Determinants Of Mobile Phone Customer Satisfaction In The Kurdistan Region

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This study examines the customer satisfaction of the telecommunications service in Kurdistan region of Iraq. The purpose is to identify the key factors that determine the customer satisfaction of the telecommunications services. A conceptual model is specified and a number of hypotheses are tested with a sample of 1,458 Kurdish mobile phone users in 2010. Discrete choice methodology is used to test the three models for user satisfaction: Binomial logit model for overall satisfaction, and multinomial logit model for brand use and for handset preferred features. Overall the findings show that the Kurdish customers are generally satisfied with the purchased mobile telecommunication services. The findings have implications for competition in the market and the flows of investment resources to the targeted market segments for potential expansion.

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1. Introduction

The Iraqi government of the former regime neglected the development of communication in the Kurdistan Region. In 1991, the region was cut off from all means of communication from other parts of Iraq and it became completely isolated due to the mass uprising. Hence, due to the blockade imposed on the region, the Kurdistan Regional Government (KRG) was unable to develop an isolated communication sector until the coalition forces invaded Iraq in 2003 and the region was reconnected to its neighboring regions.

Although most of the efforts are directed to reconstruct and develop the oil industry in the region, the communication sector has become one of the main areas of interests for the KRG and the business community. It is a mature sector which may provide significant profitable opportunities for foreign investors, and it has the greatest possibility of having competitive advantages at the regional and national levels. At the regional level it is also of a great importance considering regional governance and security reasons.

Although mobile phone operators in the Kurdistan region are newly established, the rapid growth in their business within the region and also nationwide needs to be studied to derive regulations and policy implications for their business operation. Due to its high penetration rate, the business needs to pursue a long run profit rather than a short run one for its survival in the growing competitive market. The competition is now focused primarily on the attempts to retain the existing customers through different kinds of incentives such as low price and offers of new services rather than trying to acquire new customers. Thus, measuring the customer satisfaction is essential for the telecommunication corporations to serve the customer's needs, to provide more satisfaction, and to ensure their business sustainability as it plays a significant role in the nation's economic growth.

The main objective of this research is to identify and to quantify the impacts of the factors that drives customer satisfaction in the mobile telecommunication business, and to determine the relationships between the demographic variables and the degree of customer satisfaction.

The rest of the paper is organized as follows: A review of the literature is presented in the second section. The third section presents the conceptual framework and research hypothesis. The data is described in the fourth section and model estimation and analysis of the results and marginal effects are presented in the fifth and sixth sections. The final section contains a summary

of the results, conclusion drawn and policy implications of the empirical results.

2. Literature Review

This section reviews the customer satisfaction theories and models, and analyzes the reasons behind the customer satisfaction and dissatisfaction concerning the mobile telephony service. First, a presentation of the customer purchasing process will be given in order to provide a background for how to achieve customer satisfaction. Thereafter, the measurement of customer satisfaction will be presented. Then, the concept of a perceived value and service quality will be examined. Each of the steps is described below.

Satisfaction and Customer Purchasing Process

Oliver (1997) defined the customer satisfaction as the customer reaction to the state of fulfillment, and customer judgment of the fulfilled state. Satisfaction is the consumer's reaction to the assessment of the perceived difference between prior expectations and the actual performance (Tse et al., 1988), with expectations that can be seen as predictions about what will possibly occur in the future (Parasuraman et al., 1988).

According to Kotler et al. (2006) and Lovelock et al. (2007), customers are passing through five steps of a decision making process when they make a purchase: need recognition and problem awareness, search for information, evaluation of the set of available alternatives, and purchasing and post purchase evaluation. Furthermore, Lovelock et al. (2007) developed a model for service consumption which consists of three stages. The pre-purchase stage which is a constituent of three components, first, the perception of need and the search for information that accordingly clarifies the need, second, exploring the solution, the suppliers, and alternative service products which are identified by the consumer, and third, the evaluation of the alternatives and the suppliers for a decision on purchasing the service or product. The second stage is the encounter stage, the moments of interface between a customer and a supplier. This stage involves a request from a supplier that has been chosen by the customer to supply the service or the product, or initiate self-service for which the payment maybe straightforward or billed later. The third stage is an evaluation of the performance for the service or product encountered and its

effect on future intentions. This is the stage that satisfaction or dissatisfaction will occur and the loyalty decision will be made by the customer.

In the process of purchasing or subscribing to a mobile telephony service, the customer assesses the mobile service based on experience of use and the rating is done in accordance to the mobile service attributes.

Measuring Customer Satisfaction

The customer satisfaction measurement is a useful means to meet the objectives of the business organizations and to analyze the performance of an offering to customers to identify the areas of improvements as well as customers' priorities, which can serve as a base for customer segmentation (Kotler et al., 2006). It is a predictive tool. It enables a business organization to evaluate its ability to meet to the customer's expectation, desires, and needs effectively (Parasuraman et al., 1988). The process of customer satisfaction is a projective way to get into the mind of the customers, and getting continues valuable feedback from the customers. This process is considered as the key element in total quality management (Zairi, 1994).

Measurement of the customer satisfaction involves market techniques such as survey methods, study of a focus group, standardize packages for monitoring customer satisfaction, and different computer software. However, Feclikova (2004) identified some problems at different levels in measuring the customer satisfaction using these techniques. First, problems can be encountered in analytical such as techniques, formal procedures, and systems. Second, type of problem encountered are behavioral such as attitudes, beliefs, perceptions, motivation, obligation and outcome behavior resulting from people involved in the process. Third type of problem arise from, organizational which includes issues such as organizational structure, flow of information, management style and also the level in which the process is conducted.

