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4 May 2011
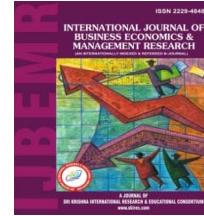
STRUCTURAL EQUATION MODELING
OF eBANKQUAL SCALE: A STUDY OF E-BANKING IN INDIA

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ABSTRACT

This study assesses the relationship between perceived quality, brand perception and perceived value with satisfaction. For the data analysis structural equation modeling (SEM) method and path analysis method were used. A result indicates that, eBankQual model is fit to assess relationship between service quality, brand perception and perceived value with overall customers' satisfaction in e-banking service. Result of regression SEM indicates that, all 14 variables found significant and good predictors of overall satisfaction in e-banking services. However, result of SEM analysis indicates that, data supports to eBankQual model and dimensions Compensation, Convenience, Contact Facilities, Easy to Use, Responsiveness, Cost Effectiveness and System Availability including brand perception and perceived value were found more significant factors in the eBankQual model.

KEYWORDS: *Structural Equation Modeling, Service quality, Brand perception, Perceived value, Satisfaction.*

INTRODUCTION

There are many scales and models available to assess service quality and customer satisfaction in service and e-service settings. However, no any appropriate scale is available to assess service quality and customers'' satisfaction in e-baking. Therefore, through the present research author has tried to develop a specialized scale to same. A customer satisfaction is an ambiguous and abstract concept. Actual manifestation of the state of satisfaction will vary from person to person, product to product and service to service. The state of satisfaction depends on a number of factors which consolidate as psychological, economic and physical factors. The quality of service is one of the major determinants of the customer satisfaction, which can be enhanced by using advanced technology. Today, almost all banks in are providing e-banking

service to their customers. It brings connivance, customer centricity, enhance service quality and cost effectiveness in the banking services. Even now, customers are evaluating their banks based on availability of high-tech services and banks also enhancing their e-banking service to satisfy their customers. Many researchers from USA, UK, Finland, Malaysia, Taiwan, etc. have proved that the use of technology positively affects the customers' satisfaction in banking industry. But some researches evidenced that, technology based banking service can't satisfy the each and every need of the customers' and each type of customers'. There are may be some possibilities of gaps between customers' expectations and actual service perception in ICT based banking service, which leads to customer dissatisfaction. Hence, author felt that, there is a need to assess the service quality and customers satisfaction in e-banking in Indian context.

OBJECTIVES AND RESEARCH QUESTIONS

Basically, concept of eBankQual scale was firstly mentioned by Jayawardhena et al., (2006) his research paper presented in European Marketing Academy Conference, Athens. The objective of this study is to test a model of customer satisfaction in e-banking service setting. To accomplish this objective a specific question was addressed:

1. What is the predictive relationship between service quality and customer satisfaction in e-banking?

2. What is the predictive relationship between brand perception and customer satisfaction in e-banking?

3. What is the predictive relationship between perceived value and customer satisfaction in e-banking?

REVIEW OF RELEVANT LITERATURE

There is hug literature available relation to measuring service quality and customer satisfaction relating to online and offline services. It elaborate that, there is strong relationship between service quality, brand perception and perceived value with customer satisfaction and loyalty (Table 1).

