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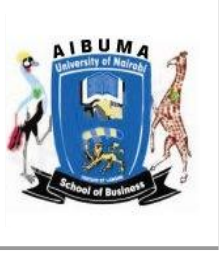

AN ASSESSMENT OF THE RELIABILITY, VALIDITY AND DIMENSIONALITY OF WEB BASED LIBRARY SERVICE QUALITY SCALE IN A DEVELOPING COUNTRY

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ABSTRACT

This study focusses on assessing the reliability, validity and dimensionality of a Web based Library service quality scale. It also investigates the perception of the library users towards the Web based services provided by the private university library. This research used the survey method for collecting data from users of the library. The Web based library service quality was measured by using a scale developed by Kiran and Diljit in 2012, originally with 25 items. A total of 600 questionnaires were distributed and 447 completed questionnaires were used in the final analysis. Cronbach's Alpha values of each construct confirmed that a good reliability existed with the data. Principle component analysis was employed to determine the important factors of the scale. Out of the 25 items, only 21 were found to satisfy requirements for testing reliability and validity. As a result, a modified scale was adopted for further analysis. Four Web based library service quality components were identified through exploratory and confirmatory factor analysis. The four included: access quality, delivery quality, functional quality and responsiveness quality. A structural equation model was developed showing the relationships between the four components and web based library service quality and all the four were significant.

Keywords: *Web-based Library Service Quality; Scale Validation; Developing Country; Kenya*

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Introduction

Libraries have become core in the delivery of quality education and research especially in the high education sector. The role of libraries have changed including their performance assessment methodologies. While libraries traditionally used their physical structures, number of books available, number of users and spaces as some of the indicators of quality, the modern libraries have embraced technology in service delivery. Advances in technology have made it possible for libraries to reach their users and give required academic and research support without necessarily coming to the physical building (Borgman, 2010). According to Kroll and Forsman (2010) academic libraries play important roles in supporting research by providing discipline-based tools, customized services, and user-centered services. Research has also found out that there exists a relationship between the quality of library services, enrollment and retention as well as the quality and amount of research outputs.

Library users want to access services from wherever they are and at their convenient time. The nature of the users today is that they could be busy executives who want to spend little time in accessing and acquiring support services from a library. Cullen (2001) state that for libraries to survive, they must improve the quality of their services. It is therefore imperative for libraries to focus on the quality service delivery by understanding the users' expectations and how they assess service quality. Service quality assessment frameworks have been developed for different service environments. Competition in the higher education sector is growing aided by globalization. Universities are now having students based in different parts of the world. The challenge becomes how to seamlessly deliver services to off-campus students and even those on campus that do not want to visit the library.

As a response to the global and competitive challenges and based on the unique needs of users, needless to say, Web-based services become critical. Libraries have invested in Web-based platforms and infrastructure to deliver library services to users. Such Web-based resources include electronic resources and databases offering e-journals, e-books, helpdesk services, online document delivery, catalogue search among others. Due to the lack of physical interaction, it therefore becomes imperative to assess whether the Web-based services meet the expectations of the user based on their needs.

Literature Review

Service Quality

Over the years, scholars have attempted to define quality leading to a multiple of definitions and perspectives. The definitions have differed based on the context, perspectives and orientations of the person defining it (Wicks and Roethlein, 2009). From manufacturing to services, the definitions have differed and therefore no universally acceptable definition. In the the manufacturing sector, quality has been defined as product performance that meets or conforms to the requirements of the user or manufacturer (Juran, 1985; Gitlow et al., 1989; Cosby, 1979). In the service sector, the quality of service is described as the extent to which a service meets customers' needs or expectations (Parasuraman et al., 1985). The author deduces that service quality is the difference between customer expectations (state before service consumption) and perceived service (evaluation after consumption). When expectations are greater than performance, a customer perceives quality as not meeting their requirements and thus feels

dissatisfaction (Parasuraman & Zeithaml, 2006).

The field of service quality has received a lot of discussion in the past. Most of the interest has focused on the dimensionality of service quality and the measurement of service quality and in specific the relevant scale/tools to do so. Service quality can be seen as an attitude about the superiority of a service. Some suggest that it stems from a comparison of expectations with performance perceptions (disconfirmation) (Parasuraman, Zeithaml & Berry, 1988), while others argue that it is derived from a comparison of performance with ideal standards (Teas, 1993) or from perceptions of performance alone (Cronin & Taylor, 1992). This is made evident by the variety of models for service quality measurement in the service literature.

In pursuit to demystifying service quality, many scholars have identified varying dimensions of service quality. Initial dimensionality studies identified that service quality can be decomposed into two major dimensions (Lehtinen & Lehtinen, 1982). The first dimension is concerned with what the service delivers and is referred to by Parasuraman et al. (1985) as "outcome quality" and by Grönroos (1984) as "technical quality". The second dimension is concerned with how the service is delivered: the process that the customer went through to get to the outcome of the service. Parasuraman et al. (1985) refer to this as "process quality" while Grönroos (1984) calls it "functional quality".

