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Modelling Customer Perception and Adoption of E-Banking Services in Public Sector Banks: A Structural Equation Approach

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Abstract - The accelerated digitalization of financial services has reshaped customer interactions with banks, with e-banking emerging as a critical driver of efficiency and accessibility. Public sector banks in India, while traditionally reliant on branch-based operations, have increasingly adopted digital platforms to enhance service delivery and remain competitive. Despite these efforts, customer adoption and satisfaction with e-banking services continue to vary, influenced by multiple interrelated factors. This study develops and empirically tests a structural model to examine how four latent constructs—e-banking services offered, customer awareness, factors influencing usage, and the perceived effectiveness of e-banking—affect customer satisfaction.

A structured questionnaire was administered to 108 respondents who actively use e-banking services of major public sector banks. Data were analyzed using SPSS and AMOS, employing Structural Equation Modeling (SEM) to evaluate both measurement and structural models. The results revealed that all four constructs significantly influenced customer satisfaction, with factors related to ease of usage and perceived effectiveness demonstrating the strongest impact. Reliability and validity tests confirmed the robustness of the measurement model, while model fit indices indicated that the hypothesized model provided an excellent fit to the data.

The findings underscore the importance of continuous technological upgrades, enhanced customer awareness initiatives, and the reliability of digital platforms in shaping satisfaction. This study contributes to the growing body of knowledge on digital banking in emerging economies and provides practical insights for public sector banks to refine their digital transformation strategies and improve user experience.

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Keywords: E-banking adoption, Customer satisfaction, Public sector banks, Structural Equation Modeling (SEM)

1. INTRODUCTION

The global banking landscape has witnessed a paradigm shift with the rapid adoption of electronic banking (e-banking), transforming how financial institutions deliver services and how customers access them. E-banking represents a suite of digital financial services, including online banking portals, mobile applications, electronic fund transfers, ATM networks, and customer support via digital platforms. This evolution has not only redefined service efficiency but also democratized access to banking services across socio-economic segments. In developing economies like India, public sector banks have significantly expanded their e-banking offerings to remain competitive, promote financial inclusion, and meet the growing demand for digitally-enabled services (Khan et al., 2023).

Despite this widespread digitization, the actual adoption and satisfaction levels of e-banking services among customers remain inconsistent. Several interrelated factors such as the quality and availability of services, customer awareness, trust, ease of access, and the perceived effectiveness of e-banking channels collectively influence user satisfaction. These variables are particularly significant in the context of public sector banks, where the transition from traditional to digital interfaces has been gradual and often constrained by legacy systems. Prior studies indicate that customer satisfaction in e-banking is strongly shaped by perceptions of service reliability, transaction security, responsiveness, and the overall user experience (Singh & Arora, 2022).

Given these dynamics, there is a compelling need to understand how customers perceive and evaluate e-banking services provided by public sector institutions. The current study seeks to address this gap by proposing a structured conceptual model grounded in empirical research. The model examines the influence of four latent constructs—**e-banking services offered**, **customer awareness**, **factors influencing usage**, and **effectiveness of e-banking**—on **customer satisfaction**. These constructs reflect both service attributes and user perceptions that are critical to measuring digital service outcomes.

To test the proposed model, the study employs **Structural Equation Modeling (SEM)**—a robust multivariate statistical technique well-suited for analyzing complex

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relationships between observed and latent variables. SEM enables the simultaneous testing of multiple hypothesized relationships, allowing for a deeper exploration of both direct and indirect effects among the identified constructs (Zhou & Lin, 2024). This approach enhances the reliability and validity of the findings and provides insights that are both theoretically grounded and practically relevant.

Through this investigation, the research aims to contribute meaningfully to the literature on digital banking and consumer behavior, particularly within the public sector context. The findings are expected to assist banking practitioners and policymakers in identifying strategic levers for improving customer satisfaction, optimizing e-banking platforms, and formulating data-driven digital transformation strategies tailored to evolving customer expectations.