	Service/Scale	Author/s	Attributes/Dimensions Used in the Study
		TABLE 1: SNAP SHOT OF LITERATURE REVIEW	
	Kano's Model	Kano (1984)	Must-be requirements, One-dimensional requirements, Attractive requirements, Reverse Quality
	Perceived Service Quality Model	Gronroos (1984)	Technical service quality, Functional service quality, Corporate image (professionalism, skill, attitude, behaviour, accessibility, flexibility, reliability, trustworthiness, service recovery, reputation)
1	SERVQUAL	Parasuraman, Zeithaml and Barry (1985; 1998)	Reliability, Responsiveness, Assurance, Empathy and Tangibles
	SERVFERF	Cronin and Taylor (1994)	Reliability, Responsiveness, Assurance, Empathy and Tangibles
2	E-commerce	Schefter and Reichheld (2000)	Customer support, on-time delivery, compelling product presentations, convenient and reasonably priced shipping and handling, clear and trustworthy privacy
3	e-SQ and e-SERVQUAL	Zeithaml, Parasuraman, and Malhotra (2000)	efficiency, reliability, fulfilment, privacy, responsiveness, compensation, and contact
4	e-Satisfaction	Szymanski and Hise (2000)	Convenience, Merchandising, Easiness, Information, Deign, Financial security
5	E-loyalty	Marcel Gommans, Krish S. Krishnan, & Katrin B. Scheffold (2001)	Website & Technology, Value Proposition, Customer Service, Brand Building and Trust & Security
6	SITEQUAL	Yoo and Donthu (2001)	Ease of use, aesthetic design, processing speed, and security
7	WebQual	Loiacono, Watson and Goodhue (2002)	Information fit to task, interactivity, trust, responsiveness, design, intuitiveness, visual appeal, innovativeness, websites flow, integrated communication, business process and viable substitute, accessibility, speed, navigability and site content.
8	e-Satisfaction	Anderson and Srinivasan (2003)	convenience motivation, purchase size, inertia, trust and perceived value
9	Online Services	Schaupp and Bélanger (2005)	Privacy ,Merchandising, Convenience, Trust ,Delivery ,Usability, Product Customization, Product Quality and Security
10	E-S-QUAL and E-RecS-QUAL	Parasuraman, Zeithaml & Malhotra in (2005)	Efficiency Fulfilment, System availability, Privacy, Responsiveness, Compensation and Contact
11	Movie-Related Websites	Cho Yoon, and Joseph Ha (2008),	Ease of use, Usefulness, involvement, information factor, Convenience, technology, Community Factor, Entertainment Factors, Brand Name, Price Factor
12	BANKZOT	Nadiri, et al (2009)	Desired, adequate, predicted and perceived service quality

Source: Review of Literature

SERVICE QUALITY AND CUSTOMER SATISFACTION

The relationship between expectation, perceived service quality and customers satisfaction have been investigated in a number of researches (Zeithaml, et al, 1988). They found that, there is very strong relationship between quality of service and customer satisfaction (Parasuraman et al, 1985; 1988;). Increase in service quality of the banks can satisfy and develop attitudinal loyalty which ultimately retains valued customers (Nadiri, et al 2009). The higher level of perceived service quality results in increased customer satisfaction. When perceived service quality is less than expected service quality customer will be dissatisfied (Jain and Gupta, 2004). According to Cronin and Taylor (1992) satisfaction super ordinate to quality-that quality is one of the service dimensions factored in to customer satisfaction judgment.

BRAND REPUTATION AND CUSTOMER SATISFACTION

Marketing literature including NCSI and ACSI literature examined positive of the link between the satisfaction and the brand reputation. Wafa et al (2009) mentioned that, the nature and amount of a consumer's experience with an evoked set of brands. Perceived brand reputation has significant impacts on customer satisfaction and a consumer's beliefs about brand are derived from personal use experience, word-of-mouth endorsements/criticisms, and/or the marketing efforts of companies. (Woodruff et, al.1983). A brand perception is also one of the important aspects of in banking sector. Perceived brand reputation in banking sector refers to the banks reputation and expiating place of bank in the banking industry (Che-Ha and Hashim, 2007, Reynolds, 2007). It measures experience of the customer how he/she fill with this brand and their services. A perceived overall brand performance is determined by some combination of beliefs about the brand's various performance dimensions (Woodruff et al 1983; Che-Ha and Hashim, 2007). A brand perception is important factor to service provides because, satisfied customer with brand will recommends that service to others.

PERCEIVED VALUE

Apart from brand perception, perceived value also one of most important constructs of the customer satisfaction measurement; it is used to assess the actual benefits of the service. Perceived value is compression between price or charges paid for the services by the customer as sacrifice of the money and utility derived by service perception (Holbrook, 1994; Bolton, & Drew, 1991; Cronin and Taylor, 1992; 1994). In this study we have assessed overall satisfaction also it can be say cumulative satisfaction. It is overall perception and concluded remark of the customer regarding alternative banking channel used by customers. The overall remark of the customer is based on his/her expectations about various aspects of service quality and actual service he/she perceived by the particular bank.

