

**Full Length Research Paper****Binary Logistic Regression Analysis in Assessment and Identifying Factors That Influence Customers' Satisfaction: The Case of Debre Berhan University, Ethiopia**Habte Tadesse Likassa¹, Gebire Kiros² and O.Chandra Sekhara Reddy³¹Head, Department of Statistics, Ambo University, Ambo, Ethiopia.²Research, Community Service Directorate Director, Debre Berhan University, Debre Berhan, Ethiopia.³Associate Professor of Statistics in Ambo University, Ambo, Ethiopia.***Corresponding Author: Habte Tadesse Likassa****Abstract**

Different organizations are working in maximizing the satisfaction of their customer taking customer satisfaction as the one and the major goal of their strategic plan. An accurate estimate level of customer's satisfaction is highly required for planning, implementation and in improving the level of satisfaction by identifying the gap where the customers are more dissatisfied. The main objective of the study is to assess and identify customer's satisfaction in Debre Berhan University, Ethiopia. A primary data collection was used for the study. Relevant information for the study was collected by setting questionnaires for all customers. A simple random sampling, stratified random sampling and cluster samplings were in determining sample size ($n=954$) by using a design effect 2 and 10% non response rate. Different statistical methods, mainly both descriptive and inferential statistics (logistic regression) are used and data collected were analyzed by using SPSS soft ware version 16. The result of the study reveals that the level of customer's satisfaction in Debre Berhan University of teachers, students, supportive staffs and external customers are respectively 46.67%, 71%, 61.5% and 95%. From this study it is observed that the proportion of male and female teachers of Debre Berhan University who don't satisfied were slightly greater than that of satisfied. The level of satisfaction of students in Debre Berhan University all most three fourth them were satisfied with service and facility offered by the university. However, the proportion of students in each college who were satisfied is greater than who don't satisfy except in Engineering and Health Science College. From the result we observed that the dominance of student centred teaching and learning approach, lesser availability of internet service, lack of appropriate infrastructure, low quality of services in lounge, shortage of resident to teaching staff, poor complain and grievance handling process, low participatory decision making process factors associated with customers satisfaction. Therefore, it is recommended that the university management and the government should work more cooperatively on factors affecting customer's satisfaction in DBU. It is advisable if the government and university management would pay their attention in providing medical laboratory in Health related and field laboratory equipments. The university management should pay more attention in providing quality of services and facilities for its customers so as to alleviate the problems. It is also recommended if there is a periodic discussion with teaching and administrative staffs on service delivery and complains handling process.

Key words: Satisfaction, Customers, Stakeholders, Variables**Introduction**

Recent interpretations in the consumer domain now couch satisfaction as a fulfilment response. Fulfilment implies that a consumption goal is known, as in basic motives of hunger, thirst and safety. However, observers of human behaviour understand that these and other goals can be and frequently are modified and updated in various ways. Thus, consumer researchers have moved away from the literal meaning of satisfaction and now pursue this concept as the consumer experiences. Oliver (1997, p. 13), the following definition has been proposed as being consistent with the conceptual and empirical evidence to date: Satisfaction is the customer's fulfilment response. It is a judgment that a product or service feature, or the product or service itself, provided a pleasurable level of consumption-related fulfilment, including levels of under- or over-fulfilment. Here, pleasurable implies that fulfilment gives pleasure or reduces pain, as when a problem in life is solved. Thus, individuals can be satisfied just to get back to normalcy, as in the removal of an aversive state. Moreover, fulfilment is not necessarily limited to the case of met needs. Over-fulfilment can be satisfying if it provides additional unexpected pleasure; and under-fulfilment can be satisfying if it gives greater pleasure than one anticipates in a given situation. Note that it has not been necessary to provide a separate discussion of dissatisfaction.

Customer satisfaction is key factor information of customer's desires for future purchase in any organizations. Furthermore; the satisfied customers will probably talk to others about their good experiences, while dissatisfied customers are wrongly inform to their friends about the organization (Ruyter, 1997). Faraz (2005) stated that customer satisfaction is the situation when customer expectations have been fulfilled to the fullest capacity when using the product or service. The capacity to fulfil customer expectation consequently brings about strong believe on the institution and in maximizing GDP and Economy of the country in

general and institution in particular. Murthy (2010) stipulated that institutions have to be efficient in dealing with individual customers in their institutions. It is also necessary for organization to strive hard to retain the existing customers in the face attracting new customers, otherwise the institution fail in risk. The number of customers served determines the institution success. Customers' confidence and trust on the services delivered by the institution determines the institution fate. A full- fledged service delivery to the customer by the institution secures the institution (university) survival.

According to Gil et.al, 2008, in contrast to products, customers are not really able to appraise services before the service process takes place. The contact with the leaders of the organizations and the customers is the key in the evaluation of service performance. The customer's service experience is defined by the interaction with the organization, the processes and the employees.