Parasuraman et al. (1985) developed a model to measure service quality (SERVQUAL) which had 10 dimensions including; tangibles, reliability, responsiveness, communication, credibility, security, competence, courtesy, understanding the customer, and access. In further analysis, the 10 dimensions were reduced to five and they included, Tangibles - physical facilities, equipment, and staff appearance; Reliability - ability to perform the promised service dependably and accurately; Responsiveness - willingness to help customers and provide prompt service; Assurance - knowledge and courtesy of employees and their ability to inspire trust and confidence; and, Empathy - caring, individual attention the firm provides its customers.

There has been much criticism in the literature of the theoretical and operational issues of the use of disconfirmation theory in measuring service quality (Kiran & Diljit, 2012). SERVQUAL and its related variant scales were developed on the disconfirmation theory. Parasuraman, Zeithaml, and Berry (1988) adopted the disconfirmation theory to justify that service quality was a measure of how well the service level delivered matched customers' expectations. According to Kiran and Diljit (2012) and Cronin and Taylor (1992) some major objections relate to predictive power of the instrument, validity of the five-dimension structure, and length of the questionnaire. A substantial amount of research has been published in the area of service quality and its measurement. However, much of this research has focused on the development of generic service quality models as opposed to context-specific service quality measurement models (Dagger, Sweeney and & Johnson, 2007).

Library Service Quality

Initial measurements of library service quality was based on the SERVQUAL methodology developed by Parasuraman et al. (1988) despite the fact that it did not focus on nonprofit sectors such as academic libraries (Rehman, Kyrillidou & Hameed, 2014). The SERVQUAL went through several modifications to fit into the library sector. However, the same was still found not to adequately address the sector specific issues since libraries

function differently from business entities (Cook & Heath, 2001; Quinn, 1997). The psychometric properties of the SERVQUAL scale have been the subject of considerable research especially due to its disconfirmatory approach to measuring of service quality leading to Cronin & Taylor (1992) developing the SERVPERF scale by dropping the expectations and measuring service quality perceptions just by evaluating the customer's overall feeling towards the service. Despite the change, the SERVPERF was also found not to adequately address the nonprofit service sectors such as academic libraries.

Due to the shortcomings of the SERVQUAL scale, the Association of Research Libraries (ARL) in collaboration with faculty members at the Texas A&M University developed a focused tool to measure library service quality called LibQUAL. The LibQUAL was informed by the dimensions of services in SERVQUAL (Tangibles, Reliability, Responsiveness, Assurance, and Empathy) in addition to other new dimensions appropriate in measuring the level of service quality in libraries (Cook, 2001). This was because the use of SERVQUAL in the academic sector was not able to provide the theoretical five dimensions of services (Thompson, Cook, & Heath, 2001). The LibQUAL instrument measures library service quality through 22 core questions on three dimensions: "affect of service", "information control" and "library as place" (Rehman et al., 2014). According to Thompson, Kyrillidou, & Cook (2008), the 22 questions represent: affect of Service (9 items); information Control (8 items); and, library as Place (5 items).

Although LibQUAL has been used to collect data from more than 1.5 million library users from more than 1,200 institutions in about 26 different countries (Rehman et al., 2014), there has been criticisms as the scale was developed, tested and validated in the United States of America whose context differ from most other parts of the world. In order to have global application, the tool may require modifications as library services development may be dependent on the level of a country's economic growth.

Web Based Library Service Quality

Web based services are services delivered and consumed in a networked environment (Kiran & Diljit, 2012). It is largely focused on services provided over the internet or services that are delivered through information and communication technology platforms and networks that provide an interaction and interface with service consumers (Rust & Lemon, 2001; Fassnacht & Koese, 2006).

According to Kiran and Diljit (2012), initially, library services focused so much on reference materials and information desk support services, user training, interlibrary loan, and library holding search services. Library services have evolved over the years from the use of the collection size to measuring quality based on the perception of the users. This has been as a result of the development and evolvement of library services as being core to any academic institutions especially universities. The library services are core in developing and sustaining a research culture of a university. Not to be left behind, university libraries have adopted technology in ensuring that appropriate services are delivered to their students. Many newer technologically based services have been introduced to aid in the delivery of existing services and even for entirely new library services (Kiran & Diljit, 2012; Poll, 2005).

The dispersion and reach of universities has ensured that they integrate web based services to reach their widely distributed users and offer convenient access beyond the operating hours of a physical library. The growth of electronic resources and

databases offering e-journals, e-books, helpdesk services, online document delivery (Kiran & Diljit, 2012) as well as other reference materials has driven universities to adopt technological platforms to avail their student's access and supportive infrastructure and services to consume these products.

As the growth in these services increase, it has become paramount for the universities to focus on the quality of the web based services they offer. In this regard, various measurement mechanisms have been adopted. Most of the measurement mechanisms have been a derivation from the existing service quality measurement tools. Initially, library service quality was measured by use of tools such as SERVQUAL. However, in many studies to test the validity and reliability of SERVQUAL, the same was found not to be fit for use in measuring library service quality. This was due to the uniqueness and non-profit nature of library services in contrast to for profit environment of which SERVQUAL was designed for. The shortcomings of SERVQUAL in a library environment is what initially led to the development of LibQual (Rehman et al., 2014). Even with sector specific tools like LibQual, the same does not cover web based services and thus there was a need to develop a tool that focuses on the uniqueness of electronic based services in the library.

