

OPERATIONAL CHALLENGES AND OPPORTUNITIES: A STUDY OF DIGITAL FINANCIAL INCLUSION STRATEGIES IN SELECT COOPERATIVE BANKS OF PUNE DISTRICT

Anita Umesh Kelkar, Research Scholar, BMCC, SPPU, Pune

Dr J R Lanjekar, Vice Principal , Research Guide, BMCC, SPPU, Pune

Abstract

Digital financial inclusion has become an important component of India's financial-sector transformation, particularly as banking services increasingly move from branch-based delivery toward mobile banking, digital payments, internet banking and other technology-enabled channels. Cooperative banks occupy a distinctive position in this transformation because of their community orientation, local customer relationships and role in serving households, small businesses and relatively underserved segments. However, the digitalisation of cooperative banking also creates operational challenges relating to technological infrastructure, cybersecurity, digital literacy, employee capabilities, customer trust, regulatory compliance and integration with contemporary payment systems. This study examines the operational challenges and opportunities associated with digital financial inclusion strategies in selected cooperative banks of Pune District. The study adopts a quantitative, descriptive and analytical research design and proposes primary data collection through a structured five-point Likert-scale questionnaire administered to customers and relevant banking personnel. The study focuses on five major dimensions: digital accessibility, technological capability, digital literacy and customer support, security and trust, and operational/regulatory challenges, with digital financial inclusion effectiveness as the dependent construct. Data analysis is proposed through descriptive statistics, reliability analysis, correlation analysis and multiple regression using SPSS 27. The paper also outlines possible policy and managerial implications to enhance the digitally inclusive cooperative banking in Pune. This study is situated within the framework of the recent developments in financial inclusion and banking digitization in India, and relies solely on Indian sources published between 2020 and 2025.

Keywords: Digital Financial Inclusion , Cooperative Banks , Digital Banking , Financial Inclusion , Pune District , Cyber Security , e-literacy , Banking Operations , India---

1 Introduction

Financial inclusion in India has moved beyond the traditional objective of providing access to bank branches and deposit accounts. Increasingly, inclusion involves the ability of individuals and enterprises to access, understand and effectively use financial services through digital channels. Mobile banking, Unified Payments Interface (UPI), internet banking, electronic fund transfers, digital lending and other technology-enabled services have substantially altered the

way financial services are delivered. The Reserve Bank of India (RBI) has consequently placed increasing emphasis on expanding both access and usage while maintaining customer protection and financial stability. RBI's Financial Inclusion Index rose to 64.2 in March 2024 from 60.1 in March 2023 with improvement seen across its three parameters of access, usage and quality signifying continued progress in India's financial-inclusion ecosystem.

The change is especially significant for cooperative banks. Cooperative banks always had a close relationship with their local communities and have been involved in credit provision and access to finance to households, small businesses and other local economic actors. Kumar and Bhatnagar (2022) study at the National Institute of Bank Management, cooperative banks are important for financial inclusion and new models for their involvement in financial services are discussed. [NIBM India][2] Likewise, Nabeel and Sumathy (2022) state that cooperative banks still are an important instrument for providing financial services to the financially excluded sections of Indian society.

Also, co-operative banks have a specific digitalization challenge. The RBI's study of urban cooperative banks had found that digitalization had progressed significantly, especially through retail payment channels and mobile applications, but the digital index of the sector stood at only 41 out of 100 in 2021. Also, the study found significant differentiation among cooperative banks according to their type, deposit base and geographical region. ([Reserve Bank of India][4]) This indicates that the availability of digital technology does not automatically imply effective digital financial inclusion.

Pune District provides an appropriate context for investigating this issue because it combines a large urban population, industrial and commercial activity, expanding digital-payment usage and a significant cooperative-banking ecosystem. Cooperative banks operating in such an environment must simultaneously preserve their relationship-based service model and respond to increasingly digital customer expectations. Consequently, the question is not merely whether cooperative banks have adopted digital services, but whether these services are accessible, affordable, reliable, secure and usable by diverse customer groups.

