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A Study on Artificial Intelligence–Enabled Digital Banking and its Influence on Customer Usage, Experience, and Technology Transformation in Coimbatore District

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Abstract: *The rapid integration of Artificial Intelligence (AI) in the banking sector has significantly transformed service delivery, customer interaction, and operational efficiency. This study examines the influence of AI-enabled digital banking on perceived usage, customer experience, technology transformation, and technical factors among bank customers in Coimbatore District, Tamil Nadu. The study is based on primary data collected from 385 bank customers across eleven taluks using a structured questionnaire, supported by secondary data from bank reports and published sources. Statistical tools such as normality tests, homogeneity tests, reliability analysis, convergent validity, and composite reliability were applied using SPSS. The results confirm that the data are normally distributed and free from homogeneity issues. Reliability and validity measures demonstrate strong internal consistency and convergent validity of the constructs. The findings indicate that AI-enabled digital banking positively influences customer satisfaction, trust, operational efficiency, and technology adoption. The study contributes empirical evidence at the district level and offers insights for banks and policymakers to enhance AI-driven banking services.*

Keywords: Artificial Intelligence, Digital Banking, Customer Experience, Technology Transformation, Reliability Analysis

I. INTRODUCTION

The banking sector has undergone a profound transformation with the adoption of Artificial Intelligence (AI), reshaping traditional banking operations into technology-driven service models. AI-enabled digital banking has introduced automated customer support, personalized services, fraud detection, and enhanced decision-making processes, thereby improving efficiency and customer satisfaction. In India, the increasing penetration of digital technologies and government initiatives promoting digital financial inclusion have accelerated the adoption of AI in banking services.

Despite the growing implementation of AI-based banking solutions, empirical studies focusing on customer perceptions, usage behavior, and experience at the regional and district levels remain limited. Understanding how customers perceive AI-enabled banking services is essential for banks to optimize technology deployment and improve service quality. In this context, the present study investigates AI-enabled digital banking in Coimbatore District, emphasizing perceived usage factors, customer experience, technology transformation, and technical factors using primary data.

Statement of the Problem

The adoption of AI-enabled digital banking has increased rapidly; however, there is limited empirical evidence on how customers perceive and experience these services at the district level. Most existing studies focus on technological efficiency or organizational benefits, with less emphasis on customer-centric factors such as perceived usage, trust, satisfaction, and experience. Furthermore, there is a lack of primary-data-based research examining the reliability and validity of AI-related constructs in digital banking. Therefore, the problem addressed in this study is to assess how AI-

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enabled digital banking influences customer usage, experience, and technology transformation among bank customers in Coimbatore District.

Objectives of the Study

- To examine the perceived usage factors of AI-enabled digital banking among bank customers.
- To analyze bank customers' experience in terms of trust, security, and operational efficiency.
- To assess the impact of AI-enabled digital banking on technology transformation factors.
- To evaluate the influence of technical factors such as problem-solving capability, task efficiency, and reputation.
- To test the reliability and validity of the measurement model used in the study.

Hypotheses of the Study

H1: There is a significant influence of AI-enabled digital banking on perceived usage factors among bank customers.
H2: AI-enabled digital banking has a significant impact on bank customers' experience factors.
H3: Technology transformation factors are significantly influenced by AI-enabled digital banking.
H4: Technical factors such as problem-solving capability, task efficiency, and reputation are significantly associated with AI-enabled digital banking.
H5: The measurement model used in the study demonstrates acceptable reliability and convergent validity.

II. RESEARCH METHODOLOGY

SECONDARY DATA

Perceived Usage, Trust, Satisfaction & Experience, and Influence of AI are the three categories into which the study's dependent variables are divided, while AI-enabled digital banking is the independent variable.

SOURCES OF DATA

This study illustrates how banks are utilizing artificial intelligence to digitize their banking operations by replacing the front desk. Both primary and secondary sources are included in the study. The questionnaire would be given to reputable bank customers in order to get primary data. Journals, periodicals, newspapers, and the websites of individual banks as well as the Indian government would be the sources of the secondary data.

