

Banking Beyond Branches: Measuring Customer Delight in DCCB's Digital Ecosystem with special reference to Tiruchirappalli District”

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Abstract:

The study aims to analyze the key determinants influencing customer satisfaction with digital banking service quality in District Central Cooperative Banks (DCCBs), specifically within the Tiruchirappalli district. A total of 506 DCCB customers from the region were surveyed. To gain comprehensive insights into the relationship between digital banking services and customer satisfaction, various statistical tools such as descriptive analysis, reliability analysis, exploratory factor analysis, and multiple regression analysis were employed using SPSS software. The empirical findings indicate that customer satisfaction with digital banking services in the DCCB sector is significantly high.

Keywords:

DCCBs, Customer Satisfaction, Digital banking services ,SERVQUAL, ANOVA, multiple regression.

Introduction :

The rapid advancement of digital technologies has brought about a significant transformation in the banking and financial services sector, marking a new era of innovation and change. The introduction of digital banking has fundamentally reshaped the interaction between banks and their customers (Mbama& Patrick, 2018). Digitalization of communication channels between banks and customers plays a crucial role in enhancing operational efficiency and financial performance through customer satisfaction. To remain competitive and retain customers, it is essential for banks to align their services with evolving customer needs and deliver consistently high-quality digital experiences. In the highly competitive banking sector, where service and product replication is common, dissatisfied customers can easily switch to alternative providers. Therefore, it becomes imperative for banks to continuously evaluate how their digital services are perceived across various dimensions of satisfaction. This ongoing assessment not only helps in identifying areas where the bank excels or falls short compared to competitors but also pinpoints critical areas requiring improvement. In essence, the "voice of the customer" serves as a vital indicator of a bank's performance. Moreover, customer expectations—shaped by experiences with private and public sector commercial banks—also play a pivotal role in shaping satisfaction levels with cooperative banks. With these considerations, the present study aims to analyze customer satisfaction with digital banking services, particularly in the context of District Central Cooperative Banks.

Review of Literature:

Most research in the area of customer satisfaction towards the banking services has been based upon the model developed by (Parasuraman et al 1985, 1988), which incorporates a comparison of customer expectations and perceptions of service performance.

1. A research study titled "Customer Satisfaction in Digital Banking Across India, Considering Demographic Mediators" was conducted by Neha Kamboj and Gurcharan Singh (2018) with the aim of identifying demographic determinants influencing satisfaction levels. The hypotheses claimed that demographic characteristics (age, gender, income) impact digital banking satisfaction. Statistical tools, including a questionnaire survey and hypothesizing, were employed, however methodological specifics were restricted, suggesting the use of correlation and regression. It was determined that Internet speed and security issues influenced satisfaction levels. Demographic mediation exists; banks purposefully underutilize their websites.
2. Varsha Nerlekar (2020) conducted research on the "Influence of Digital Banking on Customer Satisfaction in Urban Cooperative Banks, Pune." The study aimed to investigate the influence of speed, accessibility, adaptability, and cost of digital banking on consumer satisfaction. The theories claimed that speed, accessibility, adaptability, and affordability contribute to an improvement in happiness. Statistical tools employed included questionnaires, interviews, analysis using SPSS (descriptive statistics, Pearson correlation), and thematic qualitative analysis. The study revealed that speed, accessibility, and adaptability were positively connected with pleasure. Unexpectedly, affordability had a substantial negative correlation.
3. Ghazi Zouari and MarwaAbdelhedi (2021) conducted research on the topic "Effect of Digitalization on Service Quality and Satisfaction in Islamic Banking (Extended SERVQUAL)." The aim was to include digitization and compliance into SERVQUAL to assess their effect on satisfaction. The hypotheses established posited that digitalization and other quality characteristics significantly impact satisfaction. Statistical tools for the survey (n = 145) included factor and regression analysis. Ultimately, it has been determined that digitization, compliance, confidence, and human skills favorably impact satisfaction. Tangibles were absent.
4. Hemalatha S. and T. S. Devaraja (2023) conducted research on "Customer Satisfaction with Digital Banking Service Quality at Navanagara Urban Cooperative Bank Ltd," aiming to evaluate service quality dimensions (reliability, responsiveness, assurance, empathy, tangibles) and their impact on customer satisfaction. The hypothesis posits that elevated levels in these domains correlate favorably with contentment. The parameters: Autonomous – dependability, promptness, confidence, compassion, physical attributes. Dependent on customer happiness and statistical methodologies: A structured 5-point Likert questionnaire was employed, and descriptive statistics along with correlation analysis were conducted using SPSS. The study concluded that clients are highly happy with the digital services offered.
5. Binalben A. Patel and Ritesh Patel (2024) did research on "Customer Satisfaction Levels in Digital E-Banking at Selective Cooperative Banks in Gujarat," aiming to assess satisfaction levels and variances among banks. The assumptions established indicate that significant diversity in satisfaction occurs among banks. This study employed statistical approaches including random sampling (n = 290) and both descriptive and comparative qualitative-

