COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCE

DEPARTMENT OF STATISTICS

DETERMINANTS OF CUSTOMERS SATISFACTION ON SERVICE OF COMMERCIAL BANK OF ETHIOPIA: IN CASE OF WOLKITE UNIVERSITY

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SINOR RESEARCH PAPER SUBMITTED TO STATISTICS DEPARTEMENT IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE BACHELOR DEGREE IN STATISTICS

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ABSTRACT

Customer satisfaction is the customer's feeling that a product/service has met or exceeded his/her expectations. This study attempted to investigate the factors that determine Customer Satisfaction on Service of Commercial Bank of Ethiopia in Wolkite University. The main objective of this study was to identify determinants of Customer Satisfaction on Service of Commercial Bank of Ethiopia. In this study a random sample of 150 respondents were selected by using simple random sampling technique. The data were collected by using a well-designed questionnaire and analyzed using SPSS version 20. The statistical methods that are, used in this study were descriptive statistics like frequency table, graph and inferential statistics like chi-square test and binary logistic regression. From the study 84.0% of the Customers are satisfied and 16.0% of the Customers Are Not Satisfied. The chi square test of association showed variables such as Availability of connection, Availability of modern equipment, Reliability, Speed of service and Knowledge have association with customer satisfaction at 5% level of significance. The conclusion of this study were drown using binary logistic regression as factors like availability of connection, reliability, knowledge of employees are major of causes of customer satisfaction and it is recommended as the that concerning body should have to decreases this effects of the identified factor by using appropriate strategies that can increase customer satisfaction.

***Key word**: - commercial bank of Ethiopia, customer satisfaction*

ACRONMY

WKU……...Wolkite University

ATM…….….Automated Teller Machine

CBE……..Commercial Bank Of Ethiopia

SRS…….Simple Random Sampling

H_O……..….Null Hypothesis

H_A ……..…..Alternative Hypothesis

LL……....likelihood

LR…….. …….likelihood ratio

ML ……..Maximum Likelihood

OR…….. Odds Ratio

SPSS ……...Statistical Package for Social Science

SERVQUAL……Service Quality

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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Customer satisfaction is the customer's feeling that a product/service has met or exceeded his/her expectations. It is a customer's feelings, of pleasure or disappointments resulting from comparing Products or services perceived performance or outcome in relation to his or her expectations. Banks play an important role in the economy of any country. They are the main intermediaries between those with excess money (depositors) and those individuals and businesses with viable projects but requiring money for their investment (creditors). Banks have at least the following functions: lending money, depositing others' money, transferring money locally or abroad and working as paying agent (Tefere, 2013).

Banking institutions across the globe have recognized the importance of customer satisfaction and of developing and maintaining enduring relationship with their customers as two crucial parameters leading to increased business profits. At the same time, several banking institutions are experiencing increasing level of retail customer dissatisfaction (Mistry, 2013) 21stcentury, customer satisfaction has become main concern and focus in all the industries especially service industry. (Caruana, 2000) proposed a model that basically links service quality to service loyalty among the retail banking customer through the mediator customer satisfaction. Gaining high level of customer satisfaction is very important to all kind of businesses in the world reason being satisfied customers are most likely to be loyal, retain, and to make repeat orders. An organization cannot survive in long run if customers are not satisfied. Moreover, other elements like service quality, corporate image, price of services and customer satisfaction are very important elements for maintaining customer loyalty in banking industry nowadays.

Customer satisfaction is crucial in banking sector because of the special nature of the service which is characterized by intensive contact with customers who have different needs and require customized solutions and it is known to be one of the most important and serious issues towards success in today's competitive business environment, as it affects company market shares and customer loyalty (Clemes, 2008).

Customer satisfaction is considered important in defining organizational performance. Enhancing customer satisfaction is critical because it is a key to business success of any banking institution. In the competitive economy, customer's satisfaction has come under limelight due to staff competition where organizations are trying to take competitive advantage through the human factor and customers (Singh, 2006). Hence, in order to win this intense competition and maintain their market share of the bank industry; they must give attention to the existing and potential customers need, want and preferences to maximize their satisfaction and loyalty plus to that they must make continues customer service quality improvement program. Since the importance of making continuous customer service quality improvement program is to make profit, build good images, lead the market, and retain customers which lead customer loyalty. That is why we are highly motivated to conduct research in the area of customers satisfaction.

1.2 Statement of the problem

It is imperative that service companies' measure and monitor service quality and satisfaction with a view of influencing the behavioral intentions of their customers (Saha and Theingi, 2009). Satisfying customers is the first major mission and purpose of any business organization. Customer satisfaction is also crucial in the banking sector because of the special nature of the service which is characterized by intensive contact with customers who have different needs and require customized solutions and it is known to be one of the most important and serious issues towards success in today's competitive business environment, as it affects company market shares and customer loyalty (Clemes, 2008).

However, there are a number of problems hindering the smooth delivery of the banking services Research suggests that customer dissatisfaction is still the major reason of bank customers' switch to other banks (Manrai, 2007).The causes of dissatisfaction are not well known empirically however from rational point of view; the probable factors may include network problem, unavailability of modern equipment, problem of speed service, lack of enough knowledge of staff and temporary failures in the electronic banking services etc. (Ha and Jang, 2009) argued that service failure occurs when customer perceptions do not meet customer expectations. The problem with service failure is that it may lead to a destroyed relationship between the customer and the organization.As far as services provided by commercial bank of Ethiopia (CBE) are concerned in line with the above view, this problem similarly raised in Ethiopia; despite its effort to increase customer base and their loyalty it is facing stiff competition from private banks. Therefore, this study attempts to assess factors affecting customer satisfaction in case of commercial bank of Ethiopia in Wolkite University.
In general, in this study we have tried to answer the following research questions:

1. What is the relationship between reliability and customer satisfaction in commercial bank of Ethiopia?
2. What are the major factors that affect customers' satisfaction on service of CBE?

1.3. OBJECTIVES

1.3.1 General objective

The overall objective of this study was toassess the major determinants of customer satisfactiononcommercial bank of Ethiopia in case of Wolkite University

1.3.2 Specific objectives

- To describe the customer satisfaction on commercial bank of Ethiopia in caseofWolkite University.
- To examine the association between predictors and customers' satisfaction on Commercial bank of Ethiopia Service
- To understand the roles of availability connection service on customers‟ satisfaction in commercial bank of Ethiopia.

1.4 Significance of the study

The result of this study might serve as input for community, bank customer service officers, future researchers and policy makers and other relevant stakeholders about factors affecting satisfaction of bank customers.