Perceived Value

Zeithaml (1996) and Holbrook (2006) defined the perceived value as "the results or benefits customers receive in relation to the total cost (which include the price paid plus other costs associated with the purchase), or the consumers' overall assessment of what is received relative to what is given". Holbrook proposed that the perceived value can be regarded as a consumer's overall evaluation of the utility of a service or product based on the perceptions of what is received and what is given. Holbrook referred to this evaluation as

the comparison of a product or service's "get" and "give" mechanism. Moreover, in their study of mobile telephony services in Canada, Turel et al. (2006) argued that the level of the perceived value is a key factor which affects customer satisfaction.

Many scholars agreed upon the four features that are the main drivers of the customer value in mobile telephony services. These features are network quality, price, customer service, and personal value and benefit (Danaher et al. 1996; Bolton, 1998; and Booz et al., 1995 in Eniola, 2006). Network quality includes network coverage (indoor and outdoor), voice clarity, and connection quality. Price is the amount paid in order to access the service and use the network. Customer service includes the quality of the service delivered to the customer such as customer care, maintenance service, billing, etc. Finally, personal value and benefits is the level of perception of benefits from using the mobile service by individual customers.

Service Quality

For measuring the customer satisfaction in regard to the quality of services delivered to the customer, it is necessary to review the concept of quality of service. It usually refers to the customer perceived quality as it is basically defined from a customer's point of view and not from the producer's point of view.

Gronroos (1984) defined the consumer perceived quality as the confirmation or disconfirmation of a consumer's expectations of service compared to the consumer's perception of the service actually received. Consumers of product or service will make the judgment about the quality of the product or service relative to what they want. They view a provider's service quality by comparing their perceptions of service experiences with their expectations of what the service performance should be.

Other scholars have defined the service quality as the level in which a product or a service meets consumers' needs, they defined it as "the difference between customer expectations and perception of services" (Parasuraman et al., 1988; Zeithaml, 1996), resulting in the service quality model (SERVQUAL). It is a multidimensional scale including five different dimensions that must be fulfilled while delivering any product of service. Following Parasuraman et al. (1988), these are reliability (the capability to perform or deliver the promised product or service dependably and accurately), responsiveness (the willingness and readiness to support the customers and provide run time services),

assurance (the skills and knowledge and courtesy of employees as well as their capability to convey trust and confidence to the customer), empathy (provide caring and individualized attention to customers), and finally the tangibles which means the manifestation of physical facilities, resources and personnel.

These five dimensions have been used successfully across a plethora of industries, notwithstanding its flexibility and popularity (Linda et al., 2009). However, in general research on customer satisfaction is able to measure the current performance but cannot be considered as guidance to improve the customer's experience as it cannot relate to the behavior of the customer to the actual behavior that results from those perceptions (Kotler et al., 2006).

3. Conceptual Framework and Research Hypothesis

We will develop in this section the conceptual framework, introduce the model specification and the formulated hypotheses to be tested based on the relevant literature discussed on customer's mobile telecommunication satisfaction.

We propose three models with the following dependent variables: SATISFY whether the customer is satisfied with the purchased service or not, BRAND to determine the brand of cell phone the customer is using for the service, and finally PREFTUR to determine the customer's preferred features available in the cell phone. The three models are constructed to investigate

the level of Kurdish customer satisfaction of the mobile telecommunication services and then, to explore the relationship between customer satisfaction and the demographic characteristics of the customers.

According to the above discussion, we have considered the following hypotheses to study the customer satisfaction of the mobile telecommunication service in the Kurdistan region. Here, *Perceived Usefulness* is defined following Venkatesh et al. (2000) as 'the extent to which a person believes that using the system will enhance his or her work performance'. Saarinen (1996) included perceived usefulness in an adapted version of the model of information system success by DeLone et al. (1992), concluding that the perceived usefulness affects user satisfaction, and is affected by the system and information quality, and benefits to individuals, organizations and society. Hence, we expect such an influence will persist under the current circumstance, therefore our first hypothesis will be:

H1: *Perceived usefulness of the mobile technology positively affects the user satisfaction.*

Perceived ease of use is defined as the degree to which interaction with the technology is clear and understandable (Ndubisi et al., 2003). Further, perceived ease of use is found to be an important factor which influences user satisfaction. Kumar et al. (2007) developed a model of adoption of e-government user satisfaction. He found out that the customer's characteristics and perceived usefulness and perceived ease of use influences directly the e-government adoption, while service quality improves the customer's satisfaction. The model assumed that if customers are satisfied with the quality of the e-government services, they will adopt and use them frequently. Therefore the second hypothesis will be:

H2: *Perceived ease of use of the mobile technology affects the user satisfaction.*

Perceived enjoyment following Davis et al. (1992) is defined as "the extent to which the activity of using the technology is perceived to be enjoyable in its own right, apart from any performance consequences that might be anticipated". Venkatesh et al. (2000) found out that the perceived enjoyment affects the intention via perceived ease of use indirectly. If a technology is not enjoyable for the consumer, then it needs more effort to

use it. Further, Kang et al. (2009) pointed out that the user satisfaction is affected by factors such as perceived enjoyment and perceived playfulness in voluntary information system environments such as a mobile service. Hence our third hypothesis will be:

H3: *Perceived enjoyment of the mobile technology affects customer satisfaction.*

The telecommunication business studies show that customers are sensitive to the service price. Price as a competition factor is used to attract new and current customers from the competitors through marketing campaigns (Gustafsson et al., 2007). Accordingly, our next hypothesis is stated as follows:

