digital platforms. The study measures the financial inclusion of rural communities. For that, a village named Kotputli-Behror district of Rajasthan state was chosen, and data were collected through a questionnaire to check the access and viability of financial services and FinTech services, respectively. Thus, this research investigates first the availability and access to financial services and the transformative impact of FinTech innovations, such as mobile wallets and digital payment platforms, in addressing the financial exclusion challenges faced by rural communities. Employing a qualitative methodology, the study utilizes structured surveys to assess traditional banking penetration, financial accessibility, and FinTech adoption patterns. The findings reveal that FinTech has significantly enhanced financial access, particularly for younger demographics and women, thereby bridging the financial divide. However, despite this progress, challenges persist, including inadequate infrastructure, digital literacy gaps, and gender disparities. To overcome these hurdles, the study underscores the imperative need for targeted policy interventions, digital literacy programs, and infrastructure development to amplify FinTech's potential in fostering inclusive and sustainable financial ecosystems in rural India.

Keywords: FinTech, financial inclusion, digital literacy, rural India, digital applications

1. Introduction

Financial inclusion is a critical component of economic development, enabling individuals and households to access basic financial services, manage risk, and invest in their futures [1]. Despite its importance, financial exclusion remains a pervasive problem in rural India, where a significant proportion of the population continues to lack access to formal financial services. According to Demirgüç-Kunt [1], approximately 48% of India's adult population remained unbanked, with rural areas disproportionately affected. The Third Plenary Session of the 18th Central Committee of the Communist Party of China (CPC) formally put forward the concept of digital finance and regarded the development of digital inclusive finance as an important initiative to promote the construction of the financial market system [2].

FinTech, through its ability to provide digital and mobile-based financial services, has emerged as a potential game changer in bridging this gap [3]. "FinTech" – short for financial technology – is the assimilation of technology into financial services to improve or automate and disrupt financial systems. FinTech, which harnesses technology to deliver financial services, has emerged as a promising solution to tackle financial exclusion in rural India. The integration of technology with finance has shown exponential growth because it promises to make financial services more accessible, especially for people who have been overlooked or marginalized in the past [4]. FinTech enterprises in India are increasingly gaining prominence as the Government of India persistently endeavors to extend financial services to the underbanked segment of the population. Digital technology has emerged as a key driver of financial inclusion, facilitating greater access to financial services and promoting economic growth [5]. To reach the underbanked population segments and provide a stable operational ecosystem for fintech businesses, India must prioritize strengthening financial inclusion [6].

The study particularly focuses on the rural area of the Kotputli-Behror district of Rajasthan state as it serves as an important focal point for this research due to its distinct socioeconomic characteristics. Located where rural and semi-urban areas meet, it provides valuable insights into the challenges and opportunities that rural areas encounter when adopting financial technology (FinTech) solutions. In an attempt to demonstrate how technologically driven financial tools may empower marginalized people and promote economic progress, the study will examine the financial practices, demographic trends, and degrees of digital involvement in this area.

This research aims to provide evidence-based recommendations for the reach of FinTech and an inclusive financial environment in rural areas. This is an effort to address the problems of low digital literacy, lack of infrastructure, and systemic inequalities that impede access to financial services.

2. Literature Review

India, being one of the world's fastest-growing and most populous nations, still struggles with financial exclusion, especially

***Corresponding author:** Barkha Rani, Department of ABST, University of Rajasthan, India. Email: barkha@uniraj.ac.in

in rural and tribal areas, where limited access to formal banking services restricts economic progress and perpetuates poverty [6]. Millions of people rely on finance sector solutions, which cover diverse needs through safe options for saving money and microloans, along with insurance products and trustworthy payment and fund transmission services. Unfortunately, due to restricted access to formal financial channels, many are forced to use non-formal, unregulated alternatives that often prove unreliable, insecure, and costly [7]. Dev [8] emphasizes that financial exclusion goes beyond banking access, citing barriers like low income, geography, and documentation issues that limit access to credit, insurance, and other essential financial services. The proliferation of FinTech startups has brought about a significant transformation in the financial industry. A number of inventors are sharing firm beliefs that their technology can transform the way banking is done, potentially reshaping the financial landscape in the long run [9].