- the findings of this study benefited the society in that identification of the factors affecting bank customer satisfaction enables the community to easily set the best possible solutions to deal with the issue related with satisfaction with banking services.

- This study provided a clue for customer service officers about factors affecting customer satisfaction. So, having an idea about factors affecting customer satisfaction, customer service officers which are the center of service quality make a necessary adjustment in the delivery of banking service which is eventually leads to improvement in service quality.

- This study can be used as an input for further study for similar future research

1.5 Scope of Study

The scope of the study was confined to the customers' satisfaction related to service of commercial bank of Ethiopia in Wolkite University. This study was limited or concerned to the factor that affects customer's satisfaction on the services ofcommercial bank of Ethiopia Incase Wolkite University.

CHAPTER TWO

LITERATURE REVIEW

2.1. Customer Satisfaction

Customer satisfaction is defined as customers' response to the perceived gap between prior expectations or experiences and actual performance of products or services consumed (Che-Ha &Hashim, 2007). Customer satisfaction is an affective state or feeling towards the products or services. Customer satisfaction could lead to stronger customer base which is a competitive advantage to the institutions (Salifu.et,al 2010).

Due to the importance of customer satisfaction, it has become academics' and practitioners' interests in service industry. There is a continuous growth in research of customer satisfaction in retail banking sector (Decaro, et al, 2010). However, (Anderson, et al and Lehman, 1994) provided a better explanation by describing the customer satisfaction as a kind of purchase behavior and the experience of using a product.

Generally, customer satisfaction is conceptualized as an attitude-like judgment or a pleasurable level of consumption-related fulfillment resulting from purchases or consumers' interactions. When transacting with banks, customers always judge the level of services and the priority given by bank and finally decide about repurchase behavior. Customer satisfaction level is high when they obtain maximum usage and profit with minimum price (Afsar, et al&Shahjehan, 2010). On the contrary, dissatisfaction arises when pricing does not accommodate customers' needs. For instance, the interest rates on loans, charges on the usage of online services and the processing fees are among the factors which determine customer satisfaction (Afsar, et al&Shahjehan, 2010).

Customer satisfaction is the customer's feeling that a product/service has met or exceeded his/her expectations. It is a customer's feelings, of pleasure or disappointment resulting from comparing Products or services perceived performance or outcome in relation to his or her expectations.

2.2. Determinants that cause Customer Satisfaction

A customer satisfaction is an ambiguous and abstract concept. Actual manifestation of the state of satisfaction will vary from person to person, product to product and service to service. The state of satisfaction depends on a number of factors which consolidate as psychological, economic and physical factors (Anderson, E.W. et al., 2004).

The quality of service is one of the major determinants of the customer satisfaction, which can be enhanced by using ICT available to survive (Vijay, 2012).The service delivery process also plays a key role in customer satisfaction. When the process of service delivery is too long, it lengthens customer waiting time.

According to (Sasraku, 2007), the physical evidence also plays a role in customer satisfaction. The physical evidence includes the buildings and its decorations, an imposing banking hall with comfortable seats, places of conveniences, etc. The office or building and its external and internal decorations can satisfy a customer. The customer can pride him or herself as customer of that bank.

However, the nice edifice of a banking hall will not be noticeable if customer service is poor and there are unnecessary delays and lack of personal support from staff (Sasraku, 2007).The technology being used by the bank in service delivery could be a source of satisfaction to customers. When electronic devices like computers are used, they tend to speed up the processing time of transactions. System and processes solely do no create satisfaction.

Furthermore, the security of customers and their deposits is an area of concern to customers. When customers are assured of protection from external threats they feel secured and happy. However, there are a number of problems hindering the smooth delivery of the banking services.

There is customer's dissatisfaction over the service offered and the available services don't match the expectation of the customer (Mesay, 2012).this studies shows the availability of connection service, availability of modern of equipment service etc can significant affecting customer satisfaction with commercial of bank. The internal security is equally important to customer who will want to deal with personnel with integrity and good moral values especially, the financial institutions.

2.2.1 Demographics effect on customer satisfaction

Demographic information such as sex ,year of customer ship and etc need to be examined when measuring service quality in retailing; in order to discover the relationship between demographic information and dimensions (Siu& Cheung, 2001).

According to (Ogden & Ogden, 2005) the most important demographic information is marital status because it shows if customers are buying for themselves, for a spouse, or a family with children. Education level is important demographic information because as customers become more educated they demand different products and different levels of service.(P.Kotler& Armstrong, 2010) suggest there has been an increase in educated people in the United States and this leads to an increase in the demand for quality products.

Sex, level of income, and experience with bank services are the moderators of customer satisfaction in a wide range of service industries (Narteh and Kuada, 2014). It is further stated that age, gender, education and income levels are key moderators that are associated with services of banks and satisfaction in the banking sector. For instance, (Omar, 2008) did a research on determinants of retail bank choice in Nigeria with respect to gender. The results showed that there are some differences in choice factors used by male and female customers in selecting a retail banks for patronage. For example, men are risk loving than women.

(Tesfom and Birch, 2011) state that young and older bank customers differ significantly in their satisfaction levels. For instance, younger customers are more likely to easily change their banks, but for banks to retain them, they need to offer more meaningful incentives to younger customers than older customers. On educational level, a research by (Meyer et al., 2006) for Deutsche Bank on online banking found that individuals with higher formal education are more satisfied with the use of internet and are therefore, likely to do financial transactions online. According to (Narteh and Kuada, 2014), wealthier customers have higher expectations and better service options than lower-income customers. They further give example of Ghana banking industry, where by income is used as a market segmentation variable.

2.2.2 Service Quality

Services can be defined as actions, procedures and performance. The main difference between the product and services are that customers get value with no undying ownership of any tangible components. Moreover, service quality which is not like product quality which is

determined by its unique characteristics which are intangible, perishable, inseparable, and heterogeneous (Zeithaml et al., 2006).

Today one of the most dominant topics of research in services is service quality. It is necessary for service providers to understand how customers evaluate the quality of service. When customers consume a product, they compare the quality of experience with their prior expectations, which leads to their satisfaction or dissatisfaction (Thakur,2011).Therefore services marketing researchers based their work on developing a service quality concept focused on consumer behavior instead of using manufacturing quality concepts (Dr.Rakesh.R,(,2010).Thus it had been recognized that customers evaluate service quality by comparing the actual performance with service expectations that they held (Thakur, 2011).

