UNIVERSITY OF NAIROBI

SCHOOL OF MATHEMATICS

Modeling Job Satisfaction among Call Center Agents: Ordinal Regression Model

By

Njoroge Peter Wainaina

A Dissertation submitted to Faculty of Mathematics University of Nairobi in partial fulfillment of the requirement for the degree of Masters of Science in Social Statistics

July 2012

DECLARATION

This dissertation contains no material which has been accepted for the award of any other degree in any university and to the best of my knowledge I declare that it is my original work.

Student's Name:

Njoroge Peter Wainaina **Reg. No. I56/ 63751/2010**

Signed: ..... Date: 27/07/2012

Declaration by Supervisors

This project has been submitted as a partial fulfillment of the requirements for Masters of Science in Social Statistics of the University of Nairobi with our approval as the university supervisors:

Supervisors:

Mr. John Ndiritu

Signature: _____ Date: 27/7/2012

Dr. Philip Ngare

Signature: _____ Date: 7/8/2012

School of Mathematics
University of Nairobi

DEDICATION

This dissertation is dedicated to my wife and my parents for your continued support and encouragement. God bless all.

ACKNOWLEDGEMENT

I would like to seize this opportunity to personally thank my supervisors Mr. Ndiritu and Dr. Ngare. I cannot express the extent to which their support and understanding allowed me to reach the end of this journey. Their encouragement, support, understanding and, above all, their prompt, constructive and greatly appreciated criticism and feedback, were invaluable to the research, writing and completion of this study.

Special thanks to my wife, family and friends for their support during all the processes. Lastly, am indebted to all the participants who contributed to my work, not only with their responses, but also their suggestions.

ABSTRACT

Job satisfaction in call centers offers a multi-disciplinary approach covering such disciplines as Operations Research and Management, Mathematics and Statistics, Forecasting and Modeling, Industrial Engineering, Information Technology, Human Resource Management, Psychology, and Sociology. In Mathematics and Statistics context, researchers focuses on efficient call center operation and optimal staffing using mathematical modeling and queuing theory. Call centers are identified by a variety of names: contact center, customer service center, customer interaction center, and call center. A call center is basically a communications link between a company and its customers. It is through the call center that customers give feedback on products and services, the network and suggestions on what can be improved as well as appreciation for the service provided as a company. This study expands the use of statistical models - Ordinal Regression Models to an extensive spectrum of thoughts and links various factors affecting job satisfaction. The researcher investigated the relationship between job satisfaction and factors leading to job dissatisfaction. The study found that there many factors affecting job satisfaction among employee on call centers these are communications within the organization, relationship with coworkers, benefit package which are equitable , salary increase and supervision in the organization , recognition through promotion , fair payment for the work , reward given to employee and sense of pride in doing my job .

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE:

INTRODUCTION

1.1 Background to the Study

Job satisfaction in call centers offers a multi-disciplinary approach covering such disciplines as Operations Research and Management, Mathematics and Statistics, Forecasting and Modeling, Industrial Engineering, Information Technology, Human Resource Management, Psychology, and Sociology. In Mathematics and Statistics context, researchers focuses on efficient call center operation and optimal staffing using mathematical modeling and queuing theory. This study focuses on statistical modeling of job satisfaction in call centers.

Call centers are identified by a variety of names: contact center, customer service center, customer interaction center, and call center. A call center is basically a communications link between a company and its customers. It is through the call center that customers give feedback on products and services, the network and suggestions on what can be improved as well as appreciation for the service provided as a company. According to Gilmore (2001) a call centers is typically a physical location, or a virtual operation within a company, where Call Centre Representatives, CCRs often make and receive calls. Inbound calls from customers are primarily concerned with service and support issues, while telemarketing, debt collection, and fundraising account for the majority of outbound calls. CCRs represent the organization and have the potential to directly influence the customers. Thus, CCRs are an integral part of any call center.

In order to procure employment as CCR, one has to have excellent communication and people skills. Being multi-lingual is an advantage if you want to apply for positions at an international call center. Most CCRs are required to work shifts and are required to spend long hours in front of the computer screen. CCRs deal with a huge volume of customer complaints; hence they need to be able to remain calm under very pressurized circumstances.

Being a direct link to the customers, CCRs have to be highly motivated and satisfied with a high level of commitment to the organization to effectively carry out their responsibilities. Often they are

graded lowly as compared to other staff in multi-departmental organizations. As a result they are frustrated and dissatisfied.

The organization chosen for this study (Company A) is a major telecommunications provider in Kenya. This company has toll-free telephone numbers and houses more than 1000 call center agents. The company uses a variety of communications technology such as e-mail, web pages (social media) and telephones as main modes of interaction with its customers. Customers prefer voicing their concerns mainly over the telephone with some becoming more verbally aggressive than they would in other modes of interaction. Thus, call center agents ends up facing the wrath of this customers. Besides, their work is demanding, repetitive and often stressful. Other issues arising from call center agents includes meager pay, job security, social simulation, opportunities for promotion, recognition and appreciation, and opportunity to use one's abilities. These factors are known to cause job dissatisfaction.

The most widely accepted definition of job satisfaction was presented by Locke (1976) as cited by Friday & Friday (2003), who defined job satisfaction as "a pleasurable or positive emotional state resulting from the appraisal of one's job or job experiences". Additionally, job satisfaction can be defined as the "extent to which a person derives pleasure from a job" (Muchinsky, 1993) or the difference between a desired outcome a person receives and the desired outcome the person believes he or she ought to receive (Grobler, *et al*, 2002).

Job satisfaction is a function of satisfaction with different aspects of job, i.e. supervision, pay, works itself, co-workers, promotion, etc., and of the particular weighting or importance one attaches to these respective components. According to Mueller & Kim (2008) there are two types of job satisfaction which are based on the level of employees' feelings regarding their jobs. The first, and most studied, is global job satisfaction, which refers to employees' overall feelings about their jobs. The second is job facet satisfaction, which refers to feelings about specific job aspects, such as salary, benefits, and the quality of relationships with one's co-workers.

This study uses ordinal regression method to model the relationship between the ordinal outcome variable (different levels of job satisfaction) and the explanatory variables (demographics). The

outcome variable for job satisfaction will be measured on an ordered, categorical, and four-point Likert scale— 'disagree very much', 'disagree moderately', 'disagree slightly', 'agree slightly', 'agree moderately', and 'agree very much'. Explanatory variables will include demographics – gender, marital status, education level, age, work schedule and years of service.

Job satisfaction is measured by using a self-reported rating scale. Questionnaires are administered to the employees. Interviews can also be conducted but are time consuming. The questions used to investigate job satisfaction in surveys use a range of specific questions regarding individual facets related to work like salary, advancement, co-workers, education and job security. The answers to individual's attitudes and opinions are usually expressed through an ordered set of categories - a rating scale. A Likert scale (Likert 1932) provides a verbal description of ordered response levels (for example: 5 levels- strongly disagree, disagree, neutral, agree, and strongly agree; 4 levels - 'very dissatisfied', 'dissatisfied', 'satisfied', and 'very satisfied'). There is no agreement on the optimal number of response categories that should be adopted; Krosnick and Fabrigar (1997) favor a seven point scale while Cummins and Gullone (2000) state that using an expanded scale is desirable for the subjective quality of life measurement and that the appropriate scale format may be a 10-point, end-defined scale. In general, if too few scale points are provided respondents will not be able to differentiate among their feelings towards the topic while too many categories may introduce rounding and difficulty to distinguish between adjacent response classes.

According to Spector (1997) the easiest way to measure job satisfaction is by using one of the existing scales as they have already been tried and tested and their reliability and validity already established. However, there is no one best measure of job satisfaction (Muchinsky, 1993) and the researcher therefore should use the one that measures the facets of job satisfaction relevant to the study.

The most common job satisfaction measurement scales are Job Descriptive Index, Job in General Scale, Minnesota Satisfaction Questionnaire, Career Satisfaction Measure and Job Satisfaction Survey.

Job Descriptive Index (JDI): The Job Descriptive Index (JDI) is one such scale used in job satisfaction surveys. It was originally developed by Smith, Kendall and Hulin (1969) and later

revised by Smith (1985) and has been widely used and researched for over 40 years. It is extremely easy to use with all types of respondents and one of the most popular job satisfaction survey instruments (DeMeuse 1985; Zedeck 1987). The JDI measures five specific facets of job satisfaction namely, satisfaction with work itself, supervision, pay, promotions and co-workers. Each individual facet comprises of either 9 or 18 items. The test-re-test reliability of 0.57 for this scale was reached after a 16-month interval and researchers felt this score was high enough "to justify the JDI in longitudinal studies because satisfaction can change over time" (Muchinsky, 1993, p. 297). However, JDI uses only 5 factors only. In addition, the researcher deemed the questioning to be too long and complex to be answered easily by the respondents.