FinTech, a relatively new concept in the financial sector, has gained widespread attention for its innovative application of technology in financial services. According to Puschmann [10], financial technology (FinTech) is broadly defined as the application of technological innovations to deliver financial services and improve accessibility, efficiency, and user experience. Chishti and Barberis [11] suggested that the development of systems that are not only more efficient but also more accessible to all is the power of FinTech to disrupt conventional financial models. As a key area of investment for top financial firms, FinTech has witnessed rapid implementation, resulting in its widespread adoption across various domains, transforming the way financial services are delivered and consumed [12]. The advent of FinTech has revolutionized the financial services sector, transforming the way individuals and businesses interact with financial institutions [13]; however, the FinTech revolution also poses significant challenges and risks to traditional banking models. The increasing adoption of digital payment systems, mobile wallets, and online lending platforms has disrupted traditional banking channels, forcing banks to adapt to the changing landscape [14, 15]. The significance of formal financial systems in rural development has a long record, as attested by the work of Binswanger and Khandker [16]. Using their analysis, they showed the relevance of organized (and hence physical) financial services in promoting growth in rural areas. The Reserve Bank of India (RBI) has been working hard to bring more people into the financial system. To achieve this goal, they've introduced various initiatives and partnered with banks to make financial services more accessible. By creating a supportive environment and providing guidance, the RBI is helping banks reach more people and promote financial inclusion across the country [17]. The strategic extension of digital platforms has an important potential to help promote financial inclusion for those historically underserved or excluded. Through a secure, transparent, and cost-effective platform, digital platforms can provide a variety of financial services and products, closing the gap in financial inclusion and enabling marginalized communities to participate in the formal economy [18]. Chen et al. [19] reviewed prior studies that emphasize the transformative role of FinTech in reshaping financial services through digital innovations such as mobile payments, online lending, blockchain, and big data analytics and provided a detailed examination of the interplay between FinTech development and the growth of the digital economy in China. Further, the study by Cnaan et al. [20] in South India provides an example of how combining digital tools into rural financial initiatives has allowed them to serve more constituents and work more efficiently and thus balance the rural financial inclusion gap.

The integration of FinTech in promoting financial inclusion presents a dual scenario, marked by both opportunities and challenges. The study by Beck [21] suggested there is a need for an equilibrium-driven approach to the advantages of open financial access and the risks associated with cybersecurity breaches and data privacy. While facing these challenges, research from rural India offers empirical evidence to show what FinTech can bring about. Dwibedi et al. [22] noted the positive impact of FinTech innovations, such as micro-insurance and payment gateways, which stimulate economic growth, reduce poverty, and improve the livelihoods of rural communities. These findings are corroborated by Li et al. [23], who demonstrate that FinTech solutions have contributed to improved incomes and economic growth in rural areas. As FinTech continues to evolve, it is crucial to prioritize responsible development and implementation, ensuring that its benefits are equitably distributed and its risks mitigated.

The transformative impact of FinTech on financial inclusion in developing economies has been extensively researched. Hauswald and Marquez [24] and Sangwan et al. [25], who discuss this development, suggest that technological development (mainly information technology) was important for enhanced competitiveness and innovation in financial services. In addition, Standar and Kozera [26] demonstrate how these advancements can reduce socioeconomic inequalities, more specifically, thanks to local finance that can compensate for the existing inequalities of rural communities. The evidence shows a strong correlation between the spread of FinTech into developing countries and the level of financial inclusion. For instance, the ability of mobile-based FinTech services to greatly extend the reach of finance to rural India [27] shows the capability of FinTech to close the financial divide.

3. Objective

1) To understand the current state of financial inclusion in the rural region of the Kotputli-Behror district.
2) To quantify the relationship between FinTech adoption and access to formal financial services.
3) To offer data-driven insights into how FinTech solutions can help overcome financial exclusion challenges in rural communities.

4. Research Methodology

This research employs a qualitative methodology to assess traditional banking penetration, financial accessibility, and FinTech adoption patterns and to explore the relationship between FinTech adoption and financial inclusion in rural areas. The dataset for analysis is derived from 150 structured responses that were uploaded through Google Forms and originated from the population in the Kotputli-Behror district of Rajasthan state. The survey was designed to capture firsthand insights into access to financial and FinTech services and the role of the adoption of FinTech services in enhancing financial inclusion. The study utilized a combination of convenience sampling and targeted sampling to include respondents who are users of mobile phones or FinTech services. The research employed convenience sampling with targeted sampling methods to include mobile phone users and users of FinTech services. The survey collected data in three key areas. First, demographic information, including age, gender, occupation, education, and income levels, was gathered to contextualize the respondents' financial behaviors. Second, financial inclusion indicators were examined, covering bank account ownership, account types, frequency of usage, and access to savings and credit facilities. Lastly, FinTech adoption indicators were assessed, focusing on mobile phone penetration, digital literacy, and the use of services such as mobile wallets and digital payment platforms.