Despite the fact that there were tools developed to measure electronic based services, these did not fit the library environment (Kiran & Diljit, 2012). According to Kiran and Diljit, various authors have developed scales and studied online or website quality in various sectors including online retailing, online banking, online travel agencies services and eTax. In regards to the Library information services, previous studies have also been done on library Website quality, digital library quality and library e-service quality. All these studies developed their measurement scales based on the disconfirmation theory of SERVQUAL.

Based on the criticism of the SERVQUAL approach and its variants, Kiran and Diljit (2012) focused on identifying the dimensions of library web-based service quality and developed a corresponding measurement scale. In their research, Kiran and Diljit modelled Web-based library service quality and through a scale development process concluded that there were three dimensions and about 8 sub dimensions defining library Web-based service quality. The three dimensions in their model included: Environment quality, delivery quality and outcome quality. Under Environment Quality, two sub dimensions emerged including Access & Collection and Equipment. In terms of delivery quality, the sub dimensions were customer relationship, personalization and customer support. For the outcome quality, the three sub dimensions that came out included reliability, functional benefits and emotional benefit.

The Kiran and Diljit study was conducted in Asia which has a totally different environment to Kenya. It has been recommended by various authors that before using a tool developed in a different environment, the same should be tested for reliability and validity. This is more critical when the tool has some dimensionality. In different scale studies, the dimensionality of a measurement scale has been found to be different in differing test situations. It was therefore imperative for this study to test the dimensionality of library web-based service quality and identify the perception of library users on the quality provided. Therefore, this study was focused on addressing the following objectives:

- To identify the psychometric properties of the Web-based library

service quality scale applicable to libraries in Kenya.

- To determine the critical dimensions of perceived Web-based library service quality dimensions
- To determine the level of perceived Web-based library service quality

Methodology

The sample for this study was drawn from students at the United States International University -Africa. In order to qualify, only students who had been at the university for more than two semesters were targeted. This was due to the need to have responses from students who had a prior interaction with library services and in particular web based services. For the purpose of this study, a structured questionnaire with two parts was developed to collect primary data. Part one collected demographic data while part two collected data on web based library quality. Part two was an adaptation of the scale developed by Kiran and Diljit (2012) which was used as the measurement instrument for web based library quality. Though the adopted tool comprised of 25 items, this study used 21 items as preliminary testing of the tool found four items with low reliabilities.

Sample Demographic Profile

Altogether, 600 questionnaires were distributed with 447 returned representing a response rate of 75%. From the responses, 48% of the respondents were males while 52% were females. In terms of the distribution of the respondent's age, 9.8% were below 20 years; 72.5% between 20 – 30 years; 14.8% between 31 – 40 years; and, 2.9% over 40 years. Other sample demographic profiles are as presented in the table below.

Table 1: Sample Demographic Profile

Demographic data	Categories	Percent
Gender	Male	47.9
	Female	52.1
Student Status	Graduate	40.0
	Under Graduate	60.0
Age Category	Below 20 Years	9.8
	20 - 30 Years	72.5
	31 - 40 Years	14.8
	Over 40 Years	2.9

Analysis and Results

Reliability

The scale's internal consistency was tested by using reliability analysis with Cronbach's alpha. Reliability refers to the assessment of the degree of consistency between multiple measurements of a given construct (Hair, Anderson, Tatham, & Black, 1998). The Cronbach alpha for the variables used to construct the scales was 0.955. A Cronbach alpha of 0.70 is considered acceptable (Nunnally, 1978; Hatcher, 1994).

The adequacy and suitability of the sample for factor analysis was checked using the

Kaiser-Meyer-Olkin (KMO) measure. The test measures sampling adequacy for each variable in the model and for the complete model. KMO returns values between 0 and 1 and as a rule of thumb KMO values between 0.8 and 1 indicate that the sampling is adequate, even though Field (2009) recommends that the KMO statistic should be at least 0.50. In this study KMO test was 0.929 fulfilling the requirements for adequacy of data for factor analysis.

The Bartlett's test **of sphericity** was also used. It tests if a sample is from a population with equal variances (homoscedasticity or homogeneity of variances). It is also used to verify the assumption that variances are equal across groups or samples before undertaking an analysis (Snedecor & Cochran, 1989). For factor analysis to be recommended, the Bartlett's test of sphericity must be less than 0.05. In this study, data were suitable for performing EFA as indicated by the Bartlett's test of sphericity yielding significance ($p < 0.001$, Approximate Chi-square of 4,691.03, with 153 degrees of freedom).

Dimensionality

In order to examine the dimensionality of the scale construct, exploratory factor analysis was undertaken. Factor analysis helps in an orderly simplification of interrelated measures by exploring the possible underlying structure of a set of interrelated variables without imposing any preconceived structure on the outcome (Child, 1990). By performing exploratory factor analysis (EFA), the number of constructs and the underlying factor structure were identified.