Job in General Scale (JIG): JIG is similar to JDI. The JDI, introduced 1969 by Smith, Kendall, & Hulin, was modified in 1985 by the JDI Research Group. In 1996, the JDI Research Group improved this method. The criteria for selecting the final 18 items were high factor loadings on the first principal factor, and high item-total correlations. JIG is quick and easy to use, but does not give information regarding specific factors affecting job satisfaction.

Minnesota Satisfaction Questionnaire (MSQ): According to Muchinsky (1993), MSQ is the second most popular scale. It was developed by Weiss, Dawis, England and Lofquist in 1967. The long form of this survey is made up of 100 questions based on 20 sub scales which measure satisfaction with "ability, utilization, achievement, activity, advancement, authority, company policies and practices, compensation, co-workers, creativity, independence, moral values, recognition, responsibility, security, social service, social status, supervision-human relations, supervision-technical variety, and working conditions" (Fields, 2002, p.7). There is a short version of the MSQ which consists of 20 items. The short form can be completed in about 5 minutes while the long form can be completed in 15 to 20 minutes. Although both the short and long forms provide job satisfaction estimates, the long form provides much more information for the short additional administration time required. While the MSQ is more time consuming than the JDI, four of its scales corresponds with that of the JDI (Muchinsky, 1993). MSQ is reliable, easy to use and understand; offers valid measure of job satisfaction and it is applicable to any organization as well as applicable for managers, supervisors, and employees. However, it is very long and as a consequence time consuming when collecting and analyzing data for a research project, and not really meaningful to have information on each of the 20 different facets of satisfaction.

Career Satisfaction Measure: It was developed by Greenhaus, Parasuraman, and Wormley in 1990. This is a measure of career success, as opposed to job satisfaction, thus eliminated. It assesses general satisfaction with career outcome, but also satisfaction with career progress (Fields, 2002).

Job Satisfaction Survey - JSS: It was developed by Spector in 1985 and measures nine facets of job satisfaction along with an overall assessment arriving at a score. The job facets include pay, promotion, supervision, benefits, contingent rewards, operating procedures, co-workers, nature of work and communication. Each of the 9 subscale produces an individual facet score by combining responses to its 4 items, thus equating to a total of 36 questions. It consist other questions like age and gender for ease in segmentation if required. This study adopted this scale and more of JSS is discussed under methodology and the questionnaire appended in appendix 2.

1.2 Statement of the Problem

While there has been generally some research on job satisfaction in call centers, there lacks intensive research on this topic in its relation to Kenyan context. The Information generated by these studies has realistic inference for both the organization and the individuals. Organizations are always faced with challenge of high operating costs while the employees strive to get quality life. Hence job satisfaction is both critical and desired. It is this gap in knowledge that this study seeks to address.

1.4 Significance of the Study

One of the major assets of an organization is the people that it employs. This is because an effective organization aims to involve good work performers. The finding of the study would help the call center management to make informed strategic decision on job satisfaction. In addition, this study will add to the existing knowledge on application of statistical models in analysis of job satisfaction as well as forming a foundation for further research on job satisfaction.

1.5 Objectives of the Study

The main objective is to study job satisfaction in context to call centers.

The specific objectives are: -

- To investigate the explanatory factors influencing job satisfaction in call centers
- To model the satisfaction of call center representatives using Ordinal Regression

1.6 Disposition of the Report

This report is divided into five chapters. In the first chapter the background of the selected research area is presented followed by the statement of the problem and ends with significance of the study and study objectives. In chapter two previews of studies related to the topic will be presented. Methodology is comprehensively detailed in chapter three. Chapter four presents the analysis of data gathered though questionnaire. Lastly in chapter five conclusion, recommendations and areas for further research.

CHAPTER TWO:

LITERATURE REVIEW

Different statistical methods such as descriptive statistics, chi-square, linear regression, multilevel modeling, and ordinal regression techniques have been commonly found in the literature to analyze satisfaction questionnaires to study satisfaction in relation to various explanatory variables. These methods investigate the association between the explanatory variables and the outcome variable.

Descriptive statistics commonly used in relation to satisfaction are means, modes, percentages, and frequency counts. They detect either high or low levels of satisfaction. According to a student satisfaction survey conducted by Noel-Levitz Company (Cooney, 2000) respondents rated highest satisfaction on responsiveness to diverse populations, registration effectiveness, and academic services, while rating the lowest satisfaction on admissions and financial aid, academic advising, and campus support services. Another research to study job satisfaction among the employees of state bank of India in Coimbatore city, Sukumar (2000) assigned three levels of satisfaction namely high, medium and low and classified those who had obtained up to 30 counts under low satisfaction category, respondents with 30 – 45 counts were classified under medium satisfaction category and those with more than 45 counts were classified under high satisfaction category. The satisfaction levels based on percentage counts were High 23%, Medium 54% and Low 23%. Descriptive statistics only detect the most and the least satisfactory items but does not give the degree of association. Ravikumar (1985) in a study on job satisfaction among workers in Chemical Unit interviewed 60 workers on the basis of sex, age, educational qualification, experience, monthly income, marital status and family income. He adopted percentage method of tabulation to find job satisfaction.

Regression methods (such as linear, logistic, and ordinal regression), Chi-square and multilevel modeling techniques are generally utilized to investigate the association between multiple explanatory variables (e.g. partial quality attributes) and dependent variable (e.g., overall quality of service). These methods also permit researchers to estimate the magnitude of the effect of the explanatory variables on the outcome variable. If researchers wish to study the effect of explanatory

variables on all levels of the ordered categorical outcome, an ordinal regression method must be appropriately chosen to obtain the valid results (Chau-Kuang & Hughes, 2004).

According to a study *Student Retention and Satisfaction* Bailey, et al (1998) used cross tabulation and chi-square techniques to predict college student retention based on satisfaction. A strong relationship between student satisfaction and retention was found on 40 of the 68 questions (59%). Richard and Francisco (2009) used regression analysis to examine the variance in the employee satisfaction dependent variable uniquely explained by independent variable constructs. The study employed backward multiple regression method to test the study hypotheses. This process for variable selection identifies the set of variables that explain most of the variability in the dependent variable. Backward elimination starts with the full model (including all variables) and sequentially removes independent variables from the model if the significance level of the partial correlation F-value is less than 0.10. The procedure stops when there are no variables in the equation with an F-value less than 0.10 (Freund & Wilson, 2003). Regression results indicated that there were strong relationships between the dependent variable (Employee Satisfaction) and the six independent variables for both females and males. Regression model coefficients for all independent antecedent variables in both models were also significant at $p<0.001$.

Using a multilevel modeling technique to analyze survey data, one study (Umbach and Porter, 2001) examined the impact that different departments have on student satisfaction in a large research university. The research finding revealed that characteristics of departments such as size, faculty contact with students, research emphasis, and proportion of female students had a significant impact on education satisfaction within major. A study on Graduates' Job Satisfaction (Leonardo and Carla, 2005) using Multilevel Analysis fitted a model by using maximum likelihood with adaptive numerical integration. The study fitted five univariate ordinal *probit* variance component models first and the between proportion of variance was significantly different from zero for all items. Secondly the estimation of the matrix of product-moment correlations among the latent variables was done and whose entries are all significant. Then an exploratory maximum likelihood factor analysis was performed on this matrix. The results of this analysis suggest the presence of two factors: a *cultural* factor (labeled *Factor 1*), that explains chiefly the *Consistency-Professionalism-Interests*

correlations, and a *status* factor (labeled *Factor 2*), explaining mainly the *Earning-Career* correlation.

A study by Hummel and Lichtenberg (2001) was used to estimate the probabilities of the four ordinal categories ("worse", "can't tell", "better", and "much better") of client improvement in a counseling center. The research findings showed that the five explanatory variables significantly associated with the probability of an outcome category. These variables included previous experience as a client; readiness to change; level of symptomatic and interpersonal distress; pre-counseling clinical status; and the number of counseling sessions in which a client might be involved.

However, compared to these study methods, the ordinal regression method seems to be the most suitable and practical technique to analyze the effects of multiple explanatory variables on the ordinal outcome that cannot be assumed as continuous measure and normal distribution (Chau-Kuang & Hughes, 2004). Researchers do not need to alter an ordinal outcome as binary or dichotomous measure for logistic regression analysis, which may lead to the loss of inherent information. The ordinal regression method is discussed in depth in chapter three.

CHAPTER THREE:

METHODS

3.1 Sampling and Sample

The researcher used the idea of sampling to collect some of the elements of the population. The rationale for using this sampling method is due to lower cost, greater accuracy of results, speedy data collection and availability of population selection. In this sampling design, sampling elements are randomly selected and the probability of being selected is determined ahead by the researcher. If properly executed, the sample selected is representative of the population.

Two hundred and fifty questionnaires were dispatched and the response rate was 86% (215 questionnaires). They were randomly distributed to the agents working in three shifts – Morning, afternoon and night shifts. The total populace in the studied call center 1500. Participation was on voluntary basis. Participants were provided with a written explanation outlining the purpose of the study. To protect confidentiality and anonymity, respondents were not be required to provide their names.