H4: *There is a relationship between customer satisfaction of mobile telephony service and the price of the purchased service.*

The effects of demographic characteristics are found in the customer satisfaction literatures. It has shown that the demographic variables such as income age, gender are related to the service quality expectations (Webster, 1989; Scott et al., 1993; and Gagliano et al., 1994). According to the above discussion, we have considered the following characteristics related to these

hypotheses in addition to the previous ones to study the adoption of mobile telecommunication service:

H5: *Age of individual influences customer satisfaction.*
H6: *Gender of the individual influences customer satisfaction.*
H7: *Occupation of the individual influences customer satisfaction.*
H8: *Educational Level of the individual influences customer satisfaction.*
H9: *Location of the individual influences customer satisfaction.*
H10: *Income of the individual influences customer satisfaction.*
H11: *Brand of Cell phone positively affects the Customer Satisfaction.*

In Figure 1 we present a graphic representation and summary of the conceptual foundation used in this study.

Figure 1. A conceptual model for customer satisfaction
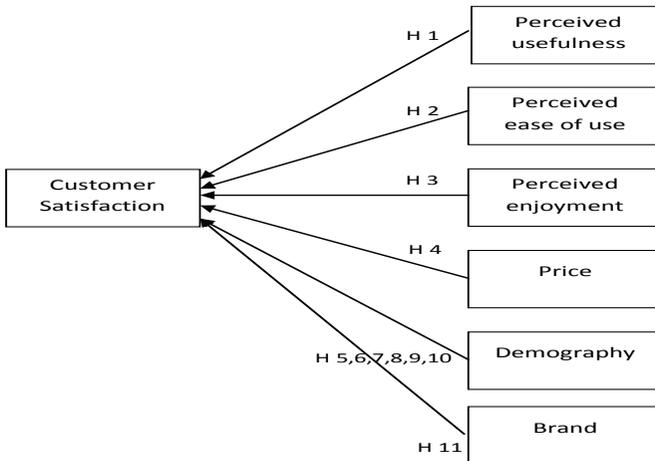
4. The Data

Different methods have been applied for data collection to collect an unbiased and representative sample of the respondents. We chose the sample for the survey from the current users of mobile telecommunication services with representative sampling probability. A total of 1,458 valid survey responses were collected in 2010, in which 800 survey forms were collected by two main mobile operators in the Kurdistan Region (Korek and AsiaCell). These were conducted by calling their customers randomly and conducting a questionnaire directly by a phone call. Another 658 forms were collected by the Ministry of Transportation and Communication, and the Ministry of Agriculture and Water Resources targeting government employees. To overcome geographical constraints, the survey forms were distributed as such

to reflect the population in each of the Kurdistan Region's three governorates.

The median respondent was found to be in the 26-40 years age interval, with a diploma or a Bachelor degree holder, a public sector employee, with an annual disposable income of less than US$8,000, the sample can be clearly seen as a representative of the region's population which will lead to a high degree of precision in the analysis performed on the collected respondent data.

The questionnaire consists of two parts: *Part I* inquires about the consumer characteristics and the general demographic factors. $\forall$ covers the questions related to the factors that drive the customer's satisfaction for the mobile telecommunication service. The questions are designed to enquire a customer's opinion about the mobile telecommunication service after experiencing it, and to also inquire about the brand and the type of the cell phone customer purchased to use the service. Moreover, based on the previous researches (e.g., Moore et al., 1991; Liao et al., 2007; and Pagani, 2004), the perceived usefulness is questioned in this part of the questionnaire. The questions included daily time use of the service, the main purpose of use, and the network quality. Further, perceived ease of use adapted from Agarwal et al. (1997) is also questioned which is about the preferred features on the cell phone. Ease of use is one of the choices available to the respondent in the questionnaire.

Furthermore, factors affecting the brand decision in the Asian mobile phone industry have been studied by Liu (2002). His finding was that the choice of a cell phone is characterized by two different behaviors to brands: the behavior towards the brand of the cell phone and the behavior towards the service network. Further, he out found that the cell phone with better capabilities and larger size are among the determinant factors that determining the brand choice in which it is also attributed to new technology features such memory capacity and messaging options. Accordingly, we have questioned the responders about the preferred brand of the cell phone.

Finally, a report by In-Stat/MDR research institute in 2003, studied customer's wide range of preferences in mobile phone features. They found that color display is the most wanted feature among the mobile users. Those who use their mobile mainly for business related purposes are highly value speaker phone (hands free) and more multimedia options. We also questioned the responders about the preferred features of the cell phone which they use.

The questionnaire is designed in two versions one in English and

one in Kurdish. The English version was created first as it is easier and more convenient for the adaptation of the original format initiated by Parasuraman et al. (1991). In order to receive correct answers, it is then translated into the Kurdish language to ensure the correct understanding for the target respondents.

The sample characteristics in usage of the mobile telecommunication services are summarized in Table 1. It shows the distribution of the mobile telephony subscribers. It is noted that Korek, AsiaCell, and Aria/MobiTel comprise of 51.3%, 44.86% and 3.84% of the respondents' subscriptions.

Table 1: Distribution of mobile telephony service subscribers in Kurdistan Region, 2010

Service Provider Name	Frequency	Percentage	Cumulative Percentage
Asia Cell	654	44.86	44.86
Korek	748	51.30	96.16
Aria/MobiTel	56	3.84	100.00
Total number of observation	1,458	100.00	

Only 56 observations (3.84%) are using other operators (i.e. Ariafon and Mobitel). Hence we pooled the number of users for the two latter operators into one provider category due to their relatively small number and market share in comparison with the two main operators. The sample share of the service providers is close to their actual market shares.

