

# E - Banking Service Quality : A Scale Development and Validation Attempt

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## Abstract

Technology empowers banks to provide ease of use to customers at any time. This re-engineering in the banking system cemented the way banks' services reached to customers with ease and flexibility through multiple channels. The Internet has taken banks to homes and offices 365 days a year through electronic banking. Advent of electronic banking also called for pleasing customers with excellent service quality. Understanding electronic - banking service quality dimensions hence became extremely vital to electronic banking existence. Although there is no dearth of studies on service quality, relatively less research has been dedicated to exploring electronic banking service quality. This could be due to lack of a standardized scale measuring electronic banking service quality. This study, therefore, tried to identify and validate the dimensions determining electronic banking service quality and to measure the relative contribution of identified dimensions towards total electronic banking service quality in the context of India. Most often cited e-banking service quality dimensions mined from review of pertinent literature were used to generate 60 items. The items were content validated from 10 experts before administering to 400 respondents. The final questionnaire consisting of 30 items was distributed to 100 respondents each of two private and two public e - banking users (sample size of 400). Exploratory factor analysis yielded a six-factor structure. Confirmatory factor analysis (CFA) was used to verify the factor structure. Multiple regression was used to measure the relative contribution of identified dimensions towards total electronic banking service quality.

**Key words :** electronic banking service quality, reliability, responsiveness, efficiency, security, ease of use, ease of access

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In the wake of globalization and deregulations, the marketplace is flooded with competition. It is not uncommon for companies to overcome geographical boundaries for profitable markets and to compete internationally if the home markets become saturated. Distressed by intense competition, businesses are in a quest to search for efficient and profitable means to differentiate themselves from competitors to achieve a sustainable competitive advantage. Information technology can be one way to achieve competitive advantage (Ho & Lin, 2010 ; Nagdev & Rajesh, 2018).

Latest information technology advancements have fundamentally changed the way services used to be provided to customers. Easy, convenient, and faster 'Do it yourself' options have become very popular these days. Further, rise in the availability and usage of technology has changed the way customers used to shop and bank. This is why adoption of electronic banking services offered by various banks has been growing lately (Ho & Lin, 2010).

With an Internet base of more than 460 million users, ranked only behind China, India is the second largest

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digital market across the globe. With India's ongoing digital boom, by 2020, the digital users are expected to double, reaching a milestone of 150 million users. There are currently 45 million active electronic banking users in India already. Increased comfort and convenience (Sadeghi & Hanzaee, 2010), user control over service delivery (Bateson, 2000), and lack of people - to - people interactions (Sadeghi & Hanzaee, 2010 ; Srivastav & Mittal, 2016) are some of the reasons motivating the use of electronic banking.

The concept of digital services is further fueled up with economic growth and the improvement of domestic and foreign market living standards. In some businesses such as banking, the delivery of quality services is considered vital in gaining a profitable market share. It is thus important to focus on dimensions customers use while evaluating the overall service quality of a service firm. It is thus extremely important for banking firms to identify customer expectations and perceptions to identify service quality gaps, if any, and to formulate effective strategies to provide superior customer services in all business functions.

## **Banking Sector in India : At A Glance**

The banking sector of India comprises of 27 public sector, 20 private sector, 43 foreign banks, 56 regional rural banks, 1589 urban cooperative banks, 93,550 rural cooperative credit institutions, and other national and state level financial institutions. More than 70% of banking system assets are controlled by public sector banks. Private banks have relatively small stocks. According to the Reserve Bank of India, the banking sector in India is well managed and capitalized. Various studies on credit market and liquidity market have shown resilience of Indian banks in enduring global recession well. Banks also encourage their customers to use electronic banking and mobile phones to manage their financial status (India Brand Equity Foundation, 2019).

## **Advent of Electronic Banking : A Significant Banking Reform**

Conventionally, consumers used to visit a bank branch to get banking services. This entity model landscaped the delivery of services for banking products. Electronic funds transfer (EFT) was the beginning of a new non - entity based trend, soon to be followed by credit cards, smart cards, and ATMs as a history of evolution. With improvements in computing technology, banking through telephones and computer telephony integration (CTI) gradually became new media for providing online banking services. Electronic banking came out as the most recent addition. Today, technology has enabled banks to provide services anywhere, anytime at customers' convenience. This change has forced banks to redesign their “distribution channels” by introducing flexibility and convenience.

Electronic banking offers the opportunity to handle bank transactions without going to the bank counter for customer convenience (Laukkanen, 2007). In recent years, banks are beginning to take advantage of the Internet by simply providing online services (Chong, Ooi, Lin, & Tan, 2010). Electronic banking uses the Internet as a remote connection between the bank and a host for either fund transfer or opening an account (Nelson & Richmond, 2007). The online banking system is more convenient as online banking portals are accessible to customers at any given point of time (Chong et. al., 2010). At a basic level, online banking is a useful web configuration for banks, itemizing various banking products and services. At an advanced level, banks offer functions such as account access, fund transfer, integrated sales, and access to many other financial products like insurance and investment such as electronic tax payment, stock trading, remittance, electronic settlement system, rail reservation, transfer to different accounts, loan application, etc.