3.2 Measuring Instruments

The Job Satisfaction Survey (JSS)

This study used an existing job satisfaction questionnaire - The Job Satisfaction Survey – JSS (Appendix 2). Job Satisfaction Survey covers major facets of satisfaction. It covers 9 facets of job and has also been used a sufficient number of times to provide norms (Michelle 2006). It also saved the researcher the additional cost and time of developing a scale from scratch. However, JSS is limited to only those facets that the developers choose to place in their instruments. This study thus made adjustments to the JSS questionnaire to include more specific areas of satisfaction or dissatisfaction as pertaining to call center job satisfaction.

The reliability of the JSS can be evaluated in terms of internal consistency reliability and test-retest reliability. The former refers to how well the items of a scale relate to each other and for that, the JSS scores range between 0.60 and 0.91. According to Spector (1997), the accepted minimum standard is

0.70. Test-retest reliability "reflects the stability of the scale over time" (Spector, 1997, p.11) and in this area the JSS scores range between 0.37 and 0.74, which is relatively stable since the time-span was eighteen months and during this time several major changes occurred (Table 2.1 and 2.2).

Table 1: Internal Consistency Reliability for the Job Satisfaction Survey

Subscale	Internal Consistency Reliability by P. *Spector*[a]	
	Coefficient Alpha	Test-Retest Reliability
Pay	0.75	0.45
Promotion	0.73	0.62
Supervision	0.82	0.55
Benefits	0.73	0.37
Contingent rewards	0.76	0.59
Operating procedures	0.62	0.74
Coworkers	0.60	0.64
Nature of work	0.78	0.54
Communication	0.71	0.65
Total	0.91	0.71
Sample size	2,870	

(a) Test – retest reliability was assessed over an 18 month time span, sample size was 2870 (Spector, 1997).

Table 2: Total norms for the Job Satisfaction Survey

Subscale	Total Norms by P. *Spector*[b]	
	Mean	Std. Deviation
Pay	11.8	2.6
Promotion	12.0	1.9
Supervision	19.2	1.5
Benefits	14.2	2.2
Contingent rewards	13.7	2.0
Operating procedures	13.5	2.2
Coworkers	18.3	1.1
Nature of work	19.2	1.3
Communication	14.4	1.8
Total	136.5	12.1

(b) Norms based on 8113 individuals from 52 samples (Spector, 1997).

Validity on the other hand "concerns our interpretation of what a scale actually assesses: That is, does our job satisfaction scale assess people's feelings concerning their jobs" (Spector, 1997, p.6). Five of the JSS scales correlate well with the corresponding sub-scales of the JDI and these correlations range from 0.61 for co-workers to 0.80 for supervision. The JSS has been used in South Africa (Westaway, Wessie, Viljoen, Booysen and Wolmarans, 1996) and in Africa (Okpara, 2002) as an acceptable scale for measuring job satisfaction. Westaway et al. (1996) concluded that the JSS was a useful measure of job satisfaction. Since the scales of the JSS correlates well with those of the JDI it can be deduced that the JSS is also an acceptable scale to use for measuring job satisfaction in South Africa. Therefore the researcher is able to use the JSS in the present study.

Job satisfaction is usually measured using a self-reported rating scale. The questions used to investigate job satisfaction in surveys can be referred to the overall job satisfaction, or use a range of specific questions regarding individual facets related to work, like pay, promotion, co-workers, education/job mismatches and job security, to study different aspects that can influence the global on-the-job satisfaction. In general, questions on individual's attitudes and opinions try to measure an underlying continuous latent variable, but for practical reasons the answer is usually expressed through an ordered set of categories, presented as a rating scale. In particular, with respect to questions where the respondent is asked to provide his/her agreement to a statement the usual reference is the Likert scale (Likert 1932) that provides a verbal description of ordered response levels (for example: strongly disagree, disagree, neither agree nor disagree, agree, strongly agree). The scale used to measure job satisfaction may be also coded as a numerical rating.

According to Cranny et al., 1992; Ellingson et al., 1998 cited in Moshavi &Terborg, 2002 study on satisfaction and performance demographic variables of age, race and gender should be included as controls. In addition, demographic variables influence job satisfaction (Moshavi &Terborg, 2002) and thus the study will include demographic profile of agents.

The questionnaire consisted of two parts, namely Demographic Information (which included: age, gender, marital status, educational degree, years of service, working schedule) and job satisfaction instrument constituted of a six-point Likert scale with 36 statements.

3.3 Empirical models for job satisfaction

3.3.1 Generalized Linear Model

Generalized linear models (GLMs) extend ordinary regression models to encompass non-normal response distributions and modeling functions of the mean. Three components specify a generalized linear model: A *random component* identifies the response variable Y and its probability distribution; a *systematic component* specifies explanatory variables used in a linear predictor function; and a *link function* specifies the function of $E(Y)$ that the model equates to the systematic component.

Components of Generalized Linear Models

The *random component* of a GLM consists of a response variable Y with independent observations $(y_1, \dots y_N)$ from a distribution in the natural exponential family. This family has probability density function or mass function of form

$$f(y_i;\, \theta_i) = a(\theta_i)\, b(y_i)\, exp[y_i\, Q(\theta_i)] \qquad (3.1)$$

Several important distributions are special cases, including the Poisson and binomial. The value of the parameter θ_i may vary for $i = 1, \dots, N$ depending on values of explanatory variables. The term $Q(\theta_i)$ is called the *natural parameter.*

The *systematic component* of a GLM relates a vector $(\tau_1, \dots, \tau_N)$ to the explanatory variables through a linear model. Let X_{ij} denote the value of predictor j $(j = 1, 2, \dots, p)$ for subject i. Then

$$\tau_i = \sum_j \beta_j X_{ij}, \quad i = 1,2, \dots N \qquad (3.2)$$

This linear combination of explanatory variables is called the *linear predictor.* Usually, one $X_{ij} = 1$ for all i, for the coefficient of an intercept (often denoted by α in the model)

The third component of a GLM is a *link function* that connects the random and systematic components. Let $\mu_i = E(Y_i), i = 1,2, \dots N$. The model links μ_i *to* τ_i *by* $\tau_i = g(\mu_i)$ where the link function g is a monotonic, differentiable function. Thus, g links $E(Y_i)$ to explanatory variables through the formula

$$g(\mu_i) = \sum_j \beta_j X_{ij}, \quad i = 1,2, \dots N \qquad (3.3)$$

The link function $g(\mu) = \mu$ called the *identity link*, has $\tau_i = \mu_i$. It specifies a linear model for the mean itself. This is the link function for ordinary regression with normally distributed Y. The link function that transforms the mean to the natural parameter is called the *canonical link*.

3.3.2 Ordinal Regression model

The ordinal logistic model is one of many models subsumed under the rubric of generalized linear models for ordinal data. Generalized linear models are a very powerful class of models, which can be used to answer a wide range of statistical questions.

The basic form of the generalized linear model is:

$$link(\gamma_{ij}) = \vartheta_j - [\beta_1 x_{i1} + \beta_2 x_{i2} + \cdots + \beta_k x_{ik}] \quad (3.4)$$

Where $link(\,)$ is the link function, γ_{ij} is the cumulative probability for the j^{th}category for the i^{th} case, $\vartheta_j$is the threshold for the j^{th} category, k is the number of regression coefficients, $\beta_1, \beta_2, \ldots, \beta_k$are the regression coefficients and $x_{i1}, x_{i2}, \ldots, x_{ik}$are values of the predictors for the i^{th} case.

The ordinal regression model may be written in the form as follows if the logit link is applied.

$$f[\gamma_j(x)] = \log\left[\frac{\gamma_j(x)}{1-\gamma_j(x)}\right] \quad (3.5)$$

$$= log\left[\frac{P(Y \le y_j|X)}{P(Y > y_j|X)}\right] = \vartheta_j + \beta X \quad (3.6)$$

Where $j = 1, 2, \ldots, k-1$, and $\gamma_j(x) = \frac{e^{(\vartheta_j + \beta X)}}{1+e^{(\vartheta_j + \beta X)}}$, where j indexes the cut-off points for all categories (k) of the outcome variable. If multiple explanatory variables are applied to the ordinal regression model, $\beta_1 X_1$ is replaced by the linear combination of $\beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_p X_p$

The function $f[\gamma_j(x)]$ is called the link function that connects the systematic components (i.e. $\vartheta_j + \beta X$) of the linear model. The ϑ_j represents a separate intercept or threshold for each cumulative probability. The threshold (ϑ_j) and the regression coefficient (β) are unknown parameters to be estimated by means of the maximum likelihood method.

Important notes on the generalized linear model are:

- This model is based on the notion that there is some latent continuous outcome variable, and that the ordinal outcome variable arises from discretizing the underlying continuum into ordered groups. The cut-off values that define the categories are estimated by the thresholds. In some cases, there is good theoretical justification for assuming such an underlying distribution. However, even in cases in which there is no theoretical concept that links to the latent variable, the model can still perform quite well and give valid results.