Four factors emerged after satisfying the two required tests including the Kaiser criterion (eigenvalues greater than 1) and a scree plot. These four factors accounted for 68.5% of the total variance. In identifying the items loading on each component, 4 items were found not to satisfy the requirements for inclusion as their factor loadings were below the recommended 0.5. The items were omitted. Based on the items, some suggested themes arise. Factor 1 had items related to issues of service access. This factor was named "Access Quality". Factor 2 items related more to the issues of service delivery. This factor was as such named "Delivery Quality". Factor 3 items were more about caring of the customer. This factor was named "Responsiveness Quality". The final items were more inherently within the users of the web based library services. This factor was named as "Functional Quality" The table below provides the various items and their factor loadings.

Table 2: Factor Analysis Component Loadings

Item	Statement	Factors			
		1	2	3	4
A1	The Library Web site is easy to use				
A2	The Library Web site has links that are all working	.848			
A3	The Library Web site is convenient to access	.818			
A4	The Library Web site is always available from outside the campus	.692			
A5	There is a menu that helps me quickly understand how content is arranged	.504			
B1	Using Library Web-based services, I can easily get what I am looking for most of the time		.843		
B2	Using Library Web-based services, I can get the information I am looking for in minimal time and effort		.824		
B3	Using Library Web-based services, I can get the exact information I'm looking for		.885		
B4	I feel very happy when I get what I want from the Library Web-based services		.773		
B5	The Library Web-based services have innovative features that are interesting to use		.632		
B6	Using Library Web-based services makes me feel the library is truly dedicated to fulfilling my needs		.759		
C1	Online librarians interact with me in a courteous manner			.812	
C2	Online librarians are always willing to help me			.873	
C3	Online librarians understand my specific information needs				.676
C4	The Library website allows me the convenience of sending a query/comment online				.653
C5	The service promptly responds to my online complaints and suggestions				.861
C6	I can renew my books online with ease				.755
C7	The library sends reminder alerts when my books are overdue				.838

Extraction Method: Principal Component Analysis; Rotation Method: Promax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

In their research, Kiran and Diljit modelled Web-based library service quality and through a scale development process concluded that there were three dimensions and about 8 sub dimensions defining Web-based service quality. The three dimensions of their model included: Environment quality, delivery quality and outcome quality. Under Environment Quality, two sub dimensions emerged

including Access & Collection and Equipment. In terms of delivery quality the sub dimensions were customer relationship, personalization and customer support. For the outcome quality, the three sub dimensions that came out included reliability, functional benefits and emotional benefit.

Assessing Validity of Scale Measures

The scale's construct validity was tested by employing confirmatory factor analysis (CFA) which was performed using the structural equation modeling (SEM). CFA in structural equations modeling generate measures of overall fit of a given measurement model and provides useful information indicating how well convergent and discriminant validity are achieved (Hooper, Coughlan & Mullen, 2008; Karakaya - Ozyer & Aksu-Dunya, 2018).

After EFA, it has been recommended that scale validity is undertaken and specifically construct validity. Confirmatory Factor Analysis (CFA) is used to test the discriminant and convergent validity of factors. The CFA analysis was undertaken using SPSS AMOS software. According to Campbell and Fiske (1959), in order to assess the construct validity of a test, one has to consider convergent validity (the degree of confidence that a trait is measured by its indicators) and discriminant validity (the degree to which measures of different traits are unrelated). In SEM, CFA is assesses construct validity (Jöreskog, 1969).

Convergent Validity

Fornell and Larcker (1981) developed a criteria to assess the degree of shared variance between the latent variables of the model. They state that convergent validity of the model is assessed by the Average Variance Extracted (AVE) and Composite Reliability (CR). AVE measures the "level of variance captured by a construct versus the level due to measurement error". Values above 0.7 are considered very good even though some authors have said the level of 0.5 is also acceptable. To evaluate convergent validity, the AVE for each construct was evaluated against its correlation with the other constructs. Where AVE is larger than the construct's correlation with other constructs, then convergent validity is considered to be confirmed (Gefen et al., 2000).

Based on the test of the scale, the following AVE scores were obtained: 0.60 (Access quality), 0.61 (Delivery quality), 0.57 (Functional quality), and 0.80 (Responsiveness quality). All the loadings were significant. On the other hand, all the factors recorded a CR of above 0.7. These results indicate that the scale had achieved convergent validity.

Table 3: Convergent and Discriminant Validity Measures

Factors	CR	AVE	MSV
Access quality	0.834	0.602	0.542
Delivery quality	0.902	0.605	0.542
Functional Quality	0.870	0.574	0.457
Responsiveness Quality	0.887	0.797	0.457

Discriminant Validity

Discriminant validity measures the extent to which factors are distinct and uncorrelated. The rule is that variables should relate more strongly to their own factor than to another factor. According to Fornell and Larcker (1981), discriminant validity can be assessed by comparing the "amount of the variance capture by the construct (AVE)" and the "shared variance with other constructs (maximum shared variance – MSV)". Fornell and Larcker suggest that discriminant validity is established if a latent variable accounts for more variance in its associated indicator variables than it shares with other constructs in the same model. To satisfy this requirement, each construct's average variance extracted (AVE) must be compared with its squared correlations with other constructs in the model (Henseler, Ringle & Sarstedt, 2015).