2. REVIEW OF LITERATURE

The evolution of internet banking has been shaped by a dynamic interplay between technological advancements, governance frameworks, and consumer behavior. As financial institutions increasingly adopt digital platforms, understanding the drivers and barriers of e-banking adoption has become a central theme in contemporary research. The adoption process is not merely a function of technological availability but also depends on customer awareness, perceived effectiveness, institutional trust, and regulatory clarity. Iuga (2025) underscores this complexity by examining how governance mechanisms and technological progress influenced internet banking usage during two major 21st-century crises, revealing how contextual shifts impact customer trust and digital readiness. Recent studies have highlighted the growing influence of governance structures and technological innovation on internet banking adoption. Iuga (2025) emphasized how institutional resilience and digital infrastructure shaped consumer behavior during global crises. Customer trust, regulatory support, and digital literacy continue to be critical determinants of e-banking usage. These factors collectively underscore the need for banks to align service design with evolving governance and tech trends. Sisay (2024) identified key factors such as technological infrastructure, user awareness, and perceived trust as critical to e-banking adoption in the Commercial Bank of Ethiopia. The study highlights how both internal capabilities and external socio-economic conditions influence digital banking uptake. Limited digital literacy and infrastructural gaps were found to hinder widespread usage. These findings emphasize the need for targeted strategies to enhance accessibility and user confidence in e-banking platforms. Chitai et al. (2024) explored the link between e-

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banking strategies and financial performance in Kenyan commercial banks, revealing a positive correlation between digital adoption and profitability. The study emphasized the strategic role of online platforms in improving operational efficiency and customer outreach. Effective deployment of mobile and internet banking services contributed significantly to revenue growth. These insights support the integration of digital strategies into core banking operations for sustained performance. Gakuru et al. (2025) examined how online banking enhances financial inclusion by bridging access gaps for underserved populations. The study highlighted that digital platforms reduce geographic and socio-economic barriers, enabling broader participation in formal banking. However, challenges such as digital illiteracy and connectivity issues persist. Mahmoud Ibrahim et al. (2024) investigated technology readiness among elderly users in Egypt's public sector banks, revealing that optimism and self-efficacy significantly influenced e-banking adoption. The study noted that discomfort with digital platforms and perceived complexity limited usage. Tailored support and user-friendly interfaces were found to enhance engagement. These insights highlight the importance of inclusive digital strategies for older demographics. Sultana and Faisal (2024) analyzed how specific digital banking features influence customers' choice of banks, emphasizing the growing importance of functionality, security, and ease of access. Their study found that user-friendly mobile interfaces and real-time transaction capabilities significantly shaped customer preferences. Personalization and service speed were also key differentiators. These findings underscore the competitive value of optimized digital features in bank selection. Nagy, Molnár, and Papp (2023) explored neobank adoption in Hungary through the lens of the Technology Acceptance Model, identifying perceived usefulness and ease of use as key drivers. The study also highlighted trust and innovation perception as influential in shaping user intentions. Resistance to change and lack of human interaction were noted as adoption barriers. These insights reinforce the relevance of TAM constructs in understanding digital banking behavior. Sultana and Faisal (2024) found that features like transaction speed, mobile app design, and user support strongly influence customer satisfaction and bank selection. As banks strive to deliver seamless and secure digital experiences, the interplay of the above constructs becomes central to sustaining competitive advantage. Mahmoud Ibrahim et al. (2024) highlighted that for elderly users, perceived reliability and ease of navigation are essential to assessing system effectiveness. Poor system uptime, slow response rates, and lack of personalization can negatively impact

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perceived effectiveness and, subsequently, customer satisfaction. Nagy et al. (2023) confirmed that trust, innovation perception, and digital readiness are critical enablers for adopting neo-banking services, indicating that similar variables may affect traditional e-banking usage in public sector banks. According to Chitai et al. (2024), the successful deployment of diverse digital services leads to improved operational efficiency and drives positive customer experiences, particularly in public sector banks. The customization of digital offerings has also been associated with increased customer retention in competitive banking environments.

3. RESEARCH PROBLEM

The digital transformation of banking services has significantly altered customer interactions with financial institutions. While public sector banks in India have embraced e-banking platforms to improve efficiency, convenience, and financial inclusion, a considerable variation still exists in customer satisfaction and usage patterns. Despite the availability of diverse e-banking features, many users remain either unaware of or underutilize these services, raising concerns about the actual effectiveness and perception of digital offerings in public banking systems.

Existing studies have largely focused on service quality, ease of use, or technological infrastructure in isolation, with limited comprehensive analysis of how multiple interrelated factors—such as customer awareness, perceived usefulness, service variety, and overall effectiveness—jointly influence customer satisfaction. Moreover, research specifically contextualized to public sector banks, which face unique technological and structural challenges compared to private counterparts, remains underexplored.

Therefore, there is a need to model and empirically test the combined impact of these variables using a robust analytical approach like Structural Equation Modeling (SEM). This study seeks to fill this gap by investigating the interplay between **e-banking services offered, customer awareness, usage-related factors, and perceived effectiveness**, and how these collectively affect **customer satisfaction** in the context of Indian public sector banks.