- The thresholds or constants in the model (corresponding to the intercept in linear regression models) depend only on which category's probability is being predicted. Values of the predictor (independent) variables do not affect this part of the model

- The prediction part of the model depends only on the predictors and is independent of the outcome category. These first two properties imply that the results were a set of parallel lines or planes-one for each category of the outcome variable.

- Rather than predicting the actual cumulative probabilities, the model predicts a function of those values. This function is called the link function, and you choose the form of the link function when you build the model. This allows you to choose a link function based on the problem under consideration to optimize your results

There are three major components in ordinal regression model, namely Location Component, Scale Component and Link Function. The Location Component is the portion of the equation that includes the coefficients and predictor variables. It uses the predictor variables to calculate predicted probabilities of membership in the categories for each case.

The Scale Component is an optional modification to the basic model to account for differences in variability for different values of the predictor variables. For example, if certain groups have more variability than others in their ratings, a scale component is used to account for this improved the model. The model with a scale component follows the form below

$$link(\gamma_j) = \frac{\theta_j - [\beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k]}{\exp[\tau_1 z_1 + \tau_2 z_2 + \cdots + \tau_m z_m]} \quad (3.7)$$

Where γ_j is the cumulative probability for the j^{th} category, θ_j is the threshold for the j^{th} category, $\beta_1, \beta_2, \ldots, \beta_k$ are the regression coefficients, $x_1, x_2, \ldots, x_k$ are the predictor variables, and k is the number of predictors.

The Link function is a transformation of the cumulative probabilities that allows estimation of the model. It is the function of the probabilities that results in a linear model in the parameters and defines what goes to the left side of the equation. It is also the link between the random component on the left side of the equation and the systematic component on the right. Five different link functions are available in the Ordinal Regression procedure, namely Logit, Complementary log-log, Negative log-log, Probit and Cauchit (inverse Cauchy).

Table 3.3: The Five Different Link Functions

Function	Form	Typical application
Logit	$\ln\left(\frac{\gamma}{1-\gamma}\right)$	Evenly distributed categories
Complementary log-log	$ln(-\ln(1-\gamma))$	Higher categories more probable
Negative log-log	$-\ln(-\ln(\gamma))$	Lower categories more probable
Probit	$\emptyset^{-1}(\gamma)$	Analyses with explicit normally distributed latent variable
Cauchit (inverse Cauchy)	$\tan(\pi(\gamma - 0.5))$	Outcome with many extreme values

Probit and logit models are reasonable choices when the changes in the cumulative probabilities are gradual. If there are abrupt changes, other link functions should be used. The complementary log-log link may be a good model when the cumulative probabilities increase from 0 fairly slowly and then rapidly approach 1. If the opposite is true, namely that the cumulative probability for lower scores is high and the approach to 1 is slow, the negative log-log link may describe the data. If the complementary log-log model describes the probability of an event occurring, the log-log model describes the probability of the event not occurring. There is no clear-cut method to distinguish the

preference of using different link functions. However, the logit link is generally suitable for analyzing the ordered categorical data evenly distributed among all categories. The clog-log link may be used to analyze the ordered categorical data when higher categories are more probable. In ordinal regression analysis, we used the Clog-log link function to build our model that is generally suitable for analyzing the ordered categorical data with higher categories more probable among all categories. (SPSS, Inc., 2002).

3.3.3 Complimentary Log-log (Clog-log) Link Function

Clog-log link function was used to build the models as it is suitable for analyzing the ordered categorical data with higher categories more probable among all categories. Clog-log link function was used in SPSS statistical package for ordinal regression modeling because the data that was gathered for analysis had dependent ordinal variable with equal categories. The Clog-log link function is of the form;

$$f[\gamma_j(x)] = log\{-log[1-\gamma_j(x)]\} \quad = log\left\{\frac{P[Y=\gamma_j/X]}{P[Y>\gamma_j/X]}\right\} \quad = a_j + \beta X \tag{3.8}$$

and $\gamma_j(x) = 1 - e^{-e^{(a_j+\beta x)}}$

where $j = 1, 2, \ldots, k-1$ and j indexes the cut-off points for all categories of the outcome variable. When multiple explanatory variables are involved in the ordinal regression model, the linear combination of $\beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k$ is substituted for $\boldsymbol{BX}$. The term complementary function comes from $1 - \gamma_j(x)$. Thus, the name of the complementary log-log link function is derived from $log\{-log[1-\gamma_j(x)]\}$.

Since the ordinal Clog-log model is nonlinear, transformation should be on the dependent variable, which equals to the linear form of $a_j + \beta X$. The ordinal regression model with the Cloglog link is called the continuation ratio model because it is a ratio of the two conditional probabilities, for example, $P(Y = y_j \mid X)$ to $(Y > y_j \mid X)$. The model with the clog-log link is also called the proportional hazard model because the relationship between the explanatory variables and the ordinal outcome is independent of the category (Chau-Kuang & Hughes, 2004).

The coefficients in the ordinal regression model depict how much the Clog-log changes based on the values of the predictor variables. Statistical fittings that were analyzed are; parameter estimates table

with location variable that gives the coefficient for the independent variable for the specified link function in ordinal regression, factor summary table that depicts that the general question ordinal scale distribution in percentage on respondents, model fitting information table that checks the presence of a relationship between the dependent variable and combination of independent variables was based on the statistical significance of the final model, goodness of fit information table with Pearson chi-square test that gives the information about how many predicted cell frequencies differ from observed frequencies, Test of parallel lines that was designed to make judgment concerning the model adequacy.

The essential features of the ordinal regression model regardless of any link function may be briefly described. First, the outcome variable of interest is a grouped and ordered category that may be regrouped from an unobserved continuous latent variable (Scott, et al., 1997). However, it is not clear whether the ordinal outcome is equally spaced. Second, the ordinal regression analysis employs a link function to describe the effect of the explanatory variables on ordered categorical outcome in such a way that the assumptions of normality and constant variance are not required (McCullagh & Nelder, 1989). Third, the model assumes that the relationship between the explanatory variables and the ordinal outcome is independent of the category because the regression coefficient does not depend on the categories of the outcome variable. In other words, the model assumes that the corresponding regression coefficients in the link function are equal for each cut-off point (Bender and Benner, 2000). Hence, the violation of the model assumption 'parallel lines' has to be verified carefully by the test of parallel lines (SPSS, Inc., 2002). The 36 explanatory variables were interrelated and classified into the five pre-determined factors, namely; communication, supervision, rewards, promotion and salary

3.4 Measures of Fit

There is no convincing evidence that selection of a model that maximizes the value of a given measure necessarily results in a model that is optimal in any sense other than the model having a larger (or smaller value) of that measure (Long & Freese 2001). However, it is still helpful to see any differences in their level of goodness of fit, and hence provide us some guidelines in choosing an

appropriate model. This study uses four scalar measures of model fit: Pseudo R-Square, Cox & Snell, and Nagelkerke.

Pseudo R-Square

In ordinal regression models, these measures were based on likelihood ratios rather than raw residuals. There are several measures intended to mimic the R-squared analysis, but none of them are an R-squared. The interpretation is not the same, but they can be interpreted as an approximate variance in the outcome. Three different methods will used to estimate the coefficient of determination. McFadden's, the ratio of the likelihoods suggests the level of improvement over the intercept model that is model without predictors offered by the full model that is the model with predictors. A likelihood falls between 0 and 1, so the log of a likelihood is less than or equal to zero. If a model has a very low likelihood, then the log of the likelihood will have a larger magnitude than the log of a more likely model. Thus, a small ratio of log likelihoods indicates that the full model is a far better fit than the intercept model. If comparing two models on the same data; **McFadden's** would be higher for the model with the greater likelihood.

$$R^2 = \frac{\ln \hat{L}\,(M_{full})}{\ln \hat{L}\,(M_{intercept})} \tag{3.9}$$

Where $M_{full} = Model\ with\ predictors,\quad M_{intercept} = model\ without\ predictors$ and $\hat{L} = Estimated\ likelihood$

Cox & Snell

$L(M)$ is the conditional probability of the dependent variable given the independent variables. If there are n observations in the dataset sample, then $L(M)$is the product of n such probabilities. Thus, taking the n^{th}root of the product $L(M)$provides an estimate of the likelihood of each dependent value. Cox & Snell's presents the R-squared as a transformation of the $-2\ln\left\{\frac{L\,(M_{intercept})}{L\,(M_{Full})}\right\}$ statistic that is used to determine the convergence of a logistic regression. If the full model predicts the outcome perfectly and has a likelihood of 1, Cox & Snell's is then $1 - L(M_{intercept})^{2/n}$ which is less than one.

$$R^2 = 1 - \left\{\frac{L\,(M_{intercept})}{L\,(M_{Full})}\right\}^{2/n} \tag{3.10}$$

Nagelkerke

To achieve this, the Cox & Snell R-squared is divided by its maximum possible value, $1 - L(M_{intercept})^{2/n}$ then, if the full model perfectly predicts the outcome and has a likelihood of 1, Nagelkerke R-squared = 1.

$$R^2 = \frac{1-\left\{\frac{L(M_{intercept})}{L(M_{Full})}\right\}^{2/n}}{1-L(M_{intercept})^{2/n}} \quad (3.11)$$

3.5 Model Assumptions

Parallel Lines

One of the assumptions underlying ordinal regression is that the relationship between each pair of outcome groups is the same. In other words, ordinal regression assumes that the coefficients that describe the relationship between, say, the lowest versus all higher categories of the response variable are the same as those that describe the relationship between the next lowest category and all higher categories, etc. This is called the proportional odds assumption or the parallel regression assumption. Because the relationship between all pairs of groups is the same, there is only one set of coefficients. Thus, in order to assess the appropriateness of the model proportional odds assumption is normally evaluated (O'Connell, 2000).