quantitative analyses. No significant variance was observed at the bank level. Nonetheless, negative satisfaction numbers surpassed positive ones, signifying that consumers anticipate enhanced digital services.

6. A research study titled “Challenges and Potential of Digital Transformation in Kerala’s Cooperative Banks” was done by Ruby S. et al. (2024) to uncover user problems in embracing digital banking and to explore future opportunities. Barriers to digital adoption encompass infrastructure and digital literacy; youth engagement is essential. Statistical methods employed included a sample survey (n = 280) and analysis of secondary literature. The study revealed that structural and literacy hurdles persist. Emphasis is required on digital tactics aimed at youth and investment in infrastructure.
7. A research paper titled "Shifts in Customer Preferences and Socio-Economic Implications of Cooperative Banking in India During COVID-19" has been conducted by Sravanthi Banoth and V. Sudha (2024). The aim was to analyze alterations in customer behavior, digital adoption, and socio-economic effects during the epidemic. The hypotheses posited that COVID-19 resulted in increased digitization preferences, banks continue to be regarded as trustworthy, and infrastructural deficiencies are present. Mixed-methods—quantitative surveys and qualitative interviews were employed as statistical instruments. It has been determined that clients have significantly transitioned to digital technologies. Confidence remains elevated; nonetheless, constraints in infrastructure and literacy endure. Recommendations encompass digital capability enhancement and financial literacy development.

Objective of the Study:

- To identify and evaluate the key dimensions of digital banking service quality that influence customer satisfaction in DCCBs
- To assess the reliability, responsiveness, assurance, empathy, and tangibility aspects of digital banking services
- To investigate the relationship between demographic variables (age, gender, education, income) and digital banking satisfaction
- To measure the level of customer satisfaction with various digital banking services offered by DCCB.
- To assess areas requiring improvement in DCCB's digital service offerings

Hypotheses:

H₀₁: There is no significant relationship between digital banking service quality dimensions and customer satisfaction in DCCBs.

H₀₂: Digital service quality dimensions (reliability, responsiveness, assurance, empathy, tangibility) collectively explain a significant proportion of variance in customer satisfaction.

Customer Satisfaction Measurement And Research Framework :

In this research, SERVQUAL model was used to test the service quality and its impact on customer’s satisfaction. This model was initially developed by Parasuraman *et al.*, (1985) and later on was developed by Van Iwaarden *et al.*, (2003) to test the service quality and its impact on customer’s satisfaction. Carman (1990) developed the SERVPERF model to address inadequacies in the SERVQUAL model for evaluating service quality; nonetheless, numerous

studies have raised concerns over the the model's dependability. Therefore, to avoid the complexity in the model SERVQUAL, the author has considered primarily the five factors of service quality in the research framework as follows:

- a. Tangibility: Parasuraman et al., (1985) define tangibility as physical outlook and features, personality of staffs and equipment
- b. Reliability: Parasuraman et al., (1985) identify reliability as capability of organization to serve correctly in the first interaction.
- c. Responsiveness: Parasuraman et al., (1985) define responsiveness as the willingness of employees to be transparent about the service deliverance.
- d. Assurance: Parasuraman et al., (1985) defines employee's knowledge, politeness and ability to inspire trust.
- e. Empathy: Parasuraman et al., (1985) identify empathy as caring and personal attention aspect of organization to the customers.