In the Appendix Table A.1, we present the descriptive statistics of the data obtained from the survey and the variables used in this study. We notice the heterogeneity (with few exceptions) strongly suggests the adequate use of groups in analysis. We will mention this section in detail. The questions in the survey are categorized according to the main construct (see Appendix Table A.2). In addition to the demographic constructs, the study has the construct of perceived usefulness and efficacy, which includes utilization rate factors. Correlation matrix of the variables is reported in Appendix Table A4. The explanatory variables are not correlated. This suggests the absence of a multicolinearity problem.

5. The User Satisfaction Models

We constructed three models in this study using Logistic regression methodology and are estimated by the statistical package NLOGIT4.0/ LIMDEP 8.0. We followed the definition of Train (2009) to explain the concept of logistic regression where a decision maker, labeled n, faces a choice among J alternatives. The decision maker would obtain a certain level of utility from each alternative. This utility is denoted as Unj, j=1,2,...,J. The decision maker chooses the alternative that provides the greatest utility. The behavioral model then, will indicate that a decision maker chooses alternative i if and only if: $Uni > Unj \ \forall \ j \neq i$. The probability that the decision maker n chooses alternative i is equal to: $Pni = \text{Prob}(Uni > Unj \ \forall \ j \neq i)$. If $j<2$, the model is a binomial choice probability model, otherwise, if $j \geq 2$, then the model is a multinomial choice probability model. The basic function of the logistic analysis is:

$$P_{ni} = E(Y_i = \tfrac{1}{X_{ni}}) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_{ni})}} \qquad (1)$$

where, Pni is the probability that individual n chooses alternative i, Xni is the vector of the observed variables that is relative to alternative i, β_0 and β_1 are vectors of unknown coefficients that are to be estimated.

In the first model out of our three specified models, the number of choice alternatives of the dependent variable is two which implies that the model is binomial logit. On the other hand, the other two (brad and feature) models are multinomial logit models as the number of choice alternatives of the dependent variables are greater than two. The three models are constructed as functions of the different data characteristics. They are estimated independently in which the dependent variables are a discrete indicator of the user satisfaction of the mobile telecommunication service.

To examine how well the three models fit the data on which it was estimated, the log likelihood ratio test (LR-test) is used. It is to make a comparison between the two models; one without restriction (often called the full model) and the other which is estimated with restriction (the null model). According to Gujarati (2004), the utility maximization that subjects to restriction will not imply a larger maximum when it is compared to the utility maximization subjects with no restriction.

The LR test is defined as the following: $\lambda = 2(LR_u - LR_r)$, where LR_u is the

log likelihood for the model with no restriction and LR_r is the log likelihood for the model with restriction. The test statistics λ follows a $\chi2$ distribution with a degree of freedom that is equal to the number of restrictions imposed by the null hypothesis. The difference between LR_u and LR_r indicates whether the restrictions are correct or not. A small deference implies that the restrictions are correct.

The three models for service satisfaction, brad selection and preferred features are outlined below.

Model 1: Binomial Logit Model for User Satisfaction (SATISFY)

The Binomial logit model is applied to examine the overall user satisfaction for the mobile telecommunication service in the Kurdistan Region of Iraq. The Binomial logit model formula can be expressed as following:

$$P[Y|X] = \Phi(X'\beta) \tag{2}$$

$$Y_i^* = X_i'\beta + \varepsilon_i \tag{3}$$

where, P is the probability of being satisfied, Y is the binary dependent variable which indicates satisfied or not satisfied, X is a vector of independent or conditional variables for user satisfaction, F is the distribution function, b is a vector of unknown parameters that is to be estimated, ε is a random error term, and i indicates an individual respondent. The dependent variable representing the user satisfaction is dichotomous. It is written as:

$$Y = \begin{cases} 1 & \text{if} \quad Y^* > 0 \\ 0 & \text{otherwise} \end{cases} \tag{4}$$

The variable Y is not observable and defined based on the latent variable Y*. It takes the value one (Y=1) if Y*>1, implying that the person is satisfied, and zero (Y=0) if Y*=0, then it suggests that the person is dissatisfied. The SATISFY model hence is specified as:

$$Y_i = f(X_{1i}, X_{2i}, \ldots, X_{Ji}) \tag{5}$$

where, Xj represents J individual indicators of user satisfaction. This can be seen in the following equation:

(6) Y=f(Gender, Age, Income, Education, Price, Location, Use purpose).
The model specification can be shown as follows:

$$Y_i = \alpha_0 + \beta_{Gen}Gender_i + \beta_{Cos}Cost_i + \sum_{j=1}\beta_j Age_j + \sum_{j=1}\beta_j Education_j + ...$$

$$\sum_{j=1}\beta_j Emplopment_j + \sum_{j=1}\beta_j UuePurpose_j + \sum_{j=1}\beta_j Location_j + \varepsilon_i$$

(7)

The models with dichotomous dependent variables are by tradition estimated using logit models (Greene, 2008). The model is written as:

$$P(Y_i = 0) = \frac{1}{1 + \exp(\beta x_i)}$$, Probability of being satisfied. (8)

$$P(Y_i = 1) = \frac{\exp(\beta x_i)}{1 + \exp(\beta x_i)}$$, Probability of being dissatisfied. (9)

where, X represents the vector of the indictors. The model is estimated by maximum likelihood estimation method. The estimation method is iterative. The estimation results are reported in Appendix Table A.3. A battery of the model specification tests can be used by a likelihood ratio test (LRT). It is based on the log likelihood values obtained from different restrictive versions of the model.