III. ANALYSIS AND INTERPRETATION

Sample Size Distribution

Table 1 Sample Size of the Study

Taluks	Sample Size
Annur	35
Anaimalai	35
Coimbatore North	35
Coimbatore South	35
Kinathukadavu	35
Madukkarai	35
Mettupalayam	35
Perur	35
Pollchi	35
Sulur	35
Valparai	35
Total	**385**

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PILOT STUDY

Initially a pilot study was carried out to evaluate the validity and applicability of the research tools. A well-structured questionnaire was framed based on theoretical and analytical studies, and bank customers' responses were gathered. For the pilot study, a face-to-face survey of 50 bank customers in each taluk of Coimbatore district was conducted. Based on the responses collected further the questionnaire was scrutinized and validated for the entire data collection. A modified questionnaire was finalized for the further data collection from the sample of 385. This procedure aided in verifying the study's questionnaire's appropriateness and relevance.

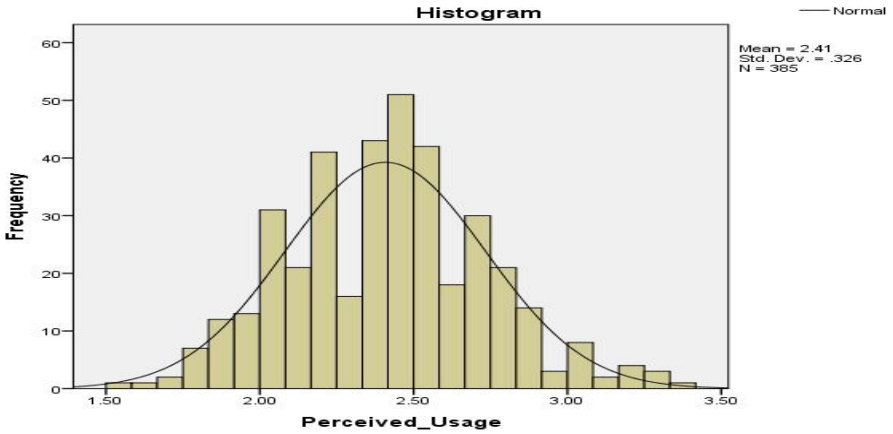
NORMALITY TEST - Checking The Assumption

It is crucial to test the underlying hypothesis that the data is appropriate for the study before using any technologies. Normality, homogeneity, reliability analysis, composite validity, and convergent validity are among the tests the researcher has used to test the assumptions.

Normal Distribution for Perceived Usage Factors, Bank Customers' Experience Factors, Technology transformation factors, and Technical Factors

For each construct, the normal distribution is tested using a Q-Q plot and a histogram diagram. One of the most widely used methods for determining normalcy is the normal Q-Q plot. The usual Q-Q plot and histogram for each construct are shown in Figures 4.1 to 4.4. For each of the constructs Perceived Usage Factors (PUF), Bank customer experience Factors (BCEF), Technology transformation factors (TTF), and Technical Factors (TF) the histogram diagram compares the observed data with a normal distribution. It is confirmed that all of the constructs are normally distributed when the normal Q-Q plot compares the observed value with the expected normal values, which are closer to the line.

