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STRUCTURAL EQUATION MODELING (SEM) BASED ANALYSIS WAS PERFORMED USING AMOS 20 SOFTWARE

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ABSTRACT

Structural equation modeling (SEM) based analysis was performed using AMOS 20 software. Maximum likelihood (ML) estimation method was preferred, as it is considered to be quite a robust method for estimating parameters (Jain & Jain, 2015). However, ML method requires the data to be multivariate normal. Though all the indicators used in the study were found univariately normal, with their skewness and kurtosis coefficients being less than the prescribed limit of 3 and 8, respectively (Kline, 1998); the data failed to confirm to multivariate normal distribution assumption. Mardia‟s coefficient for both the data samples was found to be greater than the prescribed limit of 5.0 (Byrne, 2010). As recommended in the literature, the bootstrapping method was used for assessing the robustness of the ML method-based estimates. The bootstrapping process revealed almost negligible or marginal bias present with the ML method-based parameter estimates arrived in the study. Hence, ML method has been employed in the study. This is in line with the method followed by Jain and Jain (2015).

KEYWORD: Structural Equation, Amos 20 Software, ML Method, E-Service Quality

INTRODUCTION

Analysis of e-service quality and its dimensions

E-service quality has been posited as a multidimensional concept in the services marketing literature (Parasuraman et al., 2005). As a multidimensional concept, it is viewed as comprising of various dimensions that the consumers take into account while evaluating e-service quality. An analysis of service quality dimensions is important to the service firms because it can help them identifying attributes that consumers consider important in selecting service providers and evaluating quality of services to the consumers (Jain & Jain, 2015). EFA and CFA analysis were performed to assess the validity and reliability of the constructs with respect to dimensions of e-service quality.

Exploratory Factor Analysis (EFA)

A principal component analysis (PCA) was conducted using varimax with the Kaiser normalization rotation procedure extracting factors with an eigen value above 1.0. Initial data analysis included a principal components analysis, first, on each of the independent variables (Web site design, system availability, efficiency, information quality, privacy/security, fulfillment and emotional benefits) and then all the independent variables taken together.

To ensure the adequacy of the sample size as well as the appropriateness of the EFA, both the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett‟s test of sphericity were performed. Kaiser-Meyer-Olkin measure of sampling adequacy value is .867 exceeding the

recommended level of .60 (Tabachnick & Fidell, 2001). In addition, the Bartlett‟s test of sphericity was 5763.545 ($p < .01$), suggesting that data were fit for factor analysis.

Table KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO)		0.867
Bartlett's Test of Sphericity	Approx. Chi-Square	5763.545
	df	325
	Sig.	0.000

The number of items to be retained was decided using the significance of factor loadings. The criterion for the significance of factor loadings was the absolute value of 0.50. Also, items with cross loading of 0.5 or more were eliminated (Hair et al., 2010). However, in cases where cross loadings were lower than 0.5 but very close to the main loading, even such items were dropped.

Confirmatory Factor Analysis (CFA)

To cross-check the validity of the 26-items extended scale identified above through EFA analysis (F, CFA was performed. As compared to EFA, CFA is considered to be a far more rigorous method for validating multi-item scales. In addition to the „26-item six factor model‟ as hinted above by the EFA analysis, few more models were tested:

- 26-item null model assuming no relationships among 26 items
- 26-item one factor model hypothesizing all the constituent items to be loading on a single factor
- 22-item original E-S-Qual Model as proposed by Parasuraman et al. (2005)
- 30-item seven factor model (as proposed in the Research Model of the study)
- 26-item six factor model (after removing information quality as hinted by EFA)

All the alternate models are found poorly fitting the data. While $\chi 2$ value for the given sample is significant, $\chi 2/df$ ratio is found to be above 3.0. GFI, CFI and TLI indices too are lower than the recommended level of 0.90.

Since the model fit for 26-item six factor model was still poor, the model was further subjected to a series of CFA analyses. A search was made for poorly fitting scale items, and these items were iteratively dropped from the analysis. Decision to drop the items was based on the magnitude of the residual covariances, squared multiple correlations and factor loadings. In total, nine items were dropped from the analysis. Provides a graphical view of the seventeen items retained in the study. No doubt, the results reveal the “17-item scale” to be providing relatively a better fit than the “26-item scale” model. However, the results still show a moderately acceptable model-fit thus, modification indices (MI) were used to improve the model fit. MIs were examined, this suggested some changes in the model. Where MI was high for the items of a given construct, we allow correlation among errors variances. Generally, we should not allow to covary error terms with

observed or latent variables, or with other error terms that are not part of the same factor. Thus, the most appropriate modification available to us is to covary error terms that are part of the same factor.