Methodologically, the study is divided into two core components: (i) access to financial services and (ii) access to FinTech.

The analysis evaluated rural consumers' use of institutional financial services together with their related challenges, following a close assessment of their usage patterns. The research evaluates financial integration by understanding how often people use FinTech services and at what level. The research framework delivered an in-depth analysis of traditional banking access as well as FinTech innovation to explain obstacles and potential pathways for rural financial inclusion development.

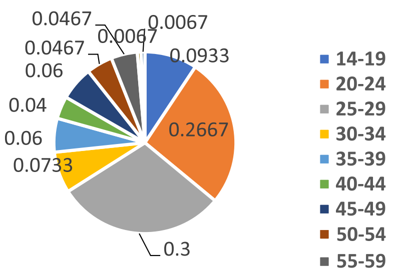
5. Findings and Analysis

5.1. Access to financial services

This analytical research advances through two systematically arranged dimensions. The initial research dimension investigates how many financial resources reach the rural residents of the Kotputli-Behror district. The research investigates the effectiveness of regional people using formal financial services and products because this forms an essential part of the study.

The study undertook a comprehensive survey of 150 individuals, strategically selected from diverse rural areas within the Kotputli-Behror district. A broad range of participants with diverse age backgrounds was selected deliberately to achieve representational and inclusive results so researchers could obtain a deeper understanding of the studied phenomenon. Figure 1 shows the age-wise participation of individuals in the study, with a majority of respondents being in their 20s (representing more than 50%); the participation of the young generation is much higher as compared to those aged above 30. Within this demographic from individuals aged 14–19 in comparison to 20–24 and 25–29 is significantly low since most teenagers don't have access to mobiles. However, a significant portion accounting for 9.33% have access to mobiles, are inclined, and are motivated to use FinTech. In contrast, in older respondents, especially those aged 60 and above, participation is comparatively low.

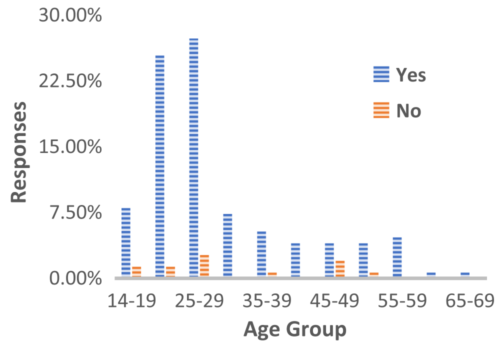
Figure 1
Age-wise participation



Moving forward, as can be seen from the above graph, there is comprehensive participation in the survey. Let's move to see how these diverse populations have access to financial services through their ownership of bank accounts, gender-wise access to bank accounts, challenges faced, etc.

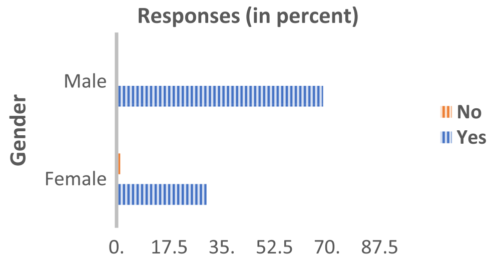
The study analyzed the ownership of bank accounts by different age groups, to provide important information as to who is benefiting from the provision of financial inclusion. The study analyzes the ownership of bank accounts by different age groups. Figure 2 reveals significant insights into financial inclusion across different age groups. Analysis shows that the highest percentage of respondents with bank accounts falls in the 20–24 and 25–29 age groups, aggregating over 50% of the responses, indicating strong financial inclusion among young adults. This trend is further reinforced by the

Figure 2
Age-wise ownership of Bank Account



correlation between participation rates and bank account ownership, where the highest participation rate (25–29 years) aligns with the highest bank account ownership (27.33%). This implies that youths are actively involved in financial transactions and are taking ownership of their financial lives. However, there is a notable decline in bank account ownership beyond the 30–34 age group and among older age groups, highlighting the need for targeted initiatives to promote financial inclusion among these demographics.

