

Impact of E-Banking SQ on CS: A PLS-SEM Approach

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Abstract: This study is aimed to evaluate the relation between SQ dimension of e-banking and CS to know the dimensions having the strongest impact on customer's satisfaction. This study employed a self-administered questionnaire with nine SERVQUAL scale categories and questions about CS to obtain data from 558 respondents. Additionally, PLS-SEM was employed to test the suggested structural model. Findings reported that out of nine dimensions, five dimensions (Reliability, Responsiveness, Tangibility, Convenience and Website Design) have positive and significant influence on CS. Whereas credibility, security & empathy have positive but non-significant effect on CS and cost have negative but insignificant influence on CS. Website Design has highest significant effect on CS followed by reliability, convenience, responsiveness and tangibility. Findings suggest that all SQ dimensions are important but a particular focus should be given to website design for enhancing CS.

Keywords: E-Banking, Service Quality (SQ), Customer Satisfaction (CS) and PLS-SEM.

1. Introduction

The Technology is changing rapidly so global business organizations are restructuring their business models and adopting value chain engineering for better productivity. Likely, financial sector is also changing as per changes in regulatory and technological advancements. As the banking industry is essential to a nation's economic growth and after liberalization due to entry of private sector banks, structure and competitiveness of Indian banking sector has been changed and e-banking is adopted in banks for providing products & services to customer need. Secondly, continuous change in environment, habits, paying habits and education

level of customers is making customers more demanding and technology enables the banks to satisfy the requirement of customers so banks should gather information regarding factors influencing the SQ. Therefore, the study's goal is to assess the perception of e-banking customers regarding SQ and resulting CS using SERVQUAL scale. For the convenience of reader, paper contained five sections, beginning with an introduction to the study, literature on SQ and CS, proposed model with different hypothesis, research methodology and results & findings.

2. Review of Literature

Several studies have been used SERVQUAL scale to explore the SQ

dimensions effecting SQ in different service firms. Reddy and Maharaja (2021) revealed that efficiency & ease of use, reliability, security & privacy, responsiveness, communication and SQ have a significant influence on CS. Asadpoor and Abolfazli (2017) reported that reliability, security, fulfillment and availability had positive influence on CS and among all, reliability is more important and personality had no impact on CS and CS had positive impact on customer loyalty. Assegaff (2016) pointed that online customer SQ; bank product SQ and online information quality were significant contribute to overall SQ of internet banking and SQ of internet banking had significant impact on CS. Beigi et al. (2016) revealed that e-banking SQ had positive and significant effects on CS and customer loyalty. Sindwani & Goel (2015) reported that personalization and convenience had positive relation with CS while CS do not have significant relation with reliability, responsiveness and security. Sakhaei et al. (2014) disclosed that among all six indicators, the most effective on CS is reliability and least effect is website design. Camilleri et al. (2014) found that consumers were overall satisfied with SQ of e-banking. Dimension's reliability and access were most important from customer point of view while it was opposed to bankers because for them security dimension is most important. Narteh (2014) disclosed that fulfillment, ease of use, reliability and responsiveness had significant impact on CS while security do not have significant impact.

Service Quality

Measuring SQ of services is complex in comparison to tangible goods due to its unique characteristics:

Intangibility, Inseparability, Heterogeneity and Perishability. In starting, SERVQUAL scale was applied by extensively in different service settings and it was developed/derived from the meaningful work done by researchers on meaning of SQ like Gronoos 1982, Sassen, Olsen, Wyckoff, 1978 and Lehtinen, 1982 and qualitative research on highlighting the dimensions on which consumer's measure SQ by Parasuraman, Zeithmal and Berry, 1985, 1988. Thus, on the basis of extensive review of literature, 41 dimensions were included under nine dimensions for assessing SQ and CS which were as follows: Reliability, Responsiveness, Security, Convenience, Tangibility, Empathy, Credibility, Cost and Website Designing. So different hypothesis formed are:

- H1: Reliability of e-banking has significant influence on CS.
- H2: Responsiveness of e-banking has significant influence on CS.
- H3: Security of e-banking has significant impact on CS.
- H4: Convenience of e-banking has significant influence on CS.
- H5: Tangibility of e-banking has significant influence on CS.
- H6: Empathy of e-banking has significant influence on CS.
- H7: Credibility of e-banking has significant influence on CS.
- H8: Cost of e-banking has significant influence on CS.
- H9: Website Design of e-banking has significant influence on CS.

