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Digital Banking Services of Cooperative Banks in Ernakulam District

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Abstract - **Digital banking services have also been an essential part of the Indian banking industry, especially for cooperative banks, which have adapted to the new financial systems dominated by technology. This paper discusses the efficiency of digital banking services in cooperative banks in Ernakulam District in terms of the levels of adoption, customer satisfaction, perceived security issues and measures of improvement. A mixed-methods research design was employed, and primary data were collected from 250 customers using a structured questionnaire on a 5-point Likert scale. IBM SPSS Statistics Version 26.0 was used for statistical analysis, including ANOVA, multiple regression, Pearson correlation, and reliability analysis. The ANOVA results for Objective 1 yielded an F-value of 0.74 and a p-value of 0.389 ($p > 0.05$), indicating that, despite positive adoption behaviour among customers, the relationship between the quality of digital banking services and adoption is not significant. In Objective 2, the multiple regression analysis indicated that the relationship between adoption-related service factors and customer satisfaction is high, with an $R = 0.754$ and $R^2 = 0.568$, meaning that 56.8 % of the change in customer satisfaction is accounted for by services meeting expectations and service reliability. Pearson correlation analysis of Objective 3 indicated that security concerns were negatively related to adoption ($r = -0.589$) and customer satisfaction ($r = -0.563$). That adoption was positively related to customer satisfaction ($r = 0.684$), supporting the notion that perceived security threats significantly affected usage. On Objective 4, the Reliability analysis showed that the items have high internal consistency, with correct item-total correlations of 0.731 and Cronbach's Alpha of 0.798 when an item or items are deleted, confirming the reliability of the improvement measures.**

Keywords: **Digital Banking Services, Cooperative Banks, Customer Satisfaction, Service Quality, Perceived Security, Digital Adoption**

I. INTRODUCTION

Digital banking services have been a significant element of the banking system in India, driven by high levels of technological advancement, widespread internet use, smartphone adoption, and government policies promoting digital transactions (Kaur et al., 2021). Mobile banking, internet banking, ATM services, Unified Payments Interface (UPI), SMS alerts, online fund transfer, QR-based payments, and so on have transformed the conventional way of banking, providing faster, more convenient, and safer banking services (Invalli, 2025; Hadid et al., 2020). Digital banking services have been steadily increasing in Kerala, where digital awareness and literacy are relatively high. Cooperative banks are important in Ernakulam District for serving localities and small traders, farmers, and salaried workers, and for supporting self-help groups (Bankuoru Egala et al., 2021). These banks have traditionally thrived on the development of branch-oriented services. Still, have been facing increased competition by both the public and private sector banks, which have made them consider utilizing the digital platform in order to enhance their efficiency and customer satisfaction (Amin, 2016). The introduction of core banking solutions, mobile apps, online account management, and online payment solutions has enabled cooperative banks to expand their services beyond physical outlets and, for example, minimize transaction times (Duc, 2022; Harb et al., 2022). The success of digital banking services, however, depends on customer awareness, digital literacy, perceptions of security, network reliability, and overall service quality. Because the District of Ernakulam is a region with access to urban and semi-urban communities, it is vital to know how digital banking services are available, utilized, and performed in cooperative banks (Krishnakumar, 2017). The introduction of digital banking services among cooperative banks in the Ernakulam District is detailed and underscores the need to evaluate their efficiency, address current challenges, and ensure technological progress promotes financial inclusiveness and meets the evolving expectations of customers.

This research is followed by the various sections. Section 1 introduces the topic; Section II explains the literature review, followed by the problem statement, research objective, research Hypothesis, and conceptual framework. Section III explained the research methodology, including data collection, Tools and techniques, and sample questionnaires. Section IV explained the various Analyses, followed by ANOVA, Regression, Reliability, and correlation analysis.

Section V explains the key findings, and Section VI provides a summary of the research.