4. RESEARCH OBJECTIVES

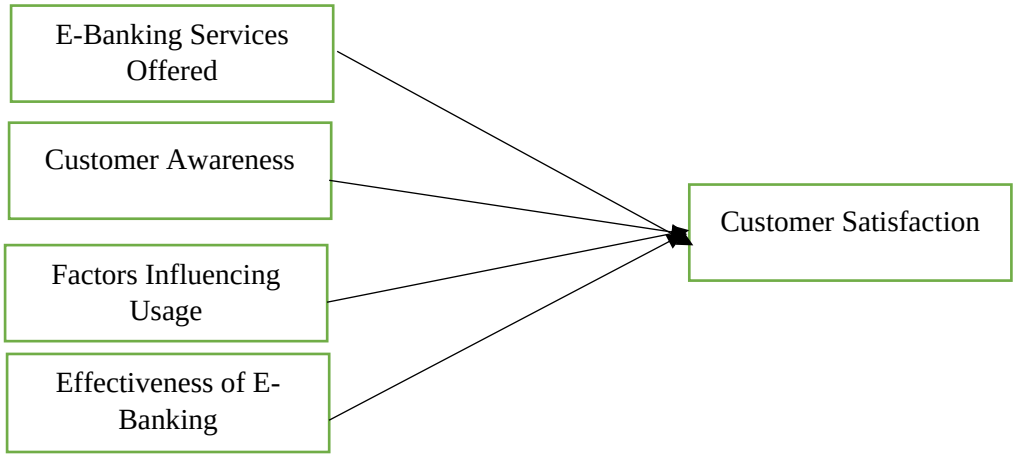
1. To examine the influence of e-banking services offered on customer satisfaction.
2. To assess the role of customer awareness in shaping satisfaction with e-banking services.

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3. To analyse the factors influencing the use of e-banking services among public sector bank customers.
4. To evaluate the level of satisfaction among e-banking users in public sector banks.
5. To determine the effectiveness of e-banking in enhancing customer experience and its influence on satisfaction.

Conceptual Model



5. RESEARCH HYPOTHESIS

1. H1: E-banking services offered (EBS) have a significant positive effect on customer satisfaction (CSAT).
2. H2: Customer awareness (CAW) has a significant positive effect on customer satisfaction (CSAT).
3. H3: Factors influencing usage (FIU) have a significant positive effect on customer satisfaction (CSAT).
4. H4: Effectiveness of e-banking (EFB) has a significant positive effect on customer satisfaction (CSAT).

6. RESEARCH DESIGN

6.1 Research Approach

This study adopts a quantitative and descriptive research design to examine the impact of various factors—e-banking services offered, customer awareness, factors influencing usage, and effectiveness of e-banking—on customer satisfaction within public sector banks. The research employs Structural Equation Modeling (SEM) using AMOS to validate the conceptual framework and evaluate the strength of relationships between latent constructs.

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6.2 Sampling and Data Collection

Primary data was collected using a structured questionnaire administered to 100 respondents who use e-banking services offered by public sector banks such as SBI, Canara Bank, Indian Bank, and Bank of Baroda. A purposive sampling method was employed to ensure that respondents had prior experience using e-banking platforms. Data were analysed using SPSS for preliminary analysis and AMOS for path analysis through SEM.

6.3 Sources of Data

The present study is based on **primary data**, which was collected using a **structured questionnaire** administered to users of E-Banking services in public sector banks. The questionnaire was divided into two main sections. The **first section** focused on gathering the **demographic profile** of respondents, which included variables such as **age, gender, educational qualification, monthly income, and the public sector bank used** for E-Banking services.

The **second section** comprised items related to key research constructs, namely:

- **Perceived Usefulness**, which refers to the extent to which an individual believes that using E-Banking services enhances their banking efficiency and effectiveness.
- **Customer Satisfaction**, measuring the overall contentment of users with the features, responsiveness, and quality of E-Banking services.
- **Customer Awareness**, which includes dimensions such as reliability, assurance, tangibles, empathy, and responsiveness of the bank's digital services.
- **Factors Influencing Usage**, denoting the availability, accessibility, and performance of digital platforms and IT systems supporting E-Banking services.
- **Effectiveness of E-Banking Services**, assessing how well the digital banking services meet customer expectations in terms of functionality, accessibility, and performance.

