Effect of Service Quality Dimensions on Students’ Satisfaction in Selected Chartered Universities in Kenya: A Multinomial Regression Application

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Abstract
The study sought to establish the effects of service quality dimensions on student satisfaction in selected chartered universities in Kenya. Service quality was measured under four dimensions: service tangibility, responsiveness, reliability, and accessibility on student satisfaction. A cross-sectional descriptive research design was employed. Sampling was conducted in two stages: stage one was the sampling of the universities which were units of analysis, while stage two was sampling students from the sampled universities. Primary data was collected from 400 respondents. Descriptive statistics, namely: cross-tabulations and frequency distributions were used to summarize the data, whereas inferential statistics were used to determine the relationship's magnitude and direction. Statistical Package for Social Sciences (SPSS) was used for data analysis. The study used the Multinomial Logistic Regression (MLR) Model. The results revealed that service tangibility and responsiveness were statistically significant among the four hypotheses tested on the main effect MLR model.

Keywords: service quality, satisfaction, students, multinomial regression

Introduction
Service quality refers to service delivery meeting and exceeding customer expectations, creating a competitive edge for the organization (Tegambwage, 2017). Service organizations have come to appreciate the importance of customer-centered philosophies and using service quality creates a difference and leads to success (Melaku, 2015). Today's competition in the business environment is stiff; therefore, organizations must deliver high-quality services, continuously evaluate, and focus on improving the current situation (Wijetunge, 2016). A study by Pathmini et al. (2019) indicates that service institutions rendering high-quality service achieve enormous success as they can satisfy customer needs. Service quality is significantly associated with customer satisfaction, which leads to positive word of mouth (Kazungu & Kubena, 2023).

According to Onditi and Wechuli (2017), service quality construct in higher education identifies many dimensions such as; competence of staff, reputation of the institution, delivery styles by tutors and lecturers, reliability, tangibles, responsiveness, sufficiency of resources, administrative services, and staff attitude support services among others. A study by Amoako & Asamoah-Gyimah (2020) investigated indicators of education service quality measurement of universities in Ghana and found that the indicators vary from one institution to another and concluded that researchers need to do more investigations on the quality dimensions that influence students’ satisfaction. Additionally, service quality is multi-dimensional construct requiring more exploration since findings from numerous studies have been inconclusive and inconsistent on the dimensions that significantly contribute to students’ satisfaction. This is because there has not been a consensus among authors on the dimensions or the best model that could be used to evaluate service quality in the universities, therefore the area requires more exploration (Onditi & Wechuli, 2017).

Review of the Related Literature
Service Tangibility
Tangibility encompasses the appearance of physical facilities, location, equipment, personnel, and communication materials (Paul et al., 2016). Concerning universities, tangibility includes the classroom environment, furniture, buildings, well-printed material, the appearance of the institution, and teaching equipment (Mwiya et al., 2017). Appearance is improved by making the environment serene and attractive, instilling professionalism and ethical practices among staff members, and promoting diversity in equipment and facilities (Raphael, 2014). According to Alkhami and Alarussi (2016), well-maintained physical facilities, available visually appealing teaching materials, and modern equipment may lead to a high score in the tangibles dimension for universities. Students' satisfaction depends on various aspects, including modern classroom facilities, computer...
students' satisfaction more so when they have a significant direct or indirect effect on the satisfaction and loyalty of private universities (Asma et al., 2018). As primary customers, students' satisfaction can be determined by academic and non-academic aspects and is crucial to any higher education institution (Mestrovic, 2017). Quality service in a university affects students' satisfaction and could result in referring potential students to the university even after completing their course (Iyoga & Lagat, 2019). Yarimoglu (2014) stated that tangible factors significantly affect students' satisfaction, as these factors create a sense of trust within the staff (Husain et al., 2022). The ability of staff to maintain student satisfaction in selected chartered universities in Kenya. Moreover, university buildings form students' initial perception of service quality.

Service Reliability

Reliability dispenses accurate, competent, and dependable services (Kubra & Orkun, 2017). According to Chege (2020), reliability indicators included providing services as promised, staff being sincere and dependable in handling service problems, performing service right the first time, and maintaining error-free records. In the university setting, the focus is satisfying students by ensuring accuracy in billing, proper record keeping, and performing designated academic and non-academic services at the designated time (Idrisu et al., 2015). Service reliability is among the five dimensions of the SERVQUAL model, considered the service industry's most dominant service quality dimension (Paposa et al., 2019). The ability of staff to maintain student information confidential, safe, and easy to retrieve when needed will create a sense of trust within the staff (Husain et al., 2022). Additionally, students expect skilled and experienced academic staff, transparency in the evaluation process, proper recording systems, and standard course content, thus increasing their satisfaction (Barua & Uddin, 2021).