Adequate Cell Count

As per the rule of thumb, 80% of cells must have more than 5 counts. No cell should have zero count as it is considered as a missing value and excluded from the study. The large percentage of cells with missing data could lead to a decrease of actual sample size from the model construction or an inaccurate Chi-square test for the model fitting, since the model goodness-of-fit is usually dependent of chi-square test. The chi-square test normally depends on the sample size (Agresti, 2002).

3.7 Data validity

To ensure validity of the study, questionnaire will be pre-tested before starting actual data collection and data will be collected within one week, within which no major event is expected to change the respondents' opinion.

3.8 Data Analysis

After collecting the data, the process of analysis will begin. Statistical tools of Microsoft excel, SPSS and R will be used for data input and analysis. The Spearman Rank Correlation matrix will be used to show the correlation followed by the p-value (level of significance) and whether the correlation is different from zero.

CHAPTER FOUR:

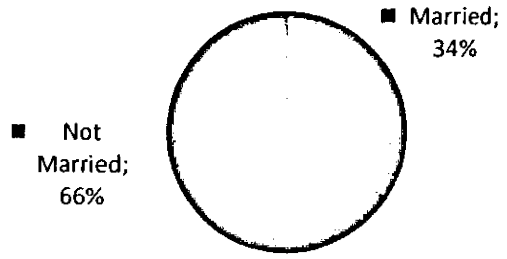
RESULTS

4.1 Exploratory Data Analysis

The following chapter presents data analysis and the results attained. The chapter has three sections, demographic information that gives the respondent general information, descriptive analysis on job satisfaction survey and the model for modeling job satisfaction.

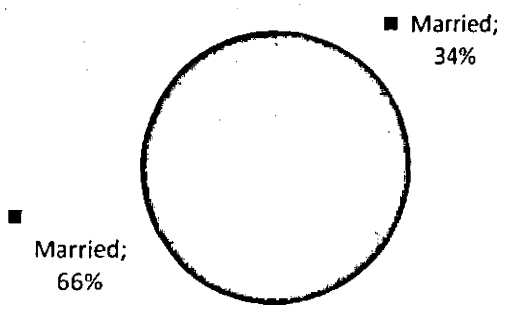
4.2 Demographic Information

Figure 4-1: Gender of the Respondent



There were a total of 113 female respondents (52.6%) and a total of 102 male respondents (47.4%). This is an indication that both genders were involved in the study in almost equal proportion and thus the study was free from gender biasness.

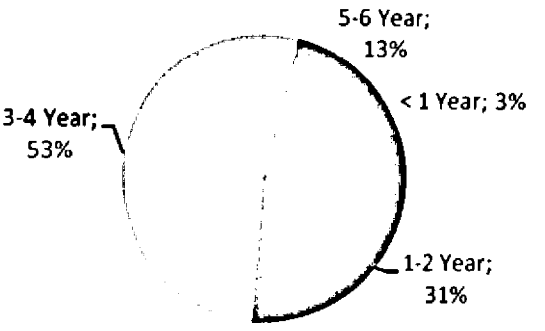
Figure 4-2: Marital Status of the Respondent



On the respondents' marital status, the study found that two thirds of the respondents (66.0%) were

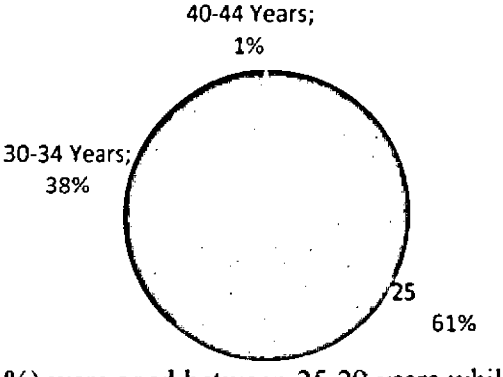
not married whereas only a third (34.0%) was married

Figure 4-3: Education Level of the Respondent



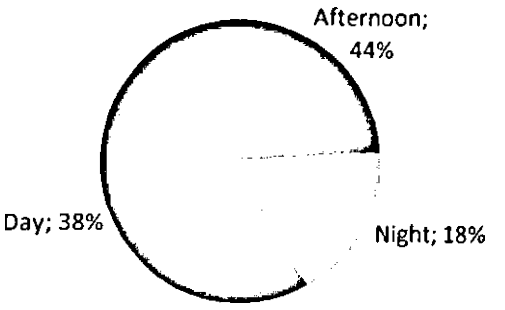
In terms of education levels, 126 respondents (58.6%) had at least attained bachelor's degree, 69 (32.1%) hold at least a diploma, while those with at least a certificate and Masters were 13 (6%) and 7 (3.3%) respectively. This is an indication that all the respondents had attained tertiary level of education.

Figure 4-4: Distribution of Respondent by Age



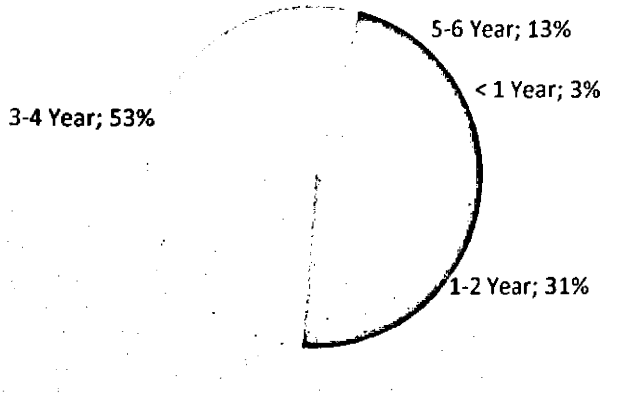
Majority of the respondent (61.4%) were aged between 25-29 years while less than 1% were over 40 years.

Figure 4-5: Schedule of Work



On the respondent schedule, the study found that 38.6% of the respondents indicated that they worked during day hours, 43.7% of the respondent indicated that they work in the afternoon whereas 17.7% of the respondent indicated that they worked during night shifts, this an indication that respondent were well distributed in all work schedules.

Figure 4-6: Years of Service in the Organization



From the findings on the respondent years of service with their organization, the study found that 53% indicated 3 to 4 years, 31.2% of the respondents indicated 1 to 2 years, 12.6% of the respondent indicated 5 to 6 years whereas 3.3% of the respondent indicated less than one year, this is an indication that most of the respondent had worked in their organization long enough to understand it and give credible information to the study.

4.3 Descriptive analysis on Job Satisfaction Survey

Table 4.4: Level of Agreement on Job Satisfaction

Job Satisfaction Survey	Disagree Very Much	Disagree Moderately	Disagree Slightly	Agree Slightly	Agree Moderately	Agree Very Much	Mean	Std deviation
I feel I am being paid a fair amount for the work I do.	3	11	62	59	70	10	3.99	1.066
There is really too little chance for promotion on my job.	20	74	66	27	28	0	2.86	1.161
My supervisor is quite competent in doing his/her job.	0	5	28	58	86	38	4.58	1.001
I am not satisfied with the benefits I receive.	10	18	31	52	74	30	4.17	1.334
When I do a good job, I receive the recognition for it that I should receive.	9	22	27	43	78	36	4.24	1.376
Many of our rules and procedures make doing a good job difficult.	74	117	20	4	0	0	1.80	.754
I like the people I work with.	0	0	0	0	35	180	5.84	.370
I sometimes feel my job is meaningless.	176	39	0	0	0	0	1.18	.386
Communications seem good within this organization.	0	0	0	0	15	200	5.93	.255
Raises are too few and far between.	0	14	83	68	50	0	3.72	.896
Those who do well on the job stand a fair chance of being promoted.	0	12	77	61	49	16	3.91	1.050
My supervisor is unfair to me.	191	24	0	0	0	0	1.11	.316
The benefits we receive are as good as most other organizations offer.	0	0	0	0	24	191	5.89	.316
I do not feel that the work I do is appreciated.	164	33	9	9	0	0	1.36	.754
My efforts to do a good job are seldom blocked by red tape.	209	6	0	0	0	0	1.03	.165
I find I have to work harder at my job because of the incompetence of people I work with.	215	0	0	0	0	0	1.00	.000
I like doing the things I do at work.	0	6	94	104	11	0	3.56	.638
The goals of this organization are not clear to me.	215	0	0	0	0	0	1.00	.000