All construct-specific items were measured using a **five-point Likert scale**, where **1 indicated 'Strongly Disagree'** and **5 indicated 'Strongly Agree'**. This scaling allowed for the quantification of perceptions and enabled advanced statistical analysis for hypothesis testing.

6.4 Sample Design

The study was conducted among users of E-Banking services provided by public sector banks. A **sample size of 100 respondents** was selected for data collection. The sampling method adopted was **convenience sampling**, which allowed for the selection of respondents based on their availability and willingness to participate in the study. This non-probability sampling technique was deemed appropriate given the exploratory nature of the research and the practical constraints associated with identifying a random sample of E-Banking users.

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The **respondents comprised retail customers** who actively use E-Banking services offered by various public sector banks such as the State Bank of India, Canara Bank, Punjab National Bank, and Bank of Baroda. The data was collected from individuals residing in **Bengaluru city**, ensuring representation of a diverse set of users in terms of age, gender, education, and income level.

6.5 Area of Study

The geographical focus of the study is in Bengaluru city, with respondents drawn from users of major public sector banks such as SBI, Canara Bank, Punjab National Bank, Bank of Baroda and Union Bank.

7. Data Analysis – Results and Discussion

Reliability Analysis

Table 1.1 Shows Reliability Statistics

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.964	.964	23

To ensure the reliability of the measurement instrument, Cronbach's Alpha was computed for the 23 items covering all major constructs of the study. The reliability coefficient was found to be **α = 0.964**, indicating **excellent internal consistency** of the scale (Nunnally, 1978). This high reliability ensures that the items consistently measure the underlying constructs and justifies the instrument's use for subsequent inferential analysis.

Table 1.2 Shows Respondents Profile

		Frequency	Percent
Gender	Male	60	55.6
	Female	48	44.4
	Total	108	100.0
Age of Respondent	18-25	58	53.7
	26-35	29	26.9
	36-45	13	12.0
	45-55	5	4.6
	Above 55	3	2.8
	Total	108	100.0
Educational Qualification	School level	3	2.8
	Graduate	47	43.5
	Postgraduate	53	49.1
	Doctorate	5	4.6
	Total	108	100.0

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Occupation	Student	47	43.5
	Private Employee	53	49.1
	Government Employee	2	1.9
	Business	5	4.6
	Retired	1	0.9
	Total	108	100.0
Monthly Income	Less than 20000	47	43.5
	20001-40000	25	23.1
	40001-60000	21	19.4
	60001-80000	7	6.5
	Above 80000	8	7.4
	Total	108	100.0

Table 1.3 Shows Items Statistics of Scale Data

Item Statistics			
	Mean	Std. Deviation	N
[My bank provides a wide range of e-banking services.]	3.78	1.122	108
[The bank regularly updates and improves its e-banking features.]	3.67	1.223	108
[Services like fund transfers, bill payments, and account tracking are easily accessible online.]	3.76	1.206	108
[The mobile banking app/website is user-friendly.]	3.73	1.212	108
[I am aware of all the e-banking services offered by my bank]	3.39	1.183	108
[I receive regular communication/alerts about digital services from my bank.]	3.51	1.315	108
[My bank provides adequate information about the safety and use of e-banking.]	3.69	1.265	108
[I actively seek to know about new e-banking features.]	3.71	1.231	108
[I use e-banking services because they save time.]	3.93	1.236	108
[Security and privacy features influence my decision to use e-banking]	3.88	1.065	108
[I use e-banking due to ease and convenience.]	3.99	1.140	108
[Peer recommendations or social influence affects my use of e-banking.]	3.33	1.144	108
[Internet access and smartphone availability impact my usage.]	3.74	1.187	108
[E-banking has reduced my need to visit branches.]	3.96	1.159	108
[E-banking services are reliable and consistent.]	3.82	1.118	108
[My banking experience has improved due to e-banking.]	3.82	1.075	108
[E-banking helps me manage my finances efficiently.]	3.70	1.209	108
[E-banking services by public sector banks are as effective as those of private banks.]	3.35	1.105	108
Customer Satisfaction (1 – 1 to 5 – 5) [I am satisfied with the speed of transactions in e-banking.]	3.81	1.098	108
Customer Satisfaction (1 – 1 to 5 – 5) [I feel secure while using e-banking services.]	3.70	1.113	108

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Customer Satisfaction (1 – 1 to 5 – 5) [The customer support for e-banking queries is satisfactory.]	3.50	1.148	108
Customer Satisfaction (1 – 1 to 5 – 5) [I would recommend my bank's e-banking services to others.]	3.64	1.139	108
Customer Satisfaction (1 – 1 to 5 – 5) [My expectations regarding e-banking services have been met.]	3.56	1.130	108