All the manifest variables are found significantly and substantially loading on their respective latent constructs. The factor loadings for all items are higher than 0.60. Composite reliability indices values too are well above their prescribed levels, namely 0.60 (Fornell & Larker, 1981; Bagozzi & Yi, 1988), thus indicating high reliability of all the scales. All average variances extracted (AVEs) are greater than 0.50 (Fornell & Larker, 1981; Hair et al., 2009), thus providing evidence for convergent validity for all constructs. The Cronbach alpha values for all the latent constructs are greater than the 0.70 threshold level (Nunnally & Bernstein, 1994; Hair et al., 2009). As the squared correlation value for none of the pairs of constructs exceeds their corresponding AVE value, six dimensions appear discriminant valid.

One of the important objectives of the present study was to analyze relationship between e-service quality and its dimensions in Indian retail banking context. For this, seven hypotheses (H1 to H7) were developed relating to each of the dimensions of the proposed model. However, one dimension (information quality) was dropped at the stage of EFA analysis, therefore, the study has analyzed remaining six hypotheses relating to six dimensions, namely, Web site design (H1), system availability (H2), efficiency (H3), privacy/security (H5), fulfillment (H6) and emotional benefits (H7).

The relative importance of each of the dimensions can be assessed with the help of standardized - coefficients. All the dimensions are found to be significant and positively affecting e-SQ (see Table 5.11). The higher the -coefficient, more is the contribution of dimension in explaining e-SQ. The results indicate that e-SQ is influenced by all the six dimensions with efficiency (=0.962, p≤0.000) as the most important dimension and privacy (=0.524, p≤0.000) being the least important. Other dimensions are also found to be important and significant: fulfillment (=0.668, p≤0.000), system availability (=0.710, p≤0.000), Web site design (=0.668, p≤0.000) and emotional benefits (=0.612, p≤0.000). Thus, all the hypotheses (H1, H2, H3, H5, H6, H7) related to dimensions are supported.

CONCLUSION

The collected data were then analyzed with the help of various statistical tools and techniques, including item-to-total correlations, Cronbach‟s alpha coefficients, exploratory factor analysis (EFA) and correlation coefficients. In addition to EFA, confirmatory factor analysis (CFA) and structural path analysis were also performed to test the validity of the multi-item scales. The hypotheses were tested using structural equation modeling (SEM). Further, to examine the relationship of e-SQ dimensions with customer satisfaction, perceived value, revisiting intentions and word-of-mouth, multiple regression analysis approach (as suggested by Parasuraman et.al. 2005) was taken up. The results have supported the hypotheses.

Findings

The results indicate that e-service quality, consisting of six dimensions, has appropriate reliability and each dimension has a significant relationship with e-service quality in Indian banking context. The results of the study also indicate that out of seven identified dimensions, viz., Web site design, system availability, efficiency, information quality, privacy/security, fulfillment and emotional benefits, six dimensions were found significant dimensions of e-service quality construct. One dimension, i.e., information quality, was dropped during EFA due to cross loading of all its items with other dimensions. The results also confirm that all the six dimensions (Web site design, efficiency,

system availability, privacy/security, fulfillment and emotional benefits) are distinct constructs. Therefore, in order to maintain a high level of e-service quality, banks should pay attention to all six dimensions identified in the study. In this study, efficiency is found to be most important dimension affecting e-service quality, followed by fulfillment, system availability, Web site design, emotional benefits and privacy/security, respectively. This finding is consistent with Herington and Weaven (2009) and Sohail and Shaikh (2008) findings who stated that efficiency of website is the most influencing factor in user‟s evaluation of internet banking service quality. Efficiency and fulfillment are the most critical, and equally important, facets of e-service quality. Of the four E-S- QUAL dimensions, customers‟ assessments of a Web site on these two dimensions (efficiency and fulfillment) have the strongest influence not only on overall quality perceptions but also on perceived value and loyalty intentions (Parasuraman et. al., 2005). The consistency of these results underscores the need for companies to place extra emphasis on Web site attributes pertaining to these two dimensions**.**

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