I feel unappreciated by the organization when I think about what they pay me.	201	3	7	4	0	0	1.13	.543
People get ahead as fast here as they do in other places.	0	9	62	131	13	0	3.69	.649
My supervisor shows too little interest in the feelings of subordinates.	212	3	0	0	0	0	1.01	.118
The benefit package we have here is equitable.	0	0	0	0	24	191	5.89	.316
There are few rewards for those who work here.	86	63	33	14	7	12	2.20	1.403
I have too much to do at work.	0	9	67	130	9	0	3.65	.631
I enjoy my coworkers.	0	0	0	0	23	192	5.89	.310
I often feel that I do not know what is going on with the organization.	153	37	25	0	0	0	1.40	.690
I feel a sense of pride in doing my job.	0	11	64	122	11	7	3.72	.778
I feel satisfied with my chances for salary increases.	0	0	28	28	67	92	5.04	1.041
There are benefits we do not have which we should have.	4	20	65	39	83	4	3.88	1.137
I like my supervisor.	189	17	9	0	0	0	1.16	.470
I have too much paperwork.	215	0	0	0	0	0	1.00	.000
I don't feel my efforts are rewarded the way they should be.	0	0	38	146	31	0	3.97	.567
I am satisfied with my chances for promotion.	0	73	90	15	37	0	3.07	1.047
There is too much bickering and fighting at work.	215	0	0	0	0	0	1.00	.000
My job is enjoyable.	0	0	128	77	10	0	3.45	.585
Work assignments are not fully explained.	215	0	0	0	0	0	1.00	.000

From the findings on the respondent level of agreement on various aspect of job satisfaction, the study found that they agreed very much that communications seem good within this organization as shown by mean of 5.93, they enjoy their coworkers, the benefit package they have here is equitable and the benefits they receive are as good as most other organizations offer as shown by mean of 5.89 in each case and they like the people they work with as shown by mean of 5.84, respondent moderately agreed that they feel satisfied with their chances for salary increases as shown by mean of 5.04 and my supervisor is quite competent in doing his/her job as shown by mean of 4.58, respondent slightly agreed that when they do a good job, they receive the recognition for it that they

should receive as shown by mean of 4.24, they are not satisfied with the benefits they receive as shown by mean of 4.17, they feel am being paid a fair amount for the work they do as shown by mean of 3.99, they don't feel my efforts are rewarded the way they should be as shown by mean of 3.97, Those who do well on the job stand a fair chance of being promoted as shown by mean of 3.91, there are benefits we do not have which we should have as shown by mean of 3.88, they feel a sense of pride in doing my job and raises are too few and far between as shown by mean 3.72 in each case , people get ahead as fast here as they do in other places as shown by mean 3.69, they have too much to do at work as shown by mean of 3.65, they like doing the things they do at work as shown by mean of 3.56, respondent slightly disagreed that their job is enjoyable as shown by mean of 3.45, they are satisfied with my chances for promotion as shown by mean of 3.07 and there is really too little chance for promotion on my job as shown by mean of 2.84, respondent moderately disagreed that there are few rewards for those who work here as shown by mean of 2.20 and Many of our rules and procedures make doing a good job difficult as shown by mean of 1.80, respondent disagreed very much that the often feel that I do not know what is going on with the organization as shown by mean of 1.40, they do not feel that the work they do is appreciated as shown by mean of 1.36, they sometimes feel my job is meaningless as shown by mean of 1.18, they like their supervisor as shown by mean of 1.16, they feel unappreciated by the organization when they think about what they pay them as shown by mea of 1.13, their supervisor is unfair to them as shown by mean of 1.11, they efforts to do a good job are seldom blocked by red tape as shown by mean of 1.03, their supervisor shows too little interest in the feelings of subordinates as shown by mean of 1.01, work assignments are not fully explained, there is too much bickering and fighting at work, they have too much paperwork, the goals of this organization are not clear to me and they find they find they have to work harder at my job because of the incompetence of people I work with as shown by mean 1.0. This information was supported by low standard deviation and indication respondent had similar opinions.

4.4 Model for Modeling Job Satisfaction

Table 4.5: Case Processing Summary Table

		N	Marginal Percentage
Satisfaction	Agree moderately	23	10.7%
	Agree very much	192	89.3%
Factors	Disagree slightly	38	17.7%
	Agree slightly	146	67.9%
	Agree moderately	31	14.4%
Valid		215	100.0%
Missing		0	
Total		215	

From this table on the Case Processing Summary table, we see the number and percentage of cases in each level of the response variable. These numbers look fine, but we would be concerned if one level had very few cases in it. In all the 215 observations in our data set that were used for analysis.

Table 4.6: Model Fitting Information

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	12.519			
Final	10.937	1.582	34	.043

The results from model fitting in the section provide results of ordinal logistic regression versus reduced model (intercept) with complimentary log-log link function. The presence of a relationship between the dependent variable and combination of independent variables is based on the statistical significance of the final model. From the table, the -2LL of the model with only intercept is 1.582 while the -2LL of the model with intercept and independent variables is 0.000. That is the difference (Chi-square statistics) is 12.519 -10.937 = 1.582 which is significant at 0.05 since P=0.043 < 0.05. We can conclude that there is the association between the dependent and independent variable(s) in complimentary Log-log link function

Table 4.7: Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	65.471	214	.019
Deviance	58.687	214	.044

The table tests for consistency between the observed data and the fitted model. The null hypothesis states that the observed data are consistent with the fitted model. The null hypothesis is accepted and one concludes that the observed data were consistent with the estimated values in the fitted model since the P-value was significance p = 0.019 and 0.044 >0.05. Using complementary Log- log Link function.

Table 4.8: Pseudo R-Square

Cox and Snell	.607
Nagelkerke	.615
McFadden	.611

In ordinal regression models, these measures were based on likelihood ratios rather than raw residuals. There are several measures intended to mimic the R-squared analysis, but none of them are an R-squared. The interpretation is not the same, but they can be interpreted as an approximate variance in the outcome. The three different methods were used to estimate the coefficient of determination. McFadden's r-squared (McFadden, 1974) is based on the log-likelihood kernels for the intercept-only model and the full estimated model. Cox and Snell's r-squared (Cox and Snell, 1989) is a generalization of the usual measure designed to apply when maximum likelihood estimation is used, as with ordinal regression. However, with categorical outcomes, it has a theoretical maximum value of less than 1.0. For this reason, Nagelkerke (Nagelkerke, 1991) proposed a modification that allows the index to take values in the full zero-to-one range.

Table 4.9: Parameter Estimates

		Estimate	Std. Error	Wald	df	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
Threshold	[satisfaction = 5]	-1.910	.536	12.703	214	.000	-.859	-.859
Location	[factors=3]	-.236	.696	.114	214	.735	1.129	1.129
	[factors=4]	.416	.609	.466		.045	1.610	1.610
	[factors=5]	0[a]	.	.		.	.	.

In the Parameter Estimates table we see the coefficients, their standard errors, the Wald test and associated p-values (Sig.), and the 95% confidence interval of the coefficients. All the value for factors affecting job satisfaction were statistically significant, this implies that a one unit increase in factors affecting job satisfaction (going from 3 to 5), we expect a 0.416 increase in job satisfaction , given all of the other variables in the model are held constant. Test of parallel lines was designed to make judgment concerning the model adequacy. SPSS tests the proportional odds assumption that is commonly referred to as the test of parallel lines. The model null hypothesis states that the slope coefficients in the model are the same across the response categories. Since the significance P-Value=0.735 > 0.05 indicated that there was no significant difference for the corresponding slope coefficients across the response categories, suggesting that the model assumption of parallel.

4.5 Regression Analysis

Table 4.10: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,816[a]	.666	.630	.48897

Adjusted R^2 which is termed as the coefficient of determination tells us how job satisfaction varies with communication, supervision, rewards, promotion and salary. According to the findings in table above, the value of adjusted R^2 is 0.630. This implies that, there was a variation of 63% of job satisfaction with changes in communication, supervision, rewards, promotion and salary at a confidence level of 95%. R is the correlation coefficient which shows that there was a strong correlation between the study variable as shown by the correlation coefficient of 0.816.