Table 2: Frequencies of actual and predicted outcomes from Model 1

Actual Value		Predicted Value	
Satisfy	Dissatisfy	Satisfy	Dissatisfy
972	486	676 (69.5%)	179 (36.8%)
1458		855 (58.7%)	

According to the results shown in Table 2, Kurdish mobile service subscribers are mostly satisfied with the service, 972 respondents observed to be satisfied and the model has correctly estimated 69.5% of the actual outcome, while an alternative frequency (dissatisfy) has 468 observations and the model has estimated correctly 36.8% of the actual outcome. To test the fit of the model, we calculate the predictive values for the two alternatives:

(676+179)/1458=58.7% which implies that 58.7% of the data fits well and is correctly predicted by the estimated model.

The Likelihood Ratio (LR) test value in this model is 120.826 with 13 degree of freedom. This indicates the effects of model specification are statistically highly significant with a confidence at 99% level of significance. Thus, we reject the null hypothesis that the coefficients of the independent variables are all simultaneously equal to zero.

We will test for heteroscedasticity in the SATISFY model and will follow the steps suggested by Verbeek (2004) for heteroscedasticity test[1]. Here, we assume the variance of the error term depends on an exogenous variable Zi, and it is written as:

$$v(\varepsilon_i | x_i) = h(z_i'\theta)$$

(10)

where, h( ) is a nonzero constant. If the value of   is not equal to zero then, the variable Zi will affect the variance, . This will present heteroscedasticity, otherwise the case will be homoscadastic. In accounting for heteroscedasticity, it is possible to investigate whether heteroscedasticity is of known or unknown form. In this case we investigate based on the assumption of known form and the function of specific consumer characteristics. The estimation results assuming heteroscedasticity of known form and multiplicative are presented in Table 3. The form of heteroscedasticity can be presented in the following equation:

$$Var[\varepsilon_i | x_i] = [\exp(\theta Z_i]^2$$

(11)

The LR for binomial logit model with heteroscedasticity is 107.3. This exceeds the critical value (CV=23.59) at the 99% level of significance for chi square degrees of freedom which is equal to 9. The null hypothesis test result for Ho: homoskadasticity ( ) indicates that the effect of the model specification is statistically significant. This suggests the presence of heteroscedasticity (Greene, 2008).

Table 3: STFY binomial Logit with heteroscedasticity

SSTF	Coefficient	Standard Error	t statistics	p Value	Mean of variable

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1 Estimation of multinomial models assuming heteroscedasticity is not feasible within the frame of the existing statistical packages (Lee, 2009).

| Constant	-0.480*	0.286	-1.680	0.093	
AGE	-0.00004	0.003	-0.020	0.988	34.108
MALE	0.385***	0.089	4.310	0.000	0.535
INCOME	-0.00007	0.0003	-0.250	0.805	928.326
PRICE	-0.032	0.218	-0.150	0.885	1.227
ERBIL	-0.196**	0.082	-2.400	0.017	0.381
DHOK	-0.129	0.101	-1.270	0.203	0.162
SOCIAL	-0.141*	0.081	-1.740	0.083	0.319
ENTMNT	-0.689***	0.241	-2.860	0.004	0.055
OTHEPRPS	0.343**	0.153	2.250	0.025	0.061
Disturbance variance terms					
PRIMS	-1.1003***	0.224	-4.910	0.000	0.119
MIDS	-0.721***	0.221	-3.260	0.001	0.112
HS	-0.745***	0.192	-3.880	0.000	0.243
POSTGRAD	-0.509	0.372	-1.370	0.172	0.056

From Table 3, one can note that the education category groups primary school PRIMS, middle school MIDS, and high school HS are negative in relation to the college degree as reference group. They are all statistically significant, and the coefficients are -1.1, -0.72, and -0.74 respectively. They decrease the conditional variance by $\exp(-1.1)2$, $\exp(-0.72)2$ and $\exp(-0.74)2$ respectively. Hence the heteroscedasticity test proves that the model under homoskadasticity is miss-specified and the less educated has less variation in user satisfaction than more educated users.

Moreover, the results of the binomial logit model presented in Appendix Table A.3 shows that the gender, age, location, education level, and the purpose of use are all highly statistically significant. However, only the gender and age have positive effect. Male users and relatively older ages are more likely satisfied with the service. The other significant factors have negative effects on user satisfaction. This can be considered as an appealing result. It implies that the users with some education level, living in Erbil, who mostly use the service for entertainments and for more than one purpose are generally not satisfied with the services they have adopted. In looking deeply to the results, even though the income and the price are not significant, they have also negative effects. They support the consumption theory that higher

price for the purchased good and lower income will lead to lower satisfaction rate.

Hypothesis H3, H5, H6, H8 and H9 are clearly justified by this model. By looking at Figure 2 which shows the proportion of satisfied users and their corresponding dimension, it shows that the highest percentage of satisfied users are because of the cheap price, then the network quality comes in the second rank. It can be inferred that the subscribers care mostly about the service fee and the network quality.

