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## Determinants of Retention in Digital Banking: PLS-SEM Meets Necessary Condition Analysis

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### Abstract

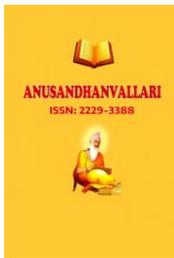
The rapid digitalisation of the banking industry has transformed service delivery mechanisms and intensified competition among banks, making customer retention a critical strategic priority. This study examines the determinants and necessary conditions of customer retention intention in digital banking by integrating Partial Least Squares Structural Equation Modelling (PLS-SEM) with Necessary Condition Analysis (NCA). Data were collected from 435 bank customers in Goa using a structured questionnaire based on a five-point Likert scale. The measurement model was assessed for reliability and validity, followed by structural model estimation to test the hypothesised relationships among customer loyalty, digital commitment, employee performance, perceived information quality, perceived service orientation, post service recovery satisfaction, and switching cost. The results reveal that post service recovery satisfaction significantly enhances customer loyalty and customer retention intention, while employee performance, perceived information quality, and perceived service orientation strongly influence recovery satisfaction. In addition, the moderation effect of switching cost on the relationship between recovery satisfaction and retention intention is supported. The NCA findings further identify employee performance, perceived information quality, and recovery satisfaction as necessary conditions for achieving high levels of customer retention. By distinguishing between sufficient drivers and indispensable prerequisites, this study offers a novel theoretical contribution to digital banking and relationship marketing literature. The findings provide practical implications for banking managers seeking to strengthen service recovery systems and build long-term customer relationships in an increasingly digital environment.

**Key word:** Digital banking; customer retention intention; post service recovery satisfaction; customer loyalty; switching cost.

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### 1. Introduction

The banking industry has undergone a profound transformation over the past decade, driven by rapid digitalisation, changing customer expectations, and intensified competition. Globally, banks are shifting from product-centric to customer-centric models in order to enhance service quality, operational efficiency, and long-term relationship building (Gomber et al., 2018; Shashikala, 2019). In India, the banking sector has experienced accelerated digital adoption through internet banking, mobile banking, and fintech integration, reshaping how customers interact



with financial institutions (Reserve Bank of India, 2022). In this evolving landscape, customer retention has emerged as a strategic priority for banks, as retaining existing customers is significantly more cost-effective than acquiring new ones and contributes directly to profitability, stability, and competitive advantage (Kumar & Reinartz, 2016).

Despite the growing importance of customer retention, prior research in banking has predominantly focused on customer intention, adoption behaviour, service quality, satisfaction, and loyalty in digital banking environments. While these studies provide valuable insights into customer behaviour, relatively limited empirical attention has been given to understanding the drivers and necessary conditions of customer retention intention, particularly from an integrated sufficiency–necessity perspective. Most existing studies rely on traditional behavioural intention models, leaving a gap in identifying which factors are not only influential but also indispensable for sustaining long-term customer relationships. This gap is particularly evident in the context of digital banking, where service recovery, employee performance, information quality, and switching barriers play an increasingly critical role.

Against this backdrop, the present study addresses this gap by examining customer retention intention in digital banking through an integrated PLS-SEM and Necessary Condition Analysis (NCA) framework. By combining sufficiency-based modelling with necessity-based logic, the study offers a more comprehensive understanding of both the drivers and prerequisites of customer retention, thereby contributing to theory and practice in relationship marketing and digital banking.

## 2. Theoretical Framework

### Customer Loyalty

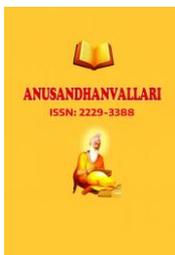
Customer loyalty refers to a customer's deep commitment to continue a relationship with a service provider, reflected in repeat usage, advocacy, and resistance to switching (Oliver, 1999). In the banking sector, loyalty is regarded as a critical relational asset because loyal customers are more likely to maintain long-term relationships, engage in cross-buying, and provide positive word-of-mouth. Prior studies in retail banking demonstrate that service failures significantly erode loyalty, while effective recovery strengthens relational bonds and reduces defection (Piha & Avlonitis, 2015). (Kumar & Reinartz, 2016) further argue that customer loyalty serves as a direct pathway to sustained retention and long-term profitability. Hence, customer loyalty remains a key behavioural outcome that translates favourable service experiences into enduring customer relationships.