Table 4.11: Regression Coefficients

Model		Un-standardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.553	.513		8.883	.000
	Communication	.094	.063	.102	1.495	.136
	Supervision	.069	.074	.065	.942	.347
	Reward	.084	.055	.105	1.527	.128
	Promotion	.055	.053	.071	1.050	.295
	Salary	.054	.097	.038	.557	.578

From the finding in table the established regression equation was

$$Y = 4.553 + 0.094\ X_1 + 0.069\ X_2 + 0.084X_3 + 0.055\ X_4 + 0.054\ X_5$$

From the above regression model, holding communication, supervision, rewards, promotion and salary to constant zero job satisfaction would be at would be at 4.553. It was established that a unit increase in communication would cause an increase in job satisfaction by a factor of 0.094, unit increase in supervision would lead to increase in job satisfaction by a factor of 0.069, also a unit increase in rewards would cause an increase in job satisfaction by factors of 0.084, unit increase in promotion would cause an increase in job satisfaction by factors of 0.055, further unit increase in salary would lead to increase in job satisfaction by factor of 0.054. This shows that there is a positive relationship job satisfaction and communication, supervision, rewards, promotion and salary.

CHAPTER FIVE:

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

This study demonstrates the use of ordinal regression statistical technique to model job satisfaction among employees. This is a statistical tool that used when the outcome is categorical with a natural ordering. Ordinal regression allows for predicted probabilities of success to be calculated for each level of the response.

Clog-log link became the best model based on the screening criteria the credibility of model assumption, the fitting statistics i.e. fitting Information, goodness of fit information, and the stability of parameter estimation. Therefore, needless to say, major research findings and implications should be drawn from the best model. The explanatory variable related to the satisfaction of faculty involvement is Service delivery at the department office it was identified in the best model. Job satisfaction significantly contributes to the probability of employees expressing satisfaction with the generally on salary, communication and other factors. Clearly, the ordinal regression modeling is a unique statistical technique in that the ordinal outcome variable is frequently encountered in the field of educational research and the model assumption of parallel lines is easily assumed and verified. From the findings the study found that there many factors affecting job satisfaction among employee on call centers these are communications within the organization, relationship with coworkers, benefit package which are equitable , salary increase and supervision in the organization , recognition through promotion , fair payment for the work , reward given to employee and sense of pride in doing my job .

From the findings on the regression analysis the study found, there was a variation of 63% of job satisfaction with changes in communication, supervision, rewards, promotion and salary. The study also revealed that there was a strong correlation between job satisfaction with changes in communication, supervision, rewards, promotion and salary. The study found that job satisfaction has a positive relationship with communication, supervision, rewards, promotion and salary. From the

research one can conclude that it is important to keep job satisfaction high so as to reduce turnover levels in call centers.

Evidence has been presented showing that high levels of job satisfaction correspond with high levels of customer satisfaction. Call centers contribute largely to a company's success through the acquisition and retention of customers. Since the data presented shows a relationship between job satisfaction and customer satisfaction, it follows that it is important for a company to ensure that their employees are satisfied in their jobs. This then indicates that employees who are satisfied in their jobs are more likely to serve customers well, which is imperative in call centers especially.

5.2 Limitations

One limitation of this study was that the sample group was quite small (n=215). With such a small sample group, it is difficult to generalize the results to the entire population which, in this case was 1500 CCRs. Some caution therefore needs to be taken in interpreting the results. Increasing the size of the sample group could yield more statistically significant results.

Another possible limitation is that it only surveyed one organization. By conducting a larger study that incorporates a few more organizations, the researcher could avoid this limitation and assist in making the results more generalizable.

In addition, job satisfaction is a very complex concept since definitions cannot be refined to certain variables listed by the researcher. Any attempt to define these variables would not be not easy as each individual has their own perception of what satisfaction means to them. Therefore, determining what exactly satisfies employees can be considered to be somewhat subjective.

5.2 Recommendations

Since the study has shown that there is a strong correlation between job satisfaction with changes in communication, supervision, rewards, promotion and salary, an individual can understand the importance of job satisfaction in companies. If organizations focus on increasing the level of job satisfaction of their employees, they could potentially reduce the level of turnover and increase the levels of performance and customer satisfaction within their company. In so doing, organizations will increase their overall productivity and performance.

REFERENCES

1. Agresti A. (2002). *Categorical Data Analysis.* John Wiley and Sons: New York.
2. Bailey, B. L.; Bauman, C. and Lata, K. A. (1998).'Student Retention and Satisfaction: The Evolution of a Predictive Model'. Paper presented at the Annual Forum of the Association for Institutional Research, Minneapolis, Minnesota. Eric No: ED424797
3. Bender, R. & Benner A (2000). "Calculating Ordinal Regression Models in SAS and S-Plus". *Biometrical Journal42*, 6, pp677-699.
4. Chanzu, I. F. (2005).'A survey of job satisfaction and organization performance in social security organization in Kenya, Case study of National Social security Funds – NSSF', Thesis: Masters of Business Administration, University of Nairobi, Nairobi
5. Chau-Kuang C. & Hughes J. (2004)."Using Ordinal Regression Model to Analyze Student Satisfaction Questionnaires". *Journal of IR Applications*, 1(1)
6. Cooney, F. (2000).'A Review of the Results and Methodology in the 1999 Noel Levitz Student Satisfaction Survey at Salt Lake Community College'. Salt Lake City, Utah: Salt Lake Community College. Eric No: ED443482
7. Cummins, R., & Gullone E. (2000): "Why We Should Not Use 5-point Likert Scales: The Case for Subjective Quality of Life Measurement," in *Proceedings, Second International Conference on Quality of Life in Cities.* Singapore: National University of Singapore, ed. by N. U. of Singapore, pp. 74–93, Singapore.
8. Damminger, J. K. (2001). "Student Satisfaction with Quality of Academic Advising Offered by Integrated Department of Academic Advising and Career Life Planning". *Glassboro, New Jersey*: Rowan University. Eric No: ED453769
9. Dean, A. (2002). "Service quality in call centers: Implications for customer loyalty". *Managing Service Quality, 12*(6), 414-423.
10. DeMeuse, K. P. (1985). "A compendium of frequently used measures in industrial/organizational psychology". *The Industrial-Organizational Psychologist*, 23, 53-59.
11. Ehlers, L.N. (2003). 'The relationship of communication satisfaction, job satisfaction, and self-reported absenteeism'. Thesis. Department of Speech Communication, Miami University.
12. Fields, D. (2002). "Taking Measure of Work: A Guide to Validated Scales for Organizational Research and Diagnosis". *Thousand Oaks, CA. SAGE Publications.*

13. Freund, R. & Wilson, W. 2003."Statistical methods, 2nd edition". *Academic Press. London.* ISBN: 0-12-267651-3

14. Friday, S.S., & Friday, E. (2003). "Racioethnic perceptions of job characteristics and job satisfaction". *Journal of Management Development, 22(5),* 426-442.

15. Gilmore, A. (2001). "Call centre management: Is service quality a priority?"*Managing Service Quality, 11, 153-159.*

16. Grobler, P.A., Wärnich, S., Carrell, M.R., Elbert, N.F.Z., & Hatfield, R.D. (2002). "Human Resource Management in South Africa"(2nd ed.). *London: Thomson Learning*

17. Hummel, T.J., &Lichtenberg, J.W. (2001) "Predicting categories of improvement among counseling center clients". ERIC: Resources in Education, ED-451-434.

18. Judge, T. A., & Church, A. H. (2000). Job satisfaction: Research and practice. In C. L. Cooper & E. A. Locke (Eds.), *Industrial and organizational psychology: Linking theory with practice* (pp. 166-198). Oxford, UK: Blackwell.

19. Kleemann, F., & Matuschek, I. (2002). Between job and satisfaction: Motivations and career orientations of German "high quality" call center employees. Retrieved February 9, 2012, from http://www.sociology.org/content/vol006.002/kleemann_matuschek.html

20. Krosnick, J. A., and L. R. Fabrigar (1997): "Designing Rating Scales for Effective Measurement in Surveys," in Survey Measurement and Process Quality, ed. by L. Lyberg, P. Biemer, M. Collins, L. Decker, E. DeLeeuw, C. Dippo, N. Schwarz, and D. Trewin. Wiley-Interscience, New York.

21. Leonardo G.& Carla R. (2009). "A Multilevel Analysis of Graduates' Job Satisfaction", Statistics Department "G. Parenti", University of Florence, Italy

22. Levin, G. (2004). *A look at what works in agent rewards and recognition.* Retrieved February 9, 2012, from http://www.ccmreview.com

23. Levin, G. (2004). *Empowering agents offline.* Retrieved February 9, 2012, from http://www.ccmreview.com

24. Locke, E. A. (1976). "The nature and causes of job satisfaction". In M. D. Dunnette (Ed.), *Handbook of industrial and organizational psychology* (pp. 1297-1349). Chicago, IL: Rand McNally

25. Long, S. J. &Freese, J. (2001) "Regression Models for Categorical Dependent Variables using Stata". *College Station, TX: Stata Press.*

26. Malhotra, N., & Mukherjee, A. (2004)."The relative influence of organizational commitment and job satisfaction on service quality of customer –contact employees in banking call centres". *Journal of Services Marketing,* 18 (3), 162-174.