Figure 3
Gender-wise ownership of bank account



Furthermore, the study highlights a significant gender gap (Figure 3) in financial inclusion, with 68.67% of men having bank accounts compared to only 30% of women. Despite this disparity, the data show that only 1.33% of women have no bank account, indicating that the majority of women (30%) in the surveyed population are financially included. Women have also helped narrow the gap in mobile financial services, representing progress in financial inclusion. However, targeted initiatives focused on addressing women's unique needs and challenges are necessary to further bridge the gender gap.

Accessing formal financial services remains a significant challenge for marginalized populations, particularly in rural areas. Factors such as high maintenance costs, minimum balance requirements, and inadequate infrastructure [28] continue to impede progress. As depicted in Figure 4, the majority (69.33%) of respondents identify distance to bank branches as the primary obstacle to accessing formal financial services. Additionally, 21.33% of respondents identify insufficient information about available services as the biggest obstacle that prevents them from participating in banking services. Further, 8% point to high costs, and 1.33% point to transaction charges, minimum balance enforcement, and document complexities as additional barriers.

Conventional banking systems have struggled with servicing rural regions, where providing financial services is frequently hindered by high operational costs. The lack of formal financial

Figure 4
Challenges faced in accessing formal financial services

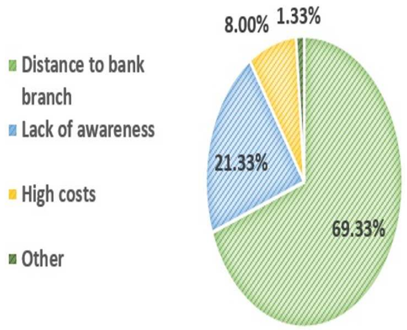
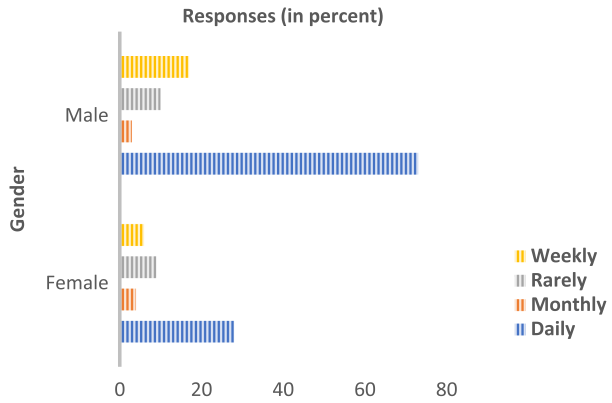


Figure 5
Frequency of usage of FinTech-based financial services



services has led to widespread reliance on informal channels among millions of rural Indian residents, who are often forced to navigate unregulated lending practices, whether viewed positively or negatively, as well as unsecured and often exploitative financing schemes that are frequently unfair, inaccessible, and inadequate. Financial inclusion is important, as it allows people to access key banking services, get better at handling their finances, and conduct business with the formal economy.

An array of continuing obstacles has led individuals to use FinTech-based services because they deliver improved reach while simplifying payment procedures and slashing costs. Surmounting conventional obstacles through digital networking platforms, enabling FinTech solutions to deliver efficient financial inclusion services, which connect the population to formal financial systems. FinTech innovations have accomplished their greatest achievements in financial services through the advancement of mobile payments and online credit platforms along with digital wallets. The technologies support wider accessibility while decreasing transaction fees and boosting financial system operational performance.

5.2. Access to FinTech

FinTech has a significant impact on financial inclusion in India, with various studies highlighting its positive effects. A study by the found that digital finance has increased access to financial services, particularly in rural areas, and has reduced the cost of financial transactions. A separate study conducted by the National Payments Corporation of India revealed that the Unified Payments Interface (UPI) has played a pivotal role in promoting digital transactions, with over 1 billion transactions occurring in 2020 alone.

FinTech is booming in India, drawing broad attention and a significant amount of investment from financial sector policymakers. Traditionally, this sector has thrived by focusing on expanding access to the financial system with those from the margins historically ignored or sidelined [4]. In general, this second dimension of the study tries to identify the role of FinTech in facilitating financial inclusion in the rural areas of the Kotputli-Behror district. It particularly focuses on the implications of FinTech services and the accessibility of key financial products such as payments, account services, credit facilities, investments, and insurance.