## **Review of Literature**

**(1) Services & Concept of Service Quality :** Services were not always considered as a dialogue between the

customer and the service provider. Services, in fact, were considered as a series of invisible activities (Grönroos, 2007). A closely related concept to services is service quality, which has been the area of interest for academicians and practitioners lately. Over the past two decades, the field of research investigating the importance of achieving quality of service and sustainable competitive advantage (Dick, 2007) grew considerably. Although the area of service quality is well researched, there is no consensus in the academic literature on the exact definition of quality of service over the Internet commonly known as electronic service quality. As the interest in the area has grown, different "definitions" of electronic service quality have been coined. One of the most commonly used outlooks defines service quality as the degree to which a service meets customers' needs or expectations. This was also reinforced in early erudite writings on service quality, where service quality was assumed to originate from a comparison of expectation (what a customer feels a service provider should offer) with the post-usage service perception (service provider's actual service performance) (Zeithaml, Parasuraman, & Malhotra, 2000). Therefore, quality of electronic service was usually regarded as a gap between expected quality of electronic service and perceived quality of electronic service (Grönroos, 2007 ; Hazra & Srivastava, 2010). If a customer expected better service than the perceived (positive gap), the customer would feel dissatisfied. Likewise, in case of a negative gap (beyond expectation), the customer would feel satisfied with the service. Service quality, therefore, was also defined as an overall evaluation of a service firm that results from comparing that firm's performance with the customer's general expectations of how firms in that industry should perform (Zeithaml et al., 2000). Some researchers also proposed that service quality indicates leftover from customer's previous perception of the service quality and the level of satisfaction with the current performance. Service quality was also assumed as an approach by the management to appreciate how it serves its customers in light of the expectations of their perceived service (Mohammad & Alhamadani, 2011).

Since most definitions show a comparison between expectation and perception, quality of service was assumed as a multidimensional concept. It might as well take up different meaning for different people (Loonam & O'Loughlin, 2008).

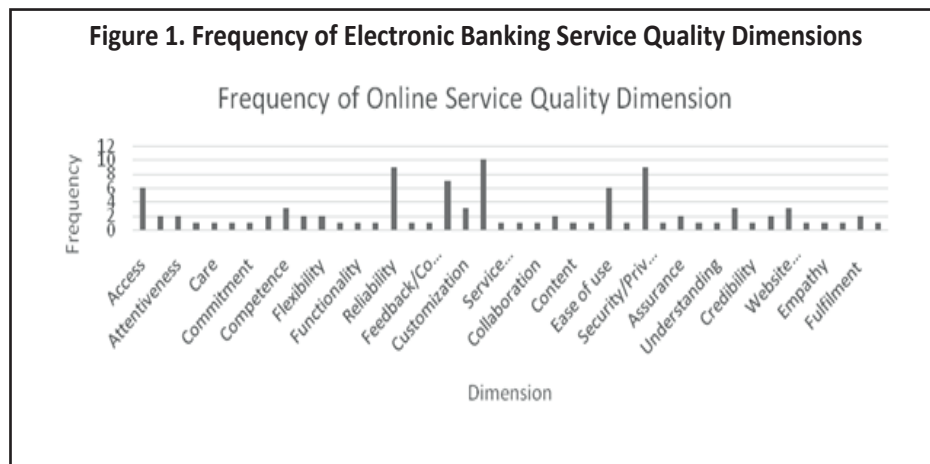
**(2) E - Service Quality :** Since electronic services are delivered over the Internet, service providers confront many challenges. One of the challenges is lack of direct interaction between service personnel and customers. The quality of e - service is an overall judgment and evaluation of the providing e-services in a virtual market (Li & Suomi, 2009). Experienced and successful companies have realized that, instead of mere presence on the Internet and relatively low prices, overall quality of e-service is a key determinant of customers accepting online services. Easy comparison of services of providers over the Internet enforced service providers to be better than competitors (Li & Suomi, 2009). Existing literature consisted of many models and procedures to measure the quality of traditional services (Loonam & O'Loughlin, 2008), but they lacked quality work on measuring the quality of online services (Aliyu & Tasmin, 2012).

Some researchers believed in measuring electronic service quality on the traditional service quality theory of using SERVQUAL (Grönroos, 2007 ; Zeithaml et al., 2000) ; whereas, others advocated exploring new determinants of e-service quality (Loonam & O'Loughlin, 2008). Debate revolved around the central idea of not using general theory with a direct interaction between customer and service provider to technology - enabled interaction between customer and service provider. Therefore, adding additional relevant dimensions comprising of quality of electronic service was suggested (Zeithaml et al., 2000). Given to the recent developments in the Indian electronic banking sector and higher customer expectations, this area calls for exploring determinants of electronic banking service quality as per the Indian setting. A review of existing literature on electronic banking service quality from 2001 onwards has been presented in the Table 1.