The issue has become more complex because digitalisation introduces new operational risks. The 2024 report on digitalization in financial services by RBI points out the advantages of efficiency and accessibility of digital financial services, but is also concerned about cybersecurity, data privacy, third-party/vendor risk and consumer protection.

Therefore, digital financial inclusion should be viewed as a trade-off between the diffusion of technology and the capacity of institutions.

2. Review of the Literature

2.1 Financial Inclusion:

India The concept of financial inclusion has evolved from just having a bank account, to a multi-dimensional process of access, usage and quality. Demand-side financial inclusion in

India has been studied by Venumuddala (2020) using evidence from household and district level and showed the importance of taking into account the differences in financial access in the geographical and socio-economic setting.

The RBI has institutionalised this multidimensional perspective through its Financial Inclusion Index. The index incorporates access, usage and quality, thereby recognising that an individual having access to an account does not necessarily mean that meaningful financial inclusion has been achieved. March 2024 FI-Index for India at 64.2 points, signifying steady progress in financial inclusion; Highlights need to improve actual use and quality of services Agarwala, Maity and Sahu (2023/2024) examined the efficiency of Indian banks in facilitating financial inclusion and found that there were marked variations in the banks' ability to translate resources into inclusive financial outcomes.

The significance of this study is that it highlights the fact that the measurement of financial inclusion should not only be based on the availability of banking infrastructure, but also on the efficiency of institutions in providing inclusive services.

2.2 Cooperative Banks and Financial Inclusion

Historically, the cooperative banks have been a relationship based segment of Indian financial system. They are local, community based and can reach customers who may have barriers to mainstream banking.

Kumar and Bhatnagar (2022) studied the contribution of cooperative banks in financial inclusion and highlighted their potential role thru the emerging business models which are micro finance oriented . Their work demonstrates that cooperatively owned financial institutions may capitalize on local knowledge and deliver formal financial services.

Nabeel and Sumathy (2022) studied the role of cooperative banks as tool of financial inclusion and rural development. They note that because cooperative institutions are locally oriented and have close links to communities, they still have an important role in meeting the financial needs of the underserved.

But the cooperative bank model is also subject to structural and technological constraints. The RBI's 2022 study on UCB digitalization found that the extent of digitization was uneven, with smaller or differently structured cooperative banks possibly lagging behind better-resourced institutions.

2.3 Financial digital inclusion

Digital financial services have lowered the barriers of geography and transaction costs, creating opportunities to extend financial access. Affiliation Academic Indian Sharda University. The financial access enabled by technology is becoming ever more crucial. Asif et al. (2023) examined the role of fintech and digital financial services in financial inclusion in India.

The implications are especially pertinent for institutions working in an ever more digital market. Digital channels can help to reduce reliance on physical branches, improve transaction

convenience, and potentially increase access to financial services. But digital inclusion depends on users having the necessary technological access, confidence and knowledge. RBI analysis 2024: Digitalization is a double-edged sword It can improve customer experience, operational efficiency and access, but it also has cybersecurity, data-protection, third-party and consumer-protection risks. This duality forms an important foundation for the present study.

2.4 Operational Challenges in Cooperative Banking Digitalisation

Digital transformation requires cooperative banks to invest in technology, human resources, cybersecurity, data management and customer-support systems. The RBI's UCB digitisation study found that although payment-channel adoption had progressed, overall digital maturity remained incomplete.

The challenge is therefore organisational as much as technological. Employees should be able to assist customers on digital channels, resolve transaction problems and explain security processes. Customers also need a reasonable level of digital proficiency to independently operate banking applications and payment platforms.

Another important challenge is cybersecurity. In its 2024 discussion on digitalization, the RBI notes that growing interconnectedness and use of technology bring additional risks around cyber assaults, privacy and third-party service providers. Thus, the cooperative banks have to go in for digital growth without compromising on customer protection.

3. Research Gap

Existing Indian literature has examined financial inclusion, cooperative banking, fintech and banking digitalisation separately. However, relatively limited empirical attention has been directed toward the **operational challenges and opportunities associated specifically with digital financial inclusion strategies in cooperative banks at the district level.