Research Model:

The analysis of customer satisfaction in this study was conducted through a structured survey using a five-point Likert scale. The questionnaire consisted of 20 items categorized under five key dimensions of service quality: **Tangibility, Reliability, Responsiveness, Assurance, and Empathy**. These dimensions aimed to capture customers' perceptions of the service quality offered by District Central Cooperative Banks (DCCBs).

Data for the study were manually collected from customers by directly administering the questionnaire and gathering their evaluations, comments, and suggestions regarding the banks' current service performance. This was followed by formal quantitative analysis.

To assess the reliability of the scale, **Cronbach's Alpha** coefficients were computed using **SPSS** software. A reliability threshold of $\alpha > 0.6$ was adopted to ensure internal consistency. Based on the reliability results, **Exploratory Factor Analysis (EFA)** was performed to refine the scale for better model fit. Further, **correlation analysis** and **multiple linear regression** were employed to examine the strength and nature of relationships among the variables in the research model. The purpose of the regression analysis was to determine the linear correlation between customer satisfaction and the identified service quality factors.

The sample size for the study included **506 respondents**, selected from among the **20,000 customers** served by the Head Office and 15 branches of DCCBs in **Tiruchirappalli District**. The data collection and analysis were confined to the year **2024**. The findings from the survey are presented in the following section through detailed tabular representations.

The multiple linear regression equation is built as follows:

$$Y = \beta_0 + \beta_1 * X_1 + \beta_2 * X_2 + \beta_3 * X_3 + \beta_4 * X_4 + \dots + \beta_n * X_n + e$$

Therein,

Y: Customer Satisfaction on Digital Banking service (Dependent Variable)

X1 ->Xn: Observed variables (Independent variable)

β_i : Regression coefficient

e: Residual

FINDINGS AND DISCUSSION :

Profile of respondents:

. Table -1 showing the profile of customers of T.D.C.C. Bank			
S.no	Investors profile	No of respondents	% of respondents
1.	<u>GENDER</u>		
	Male	436	86.2
	Female	70	13.8

Understanding the personal profile of customers is essential for conducting a meaningful analysis of customer satisfaction. The demographic characteristics of the respondents are presented in the following table and discussed below.

Source : Primary data:

Ahead of discussing the aspects concerning customer satisfaction, the profile of the customers was discussed in nutshell

2.	<u>AGE</u>		
	Below 30	67	13.2
	31-40	142	28.1
	41-50	187	37
	51 and Above	110	21.7
3.	<u>EDUCATIONAL QUALIFICATION</u>		
	High School	199	39.3
	Higher secondary school & technical	165	32.6
	College	72	14.2
	Others	70	13.8
4.	<u>OCCUPATION</u>		
	Agriculture	48	9.5
	Business	101	20.0
	Employee	210	41.5
	Professional	56	11.1
	Others	91	18.0
5.	<u>MONTHLY INCOME</u>		
	Up to Rs.25000	60	11.9
	Rs.25001 to Rs.50000	140	27.7
	Rs.50001 to Rs.75000	105	20.8
	Rs.75001 to Rs.100000	105	20.8
	Rs.100001 & above	96	19.0

Gender:

Among the 506 respondents, only **13.8%** were female, while the remaining **86.2%** were male. This distribution is reflective of the general gender ratio among the customer base of **T.D.C.C. Bank Ltd.**, indicating a significant gender disparity in the usage of cooperative banking services in the region.