In these studies, a total of 42 e - banking service quality dimensions were proposed (number of e-banking service quality dimensions varied from 4 to 17). Out of these 42 dimensions, only six dimensions namely, ease of

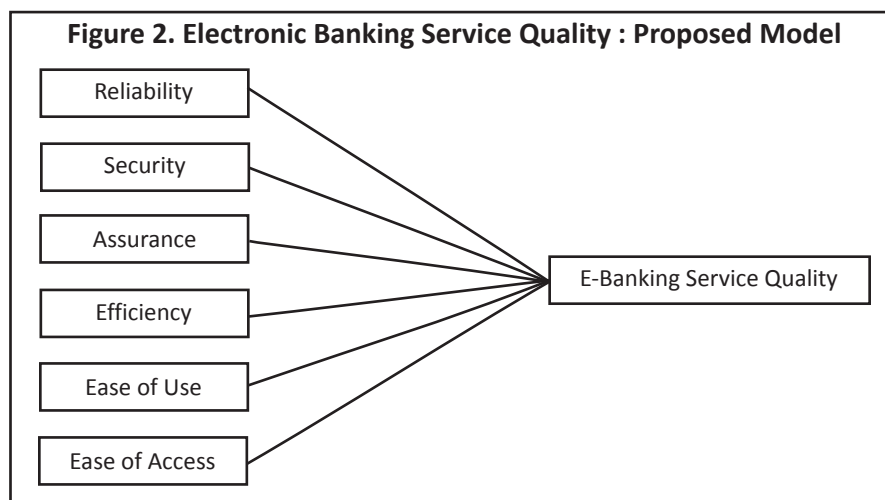
**Table 1. Review of Electronic Banking Service Quality Scales**

Sr. No	Author	Dimensions
1	Jun & Cai (2001)	Reliability, responsiveness, competence, courtesy, credibility, access, communication, customer understanding, collaboration, security, continuous improvement, content, accuracy, ease of use, timeliness
2	Broderick & Vachirapornpuk (2002)	Reliability, efficiency, responsiveness, assurance, ease of use, and access
3	Zeithaml, Parasuraman, & Malhotra (2002)	Efficiency, fulfilment, system availability, privacy, responsiveness, compensation, and contact
4	Jayawardhena (2004)	Access, website interface, trust, attention, and credibility
5	Yang, Jun, & Peterson (2004)	Reliability, responsiveness, competence, ease of use, security, and product portfolio
6	Han & Baek (2004)	Tangibles, reliability, responsiveness, and empathy
7	Liao & Cheung (2005)	Perceived usefulness, ease of use, reliability, responsiveness, security and privacy, and continuous improvement of electronic banking services
8	Sohail & Shaikh (2007)	Efficiency and security, fulfilment, and responsiveness
9	Wu, Chang, Yang, & Chen (2008)	Efficiency, reliability, privacy, compensation, responsiveness, contact, individualization
10	Loonam & O'Loughlin (2008)	Web usability, security, information quality, access, trust, reliability, flexibility, customization, responsiveness, service recovery
11	Khan & Mahapatra (2008)	Reliability, accessibility, user friendliness, privacy/security, efficiency, responsiveness and fulfilment
12	Ho & Lin (2010)	Customer service, web design, assurance, preferential treatment and information provision, and ease of access
13	Sadeghi & Farokhian (2011)	Convenience, accessibility, accuracy, security, usefulness, bank image, website design, and ease of access



access, responsiveness, reliability, efficiency, security, and ease of use were found to have the highest frequency of recurrence and were selected for the study as shown in the Figure 1.

Thus, the conceptual model stating that electronic banking service quality is dependent on reliability, security, responsiveness, efficiency, ease of use, and ease of access can be produced as in Figure 2.



## Need for the Study and Gap Identification

Introduction of e-banking services made the banks more customer - centric and fundamentally changed the way banking organizations used to create and maintain customer relationships (González, Mueller, & Mack, 2008). Stiff competition raised the e-banking service expectations. To be profitable, banks need not only concentrate on acquiring new customers, but must also strategize to retaining existing customers as shifting to a new service provider is very easy (Bhat & Darzi, 2016 ; Li & Suomi, 2009). Thus, understanding service quality issues on a digital platform has become crucial. Banks thus need to make honest efforts to understand how their online service users perceive and evaluate their e-banking service quality (Bauer, Hammerschmidt, & Falk, 2005).

Although, there is no dearth of literature on service quality (Sharma & Verma, 2015 ; Zeithaml et al., 2000), comparatively less research has been dedicated towards exploring and evaluating e-banking service quality (Aliyu & Tasmin, 2012). This is also true due to the dearth of a commonly accepted scale for measuring the e-banking service quality. Since India forayed into e - banking with ICICI in 1996, the Indian e-banking landscape is relatively younger than its Western counterparts. There is a need to explore and validate e-banking service quality dimensions in the Indian e-banking ecosystem. Thus, the current study tries to explore the underlying dimensions/determinants deciphering the concept of e-banking service quality in the Indian banking sector.

## Objectives of the Study

This study tries to accomplish the undermentioned objectives :

- (1) Exploring and validating the dimensions of electronic banking service quality.
- (2) Identifying the relative contribution of each electronic banking service quality dimension towards total electronic banking service quality.

## Research Methodology

The study was conducted from January - May 2018. The study employed qualitative as well as quantitative research design. To accomplish the stated objectives, the study was conducted in two phases. In Phase - I, an in-depth review of literature was conducted. The review of literature focused upon understanding traditional and

electronic banking service quality. The review of literature also involved reviewing of electronic-banking service quality dimensions. Forty two dimensions (refer Table 1) were extracted from the review of literature. Six most important e - banking service quality dimensions were mined from these 42 dimensions (based on the frequency of repetition).