If customer perception is higher than the actual performance level of the service provider, then perceived service quality is below the satisfactory level and that leads to customer dissatisfaction and finally customer might switch other provider. Therefore, Service quality is multidimensional structure that is very difficult to appraise due to the exceptional features of each of the service providers (Zeithaml et al., 2006).

According to(Fabnoun and Chaker , 2003), measuring service quality is an important task since it allows the service provider to appraise and compare what things were like prior to changes set in and what they are after changes were made. The SERVQUAL tool has brought extensive recognition as an best tool to investigate, review and measure the quality of services of several industries like banking, healthcare, hotels, etc. (Akter et al., 2008). Therefore, it needs modification depends on the situations.

Reliability and Customer Satisfaction

The association between reliability and customer satisfaction was investigated by (Ibanez et al, 2006). They found a significant relationship between reliability of services on the satisfaction level of customers. The literature reveals an increased degree of positive relationship between service quality, customer satisfaction and performance (both financial and non-financial) where face-to-face dealing between customer and employee is the only focus. Technology expansion has had a great impact on the choice of service delivery standard and services marketing strategies. This has yielded many prospective competitive

advantages including augmenting of productivity and enhanced revenue creation from new services (Muyeed, 2012).

Enough Knowledge of employees and Customer Satisfaction

In addition to reliability and responsiveness; knowledge of employees has been identified as significant dimension of service quality by (Parasuraman et al. 1988). They propose that all of these dimensions significantly enhance customer satisfaction. It is believed that if the employees of financial institutions display employees inspire confidence and trust, the satisfaction level of customers can be enhanced significantly. It may also positively influence repurchase intension of customers (Ndubisi, 2006; and Ndubisi&Wah, 2005).

Speed of service and customer satisfaction

(Fitzsimmons and Fitzsimmons, 2001) argue that when the customer is kept waiting for no apparent reason creates unnecessary negative perceptions of quality. Conversely, the ability for the bank to recover quickly when service fails and exhibit professionalism will also create very positive perceptions of quality. The readiness to provide timely service by the service provider includes paying attention to the customer, and dealing with the customer's complaints and problems in a timely manner. Responsiveness is being flexible with the customer and trying to accommodate the customer's demands and performing the service without delay. This leads to customer satisfaction.

CHAPTER THREE

METHODOLOGY

3.1 Study Area

This study was conducted in Wolkite University. Wolkite University is one of the higher educational institutions in Ethiopia. It was newly opened university in Ethiopia begun in 2012 G.C. Wolkite University is found in south western Ethiopia around Wolkite Town.Wolkite University far 15km from Wolkite town and Wolkite town 158km from Addis Ababa.Generally, Wolkite University far around 173km from Addis Ababa.

3.2 Target population

The target population of this study was the entire Wolkite university customers who are using CBE service. The total number of customer who was using the bank in WKU are12432, among these we was selected a sample of customers by simple random sampling.

3.3 Study variables

Basically, in any study there are two types of variables; response and explanatory variables. Explanatory (independent) is the variable whose value is used to estimate (calculate) the dependent variable. The response (dependent variable) in another aspect explains the variables whose value is estimated by the independent variables.

Dependent variables

In this study the Binary response variable is customer satisfaction which is named as satisfied or not satisfied. Customer satisfaction from service of CBE is coded as

Variables	Categories
Customer satisfaction	Not satisfied=0 ,satisfied=1

Independent variables

The following Independent variables also called explanatory or predictor variables that cannot depend on other and that can affect the customer satisfaction were considered.

These are:-

variables	Categories
sex	Male=1 ,female=0
Year of customer ship	<1 year=0,<2 year=1,<4 year=2, ≥4 year=3
Timeliness	For2hrs=0,for3hrs=1 ,for4hrs =2, for more than4hrs=3
Place of Residence	urban=0 ,rural=1
Availability of Connection services	No =0 ,yes=1
Availability of modern equipment	No =0 ,yes=1
Reliability	No =0 ,yes=1
Knowledge of employees	No =0 ,yes=1
speed of service	No =0 ,yes=1

3.4 Source of data

The source of data for this study was the primary source of data. The data were gathered from customers of commercial bank of Ethiopia in case ofWolkite University.

3.5 Method of data collection

In this study primary data was collected from customers of commercial bank of Ethiopia in case of WKU to achieve the specific objectives. This primary data wasobtained by preparing well organized questionnaire. After preparation of the questionnaire, we distributed to customers. The data were collected using standardized structure questionnaires with open and closed ended type of question which is prepared by using Englishlanguage.

3.6 Sampling technique

In this study to determine the sample size of respondents from whole population size we use simple random sampling techniques (Cochran, W.G, 1977). Simple random sampling is the most basic probability sampling techniques in which every individuals unit (member) of the population has equal probability of being included in sample.SRS insure that each unit gets an equal chance of being included in the sample. In other words SRS is probability sampling techniques where every possible sample has an equal probability of being drawn SRS can be employed only of a complete list of all population elements already exist or can be readily constructed.

3.7 Sample size determination

Determining sample is very important issue for the precision of the survey. The data of our study was obtained by applying sample survey techniques. In the planning of sample survey one of the first consideration were the sample size determinations. The sample size requires depends up on three factors –the level of precision requires in the estimate, this requires specifying the acceptable margin error or confidence level, proportion of failures or success.

In general, sample size was obtained by using sampling formula;

$n_0 = (Z\frac{\alpha}{2})^2 \frac{pq}{d^2}$…… (Cochran, 1997)

$n_{o=}$ sample size

Zα/2=reliability of coefficient or accuracy of significance

α = level of significance

p = the probability of success

q = 1-p, the probability of failure of population

d = margin of error which would be occurred when we estimate.

We take the maximum probability of success or customers satisfied (p =0.5) and probability of failure or customer dissatisfied (q = 0.5)

Zα/2=1.96

α =0.05 or 5%

p =0.5 or 50%

q =0.5 or 50%

d =8% or 0.08

Total number of populations (N) = 12432

$$n_0 = (Z_{\frac{\alpha}{2}})^2 \frac{pq}{d^2} = \frac{(1.96)2(0.5)(0.5)}{(0.08)2} = 150$$

$$\frac{n_o}{N} = \frac{150}{12432} < 5\%$$

Since our population are very large we get the sample size by taking initial sample size; i .e $n=n_o$. Then $n = 150$(our sample size)

3.8 Method of data Analysis

There are different basic methods of statistical data analysis, so a data is analyzed with reference to the purpose or objective of the study. The two statistical data analyses that we are use in this study are descriptive and inferential statistics.