Mobile phones have become a vital tool for conducting financial transactions, reflecting the increasing adoption of digital financial services across various demographics. Figure 5 shows the reliance on mobile phones for financial transactions among males and females. Both genders prefer the use of FinTech-based services to make financial transactions almost every day or once a week. A significant portion of the respondents, that is, 48.67% of males and 18.67% of females in the rural division, are opting Fintech-based services on a daily basis. However, when it comes to daily use cases, there is a notable difference: men are more likely than women to utilize FinTech-based services. The frequency of weekly mobile financial service usage also reveals a high disparity between genders, with 11.33% of males and 4% of females using these platforms weekly. On the contrary, monthly usage keeps fluctuating evenly among both genders, with rates of 2% for males and 2.67% for females. There is almost no gap in rare usage patterns; 6.67% of males and 6% of females say they sometimes engage with mobile financial services.

Despite the differences, a notable pattern has appeared: rural women are increasingly using digital platforms with amazing frequency, which indicates positive and deep financial inclusion and digital literacy from FinTech solutions. Overall, the high frequency of daily and weekly usage suggests a growing adoption of mobile financial services, with the potential for further growth in this area. Despite a shared trend toward increased FinTech-based financial activity among both men and women, it exposes the existing gap to ongoing challenges for women – a lack of digital proficiency, fewer opportunities for accessing technology, and diminished financial autonomy.

FinTech leverages technology for delivering a wide range of services. Key components include digital payments, which facilitate quick and secure transactions directly from a bank account or digital wallets, innovative lending and borrowing platforms that provide easier access to credit, and investment services like robo-advisors that democratize investing by offering automated financial planning with lower fees. Furthermore, InsurTech introduced advancements to the insurance industry by improving processes for insurance policy acquisition and management functions. To meet personal financial needs, users rely on tracking tools that manage their spending alongside budget creation features, while blockchain technology enables secure, transparent transactions with cryptocurrencies. In reference to rural areas (Figure 6), among various services offered by FinTech firms, digital payments are most popular among younger age groups (20–29), which makes sense given their high mobile usage. On the other hand, insurance and investment activities are more common among the 25–29 and 30–34 age groups, likely because people in these stages are becoming more financially independent and stable.

The adoption of FinTech has been exponentially increasing among individuals in the 20–29 age group, which perfectly aligns with the findings revealed in Figure 7, with the majority of the

Figure 6
Age-wise usage of FinTech-based services

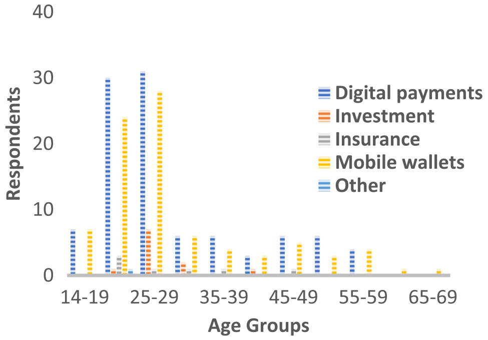
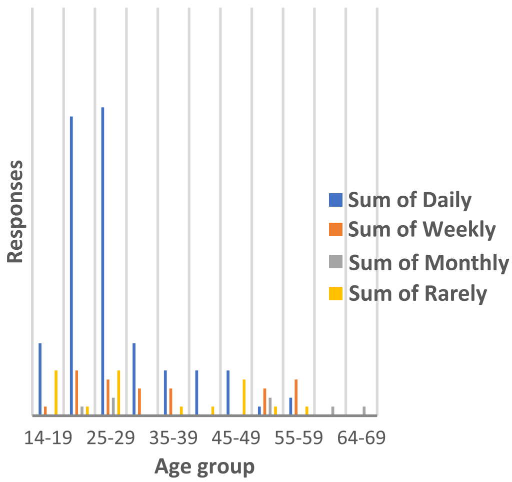


Figure 7
Frequency of usage of FinTech-based services



young respondents being daily users of FinTech services: 22% of individuals in the 20–24 age group and 22.67% in the 24–29 age group, respectively. However, the trend diminishes as the age increases, with middle-aged and older groups, such as 35–39 (2%), 40–44 (3.33%), and 45–49 (3.33%), with only a small fraction using these services daily. They prefer to use their mobile phones less frequently for financial purposes. The usage is nearly negligible among individuals aged above 60, with only 0.67% using it on a monthly basis, highlighting a clear generational gap in digital engagement.