According to Wirtz (1994) service givers have considerable occasions to control the connections that mutually form the experience. Customers are the heart of every successful institution and therefore institution need to more concentrate on customers more than ever. According to Scott (2002), Customer service is a series of activities designed to enhance the level of customer satisfaction, that is, the feeling that a product or service has met the customer expectation. The level of satisfaction can also vary depending on other options the customer may have and other products against which the customer can compare the organization's products. In this regard, Debre Berhan University is working in maximizing the satisfaction of its customer taking customer satisfaction as the one and the major goal of its strategic plan. But, still there is no a research conducted in the study area which shows the level of customer's satisfaction and factors associated with it. This year, the University has planned in satisfying 79% of its customers through the services that it provides. Therefore, the main goal of the study is binary logistic analysis in assessing and identifying factors that affect customer's satisfaction in Debre Berhan University, Ethiopia. To this end, the University has nominated a committee having three members from different colleges and experts with different quality so as to get the real satisfaction of its customers through scientific procedures. Thus, the committee has released this result based on the data collected from customers and stack holders.

Methodology

Description of study area and period

The study was carried out in Debre Birhan University from January to June 2012/2013. Debre Berhan University is found in North Shoa Zone, Debre Berhan Town which is located at 130kms from Addis Ababa to North. Data were collected from Addis Ababa, Bahir Dar, Ankober, Shoa Robit, and Debre Berhan where the customers are located.

Study Design

A community based cross sectional study was conducted to know customers level of satisfaction.

Source of population

All customers of Debre Birhan University (both internal and external customers) students, teachers, administrative staffs, customers from different sectors, board members, house of peoples' representative were sources of study.

Study Subjects

954 Customers those who are randomly selected from the source population were the study subjects of this study. Optimal percent of teachers, students, supportive staff, and external customers were taken so as to get truthful and representative data from the respondents.

Sample Size Determination

The sample size will be determined by single population proportion formula, and using a 95% confidence interval with margin of error 4% considering 2 design effect and 10% of non-response rate.

$$n = \frac{(Z_{\alpha/2})^2 pq}{d^2}$$

Where,

p = Percentage customer's satisfaction obtained from previous study on similar setting=0.5.

d = Maximum estimate of error =0.04

α = Level of significance =0.05

$Z_{\alpha/2}$ = Standard normal value at 95% CI= 1.96

n = Sample size to be determined

Based on the above formula, n can be conducted as follow:

$$n = \frac{2(1.96)^2 (0.5)(0.5)}{(0.4)^2}; \text{ By considering 10\% of non response rate, the total sample size is 904.}$$

Sampling Procedures

First the study population were stratified as internal and external customers. The internal customers were stratified based on their occupation (students and staffs) and the external customers were stratified based on their sectors. Then, a simple random sampling technique was employed to select the departments. In order to select the students from the selected departments, stratification on the base of academic years will be done and appropriate probability sampling technique will be used in all academic year of the department selected on basis of proportional to size.

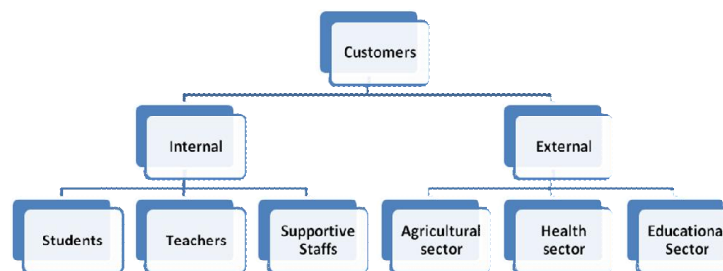


Figure 1. Schematic diagram of sampling procedures on internal and external customers of Debre Berhan University

Variables Identification

Dependent variable: customer's satisfaction which has two binary outcomes as satisfied or not satisfied.

Explanatory Variables: Includes facilities and services offered by Debre Berhan University.

Exclusion criteria: Extension students, post graduate students, summer students and Instructors currently who are on study leave are excluded from this study.

Data Collection Methods

The structured questionnaire will be prepared for quantitative method, while semi-structured questionnaire will be designed for the qualitative method.

Data Entry and Analysis

Data entry and cleaning were carried out using statistical soft ware package SPSS version 16 for the analysis. Descriptive statistics analysis will be used to show the frequency distribution and its results will be presented by tables and graphs. Test of association will be also performed to look at the association between the independent variables and dependent variable. In order to identify the effect of predictor variables on the response variable binary logistic regression model (odd ratio) is used.

