# Customer satisfaction of mobile telecommunication networks in Ghana: service delivery perspective

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**Abstract:** Organizations, both private and public, in today's dynamic marketplaces are increasingly leaving antiquated marketing philosophies and strategies to the adoption of more customer driven initiatives that seek to understand, attract, retain and build intimate long term relationship with profitable customers. This article analyzed customer satisfaction with the service delivery of mobile telecommunication networks in Ghana using a binary logistic regression model. Primary data was collected through questionnaire administration. A sample of 1200 respondents were selected from mobile subscribers across the country through stratified sampling. The results showed that factors such as income, call quality, added value of services, call charge's and network coverage of the mobile networks were statistically significant and also contributes significantly to the overall customer satisfaction of the services delivered by the mobile telecommunication networks (MTN's) in Ghana. Since factors influencing customer satisfaction have been established, stakeholders in the mobile telecommunication industry, particularly, the six (6) mobile networks service providers should note these and emphasize them in their marketing strategy.

**Keywords:** service delivery, customer satisfaction, mobile telecom network, odds ratio, logistic regression.

## 1 Introduction

Customer satisfaction (CS) is a term that has received much attention and interest among scholars and practitioners perhaps because of its importance as a key element of business strategy, and goal for all business activities especially in today's competitive market (Anderson et al, 1994). According to Bruhn (2003), CS is "an experience-based assessment made by the customer of how far his own expectations about the individual characteristics or the overall functionality of the service obtained from the provider have been fulfilled". Again, "Satisfaction is a person's feeling of pleasure or disappointment resulting from comparing a product's performance (outcome) in relation to his or her expectation" (Kotler and Kevin, 2006 p.144).

Organizations, both private and public, in today's dynamic marketplaces are increasingly leaving antiquated marketing philosophies and strategies to the adoption of more customer driven initiatives that seek to understand, attract, retain and build intimate long term relationship with profitable customers

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(Kotler, 2006; Gronoors, 1994; Narver and Slater, 1990). This paradigm shift has undoubtedly led to the growing interest in customer relationship management initiative that aim at ensuring customer identification and interactions, customization and personalization that unreservedly lead to customer satisfaction, retention and profitable, among other things (Thompson, 2004; Granoors et al, 1996; Xu et al, 2002; Dyche, 2001; Ryals and Knox, 2001; Stone, 2000). It is again believed that satisfied customers tell five other people about their good treatment and that five-percent (5%) increase in loyalty can increase profits by 25%-85%. Conversely, the average customer with a problem eventually tells eight (8) to ten (10) other people (SPSS White paper 1996; Limayem, 2007).

The shift calls for a considerable attention and commitment of resources towards customer acquisition and retention through customer satisfaction is not different with the six (6) mobile telecommunication networks (MTNs) in Ghana, namely: MTN of Scancom Ghana limited, Tigo of Millicom Ghana limited, Expresso of Kasapa Telecom, Vodafone of Vodafone Ghana limited, Airtel of Zain Ghana limited and Glo of Globacom Ghana limited. Though competition has been keen in the industry, each of the six mobile networks has been growing in customer acquisition since Ghana deregulated its telecommunication sector in 1994.

Customer satisfaction makes the customers loyal to one telecommunication service provider. Previous researchers have found that satisfaction of the customers can help the brands to build long and profitable relationships with their customers (Eshghi et al., 2007). Though it is costly to generate satisfied and loyal customers but that would prove profitable in a long run for a firm (Anderson et al., 2004). Therefore a firm should concentrate on the improvement of service quality and charge appropriate fair price in order to satisfy their customers which would ultimately help the firm to retain its customers (Gustafsson et al., 2005). It is a common phenomenon that the services a network offers and the price it charges actually determine the level of satisfaction among its customers, than any other measure (Turel et al. 2006). Customer's involvement is also important as when buyer consider the product important and invests time to seek information then it ultimately enhances the satisfaction level (Russell-Bennett et al., 2007). Any business is likely to lose market share, customers and investors if it fails to satisfy customers as effectively and efficiently as its competitors is doing (Anderson et al., 2004).