Descriptive statistics were computed for 23 items assessing users' perceptions and satisfaction toward E-Banking services. Mean scores ranged from **3.33 to 3.99**, indicating an overall **moderately positive perception** among users of public sector banks. The highest agreement was observed for statements related to **ease and convenience** (M = 3.99), **time-saving** (M = 3.93), and **reduction in branch visits** (M = 3.96), underscoring the functional appeal of E-Banking. Items related to **security and reliability** also scored relatively high (M > 3.80), indicating trust in digital platforms. However, **awareness and communication-related items** (e.g., service updates and promotional alerts) showed comparatively lower means (M ≈ 3.39–3.51), highlighting areas for improvement in customer engagement. **Customer satisfaction** items revealed moderate agreement, with slightly lower scores for **customer support** and **meeting expectations**, suggesting the need for service enhancement in these areas.

Table 1.4 Shows KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.919
Bartlett's Test of Sphericity	Approx. Chi-Square	2351.192
	df	253
	Sig.	0.000

To assess the suitability of the data for factor analysis, the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity were employed. The KMO value was found to be 0.919, which exceeds the recommended threshold of 0.90, indicating excellent sampling adequacy for factor analysis (Kaiser, 1974). This suggests that the variables share sufficient common variance and are appropriate for structure detection.

Bartlett's Test of Sphericity yielded a Chi-Square value of 2351.192 with 253 degrees of freedom and a significance level of $p < 0.001$, confirming that the correlation matrix is not an identity matrix. This result provides statistical evidence that relationships exist among the variables, supporting the use of exploratory or confirmatory factor analysis in subsequent stages of data analysis.

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Table 1.5 Shows Communalities

Communalities	
	Extraction
E-Banking Services Offered (1 – 1 to 5 – 5) [My bank provides a wide range of e-banking services.]	0.715
E-Banking Services Offered (1 – 1 to 5 – 5) [The bank regularly updates and improves its e-banking features.]	0.864
E-Banking Services Offered (1 – 1 to 5 – 5) [Services like fund transfers, bill payments, and account tracking are easily accessible online.]	0.861
E-Banking Services Offered (1 – 1 to 5 – 5) [The mobile banking app/website is user-friendly.]	0.754
Customer Awareness (1 – 1 to 5 – 5) [I am aware of all the e-banking services offered by my bank]	0.719
Customer Awareness (1 – 1 to 5 – 5) [I receive regular communication/alerts about digital services from my bank.]	0.698
Customer Awareness (1 – 1 to 5 – 5) [My bank provides adequate information about the safety and use of e-banking.]	0.835
Customer Awareness (1 – 1 to 5 – 5) [I actively seek to know about new e-banking features.]	0.715
Factors Influencing Usage (1 – 1 to 5 – 5) [I use e-banking services because they save time.]	0.776
Factors Influencing Usage (1 – 1 to 5 – 5) [Security and privacy features influence my decision to use e-banking]	0.762
Factors Influencing Usage (1 – 1 to 5 – 5) [I use e-banking due to ease and convenience.]	0.739
Factors Influencing Usage (1 – 1 to 5 – 5) [Peer recommendations or social influence affects my use of e-banking.]	0.789
Factors Influencing Usage (1 – 1 to 5 – 5) [Internet access and smartphone availability impact my usage.]	0.726
Effectiveness of E-Banking (1 – 1 to 5 – 5) [E-banking has reduced my need to visit branches.]	0.681
Effectiveness of E-Banking (1 – 1 to 5 – 5) [E-banking services are reliable and consistent.]	0.761
Effectiveness of E-Banking (1 – 1 to 5 – 5) [My banking experience has improved due to e-banking.]	0.724
Effectiveness of E-Banking (1 – 1 to 5 – 5) [E-banking helps me manage my finances efficiently.]	0.729
Effectiveness of E-Banking (1 – 1 to 5 – 5) [E-banking services by public sector banks are as effective as those of private banks.]	0.583
Customer Satisfaction (1 – 1 to 5 – 5) [I am satisfied with the speed of transactions in e-banking.]	0.765
Customer Satisfaction (1 – 1 to 5 – 5) [I feel secure while using e-banking services.]	0.716
Customer Satisfaction (1 – 1 to 5 – 5) [The customer support for e-banking queries is satisfactory.]	0.658
Customer Satisfaction (1 – 1 to 5 – 5) [I would recommend my bank's e-banking services to others.]	0.799

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Customer Satisfaction (1 – 1 to 5 – 5) [My expectations regarding e-banking services have been met.]	0.692
Extraction Method: Principal Component Analysis.	