Figure 2: Dimensions of user satisfaction
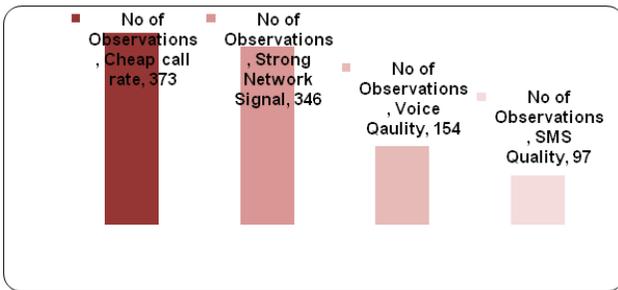
[Voice Quality spelling in the chart]

However, one can look at the satisfaction in this study in a different dimension, namely the service quality dimension that has been rated by the users. To analyze the service quality dimension, we have taken into consideration only the satisfied users (972 observations). The results show that 321 satisfied users rated the quality of the service as very high, 407 as high and 184 as medium. However, 60 observations (6.1%) rated the service quality as low and very low in spite of being with the satisfied group (see Figure 3).

Figure 3: Service quality rate
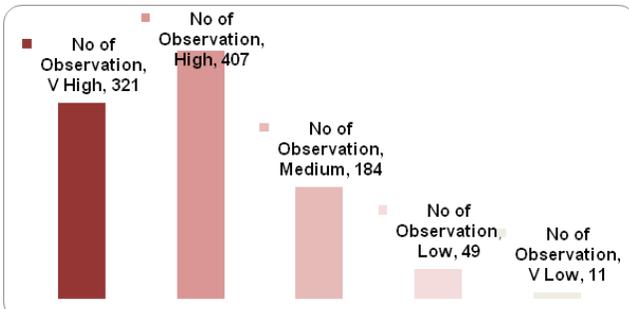
Model 2: Multinomial Logit Model for Brand Selection

Here we estimate a model of choosing the brand of the cell phone for mobile telecommunication service in Kurdistan Region. We are interested in an individual sample as a brand type; hence, we use the multinomial logit model to study the choices of brand. It can be considered as special case of a general model of utility maximization (Greene, 2008).

In our model, it is assumed that the independent variable consists of a set of individual specific characteristics, such as gender, age, income, education, employee and so on. These are the same for all the choices. The observational setting is the individual's choice among a set of alternatives, where it is assumed that the determinant of the choice are the characteristics of the individual. The models with dichotomous dependent variables are estimated. The choice probability is written as:

$$\text{Probability [choice j]} = \text{Probability } [U_j > U_k] \ \forall k \neq j \tag{12}$$

This indicates that the probability of selecting choice *j* will be the same as selecting the probability of the utility of rank *j* which is greater than the utility rank *k*, in a condition that the utilities specified are not equal. The model is specified as:

$$Y_i = f(x_{1i}, x_{2i}, \ldots, x_{Ji}) \tag{13}$$

Where, *x* are *J* indicators or vectors of indicators of operator service types. The indicators here are the users' gender, location, age, income, education, occupation, cost, and the purpose of using the adopted mobile telephony service. The model can be specified as:

$$Brand_i = \alpha_0 + \beta_{Age} Age_i + \beta_{Cost} Cost_i + \beta_{Income} Income_i + \beta_{Gender} Gender_i + \sum_{j=1} \beta_j Location_j +$$

$$\sum_{j=1} \beta_j Eduation_j + \sum_{j=1} \beta_j Usepurpose_j + \varepsilon_i \tag{14}$$

Where, Age, Income, Gender, Location, and Education represent the age, income, gender, location, and education level of the consumer, Cost and Use purpose represent the cost of using the service and the purpose of using the service most respectively. Brand is the dependent variable (that has three values (0: Nokia, 1: Korean (Samsung and LG), and 2: Other brands). The number of categories in each group of variables (J) may differ by the way the respective variable category is defined. Since, there are multiple categories for Brand; we will choose a base category as the comparison group. Here our

reference choice is the first group (Nokia=0). Moreover, reference groups for explanatory variables are Female, Sulaymaniah city, College (postgraduate) education, and she is using the phone for work related purposes[2].

The respondents were asked to rank the top brands of the region's market. The results show that 69%, 19%, and 12% of the respondents ranked Nokia, Korean and other brands such as Sony Ericson and Motorola respectively. To analyze the ranking reason of the respondents, we have developed a multinomial logit model. The results of the model can be seen in Appendix Table A.4. The predicted outcomes of the model versus the actual outcomes are reported in Table 4. To test the fit of the model, we calculate the predictive values for the three alternatives: (959+65+27)/1458=72% which implies that 72% of the data fits well and is correctly predicted by the estimated model.

The Likelihood Ratio test value in this model is 290.11 with 40 degree of freedom. This indicates the effects of model specification statistically are highly significant. With confidence at the 99% level of significance, we can reject the null hypothesis that the coefficients of the independent explanatory variables are all simultaneously equal to zero. This is favor of the specified model specification.

Table 4: Frequencies of actual and predicted outcomes- Model 2

	Predicted Alternatives (Brand)			Total
Actual Alternative	Nokia	Korean	Others (Sony Ericson,	
	0	(LG and Samsung)	Motorola, etc...)	
Nokia: 0	959 (73%)	1	2	1007 (69%)
Korean: 1	215	39	9	283 (19%)
Others: 2	131	65 (57%)	3	168 (12%)
Total	1305	10	27 (69%)	1458
		114	39	

Among the 972 satisfied customers, 675 respondents were selecting Nokia as the best brand, 188 Korean brands, and 109 the other brands (see Figure 4). Moreover, the demographic characteristics, and the entertainment aspects such as multimedia and color of the cell phone are the most significant

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2   We have chosen different references in the models to show the best results and for easy interpretation. However, choosing different references will not affect the results of the models.

factors affecting the user choice for the selected brand. Even in this model, we can prove the validation of the hypothesis H1, H3, H5, H6, H7, and H8. This indicates that this model is as powerful as the previous ones.