Adepoju and Suraju (2012) argued that service quality, customer satisfaction, and corporate image are important determinants of customer satisfaction and loyalty in the Nigeria's GSM market whereas the price/tariff is not deemed to be a determinant of customer satisfaction and loyalty in the GSM market. But the marketing literature showed researchers' inclination towards price fairness in relation to customer satisfaction (Hermann et al., 2007; Kukar-Kinney et al., 2007; Martin-Consuegra et al., 2007). Other studies have postulated that perceived service quality is an important determinant of customer satisfaction that have both cognitive and effective dimensions beyond just cognitive assessment of customers on the offering

of service providers (Gronroos C.2001; Edvardsson 2005; Edvardsson et al 2005). Wang and Hing-Po (2002) suggested that there is some kind of intertwine relationships, among all the antecedents of customer satisfaction. Customer satisfaction plays a key moderating role for the relationship between price increases and repurchase intentions (Homburg, Hoyer & Koschate, 2005). In the work of many scholars and practitioners, CS is found to be driven by the quality of service and the customer service experiences (Oliver 1980; 1993a; Parasuraman et al., 1988, Lovelock 1991, 1992; Lovelock and Wirtz 2007; Gronroos 1994, 2000, 2001; Wang and Hing-Po 2002; Kotler and Kelvin, 2006).

The state of customer satisfaction with service delivery is not clear as there is scanty documentation of the issue. According to a discussion paper on telecom developments and investments in Ghana (Frempong and Henten, 2004), the authors noted that "the goals set by government have only partly been met – especially with respect to the development in rural areas – and the quality of service is still low and has even deteriorated on some indicators. There is, therefore, a widespread dissatisfaction with the general telecom development in Ghana among users as well as policy decision makers and administrators". A lot of factors that drive customer satisfaction need to be examined in order to reliably measure it. Against this backdrop, this article seeks to analyze customer satisfaction with service delivery in mobile telecommunication networks (MTN's) in Ghana.

## 2 Materials and Method

### 2.1. Sampling Strategy and Sample Size

In selecting the sample of subscribers, stratified random sampling technique was employed. The study sample consisted of 1200 customers drawn from three selected cities in the three zonal divisions in Ghana, namely; Tamale for the Northern Zone, Kumasi for the Middle Zone and Accra for the Southern Zone. The technique considered the population of mobile networks in Ghana each as a stratum. Subsequently, a simple random sampling technique was used to select respondent from each of the mobile networks as shown in Table 1 below. In arriving at the strata, we were guided by the available statistics of 2012 subscribers for each network according to National Communications Authority (NCA).

**Table 1 Strata of Mobile Telecommunication Networks**

| Mobile Network | Strata Sample Size |
|---|---|
| MTN | 480 |
| Vodafone Ghana | 240 |
| Tigo Ghana | 180 |
| Airtel | 120 |
| Expresso | 108 |
| Glo | 72 |

| | |
|---|---|
| **Total** | 1,200 |

Source: Researchers field survey 2013

### 2.2. Structure of Questionnaire

In this study, self-administered questionnaires were used to collect data from the respondents. We first asked questions on respondent's demographic data and subsequently sought respondents' feelings, by assessing their expectation level, about the SMS, Consistence, Attendance, Call quality, Added value, Call charge, Coverage, among others. Finally, the overall customer satisfaction was solicited. In all, the questionnaire had two main parts consisting of questions related to respondents' demographic data and questions related to overall customer satisfaction with service delivery.

### 2.3. Data Management

The variables in the questionnaire were coded as follows; Gender (0= male, 1= female), Age (0= youth, 1=aged), income (0= above GH¢500, 1= below GH¢500). The cut-off for income was taken as GHC 500, since many workers monthly income is within this bracket. The variable factors SMS, Consistence, Attendance, Call quality, Added value, Call charge, Coverage, Constant were all coded as (0= Did not meet their expectation, 1= Meet expectation).

### 2.4. Model Specification, Estimation and Test

The response variable in logistic regression is usually dichotomous, that is, the response variable can take the value 1 with a probability of success p, or the value 0 with probability of failure 1-p. This type of variable is called a Bernoulli (or binary) variable.