Normality – Histogram & Q-Q Plot for Perceived Usage Factors (SPSS Output)



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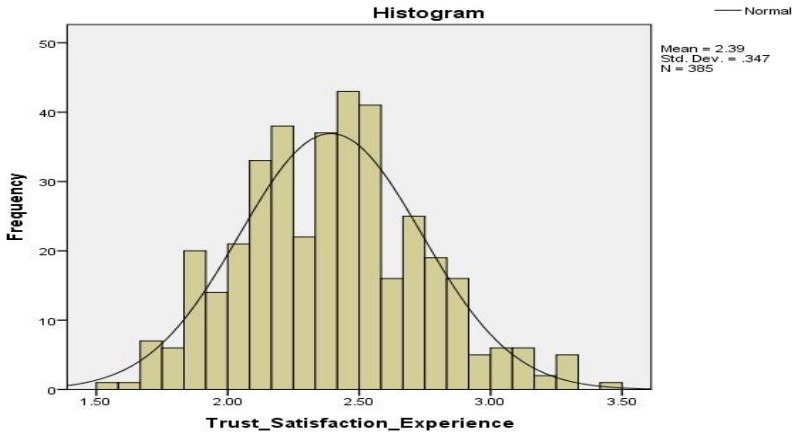
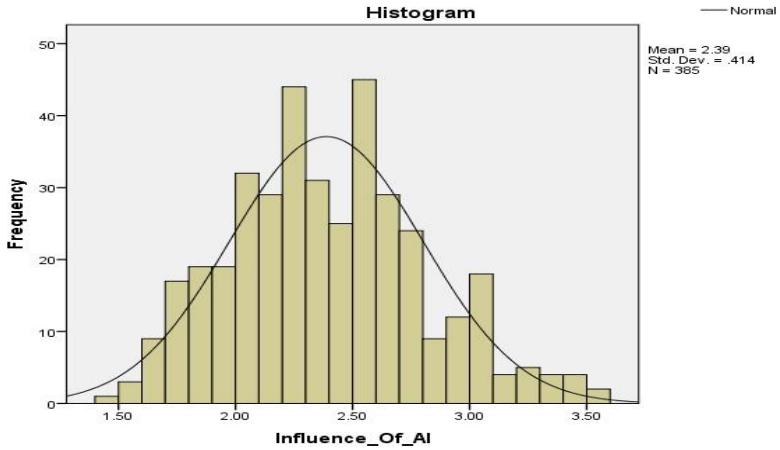
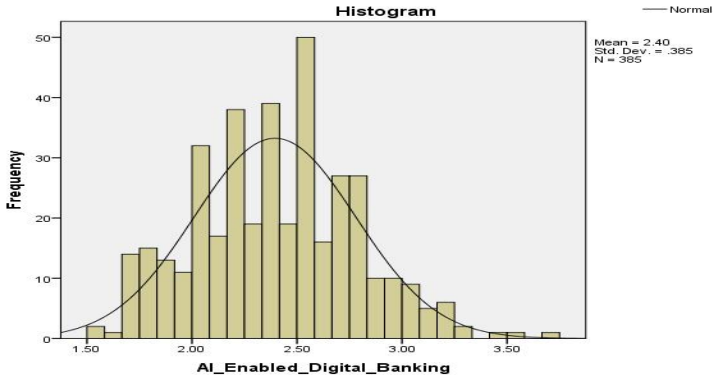
Normality – Histogram & Q-Q Plot for Bank Customers Experience Factors (SPSS Output)



Normality – Histogram & Q-Q Plot for Technology transformation factors (SPSS Output)



Normality – Histogram & Q-Q Plot for Technical Factors (SPSS Output)



Checking Normality Assumption

One sample Kolmogorov-Smirnov test was used to check for normality. The table shows the normal distribution of the constructs, which are Technical Factors (TF), Technology Transformation Factors (TTF), Bank Customer Experience Factors (BCEF), and Perceived Usage Factors (PUF). All of the constructs have significant values above the 0.05 or ≥0.05 threshold level, indicating that the entire set of constructs was normally distributed.