Age:

The age-wise distribution reveals that the **majority (37%)** of respondents belonged to the **40–50 years** age group, followed by **28%** in the **31–40 years** bracket. Respondents above **51 years** accounted for **21.7%**, while those below **30 years** constituted only **13.2%**. This suggests that the bank's primary clientele lies within the **41–50 age range**, a group likely to be actively seeking banking services for purposes such as children's education, marriage, and long-term financial planning.

Educational Qualification:

A substantial proportion of respondents (**39.3%**) had education up to **high school level**, while **32.6%** had completed **higher secondary or technical education**. Only **14.2%** of the customers held a **college degree**, and a mere **13.8%** possessed **postgraduate or professional qualifications**. This indicates that cooperative banks, including T.D.C.C. Bank Ltd., are more popular among customers with lower educational qualifications, possibly due to limited access to modern banking facilities and customized services often demanded by more highly educated individuals.

Occupation:

The occupational profile shows that the **largest segment (41.5%)** of respondents were **employed in government or private organizations**. Businesspeople comprised **20%**, while **11.9%** were **agriculturists**. The remaining **19%** fell under the "others" category, including students, retired individuals, homemakers, and the unemployed.

Income:

The preceding figure shows that the majority (41.6%) of respondents had a monthly income between Rs.50000 and Rs.100000. 39.6% of respondents reported having a monthly salary of less than Rs.25000. Finally, only 19% had a monthly salary of more over Rs.100,000.

Overall Satisfaction Assessment:

From the demographic distribution, it is evident that a **significant proportion (41.6%)** of the respondents rated their overall satisfaction with the bank at a **very good** level. These insights formed the basis for the author’s final evaluation, the results of which are detailed in the following table.

Scale reliability assessment :

The scale test enables the author to refine the measurement instrument by eliminating irrelevant or low-performing variables, thereby enhancing the overall quality and reliability of the research. This process involves evaluating the internal consistency of the scale using **Cronbach's Alpha coefficient**. Variables with a **Corrected Item-Total Correlation** of less than **0.3** are considered weak and needs to be excluded from the analysis.

In general, a **Cronbach’s Alpha** value between **0.6 and 0.8** is deemed acceptable, particularly when the study involves the exploration of a relatively new concept. However, many researchers suggest that a reliability coefficient of **0.8 or above** indicates a high level of internal consistency, making the scale robust and reliable.

Following these criteria, the author finalized the measurement scale, and the results are presented in **Table 2**.

Table 2. The results of testing the reliability of Cronbach's Alpha scale

Item	Observed variables	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
	Cronbach's Alpha (Tangibles Quality) N=4; 1 variable removed	0.89	
TAN-1	Modern and user-friendly mobile banking applications (TAN-1)	0.72	0.947
TAN-2	Professional website design and interface (TAN-2)	0.74	0.946
TAN-3	Visually appealing graphics and layouts (TAN-3)	0.76	0.945
	Cronbach's Alpha (Reliability Quality) N=4, 1 variable removed	0.92	
REL-1	Reliable mobile/internet banking uptime (REL-1)	0.73	0.947

REL-2	Consistent performance of digital transactions (REL-2)	0.71	0.948
REL-3	The fee/interest rate on the digital space is quite competitive (REL -3)	0.72	0.947
	Cronbach's Alpha (Responsiveness Quality) N=3, 2 variables removed	0.91	
RES-1	Quick response to digital service inquiries (RES-1)	0.69	0.949
RES-2	Fast processing of digital loan applications (RES-2)	0.75	0.946
RES-3	Bank's online forms and procedures are easy to follow RES-3	0.74	0.946
	Cronbach's Alpha (Assurance Quality) N=4; 1 variable removed	0.88	
ASS-1	Professional handling of online queries (ASS-1)	0.71	0.948
ASS-2	Knowledgeable online support staff (ASS-2)	0.77	0.945
ASS-3	Safety of transactions Conducted on the digital space (ASS-3)	0.68	0.95
	Cronbach's Alpha (Empathy Quality) N=4, 1 variable removed	0.85	
EMP-1	Understanding of specific customer needs ((EMP-1)	0.64	0.951
EMP -2	Special assistance for elderly customers (EMP-2)	0.73	0.947
EMP-3	Quick complaint settlement process through digital channels	0.65	0.95

(Sources of data : Author Compilation)

Exploratory Factor Analysis:

Exploratory Factor Analysis (EFA) is a statistical technique used primarily for **data reduction and summarization**, helping to identify underlying structures among a large set of variables.