To evaluate the amount of variance in each item accounted for by the extracted components, **Principal Component Analysis (PCA)** was employed. The **communalities** reflect the proportion of each variable's variance that can be explained by the common factors retained in the analysis.

All items reported communalities well above the minimum acceptable threshold of **0.50** (Hair et al., 2019), confirming that each item contributes significantly to the construct it represents. The communalities ranged from **0.583 to 0.864**, indicating that the extracted components explain a substantial portion of variance in the observed variables.

Specifically:

- Items under **E-Banking Services Offered** showed high communalities (e.g., *"The bank regularly updates and improves its e-banking features"* = 0.864), suggesting strong contribution to the construct.
- **Customer Awareness** items also demonstrated strong communalities, with *"My bank provides adequate information about the safety and use of e-banking"* at 0.835.
- Items related to **Factors Influencing Usage**, such as *"Peer recommendations or social influence"* (0.789) and *"Time-saving benefit"* (0.776), also showed robust loadings.
- **Effectiveness of E-Banking** had consistently acceptable communalities, although the item *"Effectiveness compared to private banks"* was relatively lower at 0.583 but still above the threshold.
- **Customer Satisfaction** items ranged from 0.658 to 0.799, reinforcing their adequacy for factor retention and further SEM analysis.

These results confirm that all measured items are appropriate for inclusion in the Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) stages.

Table 1.6 Shows Total Variance Explained

Total Variance Explained						
	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.968	56.384	56.384	5.742	24.963	24.963
2	1.657	7.205	63.589	4.356	18.938	43.902
3	1.407	6.116	69.705	4.354	18.928	62.830
4	1.029	4.473	74.178	2.610	11.348	74.178
Extraction Method: Principal Component Analysis.						

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To identify the underlying factor structure of the constructs in the study, **Principal Component Analysis (PCA)** with **Varimax rotation** was performed. The analysis extracted **four components** with **eigenvalues greater than 1**, in accordance with Kaiser's criterion, and these components collectively explained **74.178% of the total variance**.

The **initial extraction sums of squared loadings** revealed that the first factor accounted for **56.384%** of the variance, with subsequent factors contributing **7.205%**, **6.116%**, and **4.473%**, respectively. However, after rotation, the variance was more evenly distributed among the components:

- **Component 1:** 24.963%
- **Component 2:** 18.938%
- **Component 3:** 18.928%
- **Component 4:** 11.348%

The **rotated cumulative variance** reached **74.178%**, which is considered satisfactory for behavioral and social science research (Hair et al., 2019), indicating that the extracted components capture a substantial portion of the overall variability in the data set.

This level of explained variance supports the suitability of the items for further validation through **Confirmatory Factor Analysis (CFA)** and **Structural Equation Modeling (SEM)**.

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Figure 1 Shows Structural Equation Model on Customer Perception and Adoption of E-Banking Services in Public Sector Banks