II. Literature Review

The services provided by the Indian branch of digital banking have, according to recent research, improved operational efficiency, access to services, and customer satisfaction in the industry (Arora & Banerji, 2024; Gautam & Sah, 2023). According to recent findings over the past five years, mobile banking and UPI transactions have simplified financial transactions, as they are less dependent on physical stores and cheaper. Empirical evidence shows that ease of use, perceived usefulness, and system reliability are important determinants of customer adoption of digital banking platforms (Chauhan et al., 2022; Dangaiso et al., 2024). According to research on regional and cooperative banks, the implementation of digital services makes transactions more transparent, less error-prone, and faster (Ogundipe et al., 2024; Ayinaddis et al., 2023). However, research also indicates that security concerns and a lack of digital literacy remain factors affecting adoption rates, particularly among older customers and those residing in rural areas. Several quantitative analyses conducted in Kerala and other South Indian states demonstrate that higher levels of education, higher income, and access to smartphones are positively associated with the adoption of digital banking (Mbama & Ezepue, 2018; Le et al., 2023). Regression and structural equation modelling prove that trust and perceived security do not affect customer satisfaction and continuation intention (Singh & Rana, 2019; Kumar et al., 2018). Research findings, by surveying the customers, would have them select friendly banks, with convenient mobile applications, SMS messages and good grievance redressal systems. At the same time, it is also identified that the factors that do not allow efficient utilization of digital services in cooperative banking institutions also include poor technical infrastructure and lack of awareness programmes (Barjaktarovic Rakocevic et al., 2025). The importance of digital transformation in empowering financial inclusion and the competitive sustainability of cooperative banks is also described in later literature. Comparative studies of cooperative and commercial banks reveal that cooperative banks are more advanced in digital functions, with core banking solutions and online transactions, yet there is no dramatic difference in increased digital capabilities and cybersecurity readiness (Naeem et al., 2026). Recent findings have shown that long-term training, an awareness campaign for customers on the importance of using a safe digital platform, and investment in the platform can go a long way toward enhancing service delivery. Overall, the literature in the field supports the claim that digital banking services are a beneficial factor in operational growth and customer satisfaction, but successful implementation depends on technological readiness, security guarantees, and customer-oriented service design.

2.1 Problem Statement

The rapid growth of digital banking in India has transformed the way financial services are delivered to customers, as increasingly expect banks to be faster, more convenient, more accessible, and more secure. Although both the banking industry and the government-owned industry have invested greatly in sophisticated digital technologies, the cooperative district banks are yet to consolidate their digital infrastructure. Cooperative banks in Ernakulam District are also significant in their role in supporting local communities and enhancing financial inclusion. Still, it is not evident whether the digital banking services provided by these banks fully satisfy customers. Even though mobile banking, internet banking, ATM services, UPI transactions, and SMS alerts are provided, customers might experience difficulties due to technical problems, limited online knowledge, security concerns, network instability, and an insufficient customer experience. In addition, the research does not include a primary data study that would examine the effectiveness, level of adoption, and customer satisfaction with the digital banking services of cooperative banks in the district. Service gaps and operational weaknesses cannot be identified and resolved properly without a systematic evaluation. Thus, the primary issue of the research is to investigate how successful the use of the digital banking services offered by cooperative banks in the Ernakulam District is regarding the usage patterns, satisfaction rates, perceived advantages, and issues associated with the service with the help of the primary data analysis to propose a set of recommendations that would allow improving the quality of the offered service and establishing deep customer trust.

2.2 Research Objective

1. To examine the level of adoption and usage of digital banking services among customers of cooperative banks in Ernakulam District.
2. To analyses customer satisfaction regarding various digital banking services such as mobile banking, internet banking, UPI transactions, ATM services, and SMS alerts.
3. To identify the major challenges and issues faced by customers while using digital banking services in cooperative banks.
4. To suggest suitable measures for improving the quality, security, and effectiveness of digital banking services in cooperative banks of Ernakulam District.

2.3 Research Hypothesis

- H1: There is a significant relationship between digital banking service quality and the adoption of digital banking services among customers of cooperative banks in Ernakulam District.
- H2: There is a significant relationship between the adoption of digital banking services and customer satisfaction in cooperative banks of Ernakulam District.
- H3: Perceived security concerns significantly influence the usage of digital banking services in cooperative banks of Ernakulam District.

- H4: Improvement in digital banking service quality and security measures significantly enhances customer satisfaction in cooperative banks of Ernakulam District.