**(1) Pre - Test :** These six dimensions were used to generate items for the questionnaire to collect the responses. Sixty items were generated (10 for each dimension). These items were then presented to experts for content validation as only a group of experts can assess content validity (Judd, Smith, & Kidder, 1991). Ten experts (with a minimum experience of 10 years in private/public sector banks) from various managerial levels in banking and customer relationship management and five academicians (with a minimum experience of 5 years) having rich experience of teaching and research in service marketing and e - marketing were selected for content validation. Expert feedback led to rewording and deletion of some items. An inventory of 30 items was retained for the final study (11 statements were modified, 30 statements were deleted, and 19 statements were retained as such).

**(2) Sample Selection and Questionnaire Administration :** The questionnaire was then distributed amongst 400 electronic banking service users (based on review of previous studies) of two public and two private banks (100 respondents from each bank) to capture the perceived service quality of these banks. The sample respondents were selected using judgmental sampling technique. The banks were selected based on market capitalization. The respondents were asked to specify how much they agreed or disapproved of an item by looking at the appropriate responses to the questionnaire ; 356 responses were found to be correctly filled and were considered for further study (four questionnaires being incomplete were dropped from further analysis). A brief on the sample respondents and banks has been produced in the Table 2 and Table 3, respectively.

**Table 2. Sample Profile**

Classification	Percentage (%)
<b>Gender</b>	
Male	50
Female	50
<b>Education</b>	
Under Graduate	38.4
Graduate	21.1
Post Graduate	19.7
Other	20.8
<b>Age</b>	
16 - 24 years	17.4
25 - 34 years	19.1
35 - 44 years	24.2
45 - 54 years	18.8
55 or over years	20.5
<b>Income (in INR)</b>	
1 Lakh - 2.9 Lakhs	21.9
3 Lakhs - 4.9 Lakhs	22.5
5 Lakhs - 6.9 Lakhs	35.7
7 Lakhs and above	19.9



<b>Country</b>	
India	100
<b>Years of Using Personal Computer</b>	
1 to 5 years	37.3
6 to 10 years	40.1
11 years or over	22.6
<b>Years of Using Internet for Shopping</b>	
> 6 months	8.8
0.5 to 1 year	23.3
1 to 2 years	17.7
3 to 5 years	21.6
< 5 years	28.6
<b>Frequency of Use of Internet</b>	
1 to 5 times/week	3.6
1 to 4 times/day	25.3
5 to 8 times/day	35
9 times/day	36.1
<b>Hours/per Week Spent on Browsing the Web</b>	
> 1 hour	16.9
1 to 5 hours	15.7
6 to 10 hours	17.4
11 to 20 hours	17.7
21 to 40 hours	14.9
< 40 hours	17.4

**Table 3. Selected Banks**

Private Banks		Public Banks	
Name of Bank	Market cap (in Cr.)	Name of Bank	Market cap (in Cr.)
State Bank of India	239,712.04	HDFC	4,81,063.70
Bank of Baroda	31,953.52	ICICI	2,02,174.40

Source : Capital Line, 2017

## Analysis and Results

**(1) Exploring the Dimensions of Electronic Banking Service Quality :** In order to achieve the goal of exploring the determinants of electronic banking quality, first exploratory factor analysis is used. The results show the presence of six dimensions that add up to form electronic banking service quality. Before applying EFA on all the items of the questionnaire, each construct (dimension) was explored using EFA. To demonstrate the internal reliability of the model used, reliability test (Cronbach's alpha) was applied. While performing the test, each dimension was studied separately for testing the internal reliability. The test results have been shown in the Table 4.

The  $\alpha$  - Cronbach degrees in each dimension are higher than 0.7, indicating that the dimensions are quite reliable, and elements related to each of these dimensions can be used to measure the dimensions / constructs involved. Exploratory factor analysis was applied to these items pertaining to these dimensions thereafter. To ascertain the suitability of data for structure detection, KMO and Bartlett's test was applied. The results are shown in the Table 5.

**Table 4. Cronbach's Alpha Scores**

Sr. No	Dimension	Cronbach's Alpha
1	<b>Reliability</b> : Consistency of website performance and reliability.	0.92
2	<b>Responsiveness</b> : The client believes that assistance is obtained through automatic or human factors when needed.	0.83
3	<b>Efficiency</b> : The convenience and speed of accessing and using the website.	0.91
4	<b>Privacy/Security</b> : The site's security and protection of customer information.	0.89
5	<b>Ease of Access</b> : How easy is this to access the e-services through the bank's website.	0.94
6	<b>Ease of Use</b> : How easy is this to self-operate on the electronic banking platforms.	0.87

**Table 5. KMO and Bartlett's Test**

Kaiser - Meyer - Olkin Measure of Sampling Adequacy		.921
Bartlett's Test of Sphericity	Approx. Chi-Square	8080.894
	Df	435
	Sig.	.000

The sufficiency of KMO measurement sampling (determining whether the sample's response is sufficient) should be close to 0.5 for satisfactory factor analysis. Kaiser (1974) recommended that a value of 0.5 (the value of KMO), which is the smallest is hardly acceptable ; values between 0.7 - 0.8 are acceptable ; and values above 0.9 are excellent. This is well supported by KMO (Kaiser - Meyer - Olkin) value of 0.921, which indicates reducing several variables into fewer factors is appropriate. Further, Bartlett's test of sphericity significance value is 0.000, which reveals that correlations in the data set are appropriate for EFA.