According to Hair et al. (2010), discriminant validity is established where MSV is lower than the AVE for all the constructs. In the testing the scale, and as indicated in the table below, all the 4 factors MSV were lower than the AVE and thus achieving the required thresholds for discriminant validity. On the other hand, as indicated in the Table 4 and Figure 1 below, all the 4 factors were significantly correlated at $p< 0.05$ level.

Table 4: Discriminant Validity – Correlation Matrix

Factors	Access quality	Delivery quality	Functional quality	Responsiveness quality
Access quality	**0.776**			
Delivery quality	0.736*	**0.778**		
Functional quality	0.570*	0.631*	**0.757**	
Responsiveness quality	0.506*	0.622*	0.676*	**0.893**

* $p< 0.05$

The correlation between delivery quality and access quality was estimated at 0.74; while that of Functional quality and access quality was 0.57; that of responsiveness and access quality was 0.51; between functional quality and delivery quality was 0.63; between responsiveness and delivery quality was 0.62; between responsiveness and functional quality was 0.68. All were significant at $p < 0.001$.

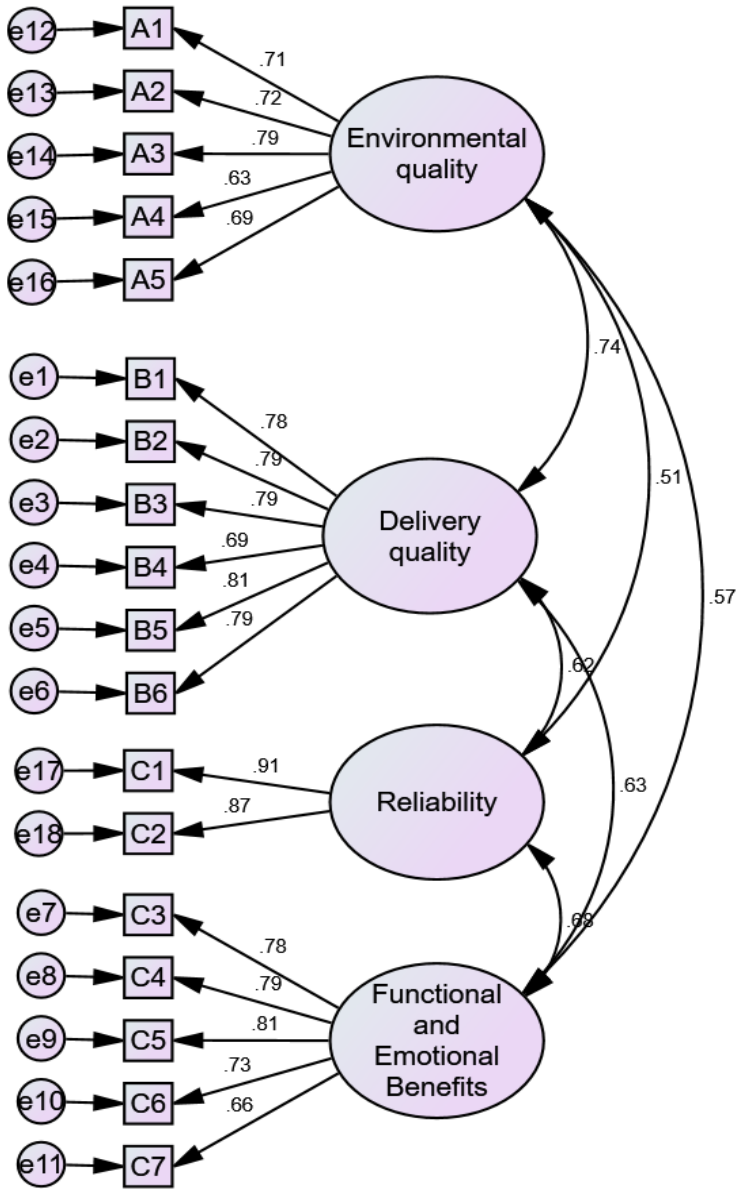

Figure 1: First Order Web Based Library Service Quality CFA Path Analysis

The scale was also subjected to SEM. Under this, various fit indices were used to test the model fit. The chi-square, degrees of freedom, the root mean square error of approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), comparative fit index (CFI) are measures recommended to be used (Kline, 2010; Hair et al., 2010). Hair et al. posits that there is no absolute value for the various fit indices to suggest a good fit. In this study, all the model fit indices were attained as explained below and provided in Table 5 below.