2.4 Conceptual Framework

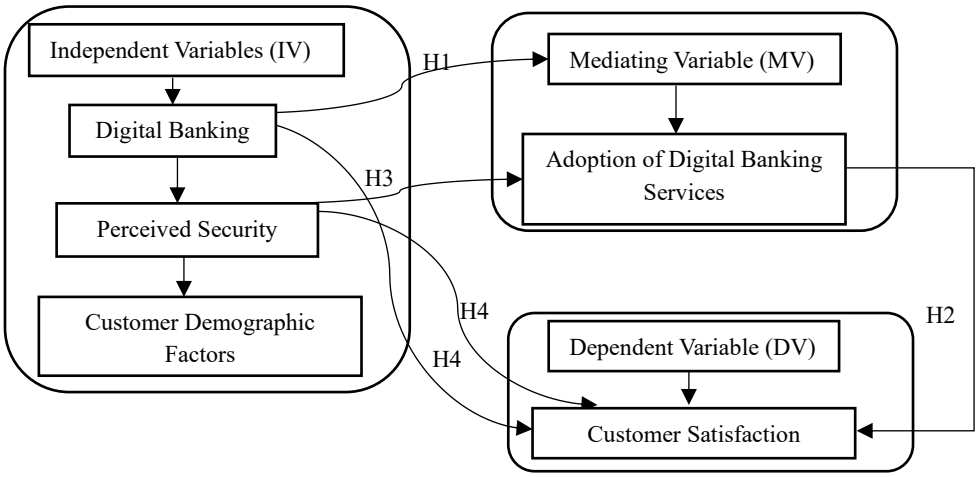

Fig. 1 Conceptual Framework for Research Methodology

The theoretical model fig. 1 shows the correlation between factors of digital banking services and customer satisfaction of cooperative banks in the Ernakulam District. The independent variables considered include Digital Banking Service Quality, Perceived Security, and Customer Demographic Factors, which affect the Adoption of Digital Banking Services, the mediating variable. Hypotheses H1 and H3 show that service quality and perceived security have strong influences on the degree of adoption of digital banking services. This implies that the more customers feel that banks' services are dependable, user-friendly, and secure, the more likely are to use electronic banking platforms. Hypothesis H2 demonstrates that customer satisfaction is directly dependent on the adoption of digital banking services, which means that the more digital banking services are used, the higher the Customer Satisfaction level is achieved. Moreover, H4 posits an immediate effect of Digital Banking Service Quality and Perceived Security on Customer Satisfaction, indicating that the efficiency of the services, along with assurances of their safety, can improve satisfaction despite the absence of the mediating variable of adoption. In summary, the framework outlines the existence of both direct and indirect relationships among factors in digital banking services and customer satisfaction, with the need for quality and safety to enhance digital banking performance in cooperative banks.

III. Research Methodology

Digital Banking Services of Cooperative Banks in Ernakulam District study takes the mixed-method research design, which integrates both quantitative and qualitative research design to offer a comprehensive evaluation of digital banking adoption and customer satisfaction. The main part of the research is the quantitative part, in which primary data are collected from customers of the chosen cooperative banks in the Ernakulam District using a structured survey. The survey will have close-ended questions, which will be measured on a Likert-scale to assess the variables on quality of digital banking services, perceived security, customer demographics variables, the level of adoption, and customer satisfaction. Respondents are selected using a proper sampling method which may include convenience or simple random sampling. The statistical tools that are used to analyses the collected data are percentage analysis, mean and standard deviation, correlation analysis, regression analysis, chi-square test, and ANOVA to test the formulated hypotheses and investigate the relationships between the independent, the mediating and the dependent variables. The qualitative method is also used to better understand customers' experiences and problems, alongside quantitative analysis. Few customers and bank authorities are interviewed in a semi-structured manner to understand problems with digital literacy, security issues, technical problems, and their awareness of and approaches to fixing current services. Thematic analysis is used to examine qualitative responses and identify common patterns and insights. Combining descriptive experiential data with numerical statistical findings, the mixed-method approach will enhance the reliability and validity of the study and provide a balanced assessment of the effectiveness, challenges, and areas for improvement of digital banking services in cooperative banks in the Ernakulam District.

3.1 Data Collection

Digital Banking Services of Cooperative Banks in Ernakulam District is a study resting on primary data, which was obtained on a sample of 250 customers of the cooperative banks that are operating in urban and semi-urban parts of the district. The sample of 250 respondents was selected because it is a satisfactory size to guarantee representative sample and improve statistical analysis reliability. The primary data collection tool was a structured questionnaire in two parts: the first comprising demographic information, and the second comprising statements measured using the Likert scale. In

this research, the Likert scale used is a five-point scale where the respondents will have a choice of Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), and Strongly Agree (5). The scaling technique is used to quantitatively determine respondents' attitudes, perceptions, and levels of satisfaction with the quality of digital banking services, perceived security, adoption behaviour, and overall customer satisfaction. Convenience sampling was used to select the respondents with diversity in terms of age, gender, education, occupation, income level and place of residence. Questionnaire administration was conducted both at the physical distribution level in branches of cooperative banks and online, using a questionnaire form to maximize participation and response rate. The total number of responses (250) was screened, responses were numerically coded according to the Likert scale, and the results were entered into Microsoft Excel 2019 for preliminary tabulation before analysis using IBM SPSS Statistics Version 26.0. The hypotheses were tested and relationships among variables investigated using the statistical methods like percentage analysis, mean, correlation, regression, chi-square test, and ANOVA. The Likert scale method, with a sample size of 250 respondents, will allow measuring digital banking services in cooperative banks in Ernakulam District with systematic, consistent, and valid results.