3. Objective of the Study

This study aims to assess the relationship between the e-banking SQ dimension and CS in order to identify the factors that have the most effects on CS.

5. Research Methodology

5.1 Population & Data Collection

The population included of all the users of e-banking from public (SBI & PNB) and private banks (HDFC & ICICI) in Haryanadue to maximum share of these banks in ATMs, POS, NEFT & RTGC Transactions as per data released by RBI. Judgement/

purposively non-probability sampling was used to select sample from population. Using a self-administered questionnaire, data was collected from 600 respondents out of which 558 respondents' data was used. The customers demographic data is outlined in table I.

Table I: Demographic Profile of Respondents

Variables	Freq.	%	Variable	Freq.	%
Gender			Occupation of Respondent		
Male	401	71.9	Student	216	38.7
Female	157	28.1	Employee	260	46.6
Age of Respondent			Businessmen	35	6.3
Below 25 Years	171	30.6	Professional	32	5.7
Between 25-35 Years	327	58.6	Housewife	11	2
Between 35-45 Years	36	6.5	Other	4	0.7
Above 45 Years	24	4.3	Income of Respondent		
Education of Respondent			Below 50,000	297	53.2
UptoGraduate	234	41.9	50,001-1,00,000	137	24.6
Post Graduate	229	41	1,00,001-1,50,000	75	13.4
Professionals	66	11.8	Above 1,50,001	49	8.8
Other Specify	29	5.2	Period of Using E-Banking		
			Less than 1 Year	115	20.6
			1-3 Years	266	47.7
			Above 3 Years	177	31.7

Out of total 558 respondents, the proportion of male and female was 71.9% and 28.1%. Most of respondents were up to the age of 35 years and mostly were using e-banking more than one year so perception of these customers regarding SQ can be measure.

5.2 Research Instrument/ Operationalization of Constructs

This study used a questionnaire approach to get data from respondents. There are two sections in this questionnaire. The first component relates to client demographic data. The second segment contains 37 assertions

relating to various SQ dimensions. All items were scored on a five-point Likert scale with 1 denoting stronglyDisagree, 2 Disagree, 3 Neutral, 4 agree, and 5 strongly agree. The table II ahead provides a history of each of these objects' origins.

Variable	Items	Source
Reliability	4	Parasuraman et al., 1985, Parasuraman et al., 1988, Zeithmal et al., 2001, Wolfenbarger & Gilly 2003, Wang et al., 2007, Kaushal, 2012, Hussain, 2013
Responsiveness	4	Parasuraman et al., 1985, Parasuraman et al., 1985, Zeithmal et al., 2001, Wang et al., 2007, Kaushal, 2012, Hussain, 2013
Security	4	Parasuraman et al., 1985, Zeithmal et al., 2001, Wolfenbarger & Gilly 2003, Parasuraman et al., 2005, Wang et al., 2007, Iran, 2010, Kaushal, 2012, Hussain, 2013, Zhengwei Ma, 2012, Ankit, 2011
Tangibility	4	Parasuraman et al., 1985, Parasuraman et al., 1985, Kaushal, 2012
Empathy	4	Parasuraman et al., 1985, Parasuraman et al., 1985, Hussain, 2013, Zhengwei Ma, 2012
Website Design	4	Wolfenbarger & Gilly 2003, Iran, 2010,
Convenience	4	Joseph et al., 1999, Iran, 2010, Ankit, 2011
Credibility	5	Parasuraman et al., 1985, kaushal, 2012
Cost	4	Zeithmal et al., 2001, Zhengwei Ma, 2012, Ankit, 2011
CS	4	Asadpoor & Abolfazli, 2017, Assegaff, 2016, Sindwani & Goel, 2015, Seyal & Rahir 2011