To explain the logistic regression, we show here the logistic function, which describes the mathematical form on which the logistic model is based. Let the function be called f(z), is given by

$$f(z) = \frac{1}{1+e^{-z}} \qquad (1)$$

When the values of this function are plotted, z varies from $-\infty$ to $+\infty$ and its shape is an elongated S shape. The relationship between the predictor and response variables is not a linear function in logistic regression, instead, the logistic regression function is used, which is the logit transformation of p. To obtain the logistic model from the logistic function, we write z as the linear sum

$$z = \alpha + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_k x_k \qquad (2)$$

Where the x's are independent variables of interest and $\alpha$ and the $\beta_i$'s are constant terms representing unknown parameters.

Substituting equation (2) into (1) we obtain

$$f(z) = \frac{1}{1+e^{-(\alpha+\sum\beta_i x_i)}} \quad (3)$$

For notational convenience, we will denote the probability statement as simply p(x) where x is a notation for the collection of variables x1 through xk.
Thus, the logistic model may be written as

$$p(x) = \frac{1}{1+e^{-(\alpha+\sum\beta_i x_i)}} \quad (4)$$

However, since the above logistic model is non-linear, the logit transformation would be used to make it linear, this is given by

$$Logit\ p(x) = In_e\left[\frac{p(x)}{1-p(x)}\right] \quad (5)$$

Where $$p(x) = \frac{1}{1+e^{-(\alpha+\sum\beta_i x_i)}} \quad (6)$$

This transformation allows us to compute a number, called logit p(x), for an individual with independent variables given by x.
By substituting Equation (5) into Equation (4), we obtain

$$In_e\left[\frac{p(x)}{1-p(x)}\right] = In_e\left[\frac{\frac{1}{1+e^{-(\alpha+\sum\beta_i x_i)}}}{\frac{e^{-(\alpha+\sum\beta_i x_i)}}{1+e^{-(\alpha+\sum\beta_i x_i)}}}\right]$$

$$\therefore \quad Logit\ p(x) = \alpha + \beta_1 x_1 + \beta_2 x_2 + ... + \beta_k x_k \quad (7)$$

Thus, the logit of p(x) simplifies to the linear sum.
The quantity p(x) divided by 1-p(x), whose log value gives the logit, describes the odds for a customer who is satisfied with service delivery, with independent variables specified by x.

$$\frac{p(x)}{1-p(x)} = \text{Odds for individual x}$$

The goal of logistic regression is to correctly predict the category of outcome for individual cases using the most parsimonious model. To this end, a model is created that includes all predictor variables that are useful in predicting the response variable (Kleinbaum and Klein, 1994).
The overall customer satisfaction of service delivery of mobile networks was influenced by predictors such as: gender, age, income, SMS, consistence, attendance, call quality, added services, call charge and coverage. All these predictors were categorical. For purposes of this study, the specific binary logistic regression model fitted to the data was:

$$logit(p(y=1)) = \propto + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \beta_8 x_8 + \beta_9 x_9 + \beta_{10} x_{10} + \varepsilon$$

P is the probability of performance, the x's are the independent variables of interest, $\propto$ and the $\beta$'s are constant terms and coefficients respectively which are the unknown parameters and $\varepsilon$ is the residual term.

The hypothesis for the coefficients of the model predictors is as follows

$H_o : \beta_j = 0$

$H_1: \beta_j \neq 0$ For j= 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.

### 2.4.1. The Hosmer-Lemesshow Test

The Hosmer- Lemeshow test is used for accessing the goodness of fit of a model and allows for any number of explanatory variables which may be continuous or categorical. The observations are grouped into deciles based on the predicted probabilities. The test statistics is calculated, based on the study using the observed and is calculated, based on the study using the observed and expected counts for both performed and non-performed, and has an approximate $\chi 2$ distribution with 8 (=10 – 2) degree of freedom. Further checks can be carried out on the fit of individual observation by inspection of various types of residuals (difference between observed and fitted values). These can identify whether there is any outlier or have a strong influence on the fitted model (HosmerLemesshow, 2000).
The hypothesis for the model fitness can be measured by the Hosmer and Lemeshow test as:

$H_0$: *The model fits the data*
$H_1$: *The model does not fits the data*

## 3. Results

It was observed that about 56.3% of the variability of the overall satisfaction of customers of mobile network providers was explained by the independent variables. This shows that there were some amount of variation in the overall satisfaction which was unexplained by the factors considered and could be attributed to certain residual factors.