3.8.1 Descriptive Statistics

Descriptive Statistics conducted for organization, summarization and presentation of data by describing the observations frequency and percent of variables in meaning full forms by using table, chart, etc. Frequency Distribution is a way of displaying of numbers in organized manner or tabular arrangement whereby the data is grouped in to different interval, and then the number of observation that belongs to each interval is determined.

3.8.2 Inferential statistics

Inferential statistics is one used to making conclusion about population based on data obtained from a limit number of observation from population. It consists of estimation and hypothesis testing. To make decision we use p-value approach. The smallest p-value than level of significance is at which the null hypothesis is rejected. Inferential statistics, in order to meet the objective set up on this study chi-square test of independence and binary logistic regression model are employed in inferential statistics.

3.8.2.1 Chi-square Test of Independency

The chi-square test for independency is used when to study whether two qualitative variables are associated or not. The objective of chi-square test of independency is to test whether there is association between two categorical variables.

H_0: There is no association between dependent and independent variables Vs

H_1: There is association between dependent and independent variables.

The appropriate test statistics is given by Chi-square distribution is with (C-1) (R-1) degree of freedom. Where, C=total number of column, R=total number of row.

$$\chi^2 = \sum\sum \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \sim \chi^2_{\alpha}((R-1)(C-1))$$

Where χ^2_{cal} is the value of random variable whose sampling distribution approximately very close to the chi-square distribution with (R-1) (C-1) degree of freedom

O_{ij}- observed frequency of i^{th} row and j^{th} column.

E_{ij}- expected frequency of i^{th} row and j^{th} column.

Assumption of Chi-square

- ✓ The sample must be randomly selected from the population.
- ✓ The observation must be independent of each other.
- ✓ The expected frequency for each category is at least 5. If there is a category with all expected frequency of less than 5, either increase the sample size or combine 2 or more categories make each expected frequency at least 5.
- ✓ The chi-square value increased with increased degree of *freedom.*
- ✓ It is always positively skewed.
- ✓ Each and every individual (object) is independent of each of other member.
- ✓ The data should be expressed in original unites, rather than in parentage or ratio.

3.8.2.2Logistic Regression

One of the statistical techniques used in this study was logistic regression, since it is used when the dependent (response) variable is dichotomous variable (occurrence and study the dichotomous variables is customer satisfaction categories as satisfy or not satisfy with service of CBE. usually coded as 0 or 1) and the independent (input) variables are continuous, categorical

or both. The binary logistic regression model is defined for p-explanatory variables (i.e.X1, X2…..Xp) is given by

$$\mathbf{\Pi(x)} = \frac{e^{\beta o+\beta 1x1+\beta 2x2+\beta 3x3+\cdots \beta kxk}}{1+e^{\beta o+\beta 1x1+\beta 2x2+\beta 3x3\ldots \beta kxk}}$$

Where, β_0 = the constant of the equation

β_i = the coefficient of the ¡th predictor

An alternative form of the logistic regression equation is;

Π is probability of satisfied and 1-Π probability of not satisfied

$$logit[\pi(x)] = log\left[\frac{\pi(x)}{1-\pi(x)}\right] = \beta o + \beta 1X1 + \beta 2X2 + \ldots . + \beta kXk$$

Logistic regression also produces odds ratio (O.R) associated with each predictor values of a variable. The odds of an event are defined as the probability of an outcome event occur divide by the probability of the event not occurring. In general the odds ratio is one set of odds divide by another.

3.8.2.3 Binary Logistic Regression

Binary logistic regression is the form of regression which is used when the dependent variable is dichotomous and the independent variables are of any type (continuous or categorical).It can be used to predict a dependent variable on the basis of continuous and (categorical independent variables) and to determine the percent of variance in the dependent variable explained by the independents to rank the relative importance of independent variables; to assess the interaction effect and to understand the impact of covariate control variables. But in logistic regression our objective is to find the probability of something happening (probability of success).

Model:-$logit[\pi(x)] = log\left[\frac{\pi(x)}{1-\pi(x)}\right] = \beta o + \beta 1X1 + \beta 2X2 \ldots . . + \beta kXk$

Where: π-the probability of satisfied 1-π-theprobabilityofnot satisfied

Bo –is constant term

Xi-independent(explanatory)variables

Bi- Coefficients of independent variables

Assumptions of binary Logistic Regression

- Normally distributed error terms are not assumed.

- Logistic regression does not assume a linear relationship between the dependent and the independent variables.
- The dependent variable must be categorical.
- Linearity in the logit regression equation should have a linear relationship with the logit form of be the dependent variable.
- Absence of multi-co linearity. Logistic regression requires large sample to guarantee higher level of accuracy.

3.8.3. Variable Selection

Choosing an appropriate variable is the major issue in statistical investigations. Omitting relevant variables that are correlated with regressors causes least squares to be biased and inconsistent. Including irrelevant variables reduces the precision of least squares. So, from purely technical point, it is important to estimate a model that has all of the necessary relevant variables and none that are irrelevant. It is also important to use a suitable functional form. There are a great deal of algorithms and methods to select appropriate variables that should be included in the model; we were used one or some of these algorithms and methods to do this. There are two approaches; Frequents Approaches and Bayesian Approach. However for this study we were focus on the Frequents approach which summarized below. We refer readers for detailed description to see (Hosmer&Lemeshow, 1989).

- **Backwards or forwards selection** - still applied to logistic regression, as that of linear regression with some differences. For instance, no theoretical basis, p-values do not retain their usual meaning, tends to pick models that are much too large, etc.
- **R^2criterion** - Does not apply to logistic regression models, as we do not have the same kind of residuals as in linear models. The logit function, we are really dealing with its generalized linear model. So, using these programs, an R^2 measure can in fact be defined for logistic regression models, but it does not work well, and is seldom used in practice.

  R^2=SSE/SST
- **Adjusted R^2 criterion** – Used when the number of independent variable is greater than one in the same way as with R^2; therefore, adjusted R2 is a better measure than R^2 for a number of covariates.

  R^2adj=1-SSE/SST

3.8.4. Odds Ratio

Logistic regressions work with odds so it is necessary to define both odds and odds ratio. The odds are simply the ratio of the probabilities for the two possible outcomes. If p is the probability that the event will occur, then 1 –p is the probability that the event will not occur: odds=$\frac{p}{1-p}$ (in 2× 2 tables), within row 1 the odds of success are odds1=$\frac{p_1}{1-p_1}$and within row 2 the odds of success equal odds2=$\frac{p_2}{1-p_2}$.The ratio of the odds from the two rows $pi = \frac{odds1}{odds2}$ is called odds ratio. Whereas the relative risk is a ratio of two probabilities, the odds ratio p_i is a ratio of two odds. Interpretation of odds ratio are this$e^{\beta j}$ is the factor by which the odds changes when the jth independent variable increase by one unit, if β_j is positive then the odds increase and if β_j is negative, the odds decrease.