Figure 4: Satisfied Users with Brand Choice
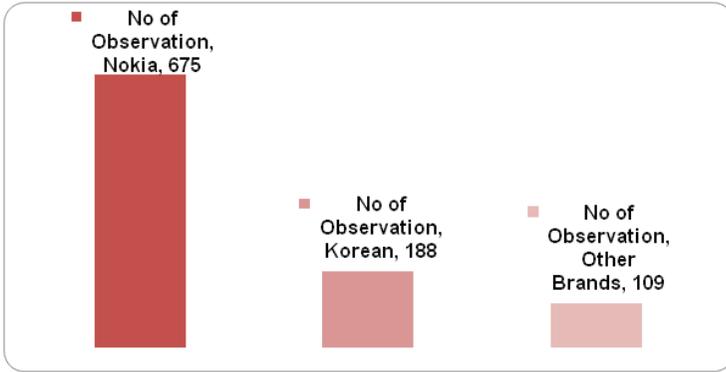
Model 3: Multinomial Logit Model for Cell Phone's Preferred Features

Respondents of the survey were asked to reveal their likings for the various features of the mobile phone that they were using. The responses are summarized in Table 5. The cell phone's color (499 observations with 34%), and user friendly (366 observations with 25%) are among the two features mostly valued by the customers, followed by multimedia (music and video) which accounted for 215 observations with 14.7%. Battery life (205 observations with 14%) and extra technology (173 observations with 11.8%) are the other two important features. The hypotheses H1, H3, H5, H6, H7, H8, and H11 are tested in this model are all justified.

Table 5: Frequencies of actual and predicted outcomes-Model 3

Actual Alternative	Predicted Alternatives (Mobile Phone Features)					Total
	Colour	Media	Battery	Technology	User Friendly	
	0	1	2	3	4	
Colour: 0	376 (75%)	20	5	6	92	499

Media: 1	98	66 (30%)	9	1	41	215
Battery: 2	96	39	11 (5%)	5	54	205
Technology: 3	85	17	6	10 (17.3%)	55	173
User Friendly: 4	172	10	7	8	169 (46%)	366
Total	827	152	38	30	411	1458

Finally, we present in Table 6 a summary of proved and justified hypothesis by the three models constructed in this study. It should be noted that, six of the hypotheses are tested in more than one model.

Table 6: Summary of the Hypotheses Test Result

Hypotheses	Models
H1	Model 3, Model 2
H2	Model 3
H3	Model 1, Model 3, Model 2
H5	Model 1, Model 2
H6	Model 1,Model 2
H7	Model 2, Model 3
H8	Mode 1, Model 2
H9	Model 1
H10	Model 3
H11	Model 3

Note that we were unable to test hypothesis H4 suggesting that the price has a relationship with the satisfaction. The price coefficient in Models 2, although negative did not turn out to be statistically significant.

6. Marginal Effects

The coefficients estimated from binomial and multinomial logit models cannot be directly interpreted. The estimated parameters will only provide the expected change in the logit but not the probability of selecting a specific choice. Thus, in order to test the effects of the explanatory variables that construct the three models under study, we need to count for the marginal effects and elasticities. The Appendix Table A.5 reports the marginal effects of the three models under study.

The coefficient of the residents of Erbil in model 1 is -0.477. This implies that the probability to be satisfied is higher for customers residing in Sulaymaniah than Erbil by 0.477. Older age's probability to be satisfied is higher than young age by 0.21. The negative signs of education categories' coefficients imply that the educated people in the region are not most likely satisfied with the service. Moreover, customers who use the service mostly for entertainment purpose are more likely satisfied with the service.

Male users in Model 2 prefer to use other brands of cell phone rather than Nokia while younger ages prefer to purchase Korean brands. Customers with less education prefer Korean brands in relative to Nokia as the Korean brands offer more user friendly interfaces that do not need higher skill to use its features. Customers who have Korean brand cell phones and use the service mostly for entertainments are generally satisfied. The probability of using the service for social interaction purposes, entertainments, and for combined social interaction network and entertainments purposes are higher by 0.673, 1.624, and 0.922 compared to using for work related purposes, and to use other than Nokia brand respectively. Those who prefer media and color in their cell phone use Korean brands. The probability of customers who prefer color differences in their cell phone is higher by 0.878, 1.032 relative to Korean and Nokia, respectively.

The positive and statistically significant value of age in Model 3 implies that the older generations are sensitive in terms of the available features in their mobile phones. Occupation factor is also a significant factor in the model which illustrates that the preferred feature of the mobile phone can be determined by the type of a consumer's occupation. However, the choice of a service provider affects the customer's choice for the feature. To be more specific, Korek users are most likely to be seeking a handset which provides a basic feature and easy to use. This can be due to the limited feature options

provided by Korek to their customers. The Korean made mobile handset is favored for the users with strong preference for color and media choice.

7. Summary, Conclusions, and Policy Implications

This exploratory study was conducted to analyze customer's decision making and to increase our current understanding of the mobile business market in the Kurdistan region of Iraq. The three discrete choice models estimated showed the evidence of the overall significance of the explanatory variables. The models were found to have a high explanatory power. Individual parameters were strongly significant with the expected sign. This indicates that the constructed model explains customers' satisfaction of the mobile services very well. Hence the analysis and tests conducted based on the three models show evidence of reliability of the factors measuring customer satisfaction. It indicates that despite a lack of previous empirical measurements of customer satisfaction of mobile telecommunication services in the region, a well-established scale for measuring the satisfaction has been developed so that it can be used by business managers, policy makers and regulators.