**H1:** Customer loyalty has a significant positive effect on customer retention intention.

### Digital Commitment

Digital commitment represents a customer's attachment, involvement, and engagement with a bank's digital platforms, driven by technology readiness, prior digital experiences, and perceived usefulness of e-services. As banking becomes increasingly digital, customers who are more committed to technology tend to exhibit higher tolerance towards digital service failures and more favourable evaluations of recovery efforts (Venkatesh et al., 2012). In digital banking environments, customers with higher digital involvement perceive recovery encounters as more convenient and responsive, thereby enhancing satisfaction levels (Mathew et al., 2020). Such commitment fosters psychological attachment to digital channels, which can positively influence customers' post-failure evaluations.

**H2:** Digital commitment has a significant positive effect on post service recovery satisfaction.



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### Employee Performance

Employee performance refers to the competence, empathy, responsiveness, and problem-solving ability of frontline service personnel during customer interactions. Despite the increasing automation of banking services, frontline employees continue to play a vital role in handling service failures, resolving complaints, and restoring customer confidence (Holloway & Beatty, 2003). High-performing employees demonstrate superior interpersonal skills and service recovery capabilities, which significantly improve customer satisfaction after service failures (Sousa & Voss, 2009). In the context of digital banking, (Mathew et al., 2020) empirically established that employee performance is one of the strongest predictors of post service recovery satisfaction.

**H3:** Employee performance has a significant positive effect on post service recovery satisfaction.

### Perceived Information Quality

Perceived information quality reflects customers' evaluation of the accuracy, relevance, clarity, and trustworthiness of information provided during service recovery encounters. Information quality plays a central role in reducing uncertainty, building confidence, and facilitating informed decision-making during service failures (Cheng et al., 2019). In banking services, inaccurate or ambiguous information during recovery may aggravate dissatisfaction and erode trust, whereas timely and reliable information enhances transparency and restores customer confidence. (Mathew et al., 2020) demonstrated that information quality is a dominant determinant of e-service recovery satisfaction in Indian banking.

**H4:** Perceived information quality has a significant positive effect on post service recovery satisfaction.

### Perceived Service Orientation

Perceived service orientation represents customers' perceptions of a bank's customer-focused culture, flexibility, and proactive problem-solving approach. Service-oriented organisations empower employees, adopt customer-centric policies, and invest in recovery systems that enable prompt and fair resolution of service failures (Global et al., 2008). In banking, service orientation reflects the extent to which customers believe that their interests are prioritised during problem resolution. Prior research indicates that service orientation strengthens recovery quality and enhances satisfaction following service failures (Mathew et al., 2020).

**H5:** Perceived service orientation has a significant positive effect on post service recovery satisfaction.

### Post Service Recovery Satisfaction

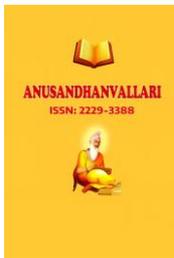
Post service recovery satisfaction refers to customers' overall evaluation of a firm's recovery efforts following a service failure. Effective recovery not only restores satisfaction but can also strengthen customer relationships and reinforce loyalty, a phenomenon referred to as the service recovery paradox (Sousa & Voss, 2009). In retail banking, service recovery satisfaction plays a decisive role in shaping loyalty, trust, and future usage intentions (Cheng et al., 2019). (Piha & Avlonitis, 2015) further established that failed service quality directly undermines loyalty and indirectly increases defection through negative customer attitudes.

**H6:** Post service recovery satisfaction has a significant positive effect on customer loyalty.

**H7:** Post service recovery satisfaction has a significant positive effect on customer retention intention.

### Switching Cost

Switching cost refers to the perceived financial, procedural, and relational costs associated with changing service providers. In banking, switching costs include administrative complexity, loss of relationship benefits, and uncertainty regarding alternative providers (Burnham et al., 2003). High switching costs discourage defection and weaken the effect of dissatisfaction on switching behaviour (El-Manstrly, 2016). In digital banking, switching cost



has been shown to moderate post-failure behavioural responses and retention decisions (Jose et al., 2021). Thus, switching barriers may strengthen or weaken the influence of service recovery satisfaction on retention intention.