6. Analysis and Interpretation

6.1 Outer Measurement Model Analysis

This analysis was performed using PLS SEM 3 (Ringle et al., 2005). Out of ten total latent variables, one variable (CS) has a formative model and nine variables (i.e. Reliability, Responsiveness, Security, Tangibility, Empathy, Credibility, Cost, Website Design and Convenience) have reflective measurement models. All reflective constructs were examined based on reliability and validity and formative model was examined based on convergent validity, indicator collinearity and discriminant validity (Hair et al., 2018).

6.2 Analysis of Reflective Measurement Models

As per directions of Hair et al., 2017 and Henseler et al., 2009, The reflective measurement model was checked through indicator reliability, internal consistency reliability, convergent and

discriminant validity. The results demonstrated that the entire factor loading lies between 0.59 and 0.85 and despite some indicators loading is less than 0.70 still Cronbach alpha and CR is higher than 0.70 so provides evidence of high construct reliability and internal consistency. Each concept obtained an AVE between 0.51 and 0.64, which indicates that the latent constructs' convergent validity has been accepted. Second, the fact that CR exceeds AVE further demonstrates the constructs' convergent validity. For discriminant validity, two most conservative methods are the Fornell-Larcker criterion and HTMT ratio. An HTMT value should, as a general rule, be between 0.90 and 0.85 to ensure discriminant validity (Henseler et al., 2015). As per second method, the results of HTMT assessment in table V ranged between 0.46 and 0.78 which also indicate acceptable discriminant validity for the model. After this the study involves the assessment of formative construct (CS).

Table III: Convergent Validity Indicators

Latent Variables	Items	Factor Loading	VF	CR	Cronbach's Alpha	AVE	Latent Variables	Items	Factor Loading	VF	CR	Cronbach's Alpha	AVE
Reliability (REL)	REL1	0.8	1.69	0.87	0.8	0.62	Convenience (CONV)	CONV1	0.79	1.5	0.86	0.78	0.61
	REL2	0.82	1.84					CONV2	0.83	1.83			
	REL3	0.79	1.82					CONV3	0.8	1.77			
	REL4	0.75	1.63					CONV4	0.69	1.37			
Responsiveness (RESP)	RESP1	0.82	1.81	0.88	0.81	0.64	Credibility (CRED)	CRED1	0.67	1.31	0.84	0.76	0.51
	RESP2	0.85	1.99					CRED2	0.67	1.34			
	RESP3	0.78	1.64					CRED3	0.77	1.63			
	RESP4	0.75	1.54					CRED4	0.75	1.7			
Tangibility (TANG)	TANG1	0.68	1.39	0.85	0.77	0.59	COST (COS)	CRED5	0.7	1.45			0.53
	TANG2	0.81	1.6					COS1	0.74	1.38	0.81	0.73	
	TANG3	0.81	1.68					COS2	0.82	1.57			
	TANG4	0.77	1.55					COS3	0.72	1.5			
Security (SEC)	SEC1	0.71	1.43	0.85	0.77	0.59	Empathy (EMP)	COS4	0.6	1.33			0.64
	SEC2	0.79	1.77					EMP1	0.8	1.81	0.88	0.81	
	SEC3	0.78	1.6					EMP2	0.85	2.07			
	SEC4	0.78	1.38					EMP3	0.85	1.95			
Website Design (WEB)	WEB1	0.79	1.61	0.85	0.76	0.59		EMP4	0.7	1.49			0.77
	WEB2	0.82	1.68										
	WEB3	0.77	1.56										
	WEB4	0.67	1.25										