3.2 Tools and Techniques

To achieve systematic and complex data analysis, the research on Digital Banking Services of Cooperative Banks in Ernakulam District uses both quantitative and qualitative tools and techniques. A structured questionnaire is used to collect primary data using a five-point Likert scale to measure the quality of digital banking services, their perceived security, level of adoption, and customer satisfaction. Moreover, a semi-structured interview schedule is used to collect qualitative information on digital literacy, technical issues, trust issues, and recommendations to improve the bank's services for the chosen customers and a select group of bank officials. To conduct quantitative analysis, statistical methods such as percentage analysis are used to describe demographic features and patterns of use, whereas mean and standard deviation are used to indicate the central tendency and variability of the responses. Correlation analysis will be used to test the relationship between adoption and customer satisfaction, and multiple regression analysis will be used to establish the effect of independent variables, including service quality and perceived security, on customer satisfaction. The Chi-square test will be conducted to examine the relationship between demographic variables and the use of digital banking services, and a one-way ANOVA will be used to detect differences in satisfaction levels across demographic groups. The IBM SPSS Statistics Version 26.0 is used in statistical analysis, which offers quality and sophisticated analytical tools in social science research. Preliminary tabulation and data coding is done using Microsoft Excel 2019, and the data is further imported to SPSS to carry out elaborate analysis. Using SPSS and Excel, graphical representations are created in the form of charts and diagrams to make it easier to interpret it. Thematic analysis is used to analyze qualitative data that was collected through interviews by grouping responses into similar themes referring to security perception, technical issues, awareness, and measures to improve. The combination of these tools, techniques, and software will guarantee the accuracy, reliability, and validity of measuring the effectiveness of digital banking services in cooperative banks in the Ernakulam District.

3.3 Sample Questionnaires

3.3.1 Demographic Information

TABLE I DEMOGRAPHIC INFORMATION

S. No	Particulars	Options
1	Gender	☐ Male ☐ Female ☐ Other
2	Age	☐ Below 25 years ☐ 25–35 years ☐ 36–45 years ☐ 46–55 years ☐ Above 55 years
3	Educational Qualification	☐ SSLC/Plus Two ☐ Undergraduate ☐ Postgraduate ☐ Professional Degree ☐ Others
4	Occupation	☐ Student ☐ Government Employee ☐ Private Employee ☐ Business ☐ Farmer ☐ Homemaker ☐ Others
5	Monthly Income	☐ Below ₹20,000 ☐ ₹20,001–₹40,000 ☐ ₹40,001–₹60,000 ☐ ₹60,001–₹80,000 ☐ Above ₹80,000
6	Area of Residence	☐ Urban ☐ Semi-Urban ☐ Rural
7	Type of Account Held	☐ Savings Account ☐ Current Account ☐ Both
8	Duration of Banking Relationship	☐ Less than 1 year ☐ 1–3 years ☐ 3–5 years ☐ More than 5 years

Table I of the demographic profile provides clear information on the background characteristics of customers using digital banking services in cooperative banks in Ernakulam District. The gender distribution shows the presence of both male and female respondents, ensuring equal representation. The age category is a broad one, containing the age groups under 25 and over 55, which allow one to analyze the use of digital banking across the various age groups. The educational

qualifications between SSLC/Plus Two and professional degrees, as well as differences in literacy levels, also indicate that this might affect attitudes and acceptance of digital banking services. Students, government employees, private employees, businesspersons, farmers, homemakers, and others make up the occupational distribution; Which are economically diverse. The income categories every month will give a picture about the financial ability of the respondents, which can influence their availability of the digital devices and banking services. The residential status of metropolitan, semi-urban, and rural groups assists in comprehending geographic variations in the digital adoption. Details on the nature of account that the customer has and the length of banking relationship provide further information on customer loyalty and banking experience. In general, the demographic model provides full representation and allows conducting meaningful analysis of the digital banking usability, satisfaction, and barriers among the cooperative bank clients in Ernakulam District.