Note: When a logistic regression is calculated, the regression coefficient (β_1) is the estimated increase in the log odds of the outcome per unit increase in the value of the exposure.In other words, the exponential function of the regression coefficient (e^{b1}) is the odds ratio associated with a one-unit increase in the exposure.

When is it used?

Odds ratios are used to compare the relative odds of the occurrence of the outcome of interest. The odds ratio can also be used to determine whether a particular exposure is a risk factor for a particular outcome, and to compare the magnitude of various risk factors for that outcome.

- OR=1predictors does not affect odds of customer satisfaction
- OR>1 predictors associated with higher odds of customer satisfaction
- OR<1 predictors associated with lower odds of customer satisfaction

3.8.5. Parameter Estimation for Logistic Regression

The maximum likelihood and non-iterative weighted least square the two meet computing. Estimation methods used in fitting logistic regression model (Hosmer&Lemeshow, 1989) When the assumption of normality of the predictors does not hold, the non- iterative weighted least square method is less efficient. In contrast the maximum likelihood estimation method is appropriate for estimating the logistic model parameters due to this less restrictive nature of

underlying assumption (Hosmer&Lemeshow, 1989) hence in this study the maximum likelihood estimation technique will be applied to estimate parameters of the model consider the logistic model.

- For estimation of coefficient in logistic we will use (MLE) maximum Likelihood estimation.
- $L(\beta) = \prod_{i=1}^{n} p(x)^{y}(1 - p(x))^{1-y}$
- Where $p(x)^{y}$=probability of success for the different value of x.
- y-is the response variable.
- To estimate the parameter we differentiate the likelihood function with respect to each parameters and equation to zero as follows.
- For constant we find $\frac{\partial L(\beta)}{\partial(\beta o)}$ =0 and
- For the slopes we find the partial derivative of the likelihood function with respect to the parameters and equal to zero $\frac{\partial L(\beta)}{\partial(\beta j)}$=0.

3.8.6 The Wald test statistic

The Wald test is a way of testing the significance of particular explanatory variables in a statistical model. In logistic regression we have a binary outcome variable and one or more explanatory variables. For each explanatory variable in the model there were associated parameters. If for a particular explanatory variable, or group of explanatory variables, the Wald test is significant, then we were conclude that the parameters associated with these variables are not zero, so that the variables should be included in the model. If the Wald test is not significant then the explanatory variables can be omitted from the model.

To test statistically significance of each coefficient β in the model.

- $Z = \frac{\beta}{Se(\beta)}$ Where β= coefficient of regression.
- Se(β)= standard error of the coefficient.
- Z= normal distribution.
- This z value is the squared yielding Wald statistics with a chi-square distribution of 95% CI

3.8.7.0 Goodness Test of the Model

A goodness-of-fit test, in general, refers to measuring how well do the observed data correspond to the fitted (assumed) model. We were using this concept throughout the course as a way of checking the model fit. Like in a linear regression, in essence, the goodness-of-fit test compares the observed values to the expected (fitted or predicted) values. A goodness-of-fit statistic tests the following hypothesis**:**

H_0:themodelM_0fits

H_A: the model M_0 does not fit (or, some other model M_A fits)

Most often the observed data represent the fit of the saturated model**,** the most complex model possible with the given data. Thus, most often the alternative hypothesis (H_A) was represent the saturated model M_A which fits perfectly because each observation has a separate parameter. The goodness of fit or calibration of a model measures how well the π model describes (explains) the dependent variable. Assessing the goodness of fit involves examining how close values predicted by the model with that of the observed value. After fitting the logistic regression model, there are several techniques used in examining the goodness, adequacy and usefulness of the model.

R^2 Statistic

The Cox and Snell measure is based on log-likelihood and considers sample size. The maximum value that the Cox & Snell R^2 attains is less than 1. The Nagelkerke R^2 is an adjusted version of the Cox & Snell R^2 and covers the full range from 0 to 1. The Cox & Snell R^2 is given by:

$$R^2_{CS}=1-\left(\frac{L(\beta^{(0)})}{L(\hat{\beta})}\right)^{2/n} \quad \text{.....(3.12)}$$ The Nagelkerke measure is as follows:

$R^2_N = \frac{R^2_{CS}}{1-(L(\beta^{(0)}))^{2/n}}$, Where, $L(\beta^{(0)})$ is the log likelihood function for model without explanatory variables and $L(\hat{\beta})$ is the log likelihood function for model with estimated parameters.

3.8.8.TheHosmer - Lemeshow Test

The final measure of model fit is the Hosmer-Lemeshow goodness of fit statics, which measure the correspondence between the actual and the predicted value of the dependent variables. The Homers -Lemeshow test is commonly used test for assessing the goodness of fit model and allows for any number of explanatory variables, which may be continuous or categorical. In this case better model fit is indicated by smaller difference in observed and predicted statistic. The logistic model of Hosmer-Lemeshow Statistic (G^2_{HL}) is given by:

$$G^2_{HL}=\Sigma \{\frac{(Oj-Ej)2}{Ej(1-Ej/nj)}\} \sim X2(g-2)$$

Where, n_j = Number of observations in the j^{th}

O_j=observed frequency of j^{th} andE_j=expected frequency of j^{th}

CHAPTER-FOUR

RESULT AND DISCUSSION

4.1 descriptive statistics

Descriptive and binary logistic regression methods were used to measure the effects of predictors that affect on customer satisfaction on commercial bank of Ethiopia in Wolkite university .The descriptive part provides percentages of customer satisfaction and graphs of customer satisfaction in relation to predictorvariables.The response variables considered in this study is customer satisfaction assuming two outcomes (1=satisfied, not satisfied=0) which are indictors of customers satisfaction. The binary logistic regression analysis was used to identify factors that affectcustomer satisfaction and the data were analyzed using SPSS version 20.

Table 4.1 proportion of customer satisfaction

		Frequency	percent
valid	satisfied	126	84.0
	Not satisfied	24	16.0
	total	150	100.0

Table 4.1 above shows that the relative frequency distributions' of the customer satisfaction; from the table 84% of customers satisfied and 16% of them are not satisfied.