**H8:** Switching cost moderates the relationship between post service recovery satisfaction and customer retention intention.

**H9:** Customer loyalty mediates the relationship between post service recovery satisfaction and customer retention intention.

### 3. Sample and Data Collection

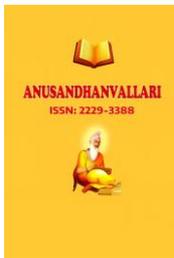
The respondents for the present study comprise customers of nationalised, private, and public sector banks in Goa, aged 20 years and above, who hold a bank account and have experienced at least one service-related issue. A non-probability purposive sampling technique was employed, as it is appropriate when respondents are selected based on specific characteristics relevant to the research objectives (Etikan et al., 2016). A total of 458 responses were initially collected using a structured questionnaire based on a five-point Likert scale. Following data preparation procedures, including data entry, screening for missing values, incomplete observations, and outliers (Hair et al., 2019), 435 valid responses were retained for analysis, which exceeds the minimum required sample size of 146.1 as suggested by power-based sample size estimation. The final sample consists of 56% customers from public sector banks and 44% from private sector banks. The demographic profile indicates a higher representation of males (61.6%) than females (38.4%), with the majority of respondents belonging to the 20–40 age group (61.4%). Graduates and postgraduates account for over 60% of the sample, and service and business professionals together represent more than 63% of respondents. Urban residents constitute 67.1% of the sample, reflecting higher digital banking penetration in urban areas.

### 4. Measures

The measurement items for all constructs were adapted from well-established prior studies to ensure content validity and comparability. Customer retention intention was measured using four items adapted from Bankuoru Egala et al. (2021), while customer loyalty and switching cost were measured using scales developed by Piha and Avlonitis (2015). Digital commitment, employee performance, perceived information quality, perceived service orientation, and post service recovery satisfaction were operationalised using validated instruments proposed by Mathew et al. (2020). All items were measured on a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. The scales demonstrate strong psychometric properties, with all indicator loadings exceeding the recommended threshold and Cronbach's alpha, composite reliability, and average variance extracted values meeting established reliability and convergent validity criteria, thereby confirming the adequacy of the measurement model for empirical analysis.

### 5. Research Methodology

The present study adopts the research onion framework proposed by Saunders, Lewis, and Thornhill (2019) to systematically structure the research methodology. At the outer layer, the study follows a positivist research philosophy, as it seeks to test hypothesised relationships using empirical data and statistical techniques. A deductive research approach is employed to develop and test hypotheses derived from established theories in relationship marketing and service recovery. The research strategy is quantitative and survey-based, enabling the collection of structured data from bank customers in Goa. A cross-sectional time horizon is adopted, as data were



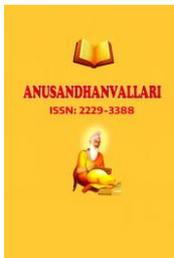
collected at a single point in time. At the core of the research onion, a structured questionnaire was used as the primary data collection instrument, and the data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) and Necessary Condition Analysis (NCA) to examine both sufficiency- and necessity-based relationships. This systematic methodological design ensures rigour, reliability, and theoretical consistency in addressing the research objectives.

## 6. Measurement model

The measurement model was assessed using Partial Least Squares Structural Equation Modelling (PLS-SEM) to examine the reliability and validity of the study constructs. Internal consistency reliability was evaluated using Cronbach's alpha and composite reliability, while convergent validity was assessed through average variance extracted and indicator loadings. Discriminant validity was examined using the Fornell–Larcker criterion and cross-loadings. These statistical procedures ensure that the measurement instruments demonstrate adequate psychometric properties before proceeding to the structural model analysis (Hair et al., 2019).