Service Accessibility

The accessibility dimension relates to the ease of contact, friendly approachability, availability, and convenience (closeness in time and space) to getting to an institution for services (Randheer, 2015). According to Osman and Saputra (2019), accessibility means that customers can use the services provided by the organization. Approachability and ease of contact are essential elements of accessibility that can lead to increased customer satisfaction. Fonseca et al. (2010) stated that accessibility as one of the service image dimensions can have a significant direct or indirect effect on the satisfaction and loyalty of bank customers. Service accessibility influences customers' satisfaction more so when they can access an institution easily, on time and at a reasonable cost (Triono & Khalid, 2023).

Student Satisfaction

Student satisfaction is a student's total experience with academic and supporting elements of what the institution typically offers (Negricea et al., 2014). Student satisfaction is a key factor for the survival of any institution, including universities (Asma et al., 2018). As primary customers, students' satisfaction can be determined by academic and non-academic aspects and is crucial to any higher education institution (Mestrovic, 2017). Quality service in a university affects students' satisfaction and could result in referring potential students to the university even after completing their course (Iyoga & Lagat, 2019). Yarimoglu (2014) stated that tangible factors significantly affect students' satisfaction, as these factors create a sense of trust within the staff (Husain et al., 2022). The ability of staff to maintain student satisfaction in selected chartered universities in Kenya. Moreover, university buildings form students' initial perception of service quality.

Objective

1. To establish the effect of service tangibility on student satisfaction in selected chartered universities in Kenya.
2. To examine the effect of service responsiveness on student satisfaction in selected chartered universities in Kenya.
3. To assess the effect of service reliability on student satisfaction in selected chartered universities in Kenya.
4. To find out the effect of service accessibility on student satisfaction in selected chartered universities in Kenya.

Hypothesis

1. Hs Service tangibility does not affect student satisfaction in selected chartered universities in Kenya.
2. Hs Service responsiveness does not affect student satisfaction in selected chartered universities in Kenya.
3. Hs Service reliability does not affect student satisfaction in selected chartered universities in Kenya.
4. Hs Service accessibility does not affect student satisfaction in selected chartered universities in Kenya.

Methodology

The study adopted a cross-sectional descriptive research design where data was collected from different respondents at a single point in time. The design supported the study's desired objectivity and allowed the logistical flexibility required for data collection and analysis (Blumberg et al., 2014). Rahi (2017) asserts that cross-sectional descriptive surveys are versatile and therefore give accurate means of evaluating the information while enabling the researcher to confirm whether or not there are significant causalities among the variables. Thus, the approach was suitable for the study since questionnaires were administered to respondents at a given time.

Modeling

Main Effect Multinomial Logistic Regression Specification

Multinomial regression is a multi-equation model similar to multiple linear regression. For a nominal dependent variable with k categories, in this case, k = 4, the multinomial regression model estimates k-1 logit equations. At the center of the multinomial regression analysis is estimating the k-1 log odds of each category. In this study, k = 4 ratings of student satisfaction, with the last category as reference multinomial regression estimates k-1 multinomial regression function of student satisfaction rating as a function of the four explanatory variables defined as follows:
For $j = 1, 2, 3, 4$

\[
\logit(y = 1) = \frac{P(y = 1)}{1-P(y = 1)} = \beta_0 + \beta_1 x_{1j} + \beta_2 x_{2j} + \beta_3 x_{3j} + \beta_4 x_{4j} - \cdots - \cdots - (1)
\]

\[
\logit(y = 2) = \frac{P(y = 2)}{1-P(y = 2)} = \beta_0 + \beta_1 x_{1j} + \beta_2 x_{2j} + \beta_3 x_{3j} + \beta_4 x_{4j} - \cdots - \cdots - (2)
\]

\[
\logit(y = 3) = \frac{P(y = 3)}{1-P(y = 3)} = \beta_0 + \beta_1 x_{1j} + \beta_2 x_{2j} + \beta_3 x_{3j} + \beta_4 x_{4j} - \cdots - \cdots - (3)
\]

Given that

- $X_1$ - Service tangibility
- $X_2$ - Service responsiveness
- $X_3$ - Service reliability
- $X_4$ - Service accessibility
- $Y$ - Student satisfaction
- $B_0$ - The constant
- $B_k$ - The coefficient of the $k^{th}$ variable

### Results

**Goodness-of-Fit Test**

The test provides results of the Chi-Square Goodness-of-Fit test used to assess the significance of the overall model. The Pearson and Deviance statistics test the same thing whether or not the predicted values differ significantly from the observed values. A statistically significant result on the "Pearson" measure indicates that the model is not a good fit for the data. The Goodness of Fit of the model in this study is shown in Table 1.