CONCEPTUALIZATION AND MEASUREMENT OF CUSTOMER SATISFACTION

The term 'e-customer' refers to the online purchaser/users whether it is individual or corporate. It can be define as "e-customer is an individual or corporate one who are using e-portals to purchase, ordering, receiving information and paying price / charges through various types of e-channels" i.e. internet banking, mobile

banking, ATM, POS, credit cards, debit cards and other electronic devises. Traditionally the level of customer satisfaction was determined by the quality of services, price and purchasing process. Consequently, the level of e-satisfaction is also determined by the quality of e-services, the price level and e-purchasing process (Ming Wang, 2003). Literature on e-consumers satisfaction realizes that there are different factors of e-customers satisfaction than formal customer, e-satisfaction are modeled as the consequences of attitude toward the e-portals (Chen and Chen, 2009). After review of the literature some important factors of e-satisfaction were extracted (Table 1). There are number of scales and instruments are available to assess service quality. Available literature shows that, the customer satisfaction is measured via service quality and service quality measured by various measurement tools and instruments developed by various researchers (Riscinto-Kozub, 2008) and marketing consultancy organisations i.e. Gronroos's 'Perceived Service Quality Model, SERVQUAL, SERVPERF, SITQUAL, WEBQUAL, etc (Table 1).

HYPOTHESES

Based on review of literature and considering rational views of the experts in banking and service marketing following Null and Alternative hypotheses were formulated;

H1 Null: Service quality not significantly contributing to customer satisfaction in e-banking

H2 Null: Service quality not significantly contributing to brand perception in e-banking

H3 Null: Service quality not significantly contributing to perceived value in e-banking

H4 Null: Perceived service quality not significantly contributing to brand perception in e-banking

H5 Null: Perceived service quality not significantly contributing to perceived value in e-banking

H6 Null: Brand perception not significantly contributing to customer satisfaction in e-banking

H7 Null: Perceived value not significantly contributing to customer satisfaction in e-banking

CONCEPTUAL MODEL

A model "eBankQual" was developed after critical reviews of exiting literature and prior scales available to assess service quality and customer satisfaction. It is realized that, there no any particular scale is available to assess service quality and customer satisfaction in e-banking service. Therefore, eBankQual (Figure 1) was developed in the present study in order to understand significant predictors' of customer satisfaction in e-banking and their relationship with customer satisfaction in e-banking. The model clarifies how customer perception relating to e-banking service quality, brand and value (See Description in Annexure-I) interact with satisfaction. Figure 1 illustrates the structure of research model. The central construct in our research model is service quality of e-banking services.