The Chi-Square ($\chi 2$) value is the traditional measure for evaluating overall model fit (Hooper et al., 2008) and assesses the magnitude of discrepancy between the sample and fitted covariances matrices' (Hu & Bentler, 1999). A good model fit provides an insignificant result at a 0.05 threshold (Barrett, 2007). In assessing goodness of fit, the ratio of chi-square to degree of freedom ($\chi 2$/df) is used. According to Hooper et al. (2008), $\chi 2$/df should be less than 3 to indicate acceptable fit (Schreider, 2008). In this study, $\chi 2$/df was 3.276 indicating an acceptable fit for this model as it was around 3.

RMSEA has been regarded as one of the most informative fit indices by various scholars (Diamantopoulos & Siguaw, 2000) due to its sensitivity to the number of estimated parameters in the model. Recommendations for RMSEA cut-off points have been reduced considerably in the recent past (Hooper et al., 2008). For the RMSEA, MacCallum, Browne, and Sugawara (1996) suggest that a RMSEA value of between 0.00 and 0.05 indicates a close model fit, a value of between 0.05 and 0.08 a reasonable fit, and a value of more than 0.08 a poor model fit. A cut-off value close to .06 (Hu & Bentler, 1999) or a stringent upper limit of 0.07 seems to be the general consensus amongst authorities in this area (Hooper et al., 2008). In the current study a RMSEA of 0.071 was achieved indicating a reasonable model fit.

Standardized Root Mean Square Residual (SRMR) is an index of the average of standardized residuals between the observed and the hypothesized covariance matrices (Chen, 2007). For SRMR, values that range between zero to 1.0 are acceptable and considered to be well fitting to the model though if values are lower than 0.05, the model is considered to excellent (Kline, 2011; Hu & Bentler, 1999; Diamantopoulos & Siguaw, 2000). SRMR index is preferred in most studies due to its relative independence from sample size (Chen, 2007). The SRMR for this study was .05 indicating an excellent model fit.

The Comparative Fit Index (CFI) is an index which takes into account sample size (Byrne, 1998) and performs well even when sample size is small (Tabachnick & Fidell, 2007). It assumes that all latent variables are uncorrelated and compares the sample covariance matrix with this null model (Hooper et al., 2008). Its values range between 0.0 and 1.0 with values closer to 1.0 indicating good fit (Hooper et al., 2008). The CFI of this study was .936 indicating a good model fit.

Table 5: Goodness of Fit Indices – CFA First Order

Measurement	**Index**	**Threshold**	**Interpretation**
Chi- square ($\chi 2$)	422.656	-	-
Degree of freedom	129	-	-
$\chi 2$/df	3.276	Between 1 and 3	Acceptable
RMSEA	.071	<0.06	Acceptable
SRMR	.053	<0.08	Excellent
CFI	.936	>0.95	Acceptable

Second order CFA

A second order CFA model was developed. From the analysis, it was clear that whereas the issues in access quality and delivery quality were clear, the other two factors of responsiveness and functional quality were sub elements of another factor. The two elements were more aligned to the expectations of service delivery and were named as outcome quality.