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Table 2 - One-Sample Kolmogorov-Smirnov Test

Constructs	N	Mean	Std. Deviation	Skewness	Kurtosis	Kolmogorov-Smirnov
	Normal Parameters					
Perceived Usage Factors	385	2.4080	.32607	.213	.011	.067
Bank Customers Experience Factors	385	2.3919	.34678	.270	.019	.059
Technology Transformation Factors	385	2.3877	.41415	.319	.244	.099
Technical Factors	385	2.3951	.38512	.213	.209	.063

Sources: Calculated & Computed from Primary data (SPSS output)

IV. HOMOGENEITY

Another premise of the multivariate approach is homogeneity, which states that the dependent variables show that the variances of the predictor variables are equal. The table that details Levene's test results for each of the seven constructs makes this clear. The purpose of this test was to determine whether the constructions had any homogeneity problems. The significant values for each of the seven constructs are more than the 0.05 cutoff point (≥0.05). Therefore, it may be said that there are no homogeneity problems with the seven conceptions.

Table 3 - Results of Homogeneity of Variance- Levene's Test

Label	Constructs	Levene Statistic	Sig.
PUF	Perceived Usage Factors	0.394	0.531
BCEF	Bank Customers Experience Factors	0.178	0.674
TTF	Technology Transformation Factors	1.258	0.263
TF	Technical Factors	0.867	0.352

Sources: Calculated & Computed from Primary data (SPSS output)

ASSESSMENT OF RELIABILITY ANALYSIS

Table 4 – Reliability Analysis

Label	Constructs	Cronbach's Alpha (α)
PUF	Perceived Usage Factors	0.822
BCEF	Bank Customers Experience Factor	0.856
TTF	Technology Transformation Factors	0.830
TF	Technical Factors	0.808

Sources: Calculated & Computed from Primary data (SPSS output)

CONSTRUCT-WISE RELIABILITY TEST

An indicator of the items' general consistency is reliability analysis. One way to measure, the scale variable in a given construct is through internal consistency reliability. The internal consistency of the constructs was tested in this study using Cronbach's alpha coefficient; reliably consistent constructs are indicated by Cronbach's alpha coefficient values of more than 0.7 (≥0.7).

Table 5 Reliability Analysis of Perceived Usage Factors

Label	Statements of PUF	Cronbach's Alpha (N=385)
Satisfaction		

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PUF 12	If I just had a built-in assistance facility	0.781
PUF 13	If I had access to digital banking applications or systems, I would use them	
PUF 14	Over the coming months, I plan to use digital banking applications or systems	
PUF 16	I am willing to use artificial-enabled digital banking for online banking transactions.	
PUF 17	The use of artificial intelligence-enabled banking gives me a feeling of pleasure.	
PUF 18	My experience with AI-enabled digital banking is better than I expected.	
PUF 19	The benefits of AI-enabled digital banking are better than I expected.	
PUF 20	The AI-enabled digital banking had a better service level than I expected.	
PUF 21	My expectations towards AI-enabled digital banking are confirmed.	
Technology Acceptance		
PUF 1	The use of digital banking applications or systems improves the quality of my work and related to the job	0.861
PUF 2	It helps me to complete my tasks faster with essential aspects	
PUF 3	Digital transformation increases my productivity and efficiency at work.	
PUF 4	Digital banking applications and systems ease my work in general.	
PUF 6	It is easy for me to learn how to run digital banking applications or systems.	
Self-Sufficiency		
PUF 8	The interaction with digital banking requires a great deal of customer effort.	0.885
PUF 9	My experience with digital banking applications or systems is transparent and understandable	
PUF 11	if there was nobody around to tell me what to do when I went	

Sources: Calculated & Computed from Primary data (SPSS output)

The reliability analysis of perceived usage factors is shown in the table. The construct demonstrates internal consistency among the items in the corresponding scales, with Cronbach's alpha coefficient values for PUF-Satisfaction being 0.781, PU-Technology Acceptance being 0.861, and PU-Self-Sufficiency being 0.885. All of these values are greater than 0.7. As a result, the constructs are trustworthy and appropriate for additional study.