**(i) Factor Extraction and Total Variance Explained** : SPSS output as listed in Table 5 lists the Eigen values and hence the variance explained by each factor. The table also displays the Eigen value in terms of the percentage of variance explained. In this case, Factor 1 explains 34.109% of the total variance while Factors 2, 3, 4, 5, and 6 explain variances of 11.379%, 8.060%, 6.369%, 4.568%, and 2.544%, respectively. Thirty statements, as used to conduct exploratory factor analysis, are rearranged into six factors that explain approximately 67.029% of the variance as shown in the Table 6.

**Table 6. Total Variance Explained**

Factor	Initial Eigen Values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	10.778	35.927	35.927	10.233	34.109	34.109	7.149
2	3.751	12.504	48.431	3.414	11.379	45.488	4.865
3	2.725	9.084	57.515	2.418	8.060	53.548	6.776
4	2.060	6.866	64.381	1.911	6.369	59.917	6.786
5	1.642	5.472	69.853	1.370	4.568	64.485	5.830
6	1.070	3.567	73.420	.763	2.544	67.029	7.471

Extraction Method : Maximum Likelihood.

**Note.** When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.



The rotation of component matrix shows the correlation between each variable (row) and different factors (columns). Each variable should be related to the most relevant factor. If a variable has similar correlation values with multiple factors, this may mean that the variable is almost equally applicable to several factors, which means that the variable itself is not very clearly defined and, therefore, can be excluded from the model. No such variable can be found in the rotated component matrix. The rotating component matrix (pattern matrix) results in six

**Table 7. Rotated Component Matrix**

	Pattern Matrix <sup>a</sup>					
	Factor					
	1	2	3	4	5	6
I am able to get on this electronic banking website quickly.	.969					
The electronic banking website is always available for business.	.946					
Electronic banking services can be availed at any time during the week.	.822					
Network requirements for accessing the electronic banking website are quite congenial for access.	.801					
The electronic banking website is rarely down.	.770					
The electronic banking organization performs the service correctly the first time.		.916				
My electronic banking transactions are always accurate.		.868				
The electronic banking organization keeps my records accurately.		.867				
Electronic banking provides consistent service performance.		.841				
I feel electronic banking services are dependable.		.765				
The service delivered through the Internet banking pages is quick.			.908			
Structure of online content in this electronic banking website is easy to follow.			.896			
It is easy for me to complete a transaction through this electronic banking website.			.839			
Electronic banking provides immediate and quick transactions and check outs with minimal time.			.748			
This electronic banking organization requires a minimum of information to be input by the customer.			.663			
I feel safe in my electronic banking transactions.				.977		
I feel secure in providing sensitive information (e.g. credit card number) for electronic banking transactions.				.856		
I feel the risk associated with electronic banking transactions is low.				.703		
I feel electronic banking is guarded against fraud.				.683		
The electronic banking organization will not misuse my personal information.				.476		
Using this electronic banking website does not require a lot of effort.					.932	
Structure of online content in this electronic banking website is easy to follow.					.764	
It is easy for me to complete a transaction through this electronic banking website.					.760	
This electronic banking website offers easy navigation.					.680	
It is easy to find what I need on this electronic banking website.					.670	
I receive a prompt response to my requests by e-mail or other means from the electronic banking services.					.784	
This electronic banking organization quickly resolves the problems I encounter.					.724	
The electronic banking organization gives me prompt service.					.704	
The electronic banking organization is genuinely interested in solving my problems.					.624	
This electronic banking organization is happy to help in time of need.					.534	

Extraction Method: Maximum Likelihood.

Rotation Method: Promax with Kaiser Normalization.<sup>a</sup>

factors. Factor 1 consists of variables pertaining to Reliability in case of electronic banking service quality ; a result which is in conformance with the findings obtained by Wu et al. (2008), Loonam and O' Loughlin (2008), and Khan and Mahapatra (2009). Factor 2 consists of variables related to Security of online transactions, which is in conformance to studies conducted by Sohail and Shaikh (2008), Loonam and O'Loughlin (2008), Khan and Mahapatra (2008), and Sadeghi and Farokhian (2011). Factor 3 consists of variables related to Responsiveness, which is in conformance to the results of Yang, Jun, and Peterson (2004) ; Han and Baek (2004) ; Liao and Cheung (2005) ; Sohail and Shaikh (2008) ; Wu et al. (2008) ; Loonam and O' Loughlin (2008) ; and Khan and Mahapatra (2008). Factor 4 consists of variables related to Efficiency, which is well supported by the studies of Broderick and Vachirapornpuk (2002), Zeithaml et al. (2002), Sohail and Shaikh (2008), Wu et al. (2008), and Khan and Mahapatra (2008). Factors 5 and 6 consist of variables, which are in conformance to various studies in the literature. These are Ease of Use (Broderick & Vachirapornpuk, 2002 ; Jun & Cai, 2001 ; Liao & Cheung, 2005 ; Yang et al., 2004) and Ease of Access (Broderick & Vachirapornpuk, 2002 ; Jun & Cai, 2001 ; Jayawardhena, 2004 ; Ho & Lin, 2009 ; Sadeghi & Farokhian, 2011), respectively in case of electronic banking service quality. The rotated component matrix is shown in the Table 7.