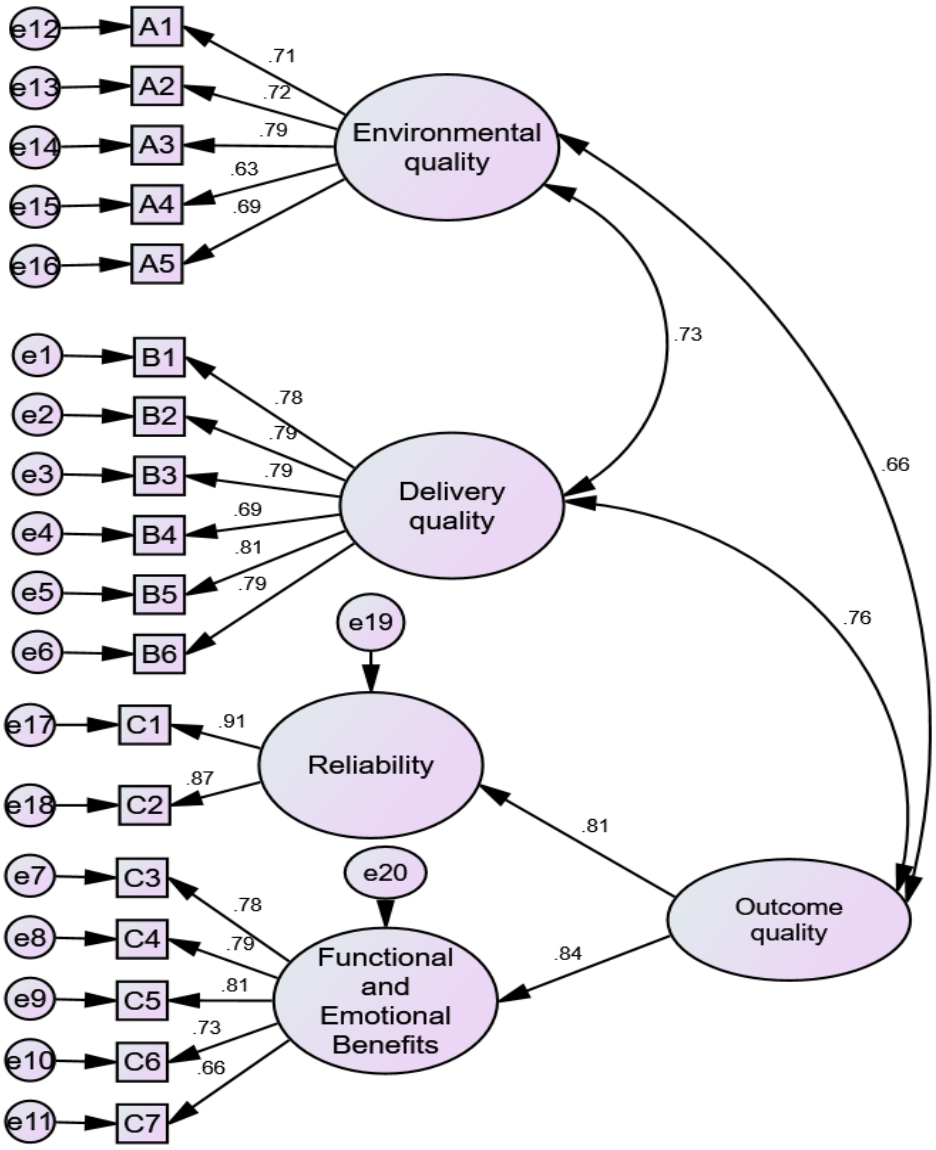

Figure 2: Second Order Web Based Library Service Quality CFA Path Analysis

Model Fitness Assessment with Structural Equation Modelling

The scale was also subjected to Structural Equation Modelling (SEM). In the

analysis, in order to subject the model to fitness tests, descriptive statistics were computed to identify the normality of the Descriptive statistics for composite values

data. The tests found the data fit for SEM analysis as shown below.

Dimension	Mean	Std. Deviation	Skewness	Kurtosis
Web based service quality	4.3617	1.12448	-.483	-.251
Outcome quality	3.6985	0.96305	-.479	-.216
Responsiveness	4.7740	1.51416	-.560	-.385
Access quality	4.3254	1.21975	-.413	-.386
Functional quality	4.1980	1.20345	-.320	-.338
Delivery quality	4.6272	1.26494	-.492	-.262

Reliability Analysis for the variables

In terms of reliability, as shown in the Table below, all the Web-based library service quality elements were found to be

fit as they all had a Cronbach Alpha score above 0.7.

Variable order	Variable name	Number of items	Overall Cronbach's Alpha
First	Access quality	5	.831
First	Delivery quality	6	.901
First	Responsiveness	2	.866
First	Functional quality	5	.886
Second	Outcome quality	7	.883
Third	Web based service quality	18	.928

In order to test the fitness of the model, various fit indices were used. The indices were chi-square, degrees of freedom, RMSEA, SRMR and CFI as indicated in Table 7: Goodness of Fit Indices

the table below. All the fit indices achieved acceptable status and thus indicating model fitness.

Measurement	Index	Threshold	Interpretation
Chi- square ($\chi 2$)	424.648	-	-
Degree of freedom	130	-	-
$\chi 2$/df	3.267	Between 1 and 3	Acceptable
RMSEA	.071	<0.06	Acceptable
SRMR	.053	<0.08	Excellent
CFI	.936	>0.95	Acceptable

The model estimates were also considered. All item loadings were significant at $p < 0.001$. The critical ratios (CR) for each path exceeded the threshold values required. When the critical ratio (CR) is > 1.96 for a regression weight, that path is significant at the .05 level. The results show that Web based service quality has a significant and positive impact on Outcome quality, Access quality and Delivery quality. Outcome quality was positively related to Responsiveness and Functional quality as indicated in the table below. Based on the regression coefficients, an increase in outcome quality, access quality as well as delivery quality will have a corresponding change in web based service quality. The results of SEM analysis are presented in the table and figure below.

Table 8: The regression path coefficient and its significance

Path			**B**	**Beta**	**S.E.**	**C.R.**	**P**
Outcome quality	<---	Web based service quality	1.014	0.824	0.099	10.232	***
Responsiveness	<---	Outcome quality	1.2	0.806	0.101	11.837	***
Functional quality	<---	Outcome quality	0.833	0.84	0.07	11.837	***
Access quality	<---	Web based service quality	0.855	0.795	0.08	10.679	***
Delivery quality	<---	Web based service quality	1.17	0.924	0.11	10.679	***

Table 8 shows the effect of consumer ethnocentrism (main construct) on all sub-constructs are significant (p>0001).