TABLE 4.2Distributions of Customer Satisfaction over Selected Independence Variable

		CUSTOMER SATISFACTION			
		Satisfied	Not Satisfied	Total frequency	Person chi-square test
Sex	Male	58(78.4%)	16(21.6%)	74(100%)	3.434(0.064)
	Female	68(89.5%)	8(10.5%)	76(100%)	
Year of customer ship	<1 year	67(89.3%)	8(10.7%)	75(100%)	6.912(0.071)
	<2 year	28(80.0%)	7(20.0%)	35(100%)	

	<4 year	23(85.2%)	4(14.8%)	27(100%)	
	≥4 year	8(61.5%)	5(38.5%)	13(100%)	
Place of Residence	Urban	57(85.1%)	10(83.1%)	67(100%)	0.104(0.742)
	Rural	69(83.1%)	14(16.9%)	83(100%)	
Timeliness	For 2hrs	56(88.9%)	7(11.1%)	63(100%)	5.016(0.171)
	For 3hrs	57(82.6%)	12(17.4%)	69(100%)	
	For 4hrs	9(81.8%)	2(18.2%)	11(100%)	
	For more than 4hrs	4(57.1%)	3(42.9%)	7(100%)	
Availability of connection	Yes	90(89.1%)	11(10.9%)	101(100%)	6.004(0.014)
	No	36(73.5%)	13(26.5%)	49(100%)	
Availability of modern equipment	Yes	99(90.8%)	10(9.2%)	109(100%)	13.524(0.000)
	No	27(65.9%)	14(34.1%)	41(100%)	
Reliability	Yes	100(91.7%)	9(8.3%)	109(100%)	17.79(0.000)
	No	25(63.4%)	14(36.6%)	41(100%)	
Speed of service	Yes	77(90.6%)	8(9.4%)	85(100%)	15.54(0.012)
	No	49(75.4%)	16(24.6%)	65(100%)	
Knowledge of employees	Yes	101(91.0%)	10(9.0%)	111(100%)	6.335(0.000)
	No	25(64.1%)	14(35.9%)	39(100%)	

TABLE 4.2shows that the proportion of customer satisfaction varies by sex. A higher percentage of satisfied was observed with female 68(89.5%) and a lower percentage of satisfied was observed with male 58(78.4%) but 8(10.5%) of female customers and 16(21.6%) of male had not satisfied from commercial bank of Ethiopia in Wolkite University.

For Year:-the highest percentage of satisfied customers are observed in year group (<1 year) 67(89.3%) and lowest percentage satisfied is observed in year group (≥4 year) 8(61.5%) from commercial bank of Ethiopia.

For place of Residence:-The proportion of customers who more satisfied was 57(85.1%) in rural areas while it was 69(83.1%) in urban areas, also the highest proportion of customers who not satisfied was 14(16.9%) in rural and 10(14.9%) of customer is not satisfied was in urban.

For Timeliness:-The proportion of customers was said bank give service only for two hours was 56(88.9%) and bank give service for three hours was 4(57.1%),the proportion of customer bank give service only for four hours was57(82.6%) and bank give service more than four hours was 12(17.4%).

For availability of connection service: -The higher proportion of customers were observed satisfied from availability of connection is 90(89.1%) and a lower percentage was observed in those satisfied from no availability of connection 36(73.5%)

For availability of modern equipment:-The highest percentage of customer was observed satisfied from availability of modern equipment 99(90.8%) as opposed to lowest percentage of customer was observed for no availability of modern equipment is 27(65.9%).

Table 4.2 shows that the proportion of customer satisfaction varies by staff reliability. A higher percentage of satisfied was observed with reliability of staff 100(91.7%) and lower percentage was observed in those no staff reliability 26(63.4%).

Table 4.2 reveals that the customer satisfaction varies by speed of services. The higher percentage of satisfied was observed with speed of services 77(90.6%) opposed to the lowest percentage of customer was observed for speed of service is 49(75.4%). The last determinant that affect customer satisfaction was employees knowledge (assurance).The higher percentage of

satisfied was observed with knowledge of employees 101(91.0%) and the lowest percentage of satisfied was observed with knowledge of employees25 (64.1%)

From table 4.2 variables which had p-value of Pearson chi-square less than α=0.05 was considered to have significance association with customer satisfaction, whereas variables which had p-value of Pearson chi-square a greater than a value of α=0.05 had no significant association with customer satisfaction.

Table 4.2 shows that customer satisfaction has a significant association with availability of enough connection service, availability of enough modern equipment, reliability, speed of service and knowledge of employees. However, sex, year of experience, residence and time of service has no significant association with customer satisfaction at 5% level of significance.

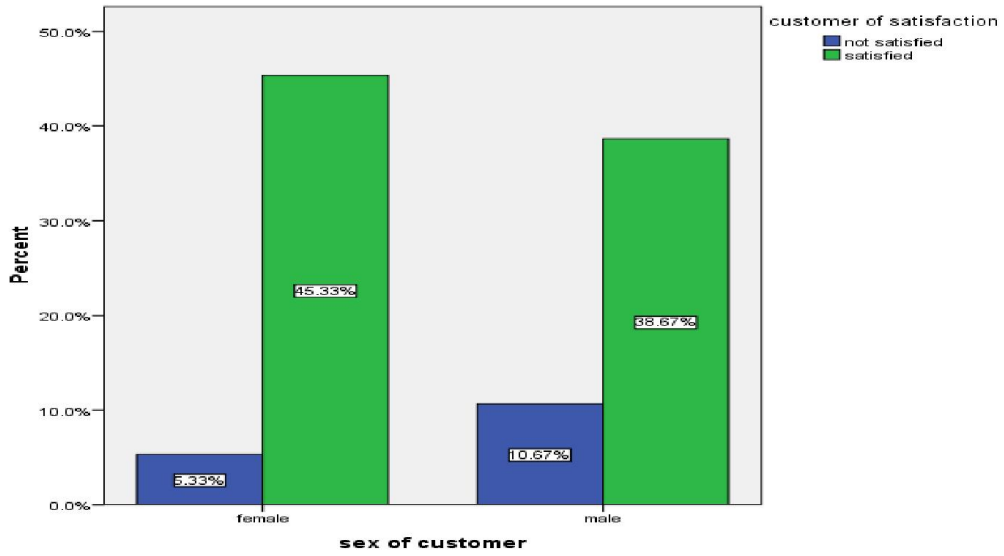

Figure 4.1 Bar chart of customer satisfaction by sex of customer

From the above bar chart one can observethe highest proportion of satisfied customers were female about 45.33% while the lowest proportion of satisfied customer was observed with male (38.67%).