Table 6 Reliability Analysis of Bank Customer's Experience Factors

Label	Statements of BCEF	Cronbach's Alpha (N=385)
User Trust		
BCEF 1	Artificial intelligence (AI) enabled digital banking to provide credible information to users.	0.850
BCEF 2	Communication using artificial intelligence (AI) enabled digital banking is more productive and useful.	
BCEF 3	Artificial intelligence-enabled (AI) digital banking saves a tremendous amount of time.	
BCEF 4	I am satisfied with AI-enabled digital banking services.	
BCEF 7	Digital banking applications led by artificial intelligence are visually appealing.	
BCEF 8	The interface of AI-enabled digital banking applications is attractive.	
BCEF 9	The user interface of AI-enabled digital banking applications is professionally designed.	
BCEF 10	AI banking methods are more effective than traditional approaches.	
BCEF 11	AI banking ensures ease and security.	

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Security		
BCEF 12	AI banking guarantees accuracy and utility.	0.759
BCEF 13	AI-based banking applications are perceived as secure for conducting transactions.	
BCEF 15	The banking sector urgently requires AI to enhance efficiency, security, and customer experience.	
Operational Efficiency		
BCEF 5	The AI-enabled digital banking is according to my experience	0.702
BCEF 16	AI has become the primary medium for consumer interaction in the banking industry.	
BCEF 17	AI reduces the need for manpower in routine tasks.	
BCEF 18	AI applications offer user-friendly interfaces.	
BCEF 19	Payments are simple and seamless.	
BCEF 21	AI replaces telecallers for routine consumer interactions.	

Sources: Calculated & Computed from Primary data (SPSS output)

The table shows the reliability analysis of bank customers' experience factors. The construct demonstrates internal consistency among the items in the corresponding scales, with Cronbach's alpha coefficient values for BCEF - User Trust being 0.850, BCEF - Security being 0.759, and BCEF - Operational Efficiency being 0.702, all of which are greater than 0.7. As a result, the constructs are trustworthy and appropriate for additional study.

Table 7 Assessment of Reliability Analysis – Technology Transformation Factors

Label	Statements of TTF	Cronbach's Alpha (N=385)
Challenges		
TTF 10	The banking sector may undergo significant transformation in the coming years.	0.761
TTF 11	Employability improves following AI training.	
TTF 12	Virtual personal shoppers assist consumers in their purchasing decisions.	
TTF 13	Customer service ensures client satisfaction through assistance and support.	
TTF 14	Conversational commerce facilitates transactions through interactive conversations.	
TTF 16	The hiring process incorporates AI technologies for efficiency and effectiveness.	
TTF 17	Product targeting occurs in real time for enhanced marketing effectiveness.	
TTF 20	Online buyers enjoy personalized shopping experiences tailored to their preferences and behaviors.	
Transformations		
TTF 1	Users express satisfaction with the comfort provided by AI.	0.841
TTF 2	The job becomes easier with the integration of AI.	
TTF 3	Work frequency is impacted by the presence of AI.	
TTF 5	AI exhibits certain drawbacks.	
TTF 7	Users are highly satisfied with AI utilization.	
TTF 8	Fraud and error reduction achieved.	
TTF 9	AI significantly impacts work life.	
Personalization		
TTF 21	Voice-powered search enables users to perform searches using spoken commands or queries.	0.765
TTF 22	Advertisements prioritize customer needs and preferences, ensuring a more personalized and engaging experience.	
TTF 23	The assortment intelligence tool enhances decision-making by providing insights into product selection and optimization.	

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TTF 24	The sales process incorporates AI technologies for improved efficiency and effectiveness.	

Sources: Calculated & Computed from Primary data (SPSS output)

The reliability analysis of technology transformation factors is shown in the table. There is internal consistency among the items in the corresponding scales, as indicated by Cronbach's alpha coefficient values of 0.761 for TTF - Challenges, 0.841 for TTF - Transformations, and 0.765 for TTF - Personalization. The constructs are therefore trustworthy and appropriate for additional study.