FIGURE 1: CONCEPTUAL MODEL: EBANKQUAL
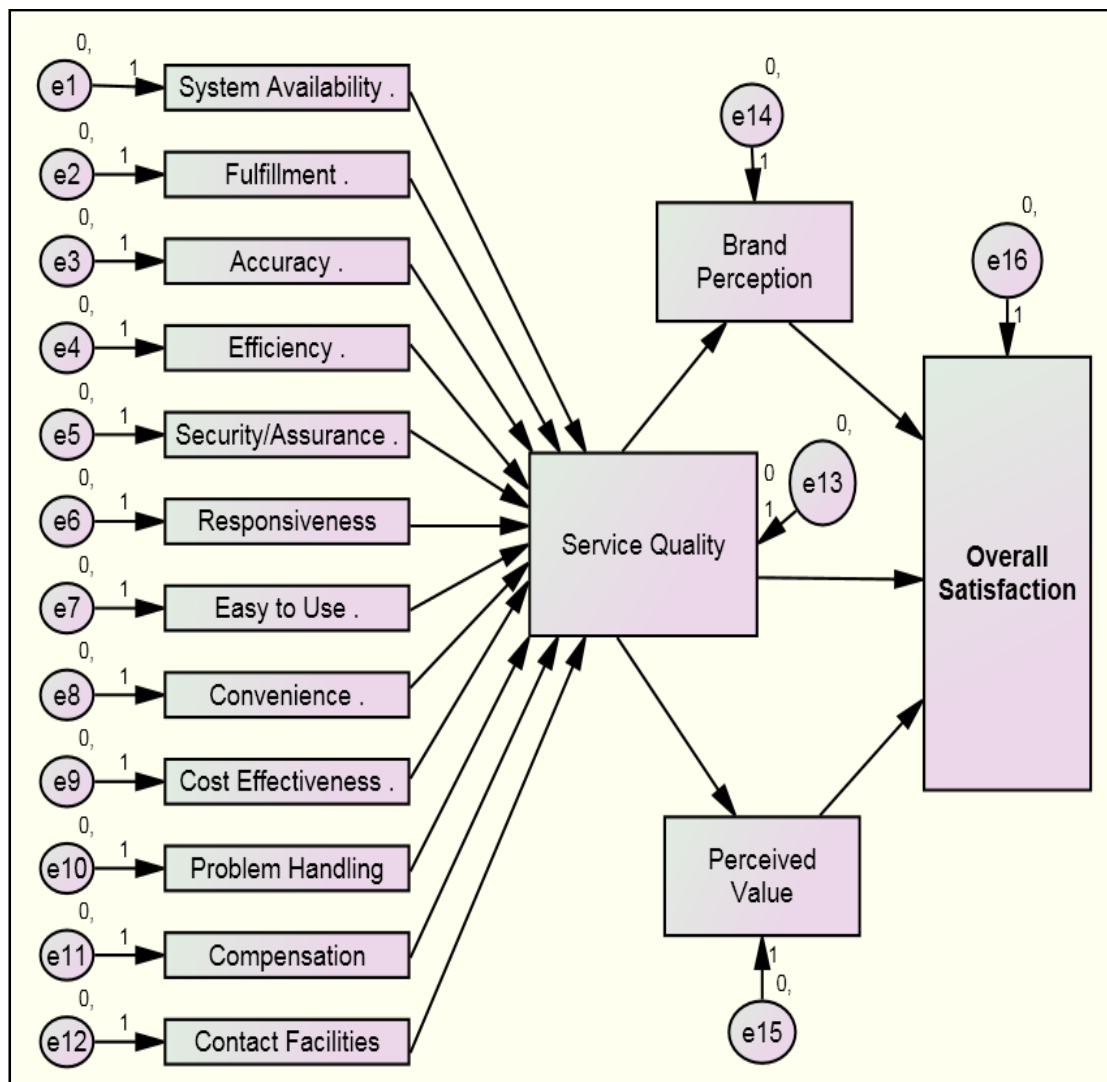
DATA AND METHODS

The research model as presented Figure 1 implemented as a structural equation model (SEM) through AMOS 18.0. This model is tested with numerical data obtained from customer survey. The data were collected from customer (N=200) of public and private sector in Satara city of Maharashtra during the month of May to August 2010. Survey was conducted using Likert based questionnaire ranging from 1= Strongly Disagree to 5= Strongly Agree. All questions are positively worded and before the filling questionnaire author has clarify the objectives of the study to respondents. The respondents were selected using judgmental sampling method; because, banks are not providing customers' name and information due to legal restrictions. Reliability of constructs was tested using Cronbach's alpha test through SPSS 19.0. Prior to the statistical analysis 10

incomplete and out of order questionnaires were eliminated and only 190 usable questionnaires were used. Thereby the gathered raw data were aggregated according to dimensions under study. The structural equation model was performed using AMOS 18.0 to specify the causal relationships among the latent variables, describes the causal effects and unexplained variance through SPSS 19.0 and AMOS 18.