**(ii) Confirming E - Banking Service Quality Dimensions :** For checking whether the hypothesized six - factor electronic banking service quality model conforms to the data set or not, structural equation modeling (SEM) technique is applied.

This procedure follows two steps. In the first step, the study examines any items that are worth removing if it loads the wrong factor or cross-loads or exhibits high standardized residual (Anderson & Gerbing, 1988 ; Bollen, 1989). This is followed by removing any questionable item if found to be represented by another indicator. After an item is removed, CFA is run again. This process continues until all items are deemed necessary, both qualitatively and quantitatively. Further, from the 27 proportional items (decrease from the initial 30), six factors are derived. The resulting six factors are :

- (i) Reliability**
- (ii) Security**
- (iii) Responsiveness**
- (iv) Efficiency**
- (v) Ease of Use**
- (vi) Ease of Access**

The Table 8 depicts the estimated reliability of each of the six factors : 0.92, 0.89, 0.83, 0.91, 0.87, and 0.94, respectively by calculating its Cronbach's alpha value. These scale items are found to have sufficient reliability and can be used for further analysis.

The results of the confirmatory factor analysis (CFA) of the e-bank service quality dimension in Table 8 show that the chi-square is statistically significant ( $\chi^2 = 522.88$  ;  $d.f. = 309$ ,  $p < 0.03$ ). However, the ratio of chi-square statistic to the degree of freedom is 1.69, which is lower than the value of 2, which is the proposed cut-off point. Further, the value of goodness - of - fit index (GFI) is found to be 0.90 ; for non - normed fit index (NNFI), the value is 0.96 ; for competitive fit index (CFI), the value is 0.96 ; and for root mean square residual (RMR), the value is found to be 0.02.

Average variance extracted (AVE) and composite reliability (CR) are calculated for examining the convergent validity of the measurement model (Fornell & Larcker, 1981). Further, the values of reliability are found to be more than the threshold value of 0.7 (Nunnally & Bernstein, 1994). The AVE explains the measure of variance acquired

by the construct measurement corresponding to the correlation between the measurement error and the latent variable. In the study, all the AVE indicators extracted have a variance of greater than 50%, which is the threshold value (Bagozzi & Yi, 1988).

For measuring the discriminant validity of the measures, two methodologies are adopted. First, AVE values are compared to the square of parameter estimates in latent variables (0). This shows that the correlation between the indicators of each construct is greater than the correlation between the construct and any other construct. Second,

**Table 8. CFA Results of Measures**

Dimension/ Items	Mean	SD	Loading
<b>Reliability Dimensions (<math>\alpha = 0.92</math> ; AVE = 0.73 ; CR = 0.93)</b>			
The electronic banking organization performs the service correctly the first time.	2.42	.94	.76
My electronic banking transactions are always accurate.	2.40	.97	.84
The electronic banking organization keeps my records accurately.	2.23	.83	.91
Electronic banking provides consistent service performance.	2.28	.91	.86
I feel electronic banking services are dependable.	2.27	.85	.86
<b>Security Dimensions (<math>\alpha = 0.89</math> ; AVE = 0.65; CR = 0.88)</b>			
I feel safe in my electronic banking transactions.	3.76	.76	.47
I feel secure in providing sensitive information (e.g. credit card number) for electronic banking transactions.	3.89	.72	.85
I feel the risk associated with electronic banking transactions is low.	3.89	.74	.97
The electronic banking organization will not misuse my personal information.	3.76	.77	.70
<b>Responsiveness Dimensions (<math>\alpha = 0.83</math> ; AVE = 0.58 ; CR = 0.84)</b>			
I receive a prompt response to my requests by e-mail or other means from electronic banking services.	4.0	.64	.70
This electronic banking organization quickly resolves the problems I encounter.	3.8	.68	.72
The electronic banking organization gives me prompt service.	4.1	.59	.78
The electronic banking organization is genuinely interested in solving my problems.	3.9	.71	.62
<b>Efficiency Dimensions (<math>\alpha = 0.91</math>; AVE = 0.68; CR = 0.91)</b>			
The service delivered through the Internet banking pages is quick.	3.47	.92	.66
Structure of online content in this electronic banking website is easy to follow.	3.50	.92	.90
It is easy for me to complete a transaction through this electronic banking website.	3.56	.90	.83
Electronic banking provides immediate and quick transaction and check outs with minimal time.	3.74	.81	.89
This electronic banking organization requires a minimum of information to be input by the customer.	3.39	.94	.74
<b>Ease of Use Dimensions (<math>\alpha = 0.87</math> ; AVE = 0.60 ; CR = 0.88)</b>			
Using this electronic banking website does not require a lot of effort.	2.74	.83	.67
Structure of online content in this electronic banking website is easy to follow.	2.88	.89	.93
It is easy for me to complete a transaction through this electronic banking website.	2.73	.88	.76
This electronic banking website offers easy navigation.	3.11	.90	.68
It is easy to find what I need on this electronic banking website.	3.01	.94	.76
<b>Ease of Access Dimensions (<math>\alpha = 0.94</math> ; AVE = 0.79 ; CR = 0.93)</b>			
I am able to get on this electronic banking website quickly.	4.00	.69	.80
The electronic banking website is always available for business.	4.00	.70	.94
Electronic banking services can be availed at any time during the week.	3.99	.68	.96
Network requirements for accessing the electronic banking website are very congenial for access.	4.05	.69	.82