Third order SEM

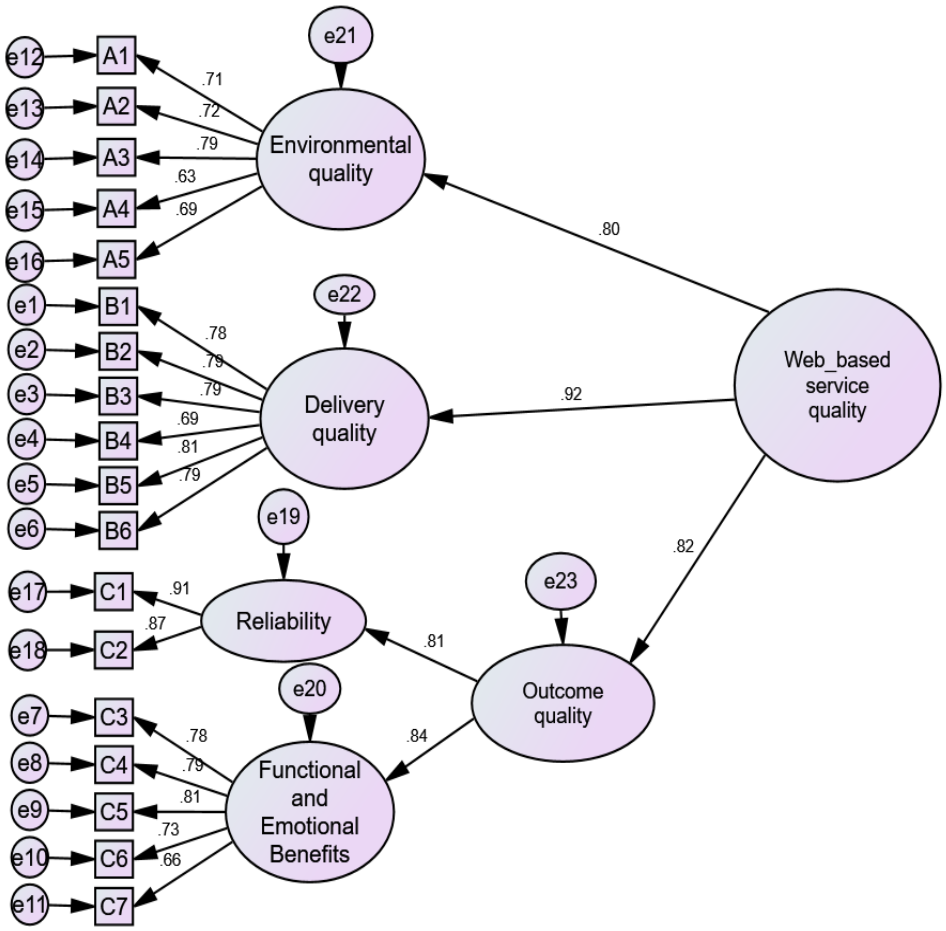

Figure 3: Web Based Library Service Quality SEM Path Analysis

Conclusions and Implications

This study was driven by three broad objectives; to evaluate the psychometric properties of the Web-based library service quality scale applicable to libraries in Kenya; to determine the critical dimensions of perceived Web-based library service quality dimensions in order to determine its applicability and dimensionality in Kenya; and, to determine the level of perceived Web-based library service quality.

On the first objective, the validity, reliability and dimensionality of the Web-based library service quality was investigated. In terms of validity, the adjusted tool was found to be valid as it fulfilled all the validity tests. Likewise with reliability, tests performed found the scale to be reliable.

The second objective focused on determining the dimensions of library Web-based service quality. For the dimensions, like the original study by Karin and Daljit (2012), web based library service quality was found to be multidimensional. The three dimensions that were identified included access quality, delivery quality and outcome quality. However, even though the current study found that the service quality had three dimensions, unlike Karin and Daljit, only one dimension (outcome quality) had some sub dimensions. In Karin and Daljit study, all the three dimensions identified of environmental quality, delivery quality

and outcome quality had two, three and three sub dimensions respectively.

In terms of the third objective, the users rated the overall web based library service quality as above average. However, in relation to the dimensions, delivery quality was rated higher than access quality. Outcome quality was rated as below average. The specific sub elements of the outcome quality were functional quality and responsiveness. From the specific issues under the two, it was evident that there was minimal interaction and engagement with the library staff through the web. Such interaction was the online assistance and helpdesk, response to queries online, ability to send queries and receive feedback, renewal of books online and even sending of overdue alerts. It can therefore be concluded that even though respondents rated service quality as above average, there were some areas that required improvement if the library was to ensure a high quality service delivery and satisfied web services users.

The findings from this study can inform both practice and policy. It also contributes to the body of knowledge especially in relation to the measurement of Web-based library services quality in a developing country. In terms of practice, libraries especially those in universities can learn from this study in their endeavor to integrate and use technology in service delivery.

Limitations

This study had several limitations. The study's scope was one private university library. The views therefore might not represent the other public and private universities. As such this might limit the generalization of the findings. The study also in measuring the level of web-based library services did not focus on any moderating variables that could provide different results such as the availability and reliability of internet which might affect access to library website. Notwithstanding the above limitations, the study contributes invariably to research in an under researched area in Africa. Other researchers could focus on undertaking such a study focusing on different universities, both public and private in order to develop a tool that can be used across the board. Research should also be conducted in other Eastern Africa countries. This would allow a better comparative analysis with those studies undertaken in Europe, Asia and North America.

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