Several key statistical parameters were employed in this study to validate the suitability of EFA:

- **Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy** was used to determine the appropriateness of the data for factor analysis. According to Sunho (2013), a KMO value above **0.5** is considered acceptable. In this study, the **KMO value was 0.892**, indicating excellent sampling adequacy.
- **Bartlett’s Test of Sphericity** was applied to test the null hypothesis that the variables are uncorrelated in the population. As per Hoang & Chu (2008), statistical significance (Sig. < 0.05) confirms that the observed variables are correlated and suitable for factor analysis. The test result was **significant at p = 0.001**, validating the assumption.
- **Principal Component Analysis (PCA)** was used as the factor extraction method. In line with the criterion established by Masanori (2015), only components with **eigenvalues greater than 1** were considered and the **total variance explained exceeded 50%**. In this case, the total variance extracted was **78.01%**, indicating strong explanatory power.
- To ensure convergence and discriminant validity, **factor loadings below 0.5** were eliminated. Additionally, if a variable exhibited high loadings (greater than 0.5) on multiple

factors and the difference between the loadings was **less than 0.3**, the variable was also excluded to avoid ambiguity (Watkins, 2018).

EFA was conducted using **Principal Component extraction** and **Varimax rotation**. Upon meeting all necessary conditions, the final **rotated factor matrix** was derived and is presented in

Table 3.

Table 3- Factor Loadings Matrix (After Varimax Rotation)					
Variable	Factor 1 (TAN)	Factor 2 (REL)	Factor 3 (RES)	Factor 4 (ASS)	Factor 5 (EMP)
TAN-1	0.812				
TAN-2	0.798				
TAN-3	0.756				
REL-1		0.834			
REL-2		0.867			
REL-3		0.723			
RES-1			0.789		
RES-2			0.845		
RES-3			0.776		
ASS-1				0.743	
ASS-2				0.698	
ASS-3				0.891	
EMP-1					0.721
EMP-2					0.756
EMP-3					0.689

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 6 iterations.

Source: Author's compilation

Table 3 demonstrates that the observed variables exhibit high reliability and are well-suited for inclusion in the **multiple regression analysis** with **Customer Satisfaction on Digital Banking (CSoDB)** as the dependent variable. The results of the exploratory factor analysis support the statistical soundness of these variables, making them appropriate predictors for examining the relationship between CSoDB and the identified factors. Thus, Table 3 serves as a strong foundation for conducting and interpreting the regression analysis..

Regression analysis

To assess the suitability of the regression model, several statistical tests and indicators were employed. The **R² coefficient** and the **F-test** were used to evaluate the overall fit of the linear regression model to the dataset. To determine the significance of individual predictors, the **t-test** was applied to test the null hypothesis that the population regression coefficients are equal to zero. The **standardized Beta coefficients** were analyzed to understand the strength and direction of influence that each independent variable has on the dependent variable.

Additionally, to ensure the reliability and validity of the final regression model, various diagnostic checks were conducted to test the key assumptions of linear regression. These include verifying the **linearity of relationships**, **homoscedasticity** (constant variance of residuals), **normality of residuals**, **independence of errors**, and the absence of **multicollinearity** among predictors. These tests help confirm that the regression equation is statistically sound and appropriately specified for the analysis.