**Table 9. Correlation Matrix**

Dimension	Mean	SD	Ease of Use	Ease of Access	Reliability	Efficiency	Security	Responsiveness
Ease of Use	2.90	0.73	.775					
Ease of Access	4.01	0.64	.351	.890				
Reliability	2.33	0.79	.377	.212	.855			
Efficiency	3.53	0.78	.533	.498	.246	.828		
Security	3.83	0.64	.278	.522	.223	.391	.808	
Responsiveness	3.97	0.54	.425	.561	.255	.533	.722	.763

**Note.** Correlation is significant at the 0.05 level (two-tailed).

the discriminant validity of each structure can be proved by the fact that a load of each indicator in the interest rate structure is higher than any other variable (Chen, Yen, Li, & Ching, 1998). The Table 9 shows the mean, standard deviation, and correlation between constructs for each construct.

### (iii) Model Fit Indices :

$$\chi^2 = 522.88 (p = .00), d.f. = 309, \chi^2/d.f. = 1.69$$

$$RMR = 0.02, GFI = 0.90, CFI = 0.96, NFI = 0.92, NNFI = 0.96$$

Note : CR = composite reliability; AVE = average variance extracted

In summary, the analysis supports the convergence and discriminant validity of this measure. The confirmatory factor analysis results show that the six-factor model is appropriate and sufficiently reliable.

**(2) Identifying the Relative Contribution of Each Electronic Banking Service Quality Dimension Towards Total Electronic Banking Service Quality :** As mentioned earlier, the quality of electronic banking services is believed to depend on six dimensions of service quality namely Reliability, Responsiveness, Efficiency, Security, Ease of Access, and Ease of Use. In order to determine the relative importance/contribution of each dimension (independent variable) to the quality of electronic banking services (dependent variable), multiple regression is used.

Before proceeding with the multiple regression, the key assumptions are assessed. Multivariate normality is checked using Jarque - Bera test that reveals that the data is not normally distributed. However, as the regression is a very robust test, and the sample size is quite large, the following assumption can be overlooked. The second multicollinearity is checked using variance inflation factor (VIF) test, and the values of all the six independent factors are found out to be below 3, which is an indication that there is no multicollinearity in the data. The third autocorrelation is checked using the Durbin - Watson test with a value of 1.8, which indicates that no autocorrelation exists in the data. Lastly, heteroscedasticity is checked in the data using White test, and it is found that the variances of the residuals are similar across the groups, which means that there is no heteroscedasticity in

**Table 10. Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin - Watson
1	.940 <sup>a</sup>	.884	.882	.16559	1.831

**Note.** <sup>a</sup> Predictors: (Constant), Ease of Use, Ease of Access, Efficiency, Security, Reliability, Responsiveness

<sup>b</sup> Dependent Variable: e\_banking SQ

**Table 11. ANOVA Table**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	73.175	6	12.196	444.795	.000 <sup>b</sup>
	Residual	9.569	349	.027		
	Total	82.744	355			

**Note.** <sup>a</sup> Dependent Variable: e\_banking SQ

<sup>b</sup> Predictors : (Constant), Ease of Use, Ease of Access, Efficiency, Security, Reliability, Responsiveness

**Table 12. Coefficients**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.192	.111		1.734	.084		
	Responsiveness	.073	.018	.115	3.971	.000	.396	2.525
	Ease of Access	.022	.011	.041	2.086	.038	.876	1.141
	Efficiency	<b>.098</b>	.018	<b>.127</b>	5.455	.000	.607	1.646
	Security	.043	.011	.079	4.029	.000	.868	1.153
	Reliability	<b>.853</b>	.024	<b>.817</b>	35.121	.000	.612	1.634
	Ease of Use	.034	.010	.082	3.261	.001	.527	1.898

**Note.** <sup>a</sup> Dependent Variable: e\_banking SQ

the data, and the data is fit for carrying out a regression analysis. The results of multiple regression are discussed as model summary, ANOVA table, and coefficients in Tables 10, 11, and 12, respectively.

The "*R*" column of the model summary (Table 10) shows the value of *R*, which represents multiple correlation coefficients. *R* is a measure of the predictive quality of the dependent variable (brand avoidance). A value of 0.940 indicates a good prediction level. This is an overall measure of the strength of the association and does not reflect the extent to which any particular independent variable is related to the dependent variable. The model summary statistics also show that the value of *R*-squared (decision coefficient) is 0.884, which indicates that the independent variable can explain/predict 88.4% variance of the dependent variable (quality of electronic banking services). The adjusted *R*-squared is a modified version of the *R*-squared adjusted for the number of predictors in the model (in this case, 6). The adjusted *R*-squared value of 0.882 (almost the same as the *R*-squared) again shows the predictive power of the independent variables.

The *F* - ratio in the ANOVA table tests whether the overall regression model fits the data. The table shows that the independent variable statistically predicts the dependent variable [*F* (6,349) = .027, *p* < .0005] (i.e., the regression model fits the data well).

Std. estimated error (SEE) is the standard deviation of the residual SEE, .16559. On an average, the estimate of brand aversion will be negligibly worse with respect to the quality of the electronic banking service. As *R* square is close to 1, SEE will be smaller. The larger the square of *R* is, the better the fit becomes and the smaller the estimation error is.