Table 8 Reliability Analysis of Technical Factors

Label	Statements of AIEDB	Cronbach's Alpha (N=385)
	Problem-Solving Capability	
TF 4	I believe AI-enabled digital banking services are credible and fulfill promises.	0.770
TF 7	AI-enabled digital banking offers valuable features that I couldn't find in conventional digital banking.	
TF 8	AI-enabled digital banking allows me to perform transactions according to my preference.	
TF 14	With AI-enabled digital banking completing financial tasks is easier for me.	
TF 15	The use AI enabled digital banking enhances performance.	
TF 17	Digital banking led by AI can handle customer complaints directly and immediately.	
TF 18	AI-enabled digital banking can solve complex problems.	
	Task efficiency	
TF 12	The AI-enabled digital banking increased my productivity.	0.705
TF 13	The AI-enabled digital banking allows me to complete tasks more quickly.	
TF 16	I believe that digital banking led by AI can get the job done.	
	Reputation	
TF 1	I believe banks providing AI-enabled digital banking have a good reputation.	0.788
TF 5	This AI-enabled digital banking meets my personal needs.	
TF 10	The AI-enabled digital banking gives up-to-date information about digital banking services.	
TF 11	The use of AI-enabled digital banking gives the latest information about digital banking services.	

Sources: Calculated & Computed from Primary data (SPSS output)

Reliability analysis of technical factors is shown in the table. With Cronbach's alpha coefficient values of 0.770 for TF's Problem-Solving Capability, 0.705 for TF's **Task efficiency**, and 0.788 for TF's **Reputation** all of which are higher than 0.788 the construct demonstrates internal consistency among the items in the corresponding scales. As a result, the constructs are trustworthy and appropriate for additional research.

VALIDATION OF MEASUREMENT MODEL

When every item in a measurement model is statistically significant, this validity is attained. By calculating the Average Variance Extracted (AVE) for each construct, the convergent validity could also be confirmed. To obtain this validity, the AVE value must be 0.5 or greater.

CONVERGENT VALIDITY

How closely one assessment is related to other assessments, that measure the same (or comparable) constructs is known as convergent validity. The study determines whether two tests that ought to be closely related to one another are related by looking at their convergent validity. An action, attitude, or concept especially one that cannot be directly observed is

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referred to as a construct in this context. A moderate to high correlation is ideal when two tests measure the same construct, like stress. Convergent validity, which is a sign of construct validity, is demonstrated by high correlation.

One subset of concept validity is convergent validity. A test's construct validity indicates how effectively it captures the idea it was intended to capture. A little more complex, convergent validity assesses whether or not constructs that should theoretically be related to one another are related. That measurement of linked variables has a positive association with one another to assess the convergent validity of your test. Stated differently, individuals who score well on one scale ought to also score highly on the other if there are two related scales.

A correlation coefficient, like Pearson's r, is a value that falls between 1 and -1 and is used to estimate correlation. The direction and strength of the relationship between the variables are shown by this coefficient. The following interpretation applies to correlation coefficient values:

$r = 1$: There is perfect positive correlation ; $r = 0$: There is no correlation at all.

$r = -1$: There is a perfect negative correlation

Pearson's r can be computed automatically in statistical software such as SPSS, R, Excel, and others.

High factor loadings show that the observed variables are convergent in the same construct, while AVE (Average Variance Explained), a measure of convergent validity, should be more than 0.50 (≥ 0.50) to be deemed statistically significant. The following formula is used to determine the AVE values with standardized factor loading of the constructs:

$$AVE = \frac{\sum^{p}_{i=1} \lambda^2_i}{\sum^{p}_{i=1} \lambda^2_i + \sum^{p}_{i=1} Var(\delta_i)}$$