27. Marr, B., & Neely, A. (2004).'Managing and measuring for value: The case of call center performance'. Bedfordshire, Great Britain: Cranfield University, Cranfield School of Management and Fujitsu

28. McCullagh, P. &NelderJ. A. (1989)."Generalized Linear Models". *Chapman and Hall*, New York

29. McCullagh, P. (1980). "Regression Models for Ordinal Data (with Discussion)", *Journal of the Royal Statistical Society* – B 42, 109 – 142.

30. McCulloch, M.C. (2003). "Job satisfaction, myths & reality". *Call Center Magazine*, 16(11), 12.

31. Michelle R. G. (2006):'Job Satisfaction of Call Centre Representatives', Thesis: Faculty of Industrial Psychology, University of the Western Cape.

32. Moshavi, D. &Terborg, J.R. (2002)."The job satisfaction and performance of contingent and regular customer service representatives: A human capital perspective". *International Journal of Service Industry Management, 13 (4),* 333-347.

33. Muchinsky, P. (1993). *Psychology applied to work: An introduction to Industrial/Organizational Psychology.* L.A: Brooks/Cole.

34. Mueller, C. W., & Kim, S. W. (2008). The contented female worker: Still a paradox? In K. A. Hegtvedt & J. Clay-Warner (Eds.), *Justice: Advances in group processes volume 25* (pp. 117-150). Bingley, UK: Emerald Group Publishing Limited.

35. O'Connell A. A. (2000). Methods for modeling ordinal outcome variables. Measurement and Evaluation in Counseling and Development, pp 170-193.

36. Organ, D. W. (1988).*Organizational citizenship behavior: The good soldier syndrome.* Lexington, MA: Lexington Books.

37. Ravikumar C.M. (1985); A study on job satisfaction among workers in chemical unit (M/S. ShriVeecoChems Corporation, Cbe)

38. Richard P. V. & Francisco X. A: (2009):"A Model of Employee Satisfaction: Gender Differences in Cooperative Extension"; April 2009 // Volume 47 // Number 2 // Feature Articles // 2FEA2
39. Robbins, S.P. (1996). *Organizational behavior: Concepts, controversies, applications.* (7th ed.). New Jersey: Prentice-Hall Inc.
40. Scott, S. C., Goldberg, M. S., and Mayo, N. E. (1997)."Statistical Assessment of Ordinal Outcomes in Comparative Studies". *Clinical Epidemiology* Vol. 50, No. 1, pp 45-55
41. Smith, P. C., Kendall, L. M., & Hulin, C. L. (1969)."Measurement of satisfaction in work and retirement". *Chicago, IL: Rand McNally.*
42. Spector, P.E. (1997). "Job satisfaction: Application, assessment, causes, and consequences". *London: Sage Publications.*
43. Spector, P. E. (1997). *Job satisfaction Survey, JSS.* Retrieved from the World Wide Web on March 25, 2012 from http://chuma.cas.usf.edu/~spector/scales/jssovr.html.
44. SPSS, Inc. (2002): Ordinal Regression Analysis, SPSS Advanced Models 10.0., Chicago, IL.
45. Sukumar A. (2000): 'Human resource management Project - Employee satisfaction in professional couriers', Coimbatore, Thesis:
46. Thomas, E. H. &Galambos, N. (2002):"What Satisfies Students? Mining Student-Opinion Data with Regression and Decision-Tree Analysis". *Stony Brook*, New York: Stony Brook University.
47. Umbach, P. D. &Porter, S. R. (2001)."How Do Academic Departments Impact Student Satisfaction? Understanding the Contextual Effects of Departments". Paper presented at the Annual Meeting of the Association for Institutional Research, Long Beach, California. Eric No: ED456789
48. Wild, N. (2000).*Rogue Community College Student Satisfaction Survey, Management Report*: Redwood and Riverside Campuses. Grant Pass, Oregon: Rogue Community College.
49. Zedeck, S. (1987, October)."Satisfaction in union members and their spouses". Paper presented at the *Job Satisfaction: Advances in Research and Practice Conference*, Bowling Green, Ohio.

APPENDICES:

Appendix 1: Cover letter

Research Study

Dear Call Center Representative:

I am a student at the School of Mathematics in the University of Nairobi pursuing a Masters of Science degree in Social Statistics. One of the requirements of the course is to conduct a research study on a topics related to main course of study. I am currently doing research on ***"Modeling of Job Satisfaction among Call Center Agents: Ordinal Regression Models"*** and would be grateful if you would assist me by completing the attached questionnaires.

Please complete the attached questionnaires carefully:

The Job Satisfaction Survey- 36 questions

The demographic profile of Call Center Representatives – please note that the information required here is purely for statistical purposes.

The results of the questionnaires will be used purely for **academic purposes** and will not impact your current jobs in any way or form. All information obtained will be treated with the strictest confidence.

Please hand in the completed questionnaires to research assistants. If you have any queries please do not hesitate to contact me.

I appreciate your feedback and thank you for taking the time to share your opinions with me.

Sincerely,
Njoroge, P. W.
Student - School of Mathematics, University of Nairobi

Appendix 2: Questionnaire

Demographic Information

Kindly complete the information below for statistical purposes.

Instructions:

1. *You are **not** required to state your name*
2. *Mark the applicable blocks with an **X** or √*

Gender	Male	[ ]	Female	[ ]
Marital Status	Married	[ ]	Not Married	[ ]
Education Level	Certificate	[ ]		
	Diploma	[ ]		
	Degree	[ ]		
	Masters	[ ]		
	PhD	[ ]		
Age:	< 25 Years	[ ]		
	25-29 Years	[ ]		
	30-34 Years	[ ]		
	35-39 Years	[ ]		
	40-44 Years	[ ]		
	>45 Years	[ ]		
Working schedule:	Day	[ ]		
	Afternoon	[ ]		
	Night	[ ]		
Years of Service:	< 1Year	[ ]		
	1-2 Year	[ ]		
	3-4 Year	[ ]		
	5-6 Year	[ ]		
	7-8 Year	[ ]		
	>8 Year	[ ]		

Appendix 2b: Job Satisfaction Survey Questionnaire

	JOB SATISFACTION SURVEY Paul E. Spector Department of Psychology University of South Florida Copyright Paul E. Spector 1994, All rights reserved ***Please circle one number for each Question that comes closest to Reflecting your opinion about it***	Disagree Very Much	Disagree Moderately	Disagree Slightly	Agree Slightly	Agree Moderately	Agree Very Much
1	I feel I am being paid a fair amount for the work I do.	1	2	3	4	5	6
2	There is really too little chance for promotion on my job.	1	2	3	4	5	6
3	My supervisor is quite competent in doing his/her job.	1	2	3	4	5	6
4	I am not satisfied with the benefits I receive.	1	2	3	4	5	6
5	When I do a good job, I receive the recognition for it that I should receive.	1	2	3	4	5	6
6	Many of our rules and procedures make doing a good job difficult.	1	2	3	4	5	6
7	I like the people I work with.	1	2	3	4	5	6
8	I sometimes feel my job is meaningless.	1	2	3	4	5	6
9	Communications seem good within this organization.	1	2	3	4	5	6
10	Raises are too few and far between.	1	2	3	4	5	6
11	Those who do well on the job stand a fair chance of being promoted.	1	2	3	4	5	6
12	My supervisor is unfair to me.	1	2	3	4	5	6
13	The benefits we receive are as good as most other organizations offer.	1	2	3	4	5	6
14	I do not feel that the work I do is appreciated.	1	2	3	4	5	6
15	My efforts to do a good job are seldom blocked by red tape.	1	2	3	4	5	6
16	I find I have to work harder at my job because of the incompetence of people I work with.	1	2	3	4	5	6
17	I like doing the things I do at work.	1	2	3	4	5	6
18	The goals of this organization are not clear to me.	1	2	3	4	5	6
19	I feel unappreciated by the organization when I think about what they pay me.	1	2	3	4	5	6
20	People get ahead as fast here as they do in other places.	1	2	3	4	5	6
21	My supervisor shows too little interest in the feelings of subordinates.	1	2	3	4	5	6
22	The benefit package we have here is equitable.	1	2	3	4	5	6
23	There are few rewards for those who work here.	1	2	3	4	5	6
24	I have too much to do at work.	1	2	3	4	5	6

25	I enjoy my coworkers.	1	2	3	4	5	6
26	I often feel that I do not know what is going on with the organization.	1	2	3	4	5	6
27	I feel a sense of pride in doing my job.	1	2	3	4	5	6
28	I feel satisfied with my chances for salary increases.	1	2	3	4	5	6
29	There are benefits we do not have which we should have.	1	2	3	4	5	6
30	I like my supervisor.	1	2	3	4	5	6
31	I have too much paperwork.	1	2	3	4	5	6
32	I don't feel my efforts are rewarded the way they should be.	1	2	3	4	5	6
33	I am satisfied with my chances for promotion.	1	2	3	4	5	6
34	There is too much bickering and fighting at work.	1	2	3	4	5	6
35	My job is enjoyable.	1	2	3	4	5	6
36	Work assignments are not fully explained.	1	2	3	4	5	6