Results and Discussion**Level of satisfaction of teachers**

A total of 120 teachers were involved in this study. Of those, 84(78.3%) were have second degree and only 26(21.7%) were have a first degree. The median age of teachers interviewed was 29 years, ranging from age 17 to 29 years. Regarding their sex, 111(92.5%) of them were males and only 9(7.5%) of them were females during the study period. Age group of 25-29 were the predominant 68(56.7%) study subjects, followed by 30-34 29(24.2%) and age group greater than 34 account only 10 (8.3%) (Table 1).

Table 1. Socio-demographic characteristics of teachers satisfaction (n=120) in Debre Berhan University, Ethiopia, June 2013.

Variable	Frequency	Percentage
(1) Sex		
Male	111	92.5
Female	9	7.5
Total	120	100
(2) Educational status		
First degree	26	21.7
Masters	94	78.3
Total	120	100
(3) Age		
20 - 24	13	10.8
25 - 29	68	56.7
30 - 34	29	24.2
>= 34	10	8.3
Total	120	100

This study showed that, of the total teachers involved in the study about 64 (53.3%) of them were not satisfied with facility and service offered by Debre Berhan University while 56(46.7%) of them were satisfied with service and facility offered this University (Table 2). On the other hand, majority of students were satisfied (71%) with facility and service offered by Debre

Berhan University, Ethiopia. Only, 29% of them were dissatisfied with facility and service offered by Debre Berhan University, Ethiopia. It is surprising that more than nine of ten of external customers were satisfied with service and facility offered by Debre Berhan University, Ethiopia. As it is indicated in table below majority teachers were dissatisfied than others.

Table 2. Frequency distribution of teachers, students, supportive staffs and internal satisfaction from Debre Berhan University, Ethiopia, June 2013

Level of satisfaction	Internal Customers of DBU						External Customers	
	Frequency (Teachers)	(Percent Teachers)	Frequency (Students)	Percent (Students)	Frequency (Supportive)	Percent (Supportive)	Freq	Percent
Satisfied	56	46.7	504	71	64	61.5	19	95
Not satisfied	64	53.3	206	29	40	38.5	1	5
Total	120	100.0	710	100	104	100	20	100

As it is observed from the table above, majority of customers were satisfied with service and facility offered by Debre Birhan University. However, as it is cogently seen from the table the proportion of teachers who were not satisfied with service and facility are greater than who are not satisfied. Since majority of customers in Debre Birhan University are satisfied with the service and facility offered except for teachers. Relevant factors that are more related to customer’s satisfaction are listed in the table below.

Results of chi square test of association

The table below shows to determine whether there is a statistical significant association between explanatory variables and dependent variables.

Table 3. Chi-square results for various dependent variables.

Variables	Value of chi Square	DF	P-Value
CS*conductive environment in teaching	5.420	1	0.020
CS*Chance of getting education	15.614	1	0.000
CS*educational material support	10.420	1	0.005
CS*infrastructure	31.515	1	0.000
CS* availability of computer	18.127	1	0.000
CS*availability of toilet	15.651	1	0.000
CS*Living house	9.011	2	0.011
CS*finance usage	12.033	2	0.002
CS*Cooperative teaching	14.587	2	0.001
CS * Good governance	19.096	2	0.000

The table above reveals that all explanatory variables(conductive environment in teaching, Chance of getting education, educational material support, infrastructure, availability of computer, availability of toilet, Living house finance usage, Cooperative teaching, Good governance) were statistically significantly associated with customer’s satisfaction by comparing p value at 5% level of significance.

Results of Binary Logistic Regression Model

In this section it is discussed as the model summary, in order to identify factors associated with customer’s satisfaction Binary Logistic Regression Model is used. Moreover, the joint impact of all explanatory variables on the response variables will also determined by using the concept of Nagelkerke R Square which is explained in the model, summary.

Table 4. Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	158.677 ^a	.106	.141

The most common assessment of overall model fit in logistic regression is the likelihood ratio test, which is simply the chi-square difference between the null model (i.e., with the constant only) and the model containing the predictors. Under Model Summary we see that the -2 Log Likelihood statistics is 158.677. This statistic measures how poorly the model predicts the customers satisfied, the smaller the statistic the better the model. The value of Cox & Snell R² and Nagelkerke R² are good enough. Cox and Snell or Nagelkerke R² is an analogous statistic in logistic regression to the coefficient of determination R² in linear regression, but not close analogy. The model summary provides some approximation of R² statistic in logistic regression. Cox and Snell’s R² attempts to imitate multiple R² based on likelihood. The result of Cox and Snell R² indicates that 14.20% of the variation in the dependent variable is explained by the explanatory variables. Nagelkerke R² in model summary table above is 0.1420, which indicates that 14.20% of the variability in the dependent variable customers satisfied was explained the explanatory variables (Table 9).