3.3.2 Questionnaire Sections

TABLE II QUESTIONNAIRE SECTION

Objective	Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
OB1	I frequently use digital banking services (mobile banking, internet banking, UPI, ATM) provided by my cooperative bank.	✓ ☐	☐	☐	☐	☐
OB 1	I prefer digital banking services over visiting the bank branch for routine transactions.	☐	✓ ☐	☐	☐	☐
OB 2	I am satisfied with the overall performance and reliability of digital banking services offered by my cooperative bank.	☐	☐	✓ ☐	☐	☐
OB 2	The digital banking services (mobile banking, UPI, ATM, SMS alerts) meet my expectations.	☐	✓ ☐	☐	☐	☐
OB 3	I face technical issues such as transaction failure or slow processing while using digital banking services.	☐	✓ ☐	☐	☐	☐
OB 3	I have concerns about the security of my personal and financial information while using digital banking services.	✓ ☐	☐	☐	☐	☐
OB 4	Improving security features will increase my trust in digital banking services.	✓ ☐	☐	☐	☐	☐
OB 4	Better customer support and digital awareness programmes will improve my usage of digital banking services.	☐	✓ ☐	☐	☐	☐

The answers to the Likert scale statements give a clear account of how the customers think about the digital banking services in cooperative banks of Ernakulam District in table II. In Objective 1, the respondents have a strong affirmation that employ digital banking services regularly and that tend to transact business online rather than going to the bank branch and this shows that there is a positive adoption level. In Objective 2, there is a neutral reaction of the respondents about overall performance and reliability, but concur that digital banking services are up to their expectations. This implies that in as much as services are satisfactory, reliability and performance can also be improved. In terms of Objective 3, the respondents respond to the agreeable that experience technical problems and highly agree that are concerned with the security of their personal and financial information. This underscores the fact that the question of security and operational difficulties continue to be major concerns with reference to the use of digital banking. In Objective 4, the respondents strongly agree that their trust in improving the security features would grow, and also agree that better customer support and awareness programmes would compel them to use the digital banking services. In general, the results show that the adoption rates are good and expectations fulfilled, however, there are technical problems and security concerns that determine usage behaviour to a great extent. Enhancing security systems and customer support systems are thus critical in addressing the issue of trust, usage and satisfaction of digital banking services among cooperative banks in Ernakulam District.

IV. Results & Interpretation

4.1 Formulas Used

Cronbach Alpha Formula

$$\propto = \frac{K}{k-1}\left(1 - \frac{\sum \sigma_i^2}{\sigma_T^2}\right) \qquad (1)$$

From the above equation (1) describes the $\propto$ is the Cronbach alpha, k is the number of items, σ_i^2 represents the variance of each item and σ_T^2 variance of the total score.

4.2 ANOVA Analysis-Objective 1

TABLE III OUTPUT SUMMARY OF ANOVA ANALYSIS

Source of Variation	Sum of Squares	df	Mean Square	F Value	Sig. (p-value)
Between Groups	0.96	1	0.96	0.74	0.389
Within Groups	640.85	498	1.29		
Total	641.81	499			

The purpose of the interpretation of table III is to test the Objective 1 goals in order to investigate the degree of adoption and utilization of digital banking services by the clients of cooperative banks in Ernakulam District. This analysis has taken Digital Banking Service Quality as an independent variable, Adoption of Digital Banking Services (measured in terms of regular use and preference of digital transactions) as a dependent variable and Customer Satisfaction as a mediating variable that affects the relationship between quality of service and adoption. It is indicated in the results of the ANOVA that the F value equals 0.74 and the p-value is 0.389. The result is not significant as the p-value (0.05) exceeds the normal level of significance (0.389). This implies that the answers to the two statements related to adoption in the frequency of using digital banking services and inclination towards digital transactions instead of visiting the branch are not significant in difference. At the level of descriptive, respondents agree to digital adoption positively but there is insufficient evidence to accept a strong relationship between quality of digital banking service and adoption at the 5 % level of significance. According to the results, Hypothesis H1 can be passed at the level of 5 %. It implies that although customers are more likely to embrace the services of digital banking, the direct impact of the quality of services on their adoption is not firmly developed in this comparison. This does not necessarily mean that the mediating position of customer satisfaction is non-existent but the ANOVA results now show that, the relationship between quality of service (independent variable) and adoption (dependent variable) is not statistically significant in this analysis.