Table IV: Fornell- Larcker Criterion

CONV	COS	CRED	EMP	REL	RESP	SAT	SEC	TANG	WEB
0.78									
0.41	0.73								
0.59	0.54	0.71							
0.45	0.46	0.58	0.80						
0.59	0.44	0.52	0.44	0.79					
0.55	0.42	0.52	0.55	0.61	0.80				
0.61	0.43	0.54	0.48	0.60	0.55	0.00			
0.48	0.44	0.53	0.36	0.50	0.41	0.44	0.77		
0.55	0.45	0.56	0.56	0.42	0.46	0.51	0.42	0.77	
0.58	0.53	0.59	0.53	0.52	0.50	0.64	0.44	0.52	0.77

Table V Heterotrait- Monotrait (HTMT Ratio)

CONV	COS	CRED	EMP	REL	RESP	SEC	TANG	WEB
0.76	0.73							
0.56	0.61	0.75						
0.74	0.56	0.67	0.54					
0.68	0.55	0.66	0.67	0.74				
0.59	0.57	0.69	0.46	0.63	0.51			
0.71	0.60	0.72	0.70	0.52	0.58	0.52		
0.75	0.72	0.78	0.68	0.66	0.64	0.57	0.67	

6.3 Assessment of Formative Measurement Constructs

Assessment of formative models is based on the convergent validity, indicator collinearity, indication weights and their statistical significance (Hair et al., 2017). Here CS construct is formative and Result shows that the correlation of formative construct CS with single item overall CS reflective construct is 0.724 which satisfy the criteria of 0.70 or higher described by hair et al, 2017. Thus, the formative construct CS have sufficient degree of convergent validity. Collinearity of the formative indicator was checked through VIF and value of VIF above 5 shows collinearity issue (Hair

etal.,2017) and here the values of all Indicators is less than 2 so no issue of collinearity of indicators. Further, the relative importance of indicators of latent constructs was assessed through outer weights of formative indicators. Outer weights of all items of formative construct CS are mentioned in table VI. Findings demonstrate that outer weights of all formative indicators are significant and positive so criteria for significance and relevance of formative indicators have been met. Overall, the reflective and formative models have been accepted so next we will assess structural model (Inner Model).

Table VI Outer weights of formative Indicators.

	VIF	Outer Weights	T Statistic(O/STDEV)	P Value
SAT1 -> SAT	1.75	0.36**	6.99	0.00
SAT2 -> SAT	1.91	0.44**	8.23	0.00
SAT34-> SAT	1.52	0.38**	7.11	0.00

Note: *P<.05, **P<.01, CS = CS

6.4 Inner Structural Model Analysis

After this, Assessment of structural model is done by criteria like the coefficient of determination (R^2), the blindfolding-based cross validated

redundancy measure Q2, path coefficients and their significance. The R^2 value of endogenous construct satisfaction is 0.557 which is substantial which shows the acceptability of the model. Overall,

the proposed model explains 55.7% variance of CSconstruct. Moreover, the result shows that the relation between convenience and CS ($\beta=0.179$; $t\text{-value}=3.88$; $p=.000$) is positive and significant thus H1 is accepted. Likewise, the relation between cost and CS($\beta= -0.014$, $t\text{-value}=0.36$, $p=.72$) is negative and non-significant so H2 is rejected. Likewise, the relation between credibility & CS($\beta=0.035$, $t\text{-value}=0.72$, $p=.47$) is positive but non-significant so H3 is rejected. Similarly, the relation between empathy and CS($\beta=0.017$, $t\text{-value}=0.37$, $p=.71$) is positive but non-significant so H4 is rejected. Further, the relation between reliability and CS($\beta=0.202$, $t\text{-value}=4.56$, $p=.000$) is positive and significant thus H5 is accepted. Likewise, the relation between responsiveness and CS($\beta=0.108$; $t\text{-value}=2.02$; $p=.02$) is positive and significant thus H6 is accepted. Further, the relation between security and CS($\beta=0.026$, $t\text{-value}=0.67$, $p=.50$) is positive but

non-significant so H7 is rejected. Further, the relation between tangibility and CS($\beta=0.088$, $t\text{-value}=1.98$; $p=.05$) is positive and significant so H8 is accepted. Lastly, findings of analysis support the positive and significant relationship between website design and CS($\beta=0.297$, $t\text{-value}=6.59$, $p=.000$). The findings of this study are outlined in table VIII.