**Table 1**

<table>
<thead>
<tr>
<th>Tests</th>
<th>Chi-Square</th>
<th>df</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson</td>
<td>2710.740</td>
<td>90</td>
<td>.000</td>
</tr>
<tr>
<td>Deviance</td>
<td>120.787</td>
<td>90</td>
<td>.017</td>
</tr>
</tbody>
</table>

Table 1 contains Pearson's chi-square statistic for the model (as well as another chi-square statistic based on the deviance). These statistics are intended to test whether the observed data are consistent with the fitted model. In this case, the result gives a chi-square of $X^2_0 = 2710.740$, $p = .000 < .05$, implying the model does not fit the data well. This result is supported by Deviance test statistic as shown on the Table 1 which gives a $\chi^2_{0} = 120.87$, $p = .017 < .05$, which implies that the null hypothesis is accepted and hence the model is not a good fit. However, given the result found under the Model information test criterion, one would still proceed with the modelling process to estimate the desired Multinomial Logistic Regression (MLR) model. This is in line with a study by (Chege, 2020) on service quality dimensions and customer satisfaction in the insurance industry in Kenya concluded that any such results would still be suitable for estimating a multinomial regression model for predictive studies.

**Table 2**

<table>
<thead>
<tr>
<th>Models</th>
<th>Pseudo $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cox and Snell</td>
<td>.48</td>
</tr>
<tr>
<td>Nagelkerke</td>
<td>.69</td>
</tr>
<tr>
<td>McFadden</td>
<td>.54</td>
</tr>
</tbody>
</table>

**Evaluation of the overall effect of the Predictor variables**

The statistics in the Likelihood Ratio Tests Table 3 are the same types as those reported for the null and full models of the Model Fitting Information table. Here however, each explanatory of the model is being compared to the full model in such a way as to allow the researcher to determine if each element should be included in the full model. In other words, does each predictor contribute meaningfully to the full effect?

**Table 3**

<table>
<thead>
<tr>
<th>Effect</th>
<th>Model Fitting Criteria</th>
<th>Likelihood Ratio Tests</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-2 Log Likelihood of Reduced Model</td>
<td>Chi-Square</td>
</tr>
<tr>
<td>Intercept</td>
<td>$213.68^2$</td>
<td>.000</td>
</tr>
<tr>
<td>Service tangibility</td>
<td>$209.94^3$</td>
<td>.000</td>
</tr>
<tr>
<td>Service responsiveness</td>
<td>$248.365$</td>
<td>.000</td>
</tr>
<tr>
<td>Service accessibility</td>
<td>$237.739$</td>
<td>$24.053$</td>
</tr>
<tr>
<td>Service reliability</td>
<td>$383.296.839$</td>
<td>$24.053$</td>
</tr>
</tbody>
</table>

Note. $^a$ This reduced model is equivalent to the final model because omitting the effect does not increase the degrees of freedom.

$^b$ Unexpected singularities in the Hessian matrix are encountered. This indicates that some predictor variables should be excluded or some categories should be merged.

The likelihood ratio test is based on -2LL ratio. It tests the significance of the difference between the likelihood ratio (-2LL) for the researcher’s model with predictors (called model chi-square) minus the likelihood ratio for the baseline model with only a constant.