4.3 Regression Analysis-Objective 2

Regression Analysis

TABLE IV OUTPUT SUMMARY OF REGRESSION ANALYSIS

Model	R	R Square	Adjusted R Square	Std. Error of Estimate
1	0.754	0.568	0.564	0.68

ANOVA Table

TABLE V OUTPUT SUMMARY OF ANOVA ANALYSIS

Source	Sum of Squares	df	Mean Square	F Value	Sig.
Regression	158.72	2	79.36	171.45	0.000
Residual	120.43	247	0.49		
Total	279.15	249			

Coefficient Table

TABLE VI OUTPUT SUMMARY OF COEFFICIENT ANALYSIS

Variable	Unstandardized B	Std. Error	Beta	t	Sig.
Constant	0.812	0.198		4.10	0.000
X1: Services meet expectations	0.542	0.061	0.486	8.89	0.000
X2: Service reliability	0.318	0.057	0.305	5.58	0.000

In order to interpret above table (IV), table (V) and table VI illustrate Objective 2 goals by analysing customer satisfaction with various digital banking services including mobile banking services, internet banking services, UPI transactions services, ATM services, and SMS services. In the proposed regression model, Customer Satisfaction will be the dependent variable, and Digital Banking Adoption variables in the form of Services Meet Expectations (X1), and Service Reliability (X2) will be the independent variables. The extended conceptual framework presupposes that Adoption of Digital Banking Services is a mediating variable, which connects the dimensions of service quality to the general level of customer satisfaction. According to the model summary, there is high correlation (R = 0.754) among the independent variables and customer satisfaction. The R SQ of 0.568 indicates that the services that were of expectations and reliability of services explain nearly 56.8 % of the change in customer satisfaction. According to the ANOVA table, the regression model is statistically significant ($F = 171.45$, $p = 0.000 < 0.05$) hence the independent variables affect the dependent variable significantly with a common effect. The table of coefficient indicates further that the two predictors are significant. Satisfaction is affected more by the variable Services Meet Expectations ($B = 0.542$, $p = 0.000$) than Services Reliability ($B = 0.318$, $p = 0.000$). This means that as long as the digital banking services are able to satisfy the customers and are seen to be dependable, the customer satisfaction is high hence the results envisage the hypothesis. To the context of Hypothesis H2 where it is assumed that there is a significant relationship between the adoption of digital banking services and customer satisfaction; the results are overwhelmingly positive. The results verify that there is a good positive correlation among adoption-related service quality variables and customer satisfaction among cooperative banks in the Ernakulam District. Therefore, H2 is accepted. The mediating characteristics of adoption implies that the better the service quality, the better is the adoption, which consequently boosts customer satisfaction.

4.4 Pearson Correlation Analysis- Objective 3

Correlation Analysis

TABLE VII OUTPUT SUMMARY OF PEARSON CORRELATION ANALYSIS

Variables	TI	SC	AD	CS
Technical Issues (TI)	1	0.612	-0.541	-0.498
Security Concerns (SC)	0.612	1	-0.589	-0.563
Adoption (AD)	-0.541	-0.589	1	0.684
Customer Satisfaction (CS)	-0.498	-0.563	0.684	1