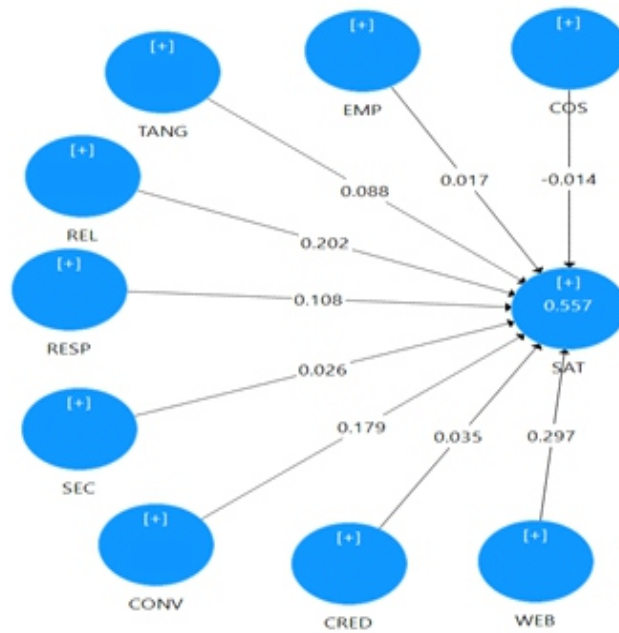
After this, predictive capability of model is checked by Q2 value (Geisser, 1974; Stone, 1974). Through blindfolding method, the value of cross validated redundancy value Q2 was calculated which comes to 0.383. As a rule of thumb, Q2 values more than 0.02, 0.15 and 0.35 represent low, medium and high predictive relevance of the PLS-path model (Chin, 1998). This model showed the high predictive relevance of CS. Overall findings shows that our study is free from collinearity issue as well as proposed model have predictive relevance.

Table VII Models Fit Values

Overall Satisfaction Model Fit Indices	SRMR	NFI	R ²	Adjusted R ²	Cross redundancy Q ²
Values	0.06	0.75	0.56	0.55	0.383

Table VIII: PLS Results of structural Model of Hypothesis Testing

Path	Original Sample (O)	t- Statistics	P Values	Hypothesis Result
CONV -> SAT	0.179	3.88	0.00	Supported
COS -> SAT	-0.014	0.36	0.72	Not Supported
CRED -> SAT	0.035	0.72	0.47	Not Supported
EMP -> SAT	0.017	0.37	0.71	Not Supported
REL -> SAT	0.202	4.56	0.00	Supported
RESP -> SAT	0.108	2.40	0.02	Supported
SEC -> SAT	0.026	0.67	0.50	Not Supported
TANG -> SAT	0.088	1.98	0.05	Supported
WEB -> SAT	0.297	6.59	0.00	Supported



(Figure 2: Structural Model)

7. Discussion

Similar to earlier studies Sindwani and Goel (2015), Sakhaei et al. (2014), Bhalla and Singh (2014), Sanjuq (2014) etc., it is accepted that the SERVQUAL model is well representing the collected data according to the results of all the indicators.

The study findings are that reliability has positive & significant influence on CS which is similar to the findings of (Fate & Nachandiya, 2019, Hammoud et al., 2018, Iran, 2010, Nupur, 2010, Kaushal, 2012, Gupta & Bansal, 2012, Hussain, 2013, Sakhaei et al., 2014, Bhalla & Singh, 2014, Camilleri et al., 2014, Nareth, 2014, Das & Ravi, 2021,) but contradictory results are explicated by previous studies (Kheng et al., 2010, Badara et al., 2013, Kayabas, 2013, Sanjuq, 2014, Ali & Omar, 2016, Sindwani & Goel, 2015).