The RBI's UCB digitisation study provides important sector-level evidence but also demonstrates substantial differentiation among cooperative banks. (Reserve Bank of India[4]) Kumar and Bhatnagar (2022) and Nabeel and Sumathy (2022) mentions the role of cooperative institutions in financial inclusion but do not focus on an empirical study at the customer level on the challenges of digital financial inclusion in Pune District. [NIBM India][2] The present study is an attempt to fill this gap. The present study attempts to understand the influence of accessibility, technological capability, technological literacy and support, security and trust, and operational/regulatory capability on the effectiveness of digital financial inclusion of selected cooperative banks in Pune District.

4. Objective of Study

Objectives of the study are as follows:

1. To study the level of Digital Financial Inclusion practices adopted by selected cooperative banks in Pune District.

2. To grasp the usability and accessibility of digital banking services provided by the cooperative banks.
3. To identify the main operational and technological challenges to digital financial inclusion;
4. To investigate the effect of digital accessibility, technological capability, digital literacy level, security and operational capability on digital financial inclusion effectiveness.
5. To find opportunities for improving digital financial inclusion thru cooperative banking institutions.
6. To make evidence based suggestions to reinforce the digital inclusive cooperative banking services in Pune District.

5. Hypotheses of the study

H1: Digital accessibility has a significant positive effect on digital financial inclusion effectiveness in selected cooperative banks of Pune District.

H2: Technological capability has a significant positive effect on digital financial inclusion effectiveness in selected cooperative banks of Pune District.

H3: Digital proficiency and customer support have a significant positive impact on the effectiveness of digital financial inclusion.

H4: Security and customer trust are important positive drivers for the effectiveness of digital financial inclusion.

H5: Operational and regulatory capability positively and significantly affects the effectiveness of digital financial inclusion.

6. Research Methodology

6.1 Design of Research

The research design of the study is **quantitative, descriptive and analytical. A structured questionnaire is used to obtain standardised responses from customers and relevant personnel associated with selected cooperative banks in Pune District. The descriptive component identifies the prevailing status of digital financial inclusion, whereas the analytical component examines the relationships between operational dimensions and digital financial inclusion effectiveness.

The design is appropriate because the study seeks to identify measurable relationships between specific dimensions of digital banking operations and financial inclusion outcomes.

6.2 Research Approach

A deductive approach is adopted. The hypotheses are developed from the existing Indian literature and institutional evidence concerning digital financial inclusion, cooperative banking

and banking digitalisation. The hypotheses are subsequently evaluated using quantitative statistical techniques.

6.3 Population of the Study

The population comprises customers and relevant employees of selected cooperative banks operating in Pune District. Customers are the main entity for measuring accessibility, usability, trust and inclusion outcomes, whereas bank staff offer a contextual understanding of operational and technological challenges.

6.4 Sampling Method

We can use purposive sampling for the selection of cooperative banks providing digital banking facilities like mobile banking, internet banking, UPI, electronic transfer or card based services. The eligible customers can be approached thru Branches and Digital Service Users within the chosen institutions.

6.5 Sample Size

For an empirical implementation, a sample of approximately **300 respondents** is recommended. This provides a strong foundation for descriptive statistics, reliability analysis, correlation and multiple regression in SPSS 27.

6.6 Data Gathering

The main data collection should be based on the structured questionnaire with the five point Likert scale: 1 = I completely disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree Secondary data will be collected from RBI publications, annual reports, cooperative-bank reports, government documents, and peer-reviewed Indian research published between 2020 and 2025.

6.7 Instrument of research

The questionnaire should cover the following: *** Demographic * Digital accessibility* Ability to use technology* Customer service* and technological literacy * Security & trust * Operational and regulatory capacity Effectiveness of digital financial inclusion.** There should be multiple items for each construct to allow for reliability and analysis at the construct level.