**Table 1: Reliability and Convergent Validity Assessment of Latent Constructs**

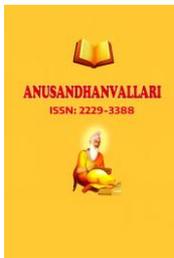
Item	Measures	loadings
<b>Customer Retention Intention (Bankuoru Egala et al., 2021)</b>		
CRI1	I will recommend to others to continuously use my bank's digital banking service	0.839
CRI2	I intend to continue using my bank's digital services	0.869
CRI3	I intend to stay because my bank provides quality digital services	0.867
CRI4	I intend to stay and recommend my bank's digital services to others	0.873
<b>Cronbach's alpha = 0.885, CR = 0.886, AVE = 0.743</b>		
<b>Customer Loyalty (Piha &amp; Avlonitis, 2015)</b>		
CL1	I would recommend the bank to relatives and friends.	0.820
CL2	In the future, I would cooperate with the bank.	0.799
CL3	Every time I need a bank product, the bank will be among my first options.	0.843
CL4	I would not defect from other products that I may possess in the bank.	0.822
CL5	When talking with relatives and friends about the bank my comments are positive.	0.858
<b>Cronbach's alpha = 0.886, CR = 0.886, AVE = 0.687</b>		
<b>Digital Commitment (Mathew et al., 2020)</b>		
DC1	Do you consider yourself as a tech savvy person?	0.937
DC2	The e service quality of the bank has been appreciated by your friends/	0.863
DC3	Your prior experience with e-service recovery elsewhere has been good	0.932
<b>Cronbach's alpha = 0.905, CR = 0.936, AVE = 0.830</b>		
<b>Employee Performance (Mathew et al., 2020)</b>		
EP1	Service personnel are polite and empathetic	0.878
EP2	Service personnel listened attentively to understand my concern	0.879
EP3	Service personnel were capable of offering solutions to my problems	0.889



EP4	Service personnel of the bank offered me an apology during service	0.870
<b>Cronbach's alpha = 0.902, CR = 0.905, AVE = 0.772</b>		
<b>Perceived Information Quality (Mathew et al., 2020)</b>		
PIQ1	The bank's service personnel clearly understood my issue	0.878
PIQ2	Information provided by the bank's service personnel was relevant	0.878
PIQ3	Information provided by the bank's service personnel was accurate	0.882
PIQ4	The information provided were from designated service personnel	0.886
PIQ5	The information provided were from trustworthy service personnel	0.874
<b>Cronbach's alpha = 0.927, CR = 0.927, AVE = 0.774</b>		
<b>Perceived Service Orientation (Mathew et al., 2020)</b>		
PSO1	Customers' requirements are given high importance	0.895
PSO2	The various products and services developed by the bank are in alignment with customer requirements	0.876
PSO3	The bank allows sufficient freedom to its employees in effective service delivery	0.879
PSO4	The bank has modern infrastructure to take care of customer grievances during service failure	0.896
<b>Cronbach's alpha = 0.909, CR = 0.91, AVE = 0.786</b>		
<b>Post Service Recovery Satisfaction (Mathew et al., 2020)</b>		
PSRS1	The recovery process was as per my expectation	0.890
PSRS2	The bank provided timely resolution to my problem	0.882
PSRS3	The bank has proper redressal mechanism in place	0.882
PSRS4	The recovery transaction process was safe and secure failure	0.890
<b>Cronbach's alpha = 0.909, CR = 0.908, AVE = 0.785</b>		
<b>Switching Cost (Piha &amp; Avlonitis, 2015)</b>		
SC1	I believe the costs in time and effort to switch banks are high.	0.878
SC2	I do not have the time to evaluate the different bank options.	0.928
SC3	I believe that switching banks entails high risk.	0.828
SC4	I consider transferring products from one bank to another as a very complex process.	0.819
<b>Cronbach's alpha = 0.893, CR = 0.922, AVE = 0.747</b>		

Source: Authors' Compilation

The measurement model exhibits strong psychometric properties, confirming the adequacy of all constructs for empirical investigation. All indicator loadings exceed the recommended threshold of 0.70, thereby establishing indicator reliability (Hair et al., 2019). Internal consistency reliability is well supported, as Cronbach's alpha and composite reliability values for all constructs are above the minimum acceptable level of 0.70, indicating high scale reliability. Furthermore, convergent validity is confirmed, with average variance extracted values ranging from 0.687 to 0.830, which surpasses the recommended cut-off of 0.50 (Fornell & f. larcke, 1981). Collectively, these results demonstrate that the constructs of customer retention intention, customer loyalty, digital commitment,



employee performance, perceived information quality, perceived service orientation, post service recovery satisfaction, and switching cost possess satisfactory reliability and convergent validity, thereby providing a robust measurement foundation for subsequent structural model analysis.