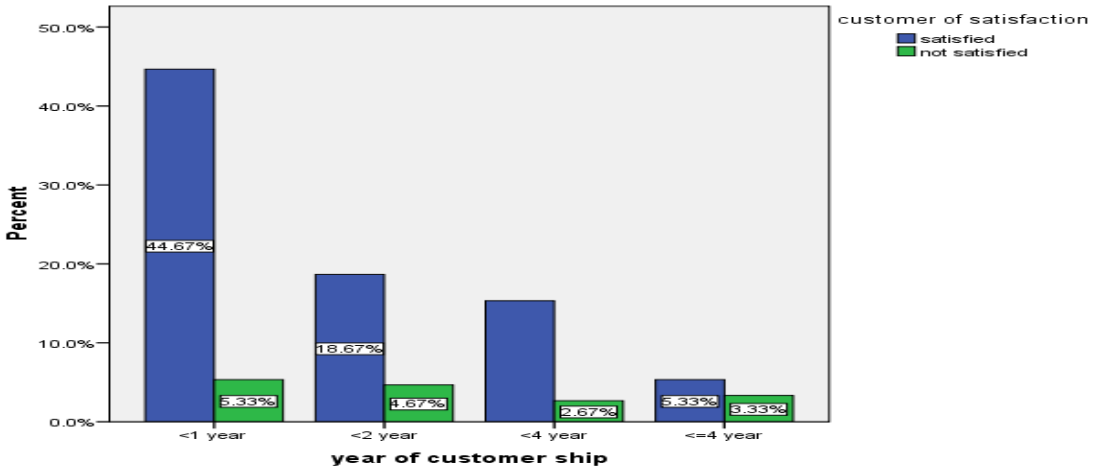

Figure 4.2 bar chart of customer satisfaction by years of customership

The above figure 4.2 shows that the highest proportion of customer satisfied was observed in year group <1 year (44.67%) and lowest proportion of satisfied was observed in year group ≥4 year (5.3%)

4.2 Inferential Statistics

Inferential statistics is the statistical method that deals with making inference or conclusion about the population based on the data obtained from a limited number of observation that come from the population.

4.3 Binary Logistic Regression

Logistic regression examines the relationship between one or more predictor variables and a binary response variable and hence the logistic regression equation can be used to examine how probability of an event changes as predictor variable changes.

Table 4.3 Result of binary logistic regression

Variable	category	B	S.E	Wald	df	Sig	Exp(B)= Odd ratio
Sex [Female as ref.]	Male(1)	.990	.597	2.755	1	.097	2.69
Yearofcustomer	<2 year(1)	-.204	.740	.076	1	.783	.815

ship [<1 year as ref.]	<4 year(2)	-.519	.794	.427	1	.514	.595
	>=4 year(3)	.908	.984	.850	1	.850	2.478
Timeliness [For 2hrs as ref.]	For 2hrs(1)	.936	.676	1.915	1	.166	2.549
	For 3hrs(2)	-.291	1.074	.074	1	.786	.747
	For more than 4hrs(3)	1.283	1.346	.909	1	.341	3.607
Place of residence [Rural as ref.]	Urban(1)	-.228		.127	1	.721	.796
Availability of Connection services [No asref.]	yes(1)	1.283	.640	4.015	1	.045	3.606
Availability of modern equipment(1) [No as ref.]	yes(1)	1.072	.578	3.435	1	.064	2.921
reliability(1) [No as ref.]	yes(1)	1.536	.604	6.471	1	.011	4.644
Knowledge of employment(1) [No as ref.]	yes(1)	1.417	.593	5.706	1	.017	4.124
Speedsof service(1) [No asref.]	yes(1)	.448	.635	.497	1	.481	1.565
Constant		-4.918	.971	25.661	1	.000	.007

Tables 4.3contain the estimated coefficients (under the column heading β)and estimated values of the logistic regression model that predict customer satisfaction. The standard error of estimates (under the column heading S.E) will help in computing the Wald statistics**.** the significance of the Wald statistics (under the column labeled sig) tells the importance of

predictor variable in the model .the column exp (β), is factor by which the odds of customer satisfaction change when the i^{th} independent variable increase by one unit .if the β_i is positive, exp (β_i) was greater than one, which means the odds of customer satisfaction increases. If β_i is negative,exp (β_i) will be less than one, which means the odds of customer satisfaction decreases.

The model can be written as:-

β_1, β_2.....β_P are coefficient of independent variable and β_o is constant (intercept).

Logit (π) =-4.918+1.283x_1+1.536x_2+1.417x_3

Where β_o=-4.918

X_1=availability of enough connection service

X_2=reliability

X_3=knowledge of employees

4.3.1 Interpretation of coefficient significance variable

4.3.1.1 Wald test

Since Wald test is used to test the statistical significance of individual coefficient (β) in the model and the test statistic is a chi-square statistics.

The hypothesis to be tested is:

To conclude that the given coefficient is significant to model based on the following:-

- The chi-square (Wald) statistics must be greater than tabulated statistics (x^2 0.05,1).
- P-values of coefficient are less than the level of significance at α=0.05.

For β_1 the parameter estimation above; the chi-square statistics (Wald) =4.015 is greater than $x^2$0.05,1=3.84 the p-value for the β_1=0.045 is less than 0.05 level of significance. Thus based on this result we see that the coefficient of availability of connection service significant to the model.

For β_2 from parameter estimation above, the chi-square statistics (Wald) =6.471 is greater than $x^2$0.05,1=3.84 the p-value for the β_2=0.011 is less than 0.05 level of significance .thus based on this result we see that the coefficient of reliability is significant to model.

For β_3 from parameter estimation above; the chi-square statistics (Wald) =5.706 is greater than $x^2 0.05,1$=3.84 the p-values for the β_3=0.017 is less than 0.05 level of significance. Thus based on this result we see that the coefficient of knowledge of employees is significant of model.

4.3.1.2. The odds ratio interpretation

we can interpret the odds ratio for variable availability of connection service obtained from above the table using the reference category No .customer satisfaction who follow availability of connection service are 3.606 times more likely than that of the followed No(the reference one) controlling for other variable in the model.

For variable reliability, reference category no. The estimated odd ratio of customer satisfaction who follow category yes are 4.644 times more likely than that of followed category no.for variable knowledge of employees, the reference category is No .the estimated odds ratio of customer satisfaction who follow the category yes are 4.124 times more likely than that followed category no controlling for the other variable in the model.