7. Data Analysis Framework

The collected data should be analysed using ****SPSS 27****. The analysis should proceed through data screening, descriptive statistics, reliability assessment, Pearson correlation and multiple regression.

The proposed regression model is:

$$**DFIE = \beta_0 + \beta_1 DA + \beta_2 TC + \beta_3 DLCS + \beta_4 ST + \beta_5 ORC + \varepsilon**$$

Where:

****DFIE**** = Digital Financial Inclusion Effectiveness

****DA**** = Digital Accessibility

****TC**** = Technological Capability

****DLCS**** = Digital Literacy and Customer Support

****ST**** = Security and Trust

****ORC**** = Operational and Regulatory Capability

****ε**** = Error term

A significance level of ****5% (p < 0.05)**** should be adopted.

8. Data Analysis and Hypothesis Testing

Using the **uploaded 300-respondent dataset**, I calculated the hypothesis tests from the construct-level mean scores. Because the workbook is explicitly a **simulated/illustrative dataset**, these results should be reported as illustrative statistical results rather than as evidence from actual bank customers.

Hypothesis Testing

Table 1. H1: Digital Accessibility and Digital Financial Inclusion Effectiveness

Model	β	t-value	p-value	R ²	Decision
Digital Accessibility → DFIE	0.522	10.56	<0.001	0.272	Accepted

The results indicate a positive and statistically significant effect of digital accessibility on digital financial inclusion effectiveness. The regression coefficient is $\beta = 0.522$, indicating that greater accessibility to digital banking services is associated with higher digital financial inclusion effectiveness. The relationship is statistically significant ($t = 10.561$, $p < 0.001$). The R² value of **0.272** indicates that digital accessibility explains approximately **27.2%** of the variance in digital financial inclusion effectiveness. Therefore, **H1 is accepted**.

Table 2. H2: Technological Capability and Digital Financial Inclusion Effectiveness

Model	β	t-value	p-value	R ²	Decision
Technological Capability → DFIE	0.541	10.44	<0.001	0.268	accepted

Technological capability demonstrates a positive and statistically significant relationship with digital financial inclusion effectiveness. The coefficient ($\beta = 0.541$) indicates that improvements in technological capability are associated with improvements in digital financial inclusion effectiveness. The relationship is highly significant ($t = 10.436$, $p < 0.001$). The R² of **0.268** indicates that technological capability explains approximately **26.8%** of the variance in the dependent variable. Thus, **H2 is accepted**

Table 3. H3: Digital Proficiency and Customer Support

Model	β	t-value	p-value	R ²	Decision
Digital Proficiency & Customer Support → DFIE	0.472	8.843	<0.001	0.208	accepted

Digital proficiency and customer support have a positive and statistically significant effect on digital financial inclusion effectiveness. The coefficient of $\beta = 0.472$ indicates that better digital proficiency and stronger customer-support mechanisms are associated with greater effectiveness of digital financial inclusion. The relationship is statistically significant ($t = 8.843$, $p < 0.001$). The R² value of **0.208** indicates that the construct explains approximately **20.8%** of the variation in digital financial inclusion effectiveness. Therefore, **H3 is accepted**.

Table 4. H4: Security and Customer Trust

Model	β	t-value	p-value	R ²	Decision
Security & Customer Trust → DFIE	0.475	9.878	<0.001	0.247	accepted

Security and customer trust have a positive and statistically significant effect on digital financial inclusion effectiveness. The regression coefficient ($\beta = 0.475$) demonstrates a positive relationship between security/trust and digital financial inclusion effectiveness. The t-value of **9.878** and p-value of **<0.001** confirm statistical significance. The R² value (**0.247**) indicates

that security and customer trust explain approximately **24.7%** of the variance in digital financial inclusion effectiveness. Hence, **H4 is accepted**.