DEMOGRAPHIC PROFILE OF THE RESPONDENTS

Graph 1 indicates demographic information of the (N=190) respondents, consisting 17.4% of State Bank of India, 14.7% of Bank of Baroda, 13.2% of Corporation Bank, 18.4% of IDBI Bank, 15.8% of Axis Bank and 20.5% of HDFC Bank (63.7% of Public Sector and 36.3% of private sector Banks). Graph 1 also indicates that, 10% of Credit Card users and 28% of Debit/ATM card users, 27% of Electronic Fund Transfer facilities users, 27% of MICR clearing facilities users, 6% of Internet baking users and 2% of Mobile banking service users.
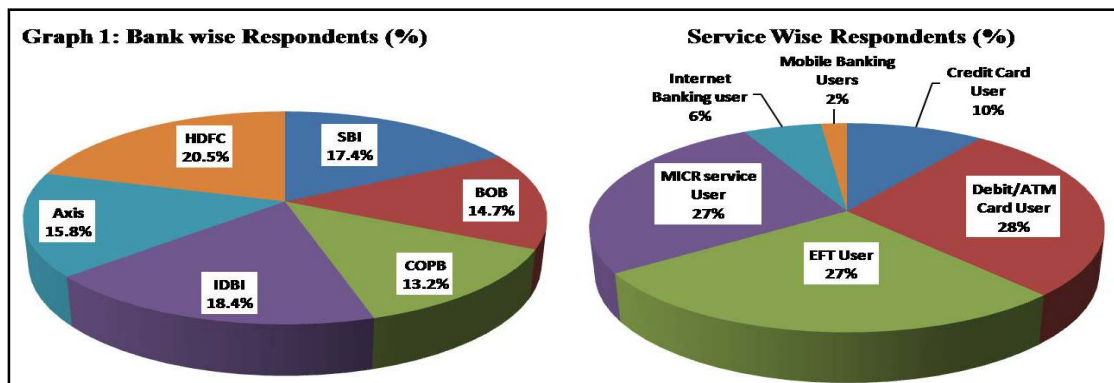

Table 1 shows that, 82.1% of the respondents were male, 17.9 % were female. In terms of age group, 20% were below 25 years, 34.7% of 25 to 35 years, 35.8% were 36 to 50 years and 9.5% were 51 to 60 years old out of 190 respondents. There were no respondent above 60 years however; some retired persons from military and army were covered under study as samples. Educational status of the respondents indicates that 4.2% of respondents were below HSC, 5.3% of HSC, 49.5% of graduate and 41.1% of post graduates. There were 31.6% of employees and 36.3% of businessmen as a core respondent who were using most of alternative channels. However, 13.7% of professional (doctor, engineers, charted accountants, investment consultants,

insurance agents etc.), 14.2% of students and 4.2% of retired persons also covered in this study.

TABLE 1: DEMOGRAPHIC PROFILE OF THE RESPONDENTS					
	Frequency	**Percent**		**Frequency**	**Percent**
<1 Lakh	39	20.5	<HSC	8	4.2
1 to 3 Lakh	31	16.3	HSC	11	5.3
3 to 8 Lakh	70	36.8	Graduate	94	49.5
8 to 15 Lakh	27	14.2	Post Graduate	77	41.1
15 to 25 Lakh	9	4.7	**Total**	**190**	**100.0**
>25 Lakh	4	2.1	Employee	60	31.6
Dependents	10	5.3	Businessman	69	36.3
Total	**190**	**100**	Retired	8	4.2
Below 25	38	20	Student	27	14.2
25-35	66	34.7	Professional	26	13.7
36-50	68	35.8	**Total**	**190**	**100.0**
51-60	18	9.5	Female	34	17.9
Total	**190**	**100**	Male	156	82.1
Source: Survey			**Total**	**190**	**100**