Significance at the .05 level or lower means the researcher’s model with the predictors significantly differs from the one with the constant only (all ‘B’ coefficients being zero). It measures the improvement in fit that the explanatory variables make compared to the null model. Chi-square is used to assess the significance of

In linear regression, $R^2$ (the coefficient of determination) summarizes the proportion of variance in the outcome that can be accounted for by the explanatory variables, with larger $R^2$ values indicating that more of the variation in the outcome can be explained up to a maximum of 1. For multinomial logistic and ordinal regression models, it is impossible to compute the same $R^2$ statistic as in linear regression, so three approximations Cox and Snell, Nagelkerke, and McFadden are computed instead. From our results in the table below, the two most often used Pseudo $R^2$ estimates: Cox and Snell, and Nagelkerke. Cox and Snell’s $R^2$ shows a value of .48, while Nagelkerke’s $R^2$ shows a value of .69. From the results below, one would interpret the measures as the model explains between 48.4% and 68.6% of the data variance, which is a good result.
this ratio as in the above to test the null hypothesis that there is no difference between the null and final models against the alternative that there is a difference between the null and final models. The best case is to reject the null as is the result here with service responsiveness being significant at $x^2 = 34.708, p = .000 < .05$ service accessibility significant at $x^2 = 24.053, p = .04 < .05$ and service reliability significant at $x^2 = 3830.313, p = .000 < .05$. The above results indicate that the estimated model should include all the predictors.

**Parameter Estimates of the MLR Model**

In this context, the MLR model’s estimated parameters summarize each predictor’s effect, where the ratio between each coefficient and its standard error squared equals the Chi-square Wald statistic.

The Odds Ratio (OR) for each category of the dependent variable (1 - strongly agree, 2 - agree, and 3 - disagree) relative to the reference category (4 - strongly disagree) are available for each independent variable in the Exp (B) column. It is instructive to note that parameters with significant negative/positive coefficients decrease/increase the likelihood of the response variable category with respect to the reference variable category. When beta is positive/negative, then Exp (B) is higher/smaller than 1 which means that Odds Ratio is Exp (B).

The estimates from the parameters obtained through the maximum likelihood estimation method for the final model are summarized in Table 4.

<table>
<thead>
<tr>
<th>Table 4</th>
<th>Parameter Estimates Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student satisfaction</td>
<td>B</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>Intercept 18.801</td>
</tr>
<tr>
<td></td>
<td>Service tangibility 3.611</td>
</tr>
<tr>
<td></td>
<td>Service responsiveness -2.877</td>
</tr>
<tr>
<td></td>
<td>Service reliability -9.060</td>
</tr>
<tr>
<td></td>
<td>Service accessibility 2.599</td>
</tr>
<tr>
<td>Agree</td>
<td>Intercept 26.285</td>
</tr>
<tr>
<td></td>
<td>Service tangibility 1.603</td>
</tr>
<tr>
<td></td>
<td>Service responsiveness -1.732</td>
</tr>
<tr>
<td></td>
<td>Service reliability -6.261</td>
</tr>
<tr>
<td></td>
<td>Service accessibility -3.225</td>
</tr>
<tr>
<td>Disagree</td>
<td>Intercept 17.857</td>
</tr>
<tr>
<td></td>
<td>Service tangibility -1.129</td>
</tr>
<tr>
<td></td>
<td>Service responsiveness -1.750</td>
</tr>
<tr>
<td></td>
<td>Service reliability .489</td>
</tr>
<tr>
<td></td>
<td>Service accessibility -2.996</td>
</tr>
</tbody>
</table>

Note. SE = Standard error. Reference category: Strongly disagree

From the *strongly agree* category of student satisfaction with the *strongly disagree* as the reference category, except for service accessibility ($p = .914 > .05$), the predictors that were found to be statistically significant were service tangibility ($p = .026 < .05$), service responsiveness ($p = .018 < .05$) and service reliability ($p = .001 < .05$). As mentioned earlier, in the interpretation of the logit coefficient is the Odds Ratio (Exp (B)). Exp (B) is the effect of the independent variable on the “Odds Ratio.” When the Odds Ratio is greater than 1 (corresponding to a positive coefficient), a one-unit change in the independent variable would more likely affect the dependent variable by a value equivalent to the Odds Ratio. Alternatively, when the Odds Ratio is less than 1 (corresponding to a negative coefficient), a one-unit change in the independent

$$\log \left[ \frac{1}{1-p} \right] = 18.801 + 3.611x_1 - 2.877x_2 - 9.060x_3 + .259x_4 + .960b_7$$

From the “agree” category of student satisfaction as indicated in Table 4, service tangibility ($p = .38 < .05$), service responsiveness ($p = .24 < .05$), service accessibility ($p = .13 < .05$), and service reliability ($p = .001 < .05$) were found statistically significant compared to the reference category “strongly disagree.” Again, a unit increase in service tangibility rating is expected to accompany a 4.970 increase in the log-odds holding the other independent variables. Similarly, a unit increase in service responsiveness rating will also be a .177 decrease in the log odds. On the other hand, regarding the statistically significant cases, one unit increase in service accessibility and service reliability will be accompanied by a .002 and .04 decrease in the log-odds of the response variable.