Table 5. H5: Operational and Regulatory Capability

Model	β	t-value	p-value	R ²	Decision
Operational & Regulatory Capability → DFIE	0.534	10.32	<0.001	0.263	accepted

Operational and regulatory capability has a positive and statistically significant effect on digital financial inclusion effectiveness. The coefficient ($\beta = 0.534$) indicates that stronger operational processes and regulatory capabilities are associated with improved digital financial inclusion effectiveness. The relationship is statistically significant ($t = 10.315$, $p < 0.001$). The R² value of **0.263** indicates that operational and regulatory capability explains approximately **26.3%** of the variance in digital financial inclusion effectiveness. Accordingly, **H5 is accepted**.

Table 6. Overall Multiple Regression Model: H1–H5

To examine the **combined effect** of all five independent variables, a multiple regression model was also estimated.

Predictor	β	t-value	p-value	Decision
Digital Accessibility	0.243	4.73	<0.001	accepted
Technological Capability	0.258	4.941	<0.001	accepted
Digital Proficiency & Customer Support	0.083	1.509	0.132	Not Supported
Security & Customer Trust	0.138	2.674	0.008	accepted
Operational & Regulatory Capability	0.215	3.931	<0.001	accepted
R² = 0.469	Adjusted R² ≈ 0.460	F = 51.879	p < 0.001	Overall model significant

Interpretation of the Multiple Regression

The multiple regression model is statistically significant ($F = 51.879$, $p < 0.001$) and explains approximately **46.9% of the variance** in digital financial inclusion effectiveness ($R^2 = 0.469$). Among the five predictors, **Technological Capability** has the strongest unique positive effect ($\beta = 0.258$, $p < 0.001$), followed by **Digital Accessibility** ($\beta = 0.243$, $p < 0.001$) and **Operational & Regulatory Capability** ($\beta = 0.215$, $p < 0.001$). **Security & Customer Trust** also has a statistically significant positive effect ($\beta = 0.138$, $p = 0.008$).

However, **Digital Proficiency & Customer Support is not statistically significant when all five predictors are considered simultaneously ($\beta = 0.083$, $t = 1.509$, $p = 0.132$)**. This is an important distinction: H3 is supported in the **individual regression**, but it is **not supported in the combined regression model**. This may indicate that its apparent effect overlaps with other dimensions such as technological capability, accessibility, security, and operational capability.

Academic conclusion: The results provide strong evidence that **digital accessibility, technological capability, security and customer trust, and operational/regulatory capability** are important determinants of digital financial inclusion effectiveness in the simulated dataset. H3 requires more cautious interpretation because digital proficiency and customer support show a significant bivariate/simple regression relationship but lose statistical significance after controlling for the other dimensions. This distinction should be explicitly reported rather than simply stating that all five hypotheses were supported.

9. Discussion

The study conceptualises digital financial inclusion as an institutional outcome generated through the interaction of technology, customers and organisational capability. This perspective is particularly appropriate for cooperative banks because digital transformation cannot be reduced to the installation of mobile applications or payment infrastructure.

The evidence available from Indian institutional research suggests that cooperative banks have made progress in digitisation, particularly in retail payments and mobile-based services, but the pace and depth of digitisation remain uneven. According to a study by RBI UCB, the digital index is just 41 out of 100 in 2021, indicating that there is considerable scope for further growth.

The present study therefore places accessibility and technology alongside digital literacy, trust and operational capability. This is important because the expansion of digital infrastructure can increase financial access while simultaneously creating exclusion among customers who lack digital skills or confidence.

The cooperative-bank context creates an additional opportunity. Cooperative banks have physical branches and personal relationships, unlike purely digital financial platforms. These can be mechanisms for transitions for customers to learn to use digital services. Kumar & Bhatnagar (2022) discussed the significance of cooperative institutions for sustained existence in financial inclusion. Cooperative institutions can be used to reach the underserved communities

Consequently, the future of cooperative-bank digitalisation may depend not on replacing relationship banking with digital banking but on ****integrating relationship banking with digital financial services****.

10. Operational Challenges

Several operational challenges are relevant to the digital transformation of cooperative banks.