Table 4. Summary of regression parameters for the research model

model	R	R2	Adjusted R2	Durbin-Watson
1	0.92	0.847	0.843	1.987

Table -4.1 ANOVAa

Source	Sum Squares	of	Degrees Freedom	of	Mean Square	F-Value	P-Value
Regression	132.804		14		9.486	194.2	< 0.001
Residual	23.985		491		0.049	-	-
Total	156.789		505		-	-	-

Table 4.2 Coefficients

Variable Code	Unstandardized coefficient		Standardized coefficient	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta (β)			Tolerance	VIF
(Constant)	0.298	0.076	-	3.921	0	-	-
TAN-1	0.086	0.019	0.127	4.526	0	0.623	1.605
TAN-2	0.078	0.018	0.119	4.333	0	0.645	1.55
TAN-3	0.072	0.02	0.105	3.6	0	0.581	1.721
REL-1	0.098	0.017	0.149	5.765	0	0.656	1.524
REL-2	0.104	0.016	0.162	6.5	0	0.687	1.456
REL-3	0.089	0.018	0.132	4.944	0	0.614	1.628
RES-1	0.081	0.019	0.118	4.263	0	0.591	1.692
RES-2	0.096	0.017	0.148	5.647	0	0.634	1.577
RES-3	0.088	0.018	0.134	4.889	0	0.608	1.645
ASS-1	0.074	0.02	0.107	3.7	0	0.567	1.764
ASS-2	0.068	0.021	0.094	3.238	0.001	0.523	1.912
ASS-3	0.112	0.018	0.171	6.222	0	0.598	1.672

EMP-1	0.063	0.022	0.084	2.864	0.004	0.487	2.053
EMP-2	0.079	0.02	0.115	3.95	0	0.556	1.798
EMP-3	0.071	0.021	0.098	3.381	0.001	0.503	1.988

Source: Author's compilation (2022)

Based on the regression model parameters presented in Table 4, the Durbin-Watson statistic is 1.987, which falls within the acceptable range of 1.5 to 2.5. This indicates that there is no violation of the assumption of first-order autocorrelation in the regression residuals (Watkins, 2018). The Adjusted R² value of 0.843 signifies that the independent variables included in the model explain 84.3% of the variance in the dependent variable, Customer Satisfaction on Digital Banking (CSoDB). The remaining 15.7% of the variation can be attributed to external factors not included in the model and random error. All independent variables have t-test significance values (Sig.) less than 0.05, indicating that each variable has a statistically significant impact on the dependent variable. Furthermore, the Variance Inflation Factor (VIF) values for all predictors are below 10, and in this case, even below 2.1, confirming that the model does not suffer from multicollinearity issues.

Based on the regression coefficients, a standardized regression equation can be constructed to represent the influence of the independent variables on CSoDB.

$$CSoDB = .084*EMP1 + .115*EMP2 + .098*EMP3 + .107*ASS1 + .094*ASS2 + .171*ASS3 + 0.127*TAN1 + 0.119*TAN2 + 0.105*TAN3 + .118*RES1 + .148*RES2 + .134*RES3 + 0.149*REL1 + 0.162*REL2 + 0.132*REL3 +$$

The regression equation highlights the significant influence of variables EMP3 and EMP1 on customer satisfaction with digital banking services. Additionally, variables such as ASS2, REL2, REL1, and RES1 also play a crucial role in shaping customer satisfaction. Although ASS1, ASS3A, and EMP3 exhibit relatively lower influence weights, their impact should not be overlooked and still warrants consideration in service improvement strategies.

Conclusion:

This research is undertaken within the framework of District Central Cooperative Banks in the Tiruchirappalli District, characterized by distinct consumer culture, digital banking products, and varying levels of technological advancement. The investigation indicates a crucial finding: customer satisfaction about the quality of digital banking services is substantially affected by elements across all five dimensions—Tangibles, Responsiveness, Assurance, Reliability, and Empathy. This highlights the necessity for a holistic strategy to service improvement that encompasses each of these quality characteristics. The factors that progressively influence client happiness are empathy, assurance, tangibility, responsiveness, and reliability. It has been noted that banks must enhance the professional management of online inquiries (ASS-1), ensure the security of transactions conducted in the digital realm (ASS-3), and expedite the complaint resolution process via digital channels to elevate customer satisfaction and maintain clientele.

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