4.4 Model Adequacy Checking

After a logistic regression model has been fitted, global test of goodness of fit of the resulting model should be performed .It is necessary to see the appropriateness, adequacies and usefulness of fitted model. The most commonly used technique is the likelihood ratio test and the Hosmer-Lemeshow test.

Table 4.3 Classification Table

observed		predicted		
		Customer satisfaction		Percentage correct
		Satisfied	Not satisfied	
Customer satisfaction	Satisfied	126	0	100.0
	Not satisfied	24	0	.0
Overall percentage				84.0

The above table 4.3 is a classification table for the response variable based on how well the model does with only the constant model. Observed is indicates the number of satisfied and not satisfied are the observed value of response variable based on the full logistic regression model. Table 4.3 shows how many subject s are correctly predicted for that customer who are satisfied

with 126 subjects correctly classified, but for those not satisfied with 24 are not correctly predicted. The constant only logistic regression correctly classified 0% of them.

The overall classification for the model is equal to 126/150=84.0% those correctly classified ,a big increase from the constant only model .what this means is that the model has do the good at classified subjects, which actually is expected at this stage of the analysis since we only have the constant term included in the mode

Table 4.9 Hosmer and Lemeshow Test

Chi-square	Degree freedom	significance
9.086	8	0.335

H_O= the model is good fit

H_1= the model is not a good fit

From the above table the Hosmer and Lemeshow test is a measure of fit which evaluate the goodness of fit between predicted and observed probabilities in classifying the response variable. Similar to the -2log likelihood test, we want this squared value (x^2(7, 0.05) =11.688 to be low and none statistically significant (p-value=0.335) if predicted and observed probabilities match up nicely. In this case we see that the test is statistically insignificant (p-value >0.05), suggesting that the fitted logistic regression model is good fit.

4.5 DISCUSSION

This study attempted to determine the factor that affects customer satisfaction on commercial bank of Ethiopia in Wolkite University. The characteristics of customer are estimated based on the sample size of 150 by using simple random sample selection technique. The descriptive analysis like frequency andpercentage, bar chart, chi-square test and binary logistic regression technique were used to analysis data. The result is discussed as follows:

This research explored its aim as much as possible out of 150 customer 126(84.0%) have satisfied and the rest 24(16.0%) have not satisfied from the commercial bank of Ethiopia at wolkite university. on the literature review we can see that the reliability and enough knowledge of staff server are significance influence on the customer satisfaction.

The odds ratios of customer satisfied of who follow availability of connection service are 3.606 times more likely than that of the followed category yes controlling for other variable in the model. This finding seemed to is consistent result with (mesay, 2012) showed the significant effect of availability of connection service in affecting the customer satisfaction.

The estimated odd ratio of customer satisfaction who follow reliability category yes are 4.644 times more likely than that of followed category no. this is in agreement with other finding (Ibanez et al,2006)showed the significant association between reliability are associated with relatively more customer satisfaction.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

This chapter attempts to highlight and summarize the significant contributions of this study. The chapter begins with a conclusion where research questions are answered, then ends with recommendation for future research.

5.1 conclusions

The main objective of this study was to investigate the factors that determine customer satisfaction inWolkite University. From the finding have concluded this study was an attempt to examine the impact of some factors that determine customer satisfaction in Wolkite University. In this analysis we have looked at logistic regression models that can be applied when our outcome is represented by a binary variable. We see in the above interpretation the proportional odds assumption is justified binary regression models can be powerful means of summarizing relationships that utilizes all the information present in the binary outcome. Based on the finding we have got from test of association and binary logistic regression model, we have examined the impact of some of the factors that determine customer satisfaction in Wolkite university and we concluded that timeliness, availability of connection service, availability of modern equipment, reliability, speed of service, and enough knowledge of employees have significant association with customer satisfaction. However, sex, and residencehave no significant association with customer satisfaction. Satisfactory customer service delivery can be achieved if customer complaints are handled appropriately. Moreover, from the result of binary logistic regression it can be concluded that the factors such as with availability of enough connection service, reliability, enough knowledge of employees had statistically significant effect on customer satisfaction.

5.2 RECOMMENDATIONS

On the basis of the findings and conclusions reached, the following recommendations were forwarded to the management of commercial bank of Ethiopia; the bank should exert its utmost effort to meet customers' expectation up to standard. The bank to better satisfy its customers should emphasize on service quality like reliability, speed of service, timeliness, high network availability, and modern equipment. Those are the most important factors to form customer satisfaction. Customer compliant dealing system of the commercial bank of the Ethiopia is contributing moderately towards customer satisfaction. The bank is highly recommended to examine determinants of customer satisfaction and inculcates them within its every day services delivery. The bank have to give more attention for solving the problems towards customer satisfaction like problem of timeliness of service, lack of modern equipment, the problem of speed up of service and etc.

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APPENDIX

WOLKITE UNIVERSITY

COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCE

DEPARTMENT OF STATISTICS

Dear respondent: The aim of these questionnaires to collect data for the research studies "Statistical Analysis of Customers Satisfaction on Service of Commercial Bank of Ethiopia: In Case Of Wolkite University**"**.

Attention: please choose from the given alternative and write your answer for open ended question. So you are requested to fill the questionnaires wisely with great thanks.

I**nstruction**: - please put tick (√) mark in the box provided; do not mark more than one.

1) Male ☐ female ☐
2) Year of experience <1 year ☐ <2 year ☐ <4 year ☐ ≥ 4 year ☐
3) Do you satisfied from commercial bank of Ethiopia? Yes ☐ No ☐
4) Commercial bank of Ethiopia in case of Wolkite University for how much hour gives service at a day? For 2hr ☐ For 3hr ☐ 4hr >4hr ☐ ☐
5) Residence :Urban ☐ Rural ☐
6) Are you satisfied availability of connection services? Yes ☐ No ☐
7) Are you satisfied availability of modern equipment? Yes ☐ No ☐
8) Do you agree that bank provides its services at the time it promises to do so? Yes ☐ No ☐
9) Are you satisfied staff members have the knowledge to answer customer's questions? You ☐ No ☐
10) Do you agree staff always consistently perform their services? Yes ☐ No ☐
11) You are satisfied the availability of the number of front desk? Yes ☐ No ☐

Thank you for your cooperation!

DECLARATION

We, the undersigned declare that this paper is our original work and has not been presented for a degree in any other university and that all sources of material used for the paper have been duly acknowledged.

Declared by:

Name_____

Signature_____

Date_____

Name_____

Signature_____

Date_____

Examiner_____

Signature_____

Date_____

Confirmed by advisor

Name_____

Signature_____

Date_____