SEM ANALYSIS

On the basis of the aggregated survey data, The Unweighted Least Squares (ULS) method is employed, because the observed variables in the data set do not follow a multivariate normal distribution. The use of structural equating modeling (SEM) techniques seems to be necessary in the study of related concepts such as service quality, satisfaction, loyalty and repurchase (Solvang, 2008). In order to determine the causal relationship between service quality, brand perception, perceived value and customer satisfaction structural equation modeling was employed (Bloemer et al 1999). Structural equation models (SEM) are the most powerful instruments for path analysis in marketing and consumer research, and have been widely applied in activity and travel behavior research during recent decades (William and Tang, 2003). Structural equation modeling (SEM) provides simultaneous tests of measurement reliability and structural relations and overcome some of the limitations of traditional statistical techniques (Smith 2004).If the appropriate distributional assumptions are met and if the specified model is correct, then the probability level is the approximate probability of getting a chi-square statistic as large as the chi-square statistic obtained from the current set of data used for testing of the Structural Equation Model (SEM). If probability level is .05 or less, the departure of the data from the model is significant at the .05 level (Bollen & Long, 1993). Results of SEM testing indicates that, eBankQual this measurement model had an adequate fit: Model fit Indices shown in Table 2. Chi-square = 1083.392, DF= 104 at Probability level = .000. RMSEA= .249, (The Root Mean Square Error of Approximation (RMSEA) values less than .06 indicate good fit, and values greater than .10 indicate poor fit.), Comparative fit index (CFI) = .748, goodness-of-fit index (GFI) = .950, adjusted goodness-of-fit index (AGFI) = .869; root mean square residual (RMR) = .043. Samples of data confirmed that the hypothesized model is fit and validity for its further use.

TABLE 2: MODEL FIT INDICES			
Chi-square	1083.392	CFI	.748
DF	104	GFI	.950
RMSEA	.223	AGFI	.869

Result of path modeling indicated in Figure 2 shows that, estimates of intercepts for predicting endogenous variables for each dimension of eBankQual and regression weighs of each dimension. All intercepts (factor mean) values are regaining from 2.61 to 3.79 and regression weights ranging from .06 to 0.10 in case of 12 dimensions of service quality. Though, regression weight of service quality to brand perception 1.06, service quality to Perceived value 1.06, Brand perception to satisfaction.070 and Perceived value to satisfaction also.070. However, regression weight of service quality to satisfaction is .86.

FIGURE 2: EBANKQUAL MODEL
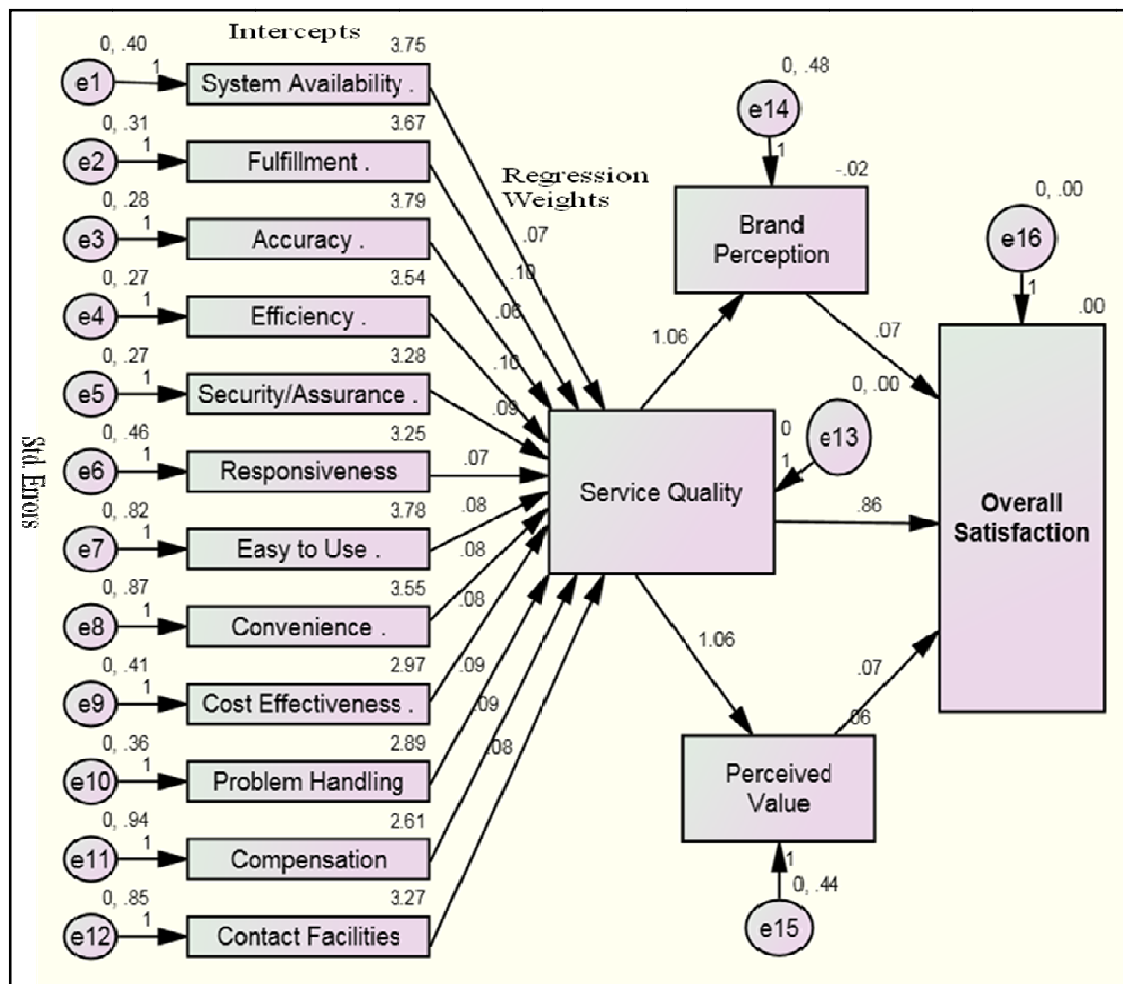
RESULTS OF REGRESSION ANALYSIS