$$\log \left[ \frac{1}{1-p} \right] = 26.285 + 1.603x_1 - 1.732x_2 - 6.261x_3 - 3.225x_4$$

Lastly, for the “disagree” category of student satisfaction, only service reliability ($p = .10 < .05$) was found not to be statistically significant compared to the reference category “strongly disagree” group. However, service tangibility ($p = .046 < .05$), service responsiveness ($p = .000 < .05$) and service accessibility ($p = .001 < .05$) produced statistically significant results. As in the above case, it can be stated that a unit decrease in service tangibility

$$\log \left[ \frac{1}{1-p} \right] = 17.857 - 1.129x_1 - 1.750x_2 + 4.899x_3 - 2.996x_4$$

In this study, the following four hypotheses are about the explanatory variables (service tangibility, service responsiveness, service reliability and service accessibility) and the outcome variable (student satisfaction and have been designed to guide the study:

1. $H_0$: Service tangibility does not affect student satisfaction in selected chartered universities in Kenya.
2. $H_0$: Service responsiveness does not affect student satisfaction in selected chartered universities in Kenya.
3. $H_3$: Service reliability has no effect on student satisfaction in selected chartered universities in Kenya.

4. $H_4$: Service accessibility does not affect student satisfaction in selected chartered universities in Kenya.

According to the parameter estimate results in Table 4, $H_0$ to $H_4$ were tested to find out whether the explanatory variables must be either significant or not over all three rating categories. Based on the results obtained in this study, it can be shown that only two of the four explanatory variables can be used to distinguish respondents across the three rating categories: service tangibility and service responsiveness since these are statistically significant for each of the three rating categories. That is, there is no evidence from the sample to accept the hypotheses corresponding to these two explanatory variables. In conclusion, there is a significant relationship between service tangibility, student satisfaction, and service responsiveness and student satisfaction. In this regard, service tangibility affects student satisfaction in selected chartered universities in Kenya. This concurs with a study by Twaussi and A-Kilani (2015) on the impact of perceived service quality and student satisfaction in higher education that concluded tangibility dimension strongly influenced student satisfaction in the university. On the contrary, a study by Kajenthiran and Karunanithy (2015) on service quality and student satisfaction found that tangibility had no significant effect.

Similarly, service responsiveness affects student satisfaction in selected chartered universities in Kenya. This is in line with a study by [Jaza et al., 2020] on the impact of service quality on student satisfaction within university institutions found that the responsiveness dimension is very important for university students. From the results, service tangibility was perceived to affect student satisfaction significantly. This was confirmed by findings that were revealed by the rating of the predictor across all the evaluation categories of the main effect model. This implied that the university had appropriate learning facilities which helped students to feel relaxed and motivated to work hard to pursue their studies successfully.

Results indicated that service responsiveness had a significant effect on student satisfaction. According to the study, the variable was rated significant across all categories, implying that staff commitment toward students’ needs was commendable. They were prompt and committed to serving. Though universities must devise the best means to communicate promptly to students when delays occur, this could go a long way to ensuring that students are informed well, thus improving student satisfaction.

Results of the MLR model indicated that service reliability and accessibility had no significant effect on student satisfaction. The perceived rating of the variables was only significant in two categories, while in the third ‘disagree’ category, the value was not significant. Hence the null hypotheses ($H_{null}$) were accepted.

**Conclusion**

Results of the MLR model revealed that service quality dimensions significantly affected student satisfaction. This was based on two service quality dimensions (service tangibility and service responsiveness), which were significant across all evaluation categories under the main effect model. From the results, service tangibility was perceived to affect student satisfaction significantly. This was confirmed by findings that were revealed by the rating of the predictor across all the evaluation categories of the main effect model. This implied that the university had appropriate learning facilities which helped students to feel relaxed and motivated to work hard to pursue their studies successfully.

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**Limitations and Direction for Future Research**

The study was limited to students from business schools only in chartered universities, specifically second, third, and fourth-year students. Therefore, further research could focus on other universities, such as engineering and where findings could be compared.

**Recommendations**

The study recommends that service quality assessment ought to be done at regular intervals by universities as this would aid in identifying and addressing service quality gaps. It also recommended that universities develop and implement an effective service quality policy. The policy would serve as a guideline for achieving expectations and enable continuous improvement in service quality.

**References**


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