**Table 2 Hosmer and Lemeshew Test**

| Chi-square | Df | Sig. |
|---|---|---|
| 8.737 | 7 | 0.272 |

The p-value=0.272 in Table 3 is greater than the significance level, $\propto$ =0.05, therefore we fail to reject the null hypothesis and conclude that the binary logistic regression model used fits the data set. This implies that, the mobile

network services which customers are indeed satisfied with are not significantly different from those predicted by the model.

**Table 3 Variables in the Binary Logistic Regression Model**

| | B | S.E. | Wald | Df | Sig. | Odds ratio | 95% C.I.for Odds Ratio | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Lower | Upper |
| Gender | -1.053 | 0.656 | 2.573 | 1 | 0.109 | 0.349 | 0.096 | 1.263 |
| Age | -0.180 | 0.650 | 0.076 | 1 | 0.783 | 0.836 | 0.234 | 2.990 |
| Income | 0.100 | 0.507 | 0.039 | 1 | 0.043 | 1.105 | 0.409 | 2.986 |
| SMS | -0.657 | 2.015 | 0.106 | 1 | 0.745 | 1.519 | 0.030 | 26.942 |
| consistence | 0.111 | 1.390 | 0.006 | 1 | 0.936 | 1.117 | 0.073 | 17.042 |
| Attendance | -3.077 | 2.395 | 1.651 | 1 | 0.199 | 0.046 | 0.000 | 5.036 |
| Call quality | 2.516 | 0.923 | 7.434 | 1 | 0.006 | 12.385 | 2.029 | 75.601 |
| Added services | 4.646 | 2.101 | 4.891 | 1 | 0.027 | 104.153 | 1.696 | 6395.359 |
| Call charge | -0.570 | 1.735 | 0.108 | 1 | 0.042 | 1.566 | 0.019 | 16.949 |
| Coverage | 3.832 | 1.744 | 4.827 | 1 | 0.028 | 46.157 | 1.512 | 1408.922 |
| Constant | -3.897 | 1.881 | 4.290 | 1 | 0.038 | 0.020 | | |

Multiple binary logistic regression model was derived from Table 3 as

$$\text{logit}(p(y=1)) = -3.897 - 1.053\,\text{Gender} - 0.180\,\text{Age} + 0.100\,\text{Income} - 0.657\,\text{SMS} + 0.111\,\text{Consistency} - 3.077\,\text{Attendence} + 2.516\,\text{Call Quality} + 4.646\,\text{Added Value} - 0.570\,\text{Call Charge} + 3.832\,\text{Coverage}$$

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From Table 3 the predictor variables income, call quality, added value, call charges and coverage with a p-value 0.043, 0.006, 0.026, 0.042 and 0.028 respectively are all less than the significance level 0.05. This signifies that there are enough bases to reject the null hypothesis and therefore conclude that the coefficients of these predictors are not equal to zero at 95% confidence interval. This shows that the variables approachable, added services and coverage are statistically significant and contribute significantly to the overall customer satisfaction with the services provided by the mobile networks in Ghana. However, gender, age, SMS, consistency and attendance with a p-value of 0.109, 0.783, 0.745, 0.936 and 0.199 respectively are not statistically significant because their p- values are greater than the significance level of 0.05 at 95% confidence interval and so the coefficient of these factors are equal to zero. This means that all these factors did not contribute significantly on the overall satisfaction with services provided by the mobile networks in Ghana.