When we look at this alongside earlier data on how frequently people use their phones for financial transactions and the popularity of mobile wallets and digital payments, it is clear that FinTech is making a notable difference in financial behavior. The ability to make day-to-day transactions and access user-friendly financial tools signifies that FinTech can help grow underserved rural communities by providing the convenience, affordability, and flexibility of a mechanism.

Nevertheless, while age represents one element in understanding complex FinTech adoption, it is crucial to examine other factors, such as occupational intersection with the use of FinTech-based financial services. The analysis reveals a pronounced inclination toward digital payments and mobile wallets as the most widely used financial services, particularly among students, private employees, and self-employed individuals, who exhibit a clear preference for easy, quick, and accessible transaction methods (Figure 8). This trend aligns seamlessly with the earlier observation of high engagement in digital payments and daily mobile financial transactions among younger age groups, specifically those aged 20–24 and 25–29. Notably, government employees demonstrate a balanced use of both mobile wallets and digital payments, whereas insurance and investment services are conspicuously underutilized across most occupational groups, with students and the unemployed showing minimal engagement in these areas. This pattern displays FinTech's broad potential to service different financial demands among the workforce while revealing the necessity to direct initiatives toward advancing the adoption of insurance and investment products, mainly for students and self-employed and unemployed populations so they can achieve complete financial stability.

Figure 9 illustrates how different occupational groups use FinTech-based financial services to gain insight into digital financial behavior patterns. Statistics show significant usage patterns that differ dramatically between jobs and demonstrate the frequency with which users access mobile wallets and digital payments and FinTech tools for daily, weekly, monthly, and exceptional financial operations. Students, for example, emerge as the most frequent users of FinTech services, with a substantial proportion engaging in daily transactions. This reflects their reliance on digital payments and mobile wallets for routine financial needs, likely driven by the convenience and accessibility that these platforms provide. Private employees also demonstrate a strong tendency toward daily usage, further reinforcing the role of FinTech in facilitating seamless financial transactions for those in this occupational category. These findings align with prior observations that younger age groups, particularly those aged 20–24 and 25–29, are the most engaged in daily mobile financial activities, underscoring the intersection between age and occupation in shap-

Figure 8
Occupation-wise usage of FinTech-based financial services

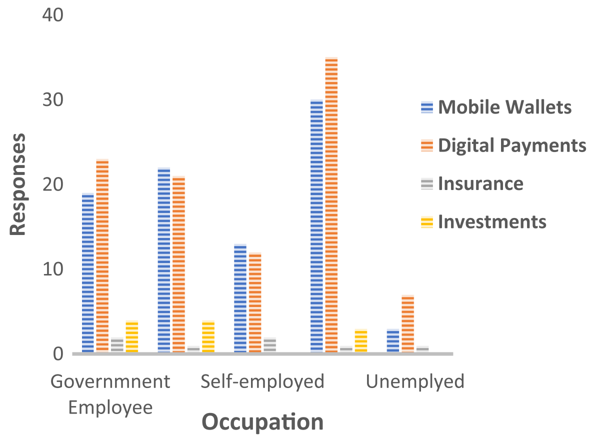
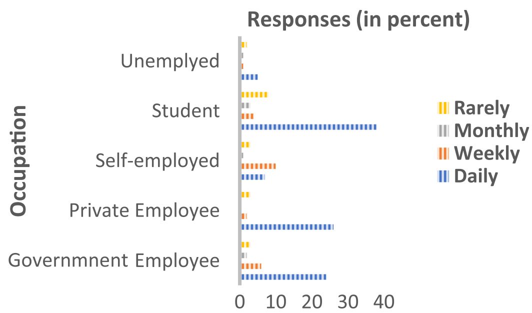


Figure 9
Frequency of usage of FinTech-based financial services by occupations



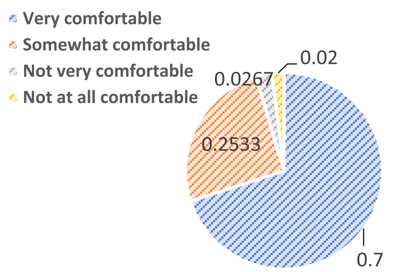
ing financial behaviors. Government employees, on the other hand, display a more balanced usage pattern, with many individuals opting for weekly or monthly interactions with FinTech services rather than daily engagement. This suggests a consistent but less intensive reliance on digital platforms, potentially reflecting the nature of their financial activities, which may not necessitate frequent transactions.