**Electronic Banking Service Quality** = .192 + .115\* *Responsiveness* + .041\* *Ease of Access* + .127\* *Efficiency* + .079\* *Security* + .817 \* *Reliability* + .082 \* *Ease of Use*

In order to find the most predictive dimension/ precedent for the quality of electronic banking service, a regression model with "independent factor" and "brand avoidance" as "dependent factor 1 to factor 6" is applied. The generated regression model produced is :

$$R \text{ Square} = .884, F = 444.795, P < .000$$

The values of all the factors (independent variables) and (dependent variable) are 0.000, indicating that all the factors contribute to the model. Among these dimensions, the standard coefficient and non-standardized coefficient is .817 and .853, respectively which makes Reliability the most predictive dimension for electronic banking service quality.

Later, it turns out that the standard coefficient's beta and unstandardized coefficient of Efficiency, that is, .127 and .098, respectively make it the second most predictive dimension. Ease of Access is found to have the least standard coefficient beta & unstandardized coefficient, that is, .041 and .022, respectively out of six predictor dimensions, which makes it the least predictive antecedent of electronic banking service quality.

## Conclusion

Electronic banking service quality is extremely important for banking organizations not only to attract new customers, but to retain existing customers as well. To design a differentiating and satisfying service quality, banks need to take note of electronic banking service quality dimensions that impact the overall electronic banking service quality which is known to increase customer satisfaction and hence customer retention in the electronic banking ecosystem (Bauer et al., 2005). The study explores electronic banking service quality dimensions as proposed by various authors. Most frequently discussed dimensions are used to conduct exploratory factor analysis. Exploratory factor analysis results in six service quality dimensions which were unearthed from the review of literature. These factors are found to be Reliability, Security, Responsiveness, Efficiency, Ease of Use, and Ease of Access. These six dimensions together explain a total variance of 69.05%. To validate the results of exploratory factor analysis, confirmatory factor analysis is used. The results obtained from the CFA demonstrate that the six-factor model is appropriate and possesses adequate reliability to be used to measure the electronic banking service quality. Further, to investigate the relative contribution of these dimensions to the overall electronic banking service quality, multiple regression is used. Reliability of electronic banking services is found to contribute the most towards the electronic banking service quality followed by Efficiency, Responsiveness, Ease of Use, Security, and Ease of Access.

## Managerial Implications

The study can be of use to banking organizations to strengthen their electronic banking service framework. Managers need to focus on six electronic-banking service quality dimensions as explored and validated in the study. This will not only help banks to differentiate their electronic banking services from competitors, but will also help in acquiring and satisfying new customers and retaining the existing customer base.

The study also helps to determine the relative contribution of various dimensions of electronic banking service quality towards overall electronic-banking service quality. It is clear that managers need to work on Reliability followed by Efficiency, Responsiveness, Ease of Use, Security, and Ease of Access. Managers need to work on improving each electronic - banking service quality dimension, but need to understand that poor performance in more important dimensions like Reliability, Efficiency, and Responsiveness can be particularly fatal leading to customer dissatisfaction and hence poor performance.



## Limitations of the Study and Scope for Future Research

The data were collected from respondents living in Doaba region (Jalandhar) of Punjab and might not represent a diverse country like India. Further, to save time and minimize the cost of the research, non - random sampling was used. To make the sample a better representative of the Indian population, a more diverse sample belonging to different states of India using electronic banking services from a diverse set of private and public banks can be taken randomly in future studies.

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# Appendix

## Questionnaire

Sr. No	Statements
1	The electronic banking organization performs the service correctly the first time.
2	My electronic banking transactions are always accurate.
3	The electronic banking organization keeps my records accurately.
4	Electronic banking provides consistent service performance.
5	I feel dependable on electronic banking services.
6	The service delivered through the Internet banking pages is quick.
7	Structure of online content in this electronic banking website is easy to follow.
8	It is easy for me to complete a transaction through this electronic banking website.
9	Electronic banking provides immediate and quick transaction and check outs with minimal time.
10	This electronic banking organization requires a minimum of information to be input by the customer.
11	Using this electronic banking website does not require a lot of effort.
12	Structure of online content in this electronic banking website is easy to follow.
13	It is easy for me to complete a transaction through this electronic banking website.
14	This electronic banking website offers easy navigation.
15	It is easy to find what I need on this electronic banking website.
16	I feel safe in my electronic banking transactions.
17	I feel secure in providing sensitive information (e.g. credit card number) for electronic banking transactions.
18	I feel that the risk associated with electronic banking transactions is low.
19	The electronic banking organization will not misuse my personal information.
20	I feel electronic banking is guarded against fraud.
21	I receive a prompt response to my requests by e-mail or other means from electronic banking services.
22	This electronic banking organization quickly resolves the problems I encounter.
23	The electronic banking organization gives me prompt service.
24	The electronic banking organization is genuinely interested in solving my problems.
25	This electronic banking organization is happy to help in time of need.
26	I am able to get on this electronic banking website quickly.
27	The electronic banking website is always available for business.
28	Electronic banking services can be availed at any time during the week.
29	Network requirements for accessing the electronic banking website are very congenial for access.
30	The electronic banking website is rarely down.

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