**Table 2: Descriptive Statistics and Discriminant Validity Assessment Using the Fornell–Larcker Criterion**

Construct	Mean	SD	CSR	CT	DC	EP	PIQ	PSO	PSRS	SC
Customer Retention Intention	2.774	0.584	<b>0.862</b>							
Customer Loyalty	2.956	0.611	0.652	<b>0.829</b>						
Digital Commitment	2.917	0.673	0.008	0.012	<b>0.911</b>					
Employee Performance	3.178	0.635	0.422	0.448	-0.024	<b>0.879</b>				
Perceived Information Quality	2.908	0.628	0.323	0.349	0.037	-0.033	<b>0.88</b>			
Perceived Service Orientation	2.842	0.668	0.289	0.305	-0.012	0.088	-0.014	<b>0.887</b>		
Post Service Recovery Satisfaction	2.843	0.647	0.659	0.745	0.053	0.518	0.436	0.437	<b>0.886</b>	
Switching Cost	3.446	0.546	-0.093	-0.057	-0.056	0.038	-0.024	-0.034	-0.037	<b>0.864</b>

Source: Authors' Compilation

Table 2 presents the descriptive statistics along with the Fornell–Larcker discriminant validity assessment for all study constructs. The mean values indicate moderate perceptions across most constructs, with switching cost reporting the highest mean (M = 3.446, SD = 0.546), suggesting that respondents perceive higher effort and risk associated with changing banks. The remaining constructs show mean values ranging between 2.774 and 3.178, reflecting moderate levels of customer perceptions. The standard deviations indicate acceptable variability in responses.

Discriminant validity is established as the square roots of AVE (bold diagonal values) are higher than the corresponding inter-construct correlations in all cases. This confirms that each construct shares greater variance with its own indicators than with other constructs in the model. Therefore, customer retention intention, customer loyalty, digital commitment, employee performance, perceived information quality, perceived service orientation, post service recovery satisfaction, and switching cost represent empirically distinct concepts, supporting the adequacy of the measurement model for further structural analysis.

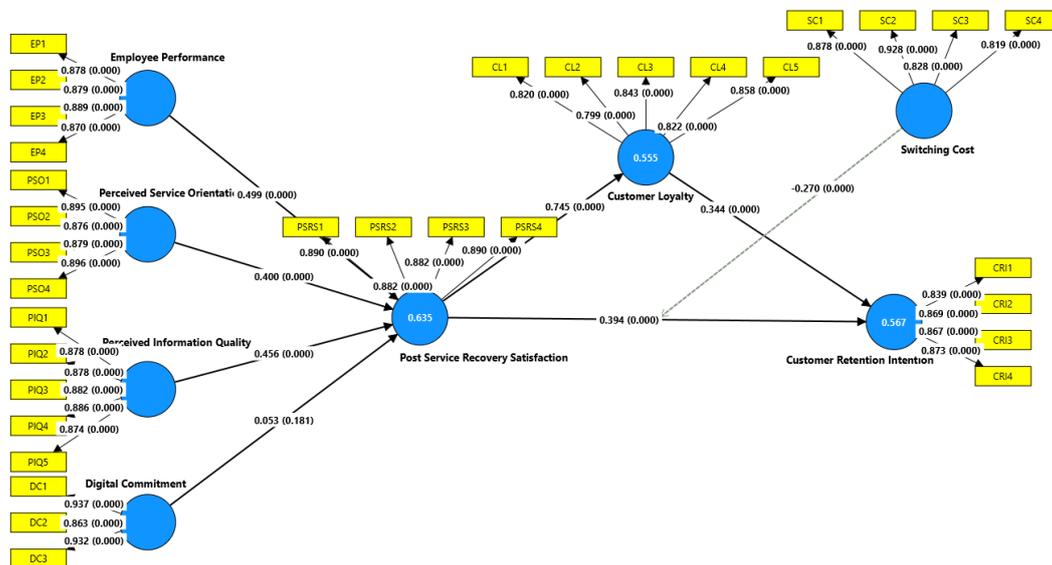
**Table 3: Structural Model Evaluation – Explanatory Power, Predictive Relevance, and Model Fit**