Responsiveness have positive and significant influence on CS and findings are in consonance with the studies conducted by (Reddy & Megharaja, 2021, Hammoud et al.,

2018, Ali & Omar, 2016, Nupur, 2010, Kayabas et al., 2013, Badara et al., 2013, Nareth, 2014, Bhalla & Singh, 2014, Sakhaei et al., 2014, Gupta & Bansal, 2015, Das & Ravi, 2021, Le, 2022) but contradictory results are explicated by previous studies of (Sanjuq, 2014, Sindhwani & Goel, 2015).

Likewise, Convenience have positive and significant influence on CS and similar findings are also depicted by studies (Kaushal, 2012, Gupta & Bansal, 2012, Kayabas et al., 2013, Ariff et al., 2013, Bhalla & Singh, 2014, Sakhaei et al., 2014, Le, 2022) but contradictory results are explicated by previous studies (Iran, 2010, Nareth, 2014, Sindhwani & Goel, 2015).

Similarly, Tangibility has positive and significant influence on CS and findings are in consonance with the studies (Lee & Moghavvemi, 2015, Bhalla & Singh, 2014, Sanjuq, 2014, Kaushal, 2012) but contradictory results are explicated by previous studies (Badara et al., 2013, Kheng et al., 2010)

Similarly, Website Design has positive and significant influence on CS. Similar results are explicated by previous studies (Iran, 2010, Gupta & Bansal, 2012, Nimako et al., 2013, Sakhaei et al., 2014, Das & Ravi, 2021).

But Security has positive but non-significant effect on CS which is consistent with the findings of (Ali & Omar, 2016, Sindwani & Goel, 2015, Narteh, 2014, Iran, 2010). Similarly, credibility has positive but insignificant effect on CS which is supported by (Kaushal, 2012). Likewise, Empathy has positive but insignificant on CS which is in consonance with findings of (Sanjuq, 2014, Hussain, 2013, Badara et al., 2013). Further, Cost has negative and insignificant on CS which is supported by (Aliyu et al., 2013, Lee & Moghavevemi, 2015). Overall the results shows the positive impact of e-banking SQ dimensions and CS supported by findings of (Tran et al., 2023, Reddy & B, 2021)

8. Conclusion and Implication for Practice

In today's competitive and challenging banking industry, SQ is one of the distinguishing and Critical success factor in the service industry. Findings shows that among all the hypothesis, five hypothesis are accepted and CS is influenced by reliability, responsiveness, convenience, website design and tangibility dimensions of SQ. Website design have strong influence on CS so e-banking website should provide upto date information in easy to understand language for doing error free transactions. Second convenience should be improved by installing ATMs on more

convenient places with more services option like depositing money into their account, pay bills and transfer funds to other accounts. Reliability and responsiveness should also improve by providing right services at right time without any error. As tangibility effect on CS can be increased by creating awareness among customers about e-banking products and services for full espousal of e-banking in India. Further cost, security, empathy and credibility do not have significant effect on CS. So charges taken by internet service provider, devise designer company and telecommunication Company should be reduced for making e-banking a cheaper way of doing banking. Awareness of customers should be increased regarding one time password (OTP), multi factor authentication, virtual keyboard, encryption, issuance of offline password and sending mobile alerts after transaction. Employees should be trained in interpersonal communication with customer for improving empathy. Credibility could be increased by enhancing the problem solving capacity. Overall, it is clear from the study that bank managers and decision makers should enhance SQ dimensions that make the significant contribution on CS.

9. Limitations and directions of the study

Despite of meaningful information regarding dimensions of SQ affecting CS of e-banking. Still some limitations exist like collection of response from Haryana only which need to be validated by collecting data across the country. Generalization of findings cannot be

done due to inclusion of four banks SBI, PNB, HDFC and ICICI. Other dimension of online SQ like Feedback/Complaint management, Efficiency, Site aesthetics, Accessibility, Customization etc. and customer loyalty can be taken for further researches.

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