A result of regression analysis indicates relationship between predicting variables and criterion variable. Table 3 indicates regression weights of predicting variables, which shows that how to affects predicting variables on dependent variable; result revels that, all variables were significantly influencing customers''

satisfaction. However, efficiency (EFFI=.097), Problem handing (PROB=.093) and Fulfillment (eFULL=.104) were highly influencing satisfaction followed by security (.086), compensation (.086), easy to use (.085), convenience (.084), Cost effectiveness (.084), contact (.082), System availability (.070), responsiveness (.069), and accuracy (.060) on overall service quality. Overall service quality influencing brand perception (1.060) and perceived value (1.062) as well as satisfaction (.855). However, brand perception (.072) and perceived value (.072) also influencing customer satisfaction.

TABLE 3: REGRESSION WEIGHTS							
		Code	**Estimate**	**S.E.**	**C.R.**	**P**	**Label**
SQ	<---	eFULL	.104	.002	45.603	***	e-Fulfillment
SQ	<---	EFFI	.097	.002	40.410	***	Efficiency
SQ	<---	PROB	.093	.002	42.977	***	Problem Handling
SQ	<---	SECU	.086	.002	35.465	***	Security
SQ	<---	COMPEN	.086	.001	62.651	***	Compensation
SQ	<---	EASY	.085	.001	58.120	***	Easy to Use
SQ	<---	CONV	.084	.001	59.430	***	Convenience
SQ	<---	COST	.084	.002	41.227	***	Cost Effectiveness
SQ	<---	CONTACT	.082	.001	57.135	***	Contact Facilities
SQ	<---	SYS	.070	.002	34.406	***	System Availability
SQ	<---	RESPON	.069	.002	35.606	***	Responsiveness
SQ	<---	ACCU	.060	.002	25.478	***	Accuracy
VALUE	<---	SQ	1.062	.230	4.619	***	SQ
BRAND	<---	SQ	1.060	.240	4.418	***	SQ
SATI	<---	SQ	.855	.002	499.436	***	SQ
SATI	<---	BRAND	.072	.000	152.544	***	Brand Perception
SATI	<---	VALUE	.072	.000	146.332	***	Perceived value
SQ = Overall Service Quality *** indicates significance at .005 level							

Table 4 explains variances expensed by predicting variables in the model (eBankQual). Table 4 indicates that, Compensation, Convenience, Contact Facilities and Easy to Use explains variances from .820 to .944 in overall service quality, thereby, Responsiveness Cost Effectiveness, Cost Effectiveness, System Availability, Problem Handling, Fulfillment, Accuracy, Efficiency and Security/Assurance explains variance less

than .500. Brand Perception and Perceived value explains variance more than .500 but less than .700 (.478 and .439 respectively). The regression weighs of all service quality indicators; brand perception and perceived value in e-banking service were found significant. Therefore, result support to reject H1 Null, H2 Null, H3 Null, H4 Null, H5 Null, H6 Null and H7 Null and accept alternative hypothesis.