Endogeneous construct	R-square	Q <sup>2</sup> predict	Fit Measure	Saturated model	Estimated model
Customer Retention Intention	0.567	0.413	SRMR	0.036	0.04
			d_ ULS	0.714	0.877
			d_ G	0.402	0.405
Post Service Recovery Satisfaction	0.635	0.629	Chi-square	1055.249	1054.64
			NFI	0.899	0.899

Source: Authors' Compilation

The results indicate strong explanatory and predictive performance of the structural model. The R<sup>2</sup> values show substantial variance explained in post service recovery satisfaction (0.635) and customer retention intention (0.567), exceeding the benchmark for substantial explanatory power in PLS-SEM (Hair et al., 2019). The positive Q<sup>2</sup>predict values for both constructs (0.629 and 0.413, respectively) confirm satisfactory out-of-sample predictive relevance (Shmueli et al., 2019). Model fit is also supported, as the SRMR values for both the saturated (0.036) and estimated (0.040) models are below the recommended threshold of 0.08, while d\_ULS and d\_G remain within acceptable limits. The NFI value of 0.899 further indicates a good overall model fit. Collectively, these findings confirm that the proposed model demonstrates strong explanatory power, predictive accuracy, and adequate global fit.

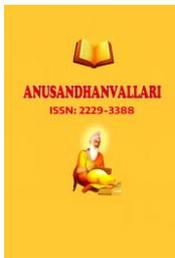
**Figure 1: Structural Model**



Source: Authors' Compilation

**Table 4: Structural Path Analysis and Hypothesis Testing Results**

Hyp.	Path	Beta	SD	t-value	P values	Supported	f 2	Effect	CI	
									2.50%	97.50%
H1	CL → CRI	0.344	0.048	7.179	0.00	Yes	0.121	Small	0.252	0.439
H2	DC → PSRS	0.053	0.040	1.339	0.18	No	0.008	No	-0.046	0.112
H3	EP → PSRS	0.499	0.030	16.762	0.00	Yes	0.677	Large	0.440	0.554
H4	PIQ → PSRS	0.456	0.027	16.594	0.00	Yes	0.567	Large	0.401	0.509



H5	PSO → PSRS	0.400	0.031	13.075	0.00	Yes	0.435	Large	0.340	0.458
H6	PSRS → CL	0.745	0.021	35.020	0.00	Yes	0.160	Medium	0.701	0.785
H7	PSRS → CRI	0.394	0.050	7.917	0.00	Yes	1.246	Large	0.296	0.490
H8	SC × PSRS → CRI	-0.270	0.051	5.260	0.00	Yes	0.165	Medium	-0.328	-0.122

Source: Authors' Compilation

The results of the structural model provide strong empirical support for most of the proposed hypotheses. Customer loyalty has a significant positive effect on customer retention intention (H1:  $\beta = 0.344$ ,  $t = 7.179$ ,  $p < 0.001$ ,  $CI = [0.252, 0.439]$ ,  $f^2 = 0.121$ ), indicating a small-to-moderate effect. Digital commitment does not significantly influence post service recovery satisfaction (H2:  $\beta = 0.053$ ,  $t = 1.339$ ,  $p = 0.18$ ,  $CI = [-0.046, 0.112]$ ,  $f^2 = 0.008$ ), suggesting a negligible effect.

Employee performance exhibits a strong positive impact on post service recovery satisfaction (H3:  $\beta = 0.499$ ,  $t = 16.762$ ,  $p < 0.001$ ,  $CI = [0.440, 0.554]$ ,  $f^2 = 0.677$ ), reflecting a large effect size. Similarly, perceived information quality significantly enhances post service recovery satisfaction (H4:  $\beta = 0.456$ ,  $t = 16.594$ ,  $p < 0.001$ ,  $CI = [0.401, 0.509]$ ,  $f^2 = 0.567$ ), and perceived service orientation also shows a strong positive influence (H5:  $\beta = 0.400$ ,  $t = 13.075$ ,  $p < 0.001$ ,  $CI = [0.340, 0.458]$ ,  $f^2 = 0.435$ ), both demonstrating large effects.