- First, technological infrastructure may differ considerably across institutions. The smaller cooperative banks may be constrained in terms of investment capability, system integration and specialized technical personnel. RBI evidence shows differentiation in UCB digitalization by bank type, deposit base and region, supporting the importance of the issue.
- "Second, the most significant institutional risks are cybersecurity and data privacy. As digital transactions increase, cooperative banks must strengthen authentication, fraud monitoring, customer awareness and incident-response systems.
- Third, digital literacy remains an important customer-side challenge. Older customers, customers with limited digital device experience, and customers who prefer branch interactions may need additional support.
- Fourth, employees must be retrained. Digital transformation changes employees' roles from primarily transaction-processing activities toward customer guidance, digital-service support, cybersecurity awareness and problem resolution.
- Finally, as banks integrate third party technology providers and digital platforms, regulatory compliance is becoming more complex. The RBI's 2024 assessment notes that vendor and third-party risk is an increasing component of digital financial-sector risk.

11 Cooperative Banks Opportunities

Digital financial inclusion also offers great opportunities. Cooperative banks can now offer services outside of normal banking hours thanks to mobile and internet banking. They can reduce transaction costs, increase convenience and create personalized financial products based on customer needs.

Digital payments integration can enhance relations with small traders, micro-enterprises and self-employed customers. Also, digital credit processes have the potential to speed up the application and documentation process of the loans, while reducing administrative costs.

Community orientation can also be an instrument of competitive advantage for cooperative banks. They can combine digital convenience with personal assistance, local knowledge and trust, rather than compete on technological sophistication alone.

The broader Indian financial ecosystem has a conducive infrastructure for such a transformation. RBI's 2024 assessment points out that India's digital public infrastructure and tech-enabled financial innovation have accelerated the digitalization of credit and financial services. ([System Health][9])

12. Recommendations

- Co-operative banks in Pune should formulate phased digital transformation strategy depending on their financial and technological capacity. Reliable mobile banking, UPI, internet banking and secure electronic transaction systems must be preferred.

- Banks need to set up structured online literacy programs for customers, especially for senior citizens, first-time digital users and the financially vulnerable sections. Branch employees can be digital enablers, helping customers learn to perform transactions safely.
- Cybersecurity investment should be treated as a core component of financial inclusion rather than as a separate technology function. Regular security audits, employee training, customer awareness programmes and rapid grievance-resolution mechanisms should be implemented.
- Cooperative banks should also upgrade the skills of their employees by providing regular training in digital banking, cybersecurity, customer service and technology-enabled financial products.
- By partnering with technology vendors and fintech companies, cooperative banks can avoid the full cost of internal development and leverage state-of-the-art digital infrastructure. But these partnerships must be managed thru strong vendor-management and data-protection mechanisms.
- Finally, cooperative banks should track digital financial inclusion with measurable indicators on access, usage, service quality, customer satisfaction, complaints, transaction reliability and perceptions of customer security. This would bring institutional monitoring in line with the multi-dimensional approach embedded in the RBI's Financial Inclusion Index.

13. Conclusion

For cooperative banks in Pune District, digital financial inclusion is both an opportunity and an operational challenge. Cooperative banks have important strengths in local relationships, community trust and established customer networks, but these advantages need to be combined with technological capability, online literacy initiatives, cybersecurity and effective operational governance.

Evidence from India indicates that cooperative banks have made good strides in digitalization, especially in payment services and mobile-based channels but there remain large gaps in digital maturity.

The rising Financial Inclusion Index of India indicates that the larger financial inclusion environment has also improved. ([Reserve Bank of India][1] The main implication of the study is that ****digital financial inclusion is not to be understood as technological adoption****. Effective inclusion requires accessible technology, capable institutions, digitally confident customers, trustworthy systems and responsive operational processes. For cooperative banks, the most promising strategy may therefore be a hybrid model that combines digital convenience with the personal and community-oriented characteristics that have traditionally distinguished cooperative banking.

The proposed empirical framework provides a basis for testing these relationships using customer-level data from selected cooperative banks in Pune District. The final conclusions

regarding H1-H5 should be drawn only after the actual questionnaire data have been analysed in SPSS 27.

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