The self-employed exhibit a mixed pattern of usage, with a significant number engaging weekly and others utilizing FinTech services on a daily basis. This variability may be attributed to the diverse financial needs and cash flow cycles inherent to self-employment, which influence the frequency of digital financial interactions. Meanwhile, the unemployed stand out for their infrequent use of FinTech services, with the majority reporting rare or monthly interactions. This limited engagement mirrors their lower overall participation in financial activities, as previously highlighted in Figure 8, where their use of long-term financial products like insurance and investments was also minimal. These findings point to systemic challenges, such as limited financial resources, digital literacy gaps, and access barriers, which disproportionately affect this group and hinder their inclusion in the FinTech ecosystem.

This study provides valuable insights into the utilization and frequency of FinTech-based services, with a specific emphasis on assessing the adoption of FinTech among rural individuals. The widespread reliance on FinTech solutions emerges not just as a preference but as a necessity, driven by systemic barriers to accessing traditional financial services. In a broader sense, the data underscores the transformative potential of FinTech in driving financial inclusion and empowering the rural community.

The findings demonstrate that FinTech is not only reshaping financial behaviors but also emerging as a critical enabler of accessibility, affordability, and convenience in financial services. Figure 10 shows insight into the potential of FinTech and why the majority of the respondents use mobile-based financial services. A significant number of respondents, 70%, feel very comfortable using mobile-based financial services, while 25.33% feel somewhat comfortable. This shows that there is a positive attitude toward FinTech innovations. This indicates that digital financial platforms, such as mobile wallets and digital payments, are overcoming obstacles to access not only digital financial services but also traditional financial services where geography and lack of physical banking options are barriers. Yet, just 2.67% of respondents reported a not very comfortable response to these services, and 2% said they were not at all comfortable with them. This indicates rural issues – limited digital literacy, questionably stable internet access, and suspicion of digital platforms – that remain problematic. These issues particularly affect rural users and need to be addressed to enhance adoption.

Figure 10
Comfort level in using financial services



The integration of FinTech in rural areas has emerged as a pivotal catalyst for fostering financial inclusion. By leveraging digital platforms, mobile wallets, and digital payment systems, FinTech has successfully bridged the financial divide, extending essential financial services to the unbanked and underbanked populations. The positive impact of FinTech on financial inclusion in rural areas is evident, with significant improvements in access, convenience, and affordability. As FinTech continues to evolve, it is poised to play an increasingly vital role in promoting inclusive and sustainable economic growth in rural India. While the benefits of FinTech for India's financial inclusion are positive, there are challenges and limitations that necessitate attention and solutions. One of the major challenges is the lack of digital literacy and awareness about FinTech services, particularly among the rural population. Another challenge is the limited availability of digital infrastructure, such as internet connectivity and mobile networks, in rural areas.

6. Conclusion

The research conducted in the rural areas of the Kotputli-Behror district sheds light on the profound impact of FinTech on financial inclusion, bridging traditional gaps in access to formal financial services. The rapid adoption of digital financial tools, such as mobile wallets and UPI, has empowered millions in these remote areas to engage with the formal financial ecosystem.

Nevertheless, systemic disparities persist, and addressing these inequalities remains an imperative. Consistent with the findings of Klapper et al. [29], younger populations (ages 20–29) are higher adopters; this trend is due to the fact that younger individuals are generally better adjusted to technology and active (and naturally) smartphone users, who more readily embrace technological solutions like digital banking because older individuals tend to present challenges (low digital literacy, etc.). Unfortunately, older adults face serious obstacles, such as a lack of digital literacy, which makes specialist educational programs for them even more important. According to Bucciol et al. [30], financial literacy strategies focusing on older demographics' specific desires are eminently important to empower the same age group to not just deal with but excel with confidence in the digital financial sphere.