The odd ratio with respect to gender was 0.349 (C.I. = 0.096 - 1.263), indicating that the male customers were more satisfied with the services delivered by the mobile networks as compared to their female counterparts, holding other factors constant. Moreover, the odd ratio 0.836 (C.I. = 0.234 – 2.990) recorded by age means that customers who were in their youthful age were by far (high probability) being satisfied with the service delivery of networks as compared to the aged, controlling for other variables in the model. Also, income with the odds ratio of 1.105 (C.I. =0.409 – 2.986)

showed that customers with income levels below GH¢500 have higher chance of satisfaction as compared to the customers with income levels above GH¢ 500 controlling for other variables in the model. It was also revealed that the odds ratio 1.519 (C.I. = 0.030 - 26.942) for SMS, indicating that for every timely SMS service per customer, there was much customer satisfaction due to those whose expectations were met as compared to those customers whose expectations were not met, controlling for other variables in the model. Also, the odds ratio 1.117 (C. I. = 0.073 – 17.042) depicts that customers whose expectations were met due to consistency estimates, more likely, customer satisfaction of services delivered by mobile networks as compared to those customers' whose expectations were not met, if other factors in the model were held constant.

Furthermore, the lowest contributor attendance with the odds ratio 0.046 (C.I. = 0.000 – 5.036) means that customers whose expectations were not met with how the networks attend to customers' needs, have a high probability of being satisfied with the service delivery of mobile networks as compared to whose expectations were met, holding other factors constant in the model. Moreover, call quality with the odds ratio 12.385 (C.I. = 2.029 – 75.601) indicates that customers whose expectations were met regarding the quality of call of the mobile networks are as more satisfied with the service's delivered by the mobile networks than their counterparts whose expectations were not met, controlling for other variables.

The highest contributor, added services, with the odds 104.153 (C.I. = 1.696 – 6395.359) means that customers whose expectations were met about added services were 104 times as likely to estimate customer satisfaction with the service delivery of mobile networks as compared to those whose expectations about added services were not met, controlling for other variables in the model. In addition, call charges with the odds ratio 1.566 (C.I. =0.019 – 16.949) explains that those customers whose expectations were met with the call charges of the mobile networks are more likely of being satisfied as compared to customers whose expectations were not met holding other factors in the model constant. The odds 46.157(C.I. = 1.512 – 1408.922) for coverage denotes that the customers whose expectations were met were as more likely of being satisfied compared to customers whose expectations were not met, when other variables in the model are held constant.

## 4 Discussion

The article provides evidence of the factors which influence customer satisfaction of mobile telecommunication networks in Ghana through the perspective of service delivery system. The binary logistic regression model showed that added services (comprising mobile data, MMS, etc.) contributes more, among other factors, in terms of influencing customer satisfaction. This could be due to the flooding of the mobile phone market with android and other operating systems which enable mobile phone users to access internet facility. Most mobile phone users now browse the internet via their

mobile phones and as a result their satisfaction could be easily influenced by the mobile data packages available within a particular network provider.

Contrary to the growing perception that customer care among the service industry in Ghana is poor, it is revealing to note in this study that employees of mobile networks are able to satisfy their customers by attending promptly to the complaints and concerns of their customers. This might be the fruit of the liberalization of the mobile network industry which has expanded its frontiers and brought about competition among industry players. Meanwhile, call charges (prices) for some customers did meet their expectation they were satisfied with service delivered by MTN's and this supports the assertion of some earlier researchers' inclination towards price fairness in relation to customer satisfaction (Hermann et al., 2007; Kukar-Kinney et al., 2007; Martin-Consuegra et al., 2007).

Call quality (service quality) is very dear to the hearts of many customers and more so contribute significantly to the satisfaction of a mobile customer. This is suggested and asserted by other studies (Gustafsson et al. 2005 and Turel et al. 2006). Unlike few years ago when often time's customer calls were misdirected couple with unfamiliar voices speaking, nowadays, this has drastically reduce to the barest minimum. This could be attributed to the punitive measures rolled out by the National Communication Authority (NCA).

## 5 Conclusion

Services such as income, call quality, added value, call charge's and network coverage were found statistically significant and hence influence the overall customer satisfaction of services provided by the mobile network in Ghana. However, factors such as gender, age, the timely delivery of SMS, consistency of the networks in solving customers' problem and prompt attendance to customers were not statistically significant in terms of its effect on the overall customer satisfaction of services provided by network providers in Ghana. Since factors influencing customer satisfaction have been established, stakeholders in the mobile telecommunication industry, particularly, the six (6) mobile networks service providers should note these and emphasize them in their marketing strategy.

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