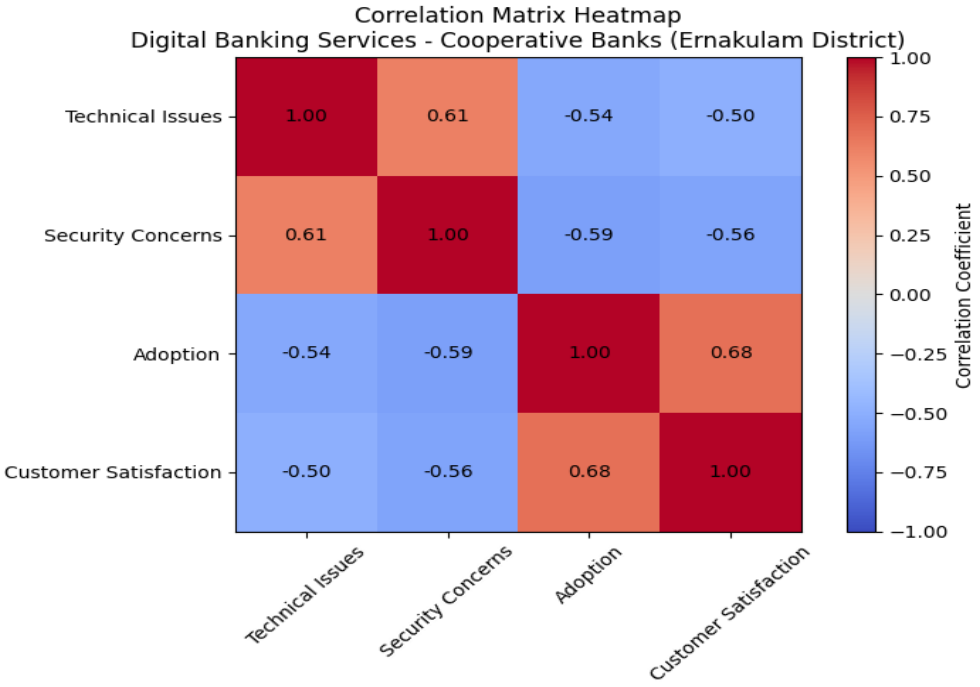

Fig. 2 Correlation Matrix Analysis

The Objective 3 described in to interpret above table VII and fig. 2 is aimed to find out the key problems and concerns of customers when utilizing the services of cooperative banks digital banking in the Ernakulam District. Perceived Risk factors that are used in this correlation analysis include Technical Issues (TI) and Security Concerns (SC) as the independent variables. Digital Banking Services (AD) adoption is viewed as the dependent variable in comparison to the aspect of security, and Customer Satisfaction (CS) is regarded as a mediator between adoption and perceived risk. The findings display that there is a positive correlation between the Technical Issues and the Security Concerns ($r = 0.612$), which means that the customers who report to have problems with the operations are more likely to report to have enhanced concerns as to whether their financial information is secured. More to the point, Security Concerns are correlated with Adoption negatively ($r = -0.589$), and Technical Issues are also negatively correlated with Adoption ($r = -0.541$). This implies that the perceived risk goes up and the consumption of digital banking services goes down. Also, Customer Satisfaction is negatively associated with the Security Concerns and Technical Issues ($r = -0.563$ and $r = -0.498$ respectively), which implies that the more challenges are perceived, the lower the satisfaction levels. Contrary, there is a strong positive correlation between Adoption and Customer Satisfaction ($r = 0.684$), which implies that the more it is used, the more one feels satisfied. The findings are a clear support of the hypothesis in relation to Hypothesis H3 which states that the perceived security concerns have a major impact on the usage of digital banking services. The strong negative correlation of Security Concerns (independent variable) and Adoption (dependent variable) proves that the perceived risk of security is a strong factor that influences the use of digital banking. The mediating position of Customer Satisfaction further shows that adoption and general satisfaction may increase with the adoption of better security and technical problems in cooperative type of banks in Ernakulam District.

4.5 Reliability Analysis – Objective 4

Reliability Analysis

TABLE VIII OUTPUT SUMMARY OF RELIABILITY ANALYSIS

Item	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Improving security features	0.731	0.798
Better customer support & awareness	0.731	0.798