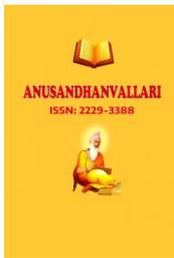
Post service recovery satisfaction has a substantial positive effect on customer loyalty (H6:  $\beta = 0.745$ ,  $t = 35.020$ ,  $p < 0.001$ ,  $CI = [0.701, 0.785]$ ,  $f^2 = 0.160$ ), indicating a medium effect. It also significantly predicts customer retention intention (H7:  $\beta = 0.394$ ,  $t = 7.917$ ,  $p < 0.001$ ,  $CI = [0.296, 0.490]$ ,  $f^2 = 1.246$ ), reflecting a very large effect. Furthermore, switching cost negatively moderates the relationship between post service recovery satisfaction and customer retention intention (H8:  $\beta = -0.270$ ,  $t = 5.260$ ,  $p < 0.001$ ,  $CI = [-0.328, -0.122]$ ,  $f^2 = 0.165$ ), indicating a medium moderating effect.

Table 5: Mediation Analysis Results

Hyp.	Mediation Path	Direct Effect ( $\beta$ )	Indirect Effect ( $\beta$ )	Total Effect ( $\beta$ )	VAF	Type of Mediation	Supported
H9	PSRS → CL → CRI	0.256	0.188	0.444	0.33	Partial Mediation	Yes

Source: Authors' Compilation

The mediation analysis reveals that customer loyalty partially mediates the relationship between post service recovery satisfaction and customer retention intention (H9). The direct effect remains significant ( $\beta = 0.256$ ), while the indirect effect through customer loyalty is also significant ( $\beta = 0.188$ ), resulting in a total effect of 0.444. The variance accounted for ( $VAF = 0.33$ ) confirms partial mediation, indicating that post service recovery satisfaction influences customer retention intention both directly and indirectly through customer loyalty.



**Table 6: Necessary Condition Analysis (NCA) Results for Customer Retention Intention**

Necessary Condition	Minimum Level Required at 80% Outcome	Effect Size (CE-FDH)	Effect Size (CR-FDH)	Permutation p-value	Necessity
Customer Loyalty	90.12%	0.372	0.362	< 0.001	Yes
Digital Commitment	23.91%	0.140	0.137	0.27	No
Employee Performance	50.81%	0.273	0.246	< 0.001	Yes
Perceived Information Quality	68.97%	0.262	0.229	< 0.001	Yes
Perceived Service Orientation	24.14%	0.179	0.145	0.05	Marginal
Post Service Recovery Satisfaction	88.05%	0.346	0.326	< 0.001	Yes
Switching Cost	1.84%	0.186	0.136	0.83	No

Source: Authors' Compilation

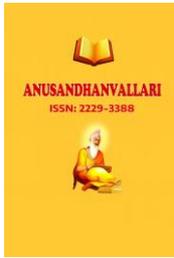
The NCA results show that customer loyalty, employee performance, perceived information quality, and post service recovery satisfaction are necessary conditions for achieving high customer retention intention. To reach an 80% level of retention intention, high minimum levels of customer loyalty (90.12%) and post service recovery satisfaction (88.05%) are particularly critical, followed by perceived information quality (68.97%) and employee performance (50.81%). These conditions exhibit medium necessity effect sizes and statistically significant permutation results, confirming their indispensability. In contrast, digital commitment and switching cost are not necessary conditions, while perceived service orientation demonstrates only marginal necessity.

**Table 7: Comparative Results of PLS-SEM and Necessary Condition Analysis (NCA)**

Predictor	Outcome	PLS-SEM $\beta$	t-value	p-value	Significance (PLS-SEM)	NCA Effect Size (CR-FDH)	Permutation p-value	Necessary Condition
CL	CRI	0.344	7.179	< 0.001	Yes	0.362	< 0.001	Yes
DC	PSRS	0.053	1.339	0.18	No	0.137	0.27	No
EP	PSRS	0.499	16.762	< 0.001	Yes	0.246	< 0.001	Yes
PIQ	PSRS	0.456	16.594	< 0.001	Yes	0.229	< 0.001	Yes
PSO	PSRS	0.400	13.075	< 0.001	Yes	0.145	0.05	No
PERS	CRI	0.394	7.917	< 0.001	Yes	0.326	< 0.001	Yes
SC × PSRS	CRI	-0.270	5.26	< 0.001	Yes	0.136	0.83	No