TABLE 4: VARIANCES					
	Estimate	S.E.	C.R.	P	Label
e11	.944	.097	9.721	***	Compensation
e8	.872	.090	9.721	***	Convenience
e12	.846	.087	9.721	***	Contact Facilities
e7	.820	.084	9.721	***	Easy to Use
e6	.461	.047	9.721	***	Responsiveness
e9	.409	.042	9.721	***	Cost Effectiveness
e1	.398	.041	9.721	***	System Availability
e10	.361	.037	9.721	***	Problem Handling
e2	.307	.032	9.721	***	Fulfillment
e3	.277	.028	9.721	***	Accuracy
e4	.275	.028	9.721	***	Efficiency
e5	.274	.028	9.721	***	Security/Assurance
e14	.478	.049	9.665	***	Brand Perception
e15	.439	.045	9.662	***	Perceived Value
Note = C.R. (Critical Ratio) **z** = Estimate /S.E. = C.R. *** indicates significance at .005 level					

DISCUSSION AND RECOMMENDATIONS

The current study attempted to examine a structural equation model of customer satisfaction. The Confirmatory Factor Analysis of the observed variables produced factor loading values listed in (Table 4) showed that the variables load on relevant factors with medium to high loadings, indicating that those variables well represent the intended underlying constructs. In this model all 14 variables were found significant and were good predictors of overall satisfaction in e-banking services. However, result of SEM analysis shows that, Compensation, Convenience, Contact Facilities, Easy to Use, Responsiveness, Cost Effectiveness and System Availability including brand perception and perceived value were important factors in the eBankQual model. Therefore, author recommends that, banker, e-banking service designers and policy makers should concentrate their more efforts to enhance Cost Effectiveness, Responsiveness, Perceived Value, Brand Perception, Easy to Use, Contact Facilities, Convenience and Compensation facilities in e-banking services.

ANNEXURE-I

| SERVICE QUALITY DIMENSIONS USED IN EBANKQUAL ||
Dimension	Description
1. System Availability	Up-to-date equipment and physical facilities- Full Branch computerization, Core banking, ATM, POS, internet banking, mobile banking, SMS alerts, credit card, EFT, ECS, E-bill pay
2. E-Fulfillment	Scope of services offered, availability of global network, digitalization of business information, Variety of services
3. Accuracy	Error free e-services through e-banking channels
4. Efficiency	Speed of service (clearing, depositing, enquiry, getting information, money transfer, response etc.), immediate and quick transaction and check out with minimal time.
5. Security	Trust, privacy, believability, truthfulness, and security, building customer confidence. freedom from danger about money losses, fraud, PIN, password theft; hacking etc.
6. Responsiveness	Problem handling, recovery of the problem, prompt service, timeliness service, helping nature, employee curtsey , recovery of PIN, password and money losses
7. Easy to use	Easy to use & functioning of ATM, Mobile banking, internet banking, credit card, debit card etc.
8. Convenience	Customized services, any ware and any time banking, appropriate language support, time saving
9. Cost Effectiveness	Price, fee, charges, - i.e. commission for fund transfer , interest rate, clearing charges, bill collection and payments', transaction charges, charges on Switching of ATM, processing fees etc.etc price, charges and commissions should be reduce and charges taken by Telecommunication Company, devise designer company, internet service providers
10. Problem Handling	It refers to problem solving process regarding computerized banking services
11. Compensation	It refers to recover the losses regarding to problems and inconvenience occurred in using e-banking channels.
12. Contact	Communication in bank and customer or customers to bank, Via e-mail, SMS, Phone, interactive website, postal communication, fax

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