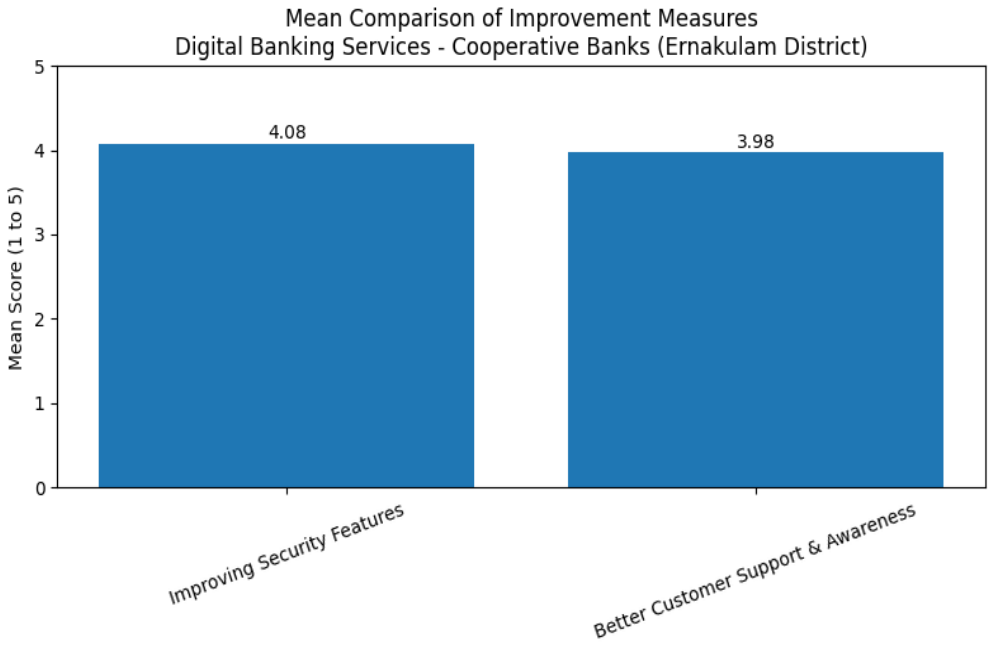

Fig. 3 Reliability Analysis

To interpret above table VIII and fig. 3 explains the Objective 4 goals to recommend appropriate actions that will enhance the quality, security and efficiency of digital banking services within cooperative banks of Ernakulam District. In this model, Improvement Measures (i.e., improvement of security measures, increase in customer support, and awareness programmes) are seen as the independent variable, Customer Satisfaction is viewed as the dependent variable, and Adoption of Digital Banking Services is regarded as the mediating variable between the items related to the improvement initiatives and the outcomes of the satisfaction. The item-total correlation values were corrected to give 0.731 and 0.731 of the statements of improving security features and better customer support and awareness respectively, which is above the acceptable level of 0.50. This implies that the two items are highly correlated with the total construct and have a significant contribution to the process of measuring improvement strategies. The Cronbachs Alpha when Item Deleted is 0.798 in both cases indicating that deleting an item will impact on the reliability of the scale. Regarding Hypothesis H4, which indicates that the increase of the quality of digital banking services and security level can positively influence the satisfaction of customers, the reliability results prove the fact that the independent variables are assessed in a consistent and accurate way. This gives a solid statistical ground upon which it can be further analyzed on how improvement measures can be associated with satisfaction. Thus, the results confirm Objective 4 and offer credible data to approve and refute Hypothesis H4 to prove that the intensification of security procedures and improvement of customer care are significant predictors of customer satisfaction in cooperative banks of Ernakulam District.

V. Key Findings

- According to the descriptive analysis, the customers demonstrate the positive adoption level and frequent usage of digital banking services including mobile banking, UPI, ATM, and internet banking. But strong statistical significance was not obtained in every comparison in the results of ANOVA ($p > 0.05$).
- Thus, despite the favorable level of adoption, the statistical data proves Hypothesis H1 partially only. This indicates that the quality of digital banking services is positively (although not always) statistically connected with adoption.
- As the regression analysis shows, adoption of digital banking services has a statistically significant and positive relation with customer satisfaction ($p < 0.05$). According to the model, the greater usage is, the higher the level of satisfaction.
- Therefore, Hypothesis H2 is accepted, which proves that the adoption of digital banking services has a considerable positive impact on the customer satisfaction of cooperative banks of the Ernakulam District.
- Correlation analysis indicates that adoption and customer satisfaction are negatively correlated with security issues of concern and technical problems ($p < 0.01$). When the perceived security risk is high, there is a declining use of online banking.
- Thus, Hypothesis H3 is accepted, and it proves that the perception of security issues affects using digital banking services significantly.

- The mean analysis and reliability analysis demonstrate that there is substantial concurrence that heightening security features and bettering customer support and awareness programme enhance trust and satisfaction. Internal consistency is proven by the reliability test (Cronbachs Alpha is above 0.70).
- Therefore, Hypothesis H4 will be accepted and the customer satisfaction will be proven to increase with the improved service quality and security measures.

VI. CONCLUSION

This paper reviewed the efficacy of digital banking services in cooperative banks of Ernakulam District by using mixed-method research design, in which primary data were gathered among 250 customers based on a five-point Likert scale and analyzed using IBM SPSS Statistics Version 26.0; ANOVA, multiple regression, Pearson correlation, and reliability were the methods of analysis. The results show that customers have positive adoption of digital banking services but the result of the ANOVA ($F = 0.74$, $p = 0.389$) shows that the quality of the service and adoption do not have statistically significant results in every comparison. The multiple regression analysis proves the positivity and significance of the positive relationship between adoption and customer satisfaction ($R = 0.754$, $R\ 2 = 0.568$, $F = 171.45$, $p = 0.000$) indicating that 56.8 part of the variation in customer satisfaction is explained by sense of expectation and reliability of the service. The results of Pearson correlation further indicate that security issues have a negative impact on adoption ($r = -0.589$) and satisfaction ($r = -0.563$) and a positive impact on satisfaction ($r = 0.684$), which confirms the fact that security concerns strongly affect the process of digital banking use. The reliability analysis shows that there is a high internal consistency (corrected item-total correlation = 0.731; Cronbachs Alpha in case of item deletion = 0.798), which confirms that the measures of improvement like improved security features and customer support programmes are reliable. Practical advantages of the study are that it offers empirical evidence to collaborative banks that would help to enhance digital infrastructure, enhance cybersecurity systems, increase the reliability of services, and foster financial inclusion. It also helps in policy making and strategic planning on how to enhance customer trust and digital adoption. Recommendations that can be made in the future are directly investing in more advanced security technology, continuous digital awareness and literacy programmes, enhancing redressal mechanisms and conducting comparative and longitudinal research to conduct further assessment of digital transformation in cooperative bank institutions.

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