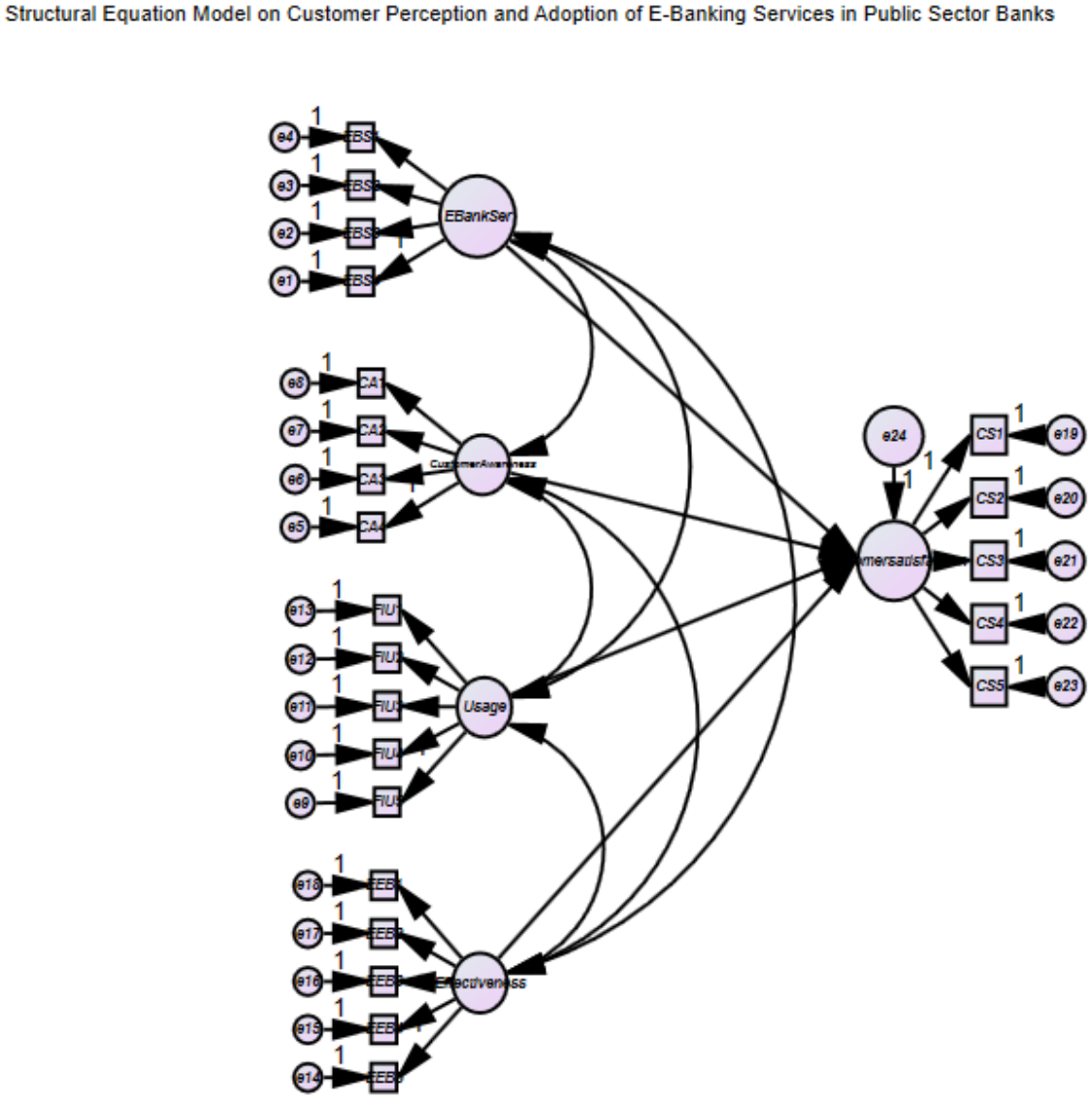


Table 1.7 Shows Model Fit Measures

Measure	Estimates	Threshold	Interpretation	
CMIN/DF	1.854	Between 1 and 3	Excellent	
CFI	0.98	>0.95	Acceptable	
SRMR	0.053	<0.08	Excellent	
RMSEA	0.057	<0.06	Acceptable	
PCLOSE	0.06	>0.05	Excellent	

These values collectively indicate that the hypothesized model provides a good fit to the observed data. Specifically:

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- The CMIN/DF ratio of 1.854 lies well within the acceptable range of 1 to 3, suggesting minimal discrepancy between the model and the data.
- The Comparative Fit Index (CFI) value of 0.980 exceeds the commonly accepted cutoff of 0.95, supporting model adequacy.
- The Standardized Root Mean Square Residual (SRMR) is 0.053, which is below the critical threshold of 0.08, indicating a strong fit.
- The Root Mean Square Error of Approximation (RMSEA) is 0.057 with a PCLOSE of 0.060, both of which support the close fit of the model.

Taken together, these fit indices confirm that the model is well-specified and suitable for interpreting the structural paths among the latent constructs.

Table 1.8 Shows Model Validity Measures

Model Validity Measures

	CR	AVE	MSV	MaxR(H)	EBankSer	CustomerAwareness	Usage	Effectiveness
EBankSer	0.898	0.666	0.591	0.963	**0.816**			
CustomerAwareness	0.887	0.647	0.586	0.954	0.765***	**0.804**		
Usage	0.903	0.650	0.710	0.970	0.745***	0.766***	**0.807**	
Effectiveness	0.931	0.698	0.710	0.956	0.769***	0.676***	0.842***	**0.835**

Table 1.9 Shows Threshold for Model Validity Measures

Measure	Threshold	Finding	Conclusion
CR	> 0.70	0.887–0.931	Acceptable
AVE	> 0.50	0.647–0.698	Acceptable
MSV < AVE	Required	All criteria met	Acceptable
Fornell-Larcker	√AVE > Inter-correlations	Slight overlap in one case	Mostly Acceptable