Whereas

AVE = average variance extracted ; λ = standardized factor loading

δ = error variance ; P = number of observed variables

Table 9 Convergent Validity Test

Measurement Model	Constructs	Label	No. of Items	AVE
1	Perceived Usage Factors	SAT	10	0.637
		TA	5	0.644
		SS	3	0.757
2	Bank Customers Experience Factors	UT	10	0.649
		SEC	7	0.627
		OE	4	0.739
3	Technology Transformation Factors	CHA	8	0.637
		TRA	6	0.631
		PER	4	0.680
4	Technical Factors	PSC	7	0.645
		TE	4	0.673
		REP	4	0.706

Sources: Calculated & Computed from Primary data

The table that explains the evaluation of convergent validity for the two models is evident. SAT is 0.637, TA is 0.644, SS is 0.757, UT is 0.649, SEC is 0.627, OE is 0.739, CHA is 0.637, TRA is 0.631, PER is 0.680, PSC is 0.645, TE is 0.673, and REP is 0.706. These are the model's AVE values. All items are convergent into their respective constructs, as explained by the AVE values of the measurement model of the constructs, which are determined from the threshold value. As a result, the models' AVE values have been verified and show strong convergent validity.

COMPOSITE RELIABILITY

Two indicators are used to measure reliability: Cronbach's alpha and composite reliability (CR), which is also referred to as construct reliability. Composite reliability is used to check the internal consistency of the data, and its values should

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be greater than the threshold value of 0.7 (≥0.7). The CR values are computed using standardized factor loadings of the constructs using the formula below:

$$CR = \frac{(\sum \lambda \; ;^{\cdot}}{:^{\wedge} \; ;\cdot:^{\wedge} \quad ;}$$

Whereas

CR = Composite reliability; λ = standardized factor loading ; δ = error variance

Table 10 Composite Reliability Test

Constructs	Label	No. of Items	Cronbach's Alpha	Composite Reliability
Perceived Usage Factors	SAT	10	0.861	0.874
	TA	5	0.785	0.781
	SS	3	0.781	0.801
Bank Customers Experience Factors	UT	10	0.850	0.868
	SEC	7	0.759	0.797
	OE	4	0.702	0.785
Technology Transformation Factors	CHA	8	0.841	0.847
	TRA	6	0.761	0.800
	PER	4	0.765	0.775
Technical Factors	PSC	7	0.770	0.812
	TE	4	0.705	0.775
	REP	4	0.708	0.751

Sources: Calculated & Computed from Primary data

The accompanying table clearly illustrates the evaluation of the composites' dependability. Cronbach's alpha coefficient and composite reliability are two indicators that have been used to measure all of the factors loadings of the constructs. SAT is 0.861, TA is 0.785, SS is 0.781, UT is 0.850, SEC is 0.759, OE is 0.702, CHA is 0.841, TRA is 0.761, PER is 0.765, PSC is 0.770, TE is 0.705, and REP is 0.708, in that order, according to the Cronbach's alpha coefficient values. The composite reliability values, which are higher than the 0.7 (≥0.7) threshold, are as follows: SAT is 0.874, TA is 0.781, SS is 0.801, UT is 0.868, SEC is 0.797, OE is 0.785, CHA is 0.847, TRA is 0.800, PER is 0.775, PSC is 0.812, TE is 0.775, and REP is 0.751. Thus, the findings demonstrated that the construct as a whole had strong internal consistency.

V. CONCLUSION

The study provides empirical evidence on the influence of AI-enabled digital banking on customer usage, experience, and technology transformation in Coimbatore District. The findings confirm that the data satisfy the assumptions of normality and homogeneity, enabling robust statistical analysis. Reliability analysis using Cronbach's alpha and composite reliability indicates strong internal consistency across all constructs, while convergent validity is established through satisfactory AVE values. Overall, AI-enabled digital banking positively impacts customer satisfaction, trust, operational efficiency, and technological adaptation. The study highlights the importance of customer-centric AI deployment in banking and offers valuable insights for banks to enhance digital service strategies. Future research may extend the scope to comparative regional studies or incorporate longitudinal analysis to assess evolving customer perceptions over time.

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