Table 5. Goodness of fit (Model Diagnostic)

Hosmer and Lemeshow Test			
Step	Chi-square	Df	Sig.
1	2.558	7	.923

As it is observed from the table above since P-value is 0.923 is greater than the level of significance at 5%. We can conclude that the data fits the model well. Since the p-value is 0.923 which is insignificant therefore our fitted logistic regression model is good fit (Table 5).

Table 6. Results and interpretation of binary of logistic regression analysis

Categorical Variables	Values of Statistics obtained from Logistic					
	B	S.E.	Wald	df	Sig.	Exp(B)
Sex (Reference category: Female)					0.00*	
Sex(Males)	1.305	.888	2.161	1	.014	3.689
Educational status(Reference category: Degree)			2.79	3	0.00*	
Educational status(Masters)	-.601	.206	8.526	1	.004*	.548
Educational status(PhD)	-.023	.189	.015	1	.904	.977
Educational status(Professor)	.255	.952	.072	1	.789	1.291
Age(Reference category: 20-24)			100.898	3	0.000*	
Age(25-29)	0.644	0.180	12.755	1	0.000*	1.905
Age(30-34)	1.105	0.151	53.887	1	0.000*	3.019
Age(>34)	1.245	0.146	72.650	1	0.000*	3.474
College(Reference category: Natural Sciences)			45.425	6	.000*	
College (Medicine and Health Science)	-0.060	.166	0.130	1	0.718	0.942
College(Engineering)	-0.692	0.222	9.695	1	.002*	.501
College(Social Sciences)	.023	.150	.024	1	.877	1.935
College(Computing)	-0.100	0.150	0.441	1	0.507	0.905
College(Business and Economics)	.268	.177	2.302	1	.0129*	1.307
College(Agriculture)	0.054	.135	.159	1	.690	1.055
Constant	.665	.638	.0861	1	.297	1.945

Variable(s) entered on step 1: Sex, Educational status, Age, and College

From the table above it is observed that the odds of male customers who are satisfied with facility and service offered by Debre Birhan University are increased by the amount of 14.2% as compared to female customers. From this it can be concluded that male's students are better satisfied than females with service and facility offered by Debre Berhan University. In addition to this the odds of customers who's their age category is greater than 34 their level of satisfaction is increased by 47.40% as compared to customers in age category 20-24. The highest age that is more satisfied is from 25-29. It is also observed from the table above the odds of Medicine and Health Science customers their level of satisfaction is decreased by 60.90% as compared to customers who are under the college of Engineering (Table 6). As it is observed from the table above, majority of customers were laboratory and relevant equipment is needed customers were highly dissatisfied.

Conclusions

Based on the above discussion and results obtained from the study, the following conclusions were drawn:

The level of satisfactions among customer teachers, students, supportive staffs and external customers respectively are 46.67%, 71%, 61.5% and 95%. Although the satisfaction measure variable are different in each case, the total level customer of satisfaction Debre Berhan University is **67.4004%**. As it can be observed from the result, when we compare the satisfaction level of internal and external customers, the external customers are more satisfied (**95%**) than the internal customers (**66.8094%**). Thus, it can be described that the satisfaction level of teachers from the internal customers is lower than the others.

- From the result of the study it is concluded that conducive environment in teaching, chance of getting further study, educational material support, infrastructure, availability of computers, availability of toilet, living house, finance usage, availability of toilet, cooperative teaching and lack of good governance were significantly statistically associated with customers satisfaction.
- It was also concluded that the odds of male customers who are satisfied with facility and service offered by Debre Birhan University are more increased as compared to female customers.

- The odd of customers who's their age category is 25-29 their level of satisfaction is increased by 90.05% as compared to customers in age category 20-24.
- The odds of Medicine and Health Science customers their level of satisfaction is decreased by 60.90% as compared to customers who are under the college of Natural and Computational Sciences.
- The result of the study reveals that, a significant proportion of the students were not satisfied in engineering and Health College as compared with others.
- The researchers believe that attempt to implement the harmonized legislation that neglects instructors' effort and time devoted to teaching and laboratory practical activities has brought about some dissatisfactions to instructors. However, this compliant has got solution lately through continuous effort of the university management.

Recommendations

Based on the above conclusions, the following recommendations are made:

- As it can be seen from the above conclusion, the satisfaction of the internal customer is not as expected as to be. Therefore, the university management and the government should work more cooperatively in satisfying their internal customers.
- The government and university management should pay attention in providing medical laboratory in Health and related field laboratory equipments in the right place.
- The university management should pay more attention in providing quality of services and facilities for its customers so as to alleviate the problems listed as potential explanatory variables.
- It is more advisable if the top management of the university put attention in providing the basic needs and relevant materials for workers so as to increase its customer's satisfaction.
- It is advisable if there is a periodic discussion with teaching and administrative staffs on service delivery and complains handling process.

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