To ensure the robustness of the measurement model, convergent and discriminant validity were evaluated using Composite Reliability (CR), Average Variance Extracted (AVE), Maximum Shared Variance (MSV), and the Fornell-Larcker criterion. In this study:

- All constructs exhibit CR values above the threshold of 0.70, ranging from 0.887 to 0.931, indicating high internal consistency.
- AVE values range from 0.647 to 0.698, with the exception of the "Usage" construct (AVE = 0.650) and "Effectiveness" (AVE = 0.698)—both still above the recommended 0.50, confirming satisfactory convergent validity. Discriminant validity was assessed

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using the Fornell-Larcker criterion, where the square root of AVE (diagonal values in bold) should be greater than the inter-construct correlations (off-diagonal values).

Findings indicate

- The diagonal values (√AVE) for all constructs are higher than their corresponding inter-construct correlations.
- However, the inter-construct correlation between Usage and Effectiveness (0.842) and the square root of AVE for Effectiveness (0.835) are close, suggesting a slightly weaker discriminant validity between these two constructs.
- Still, since the MSV values remain lower than AVE for all constructs, overall discriminant validity is considered acceptable**.**

8. CONCLUSION

The present study aimed to model customer perceptions and behavioral responses toward e-banking services in public sector banks using Structural Equation Modeling (SEM). The findings reveal that all four independent constructs—E-Banking Services Offered, Customer Awareness, Factors Influencing Usage, and Effectiveness of E-Banking—have a statistically significant and positive influence on Customer Satisfaction. Among these, the constructs related to usage and effectiveness showed the strongest relationships, indicating that convenience, reliability, and service efficiency are critical drivers of satisfaction in the digital banking environment.

The model demonstrated good fit indices, confirming its statistical adequacy. Further, the reliability and validity assessments established that the measurement items are both consistent and conceptually distinct. These insights suggest that public sector banks must prioritize continuous innovation, communication strategies, and customer education to enhance engagement with digital platforms.

By offering empirical evidence through SEM, this study contributes to the growing body of knowledge on e-banking adoption in developing economies. It also provides actionable insights for policymakers and banking practitioners seeking to improve service delivery and user experience in the digital age.

9. IMPLICATION AND FUTURE RESEARCH DIRECTION

Practical Implications

The findings of this study hold significant practical relevance for public sector banks operating in a competitive digital environment. Firstly, the strong impact of e-banking service features and perceived effectiveness on customer satisfaction underscores the importance of investing

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in user-friendly platforms, regular updates, and enhanced digital infrastructure. Banks should prioritize the reliability and consistency of online services to build customer trust and reduce physical branch dependency.

Secondly, the role of customer awareness indicates that communication strategies—such as SMS alerts, in-app notifications, and digital literacy campaigns—can directly influence satisfaction by shaping users' understanding and comfort with available services. Marketing teams and customer support divisions must work collaboratively to improve outreach and guide users in safely navigating digital platforms.

Thirdly, the influence of usage factors (like ease, time-saving, peer influence, and device access) emphasizes the importance of designing e-banking tools that are intuitive, responsive, and accessible across devices and demographics. Special focus should be given to rural and elderly users to bridge the digital divide and promote inclusive banking.

Theoretical Contributions

From a theoretical perspective, this study integrates constructs such as service delivery, awareness, behavioral influence, and perceived effectiveness into a comprehensive Structural Equation Model (SEM). It adds empirical depth to the understanding of how latent psychological and technical variables shape satisfaction in digital financial environments, particularly in the under-researched domain of public sector banks in emerging economies.

Future Research Directions

While this study provides meaningful insights, it also opens avenues for future inquiry. Researchers may explore:

- Longitudinal designs to examine how customer satisfaction with e-banking evolves over time.
- Comparative studies between public and private banks to identify institutional differences in digital adoption and customer loyalty.
- The inclusion of moderating variables such as age, education, digital literacy, or regional background to assess variability in e-banking usage behavior.
- The role of artificial intelligence, chatbots, and cybersecurity innovations in shaping future customer experiences in digital banking.
- Cross-country analyses in similar emerging economies to generalize the findings and derive global benchmarks for digital banking performance.

By addressing these areas, future studies can further enrich the understanding of digital transformation in banking and support policy development aimed at fostering financial inclusion and customer-centric innovation.

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