The gender gap remains a pressing concern, with women underrepresented in formal financial systems and digital transaction participation. To address this disparity, gender-focused initiatives, such as community-driven financial literacy programs, are essential for empowering women economically. However, the increasing adoption rate of digital platforms with remarkable frequency highlighted the positive impact of FinTech solutions in enhancing their financial inclusion and digital literacy among women in rural regions. This growing engagement reflects the transformative potential of FinTech in empowering women, breaking traditional barriers to access, and fostering deeper integration into the formal financial ecosystem. Furthermore, the same cannot be said of professionals who display somewhat less affection toward FinTech services, and these are students and private employees, because they are inclined to adopt convenience and are familiar with the digital medium. In contrast, the needs of self-employed individuals necessitate tailor-made financial solutions such as microloans [31]. While basic financial services, for example, banking, have shown promise for adoption, other products, such as life and investment insurance, for example, are underutilized. This highlights the need to increase financial literacy, enhance transparency, and streamline the process. Nevertheless, a large majority, accounting for 70% of respondents, said they were comfortable with mobile financial tools, seeing a growing trust in these innovative services. Bars to widespread adoption remain, though, as poor digital infrastructure and high transaction costs remain. However, FinTech has overcome these challenges and become a game changer, bridging the systemic gaps, empowering the economy, and promoting equitable growth in rural areas. However, FinTech companies have to maintain profitability in order to survive in the long run, offering low-cost services by leveraging technology and innovations and efficient business models. For instance, Gomber et al. [32] stated that the lower cost of FinTech operations is associated with fewer regulations and innovative technologies, contributing to higher profitability.

To fully harness the potential of FinTech, it is crucial to strengthen digital infrastructure, provide subsidies for internet access, and develop inclusive policies tailored to underserved regions. Governments and regulators play a pivotal role in supporting the sustainability of FinTech companies. Ehrentraud et al. [33] discuss how tailored regulatory frameworks can foster innovation while ensuring consumer protection and financial stability. Arner et al. [34] emphasize that sustainable development is preconditioned on financial inclusion, with FinTech acting as a key driver; they argue that supportive infrastructure and progressive policies are essential to harness the full potential of FinTech in achieving sustainable development goals. Wider adoption of UPI, digital lending, and neo-banking can enhance financial inclusion, while initiatives like "Bima Trinity" can improve insurance access. Supporting Micro, Small and Medium Enterprises (MSMEs) with cross-border payment solutions and fostering public-private partnerships for localized digital services will further drive adoption. These efforts will create a robust, inclusive FinTech ecosystem, empowering rural communities and boosting economic growth. To implement an effective digital literacy program in rural areas, the government should collaborate with local banks, Non-governmental organization (NGOs), and self-help groups to conduct hands-on training in regional languages. To bridge the financial divide, we must provide affordable financial services to underserved and underprivileged communities while empowering them through financial education and awareness. A platform that is cost-effective, widely accessible, and user-friendly is essential for catering to the needs of rural populations [35]. Mobile-based learning tools like WhatsApp chatbots and IVR systems can simplify concepts for users. Setting up FinTech kiosks for practical demonstrations and providing incentives for digital transactions will encourage adoption. Public-private partnerships can further support access to smartphones and internet connectivity, ensuring sustained engagement and financial inclusion.

To promote FinTech development, the government, financial institutions, and technology companies must collaborate through public-private partnerships, leveraging regulatory support, infrastructure, and innovation. Furthermore, a study by Chavan and Kamra [36] also highlighted that government initiatives have successfully increased formal bank account ownership in rural India, but the actual utilization of these accounts remains restricted due to underlying challenges such as limited financial resources, insufficient infrastructure, and lack of digital skills. Expanding regulatory sandboxes and the RBI Innovation Hub can facilitate the testing and refinement of new financial solutions. Secure data-sharing frameworks and standardized APIs will enhance interoperability between banks, FinTech firms, and government services. Joint digital literacy programs can drive financial inclusion, particularly in rural areas. Establishing a dedicated FinTech Council with representatives from all stakeholders can streamline policies and address challenges. These efforts will create a cohesive ecosystem that fosters innovation while ensuring financial stability and broader access to digital financial services. Ultimately, the study concludes that FinTech could play a major role in boosting the number of people served by the financial system and thereby improving financial inclusion.

Ethical Statement

This study does not contain any studies with human or animal subjects performed by any of the authors.

Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

Data Availability Statement

The data that support this work are available upon reasonable request to the corresponding author.

Author Contribution Statement

Barkha Rani: Methodology, Software, Validation, Formal analysis, Investigation, Writing – review & editing, Supervision, Project administration. **Chandan Singh Dochania:** Conceptualization, Software, Validation, Resources, Data curation, Writing – original draft, Writing – review & editing, Visualization.

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