Source: Authors' Compilation

The comparative results of PLS-SEM and NCA highlight clear distinctions between sufficient drivers and necessary conditions in the model. Customer loyalty and post service recovery satisfaction significantly predict customer retention intention in the PLS-SEM model and also emerge as necessary conditions in NCA, confirming their indispensable role in sustaining customer relationships. Employee performance and perceived information quality strongly influence post service recovery satisfaction and are likewise identified as necessary conditions,



indicating that effective frontline service and high-quality information are critical prerequisites for achieving high recovery satisfaction. In contrast, digital commitment is neither a significant predictor nor a necessary condition, while perceived service orientation, although a strong driver in PLS-SEM, does not qualify as a necessary condition. The interaction between switching cost and post service recovery satisfaction significantly moderates retention intention in PLS-SEM but is not a necessary condition, suggesting that switching barriers influence retention behaviour without acting as binding constraints.

## 7. Discussion

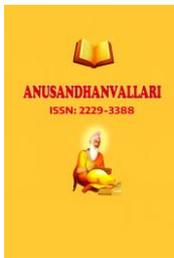
The findings of this study provide strong empirical support for the central role of post service recovery satisfaction and customer loyalty in shaping customer retention intention in digital banking. Consistent with prior research, effective service recovery significantly enhances customer satisfaction, strengthens loyalty, and reduces the likelihood of defection (Cheng et al., 2019; Piha & Avlonitis, 2015; Sousa & Voss, 2009). The results further confirm that employee performance and perceived information quality are critical antecedents of recovery satisfaction, in line with the e-service recovery framework proposed by (Mathew et al., 2020). By integrating PLS-SEM with Necessary Condition Analysis, this study extends existing relationship marketing and service recovery literature by distinguishing between sufficient drivers and indispensable prerequisites of customer retention. This dual-perspective approach represents a key theoretical contribution, as prior digital banking studies have largely focused on behavioural intention and adoption models while overlooking retention as a long-term relational outcome and the conditions that are strictly necessary to achieve it.

## 8. Managerial Implications

The results suggest that banks should prioritise strong service recovery systems to enhance customer loyalty and retention in digital banking. Managers must focus on training frontline employees to resolve complaints quickly, communicate accurate information, and demonstrate empathy during service failures. Investments in customer-oriented service processes and modern grievance-handling infrastructure can further strengthen recovery satisfaction. In addition, banks should design relationship-based and value-added digital services to increase switching costs and encourage long-term customer relationships.

## 9. Limitations and Future Scope of the Study

This study is subject to certain limitations that provide directions for future research. First, the sample is restricted to bank customers from Goa, which may limit the generalisability of the findings to other regions with different demographic and banking environments. Future studies may extend the model to a pan-India or cross-country context for broader validation. Second, the study adopts a cross-sectional research design; therefore, causal inferences over time cannot be fully established. Longitudinal research could provide deeper insights into how customer retention behaviour evolves across repeated service recovery encounters. Third, the study focuses on selected service recovery and relationship variables; future research may incorporate additional constructs such as trust, perceived risk, service innovation, and digital experience quality. Finally, while this study integrates PLS-SEM and Necessary Condition Analysis, future research could employ experimental or qualitative approaches to further explore the mechanisms underlying customer retention in digital banking.

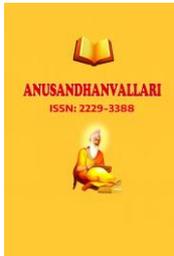


## 10. Conclusion

This study examined the determinants and necessary conditions of customer retention intention in the digital banking context by integrating Partial Least Squares Structural Equation Modelling (PLS-SEM) with Necessary Condition Analysis (NCA). The findings demonstrate that post service recovery satisfaction plays a pivotal role in strengthening customer loyalty and directly enhancing customer retention intention. Employee performance, perceived information quality, and perceived service orientation emerged as strong antecedents of recovery satisfaction, highlighting the importance of customer-centric service practices in digital banking. Furthermore, the results reveal that while certain factors act as sufficient drivers of retention, others operate as necessary conditions that must be present to achieve high levels of customer retention. By adopting a dual analytical perspective, this study advances relationship marketing and service recovery literature and provides actionable insights for banking practitioners seeking to build long-term customer relationships in an increasingly digitalised service environment.

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