These findings prove the relevance of the proposed and successfully tested hypothesis. The study represents a critical step toward developing a satisfaction model in the Kurdistan regions' mobile telecommunication. The study presented important theoretical and practical contributions that are useful to the market analyzers and decision makers. It provided a better conceptualization of the formation of satisfaction in the Kurdistan region by examining its influential factors.

The findings of this study can help mobile phone operators in their operation and their strategic plans of marketing. The attributes discussed under the category of demographic characteristics, brand, customers 'satisfaction, and service quality can be considered as reliable indicators of customer's perception. Therefore, it can be a training guideline for mobile phone operators' services in the Kurdistan region. The results also show that the perceived usefulness, perceived ease of use, and perceived enjoyment have a significant positive relationship with customer satisfaction of the mobile telecommunication service in the region.

The study has shown that the mobile phone is already used extensively within the region. However, the quality of the services provided to the users is not monitored by the government. Thereby, there are needs to develop a

proper regulation policy from the regional and central government sides. The regional government's intervention through regulating the mobile telephony market in the region will encourage the competitive firms to build and maintain a competitive advantage. The firms must try their best to achieve higher customer satisfaction, and to improve their service quality. Thus, the findings will also prove beneficial to mobile phone designers, researchers and, most important of all to the mobile phone users themselves.

It is recommended that future research should be forward looking. It should be focused on the examination of similar models as in this study with specific service area delivered such as SMS, MMS, internet service and customized services. Given availability of data, additional research is also needed to find out whether or not other factors are relevant or should be included in the proposed models such as calling cost and the price of the cell phone. These two variables were calculated. Despite an increased frequency of non-response, it is recommended for future studies that, these variables should be included in the survey questionnaire to allow more variation of data for the individual customers.

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Appendix

A.1: Summary statistics (main variables) of the survey data, N=1,458.

Variable	Mean	Standard. Deviation	Minimum	Maximum
Location	2.077	0.913	1.00	3.00
Gender	1.465	0.499	1.00	2.00
Age	1.971	0.840	1.00	4.00
Education	3.230	1.109	1.00	5.00
Occupation	4.386	1.047	1.00	7.00
Income	2.868	1.569	1.00	7.00
Monthly Expense	2.198	1.631	1.00	7.00
Month Mobile Expense	1.659	1.111	1.00	7.00
Service Provider Name	1.590	0.565	1.00	3.00
Are You Satisfy (Yes/No)	1.333	0.472	1.00	2.00
If Yes, Why	2.987	1.633	1.00	5.00
If No, Why	4.049	1.489	1.00	5.00
Hand Phone Brand	1.721	1.356	1.00	6.00
Proffered Features	3.409	1.382	1.00	5.00
Hours Use	1.418	0.634	1.00	3.00
Purpose Of Use	1.612	0.845	1.00	4.00
Satisfy Rate	2.078	1.005	1.00	5.00
Quality Of Service Rate	2.217	1.044	1.00	5.00
Cost	29.942	11.772	19.20	62.25
Price	1.227	0.144	1.16	1.92

A.2: Description of main variables and their classifications

Variable	Description	Type	Category
ERBIL	Consumer residing in the Capital of the Region Erbil	Dummy (1 for Yes, 0 otherwise)	Demography
DHOK	Consumer residing in the city of Duhok		
SULI	Consumer residing in the city of Sulaymaniyah		
MALE	Male Consumer		
FEMALE	Female Consumer		
Age	Age of the consumer	Continuous variable	
PRIMS	Level of Education Up to Primary School	Dummy (1 for Yes, O otherwise)	
MIDS	Level of Education Up to Middle School		
HS	Level of Education Up to High School		
COLLEGE	Level of Education :Bachelor or Diploma		
POSTGRAD	Level of Education: High diploma, Master, Doctorate.		
COLLEGE	Level of Education :Bachelor or Diploma		
NONE	Occupation : None/ retired		
PRIVATE	Occupation: Self employee		
PUBLIC	Occupation: Public Employee		
STUDENT	Occupation: Student		
INCOME	Monthly Income of the Consumer	Continuous variable	
SPNAM	1: Users of AsiaCell 2: Users of Korek 3: Users for Other operating services	Discrete Variable (1,2,3)	Service Resources
KOREK	Consumers use Korek service	Dummy (1 for Yes, O otherwise)	
ASIA	Consumers use AsiaCell service		
OTHESP	Consumers use the other services (Ariafon/Mobitel)		
PRICE	AsiaCell: 1.16 Korek 1. 245 Others on average: 1. 92	Continuous variable	Cost
COST	Time use * Price		
WORK	The most purpose of using the service: Work related	Dummy (1 for Yes, O otherwise)	Efficiency
SOCIAL	: Social Interaction		
ENTMNT	:Entertainment		
OTHEPRPS	: A combination of available purpose		

HOURUSE1	Service 's time used (receiving/ making a call): Less than 30 minutes per day	Dummy (1 for Yes, O otherwise)	Utility
HOURUSE2	Service 's time used (receiving / making a call): 30-60 minutes per day		
HOURUSE3	Service 's time used (receiving / making a call): More than 60 minutes per day		
NOKIA	Type of Cell Phone Brand: Nokia		
KOREAN	Type of Cell Phone Brand: LG or Samsung		
OTHEBND	Type of Cell Phone Brand: Sony/Motorola/Others		
COLOR	Preferred Cell Phone feature: Color		
MEDIA	Preferred Cell Phone feature: Multimedia		
BATTERY	Preferred Cell Phone feature: Battery Live		
TECH	Preferred Cell Phone feature: High Tech options		
EASYUSE	Preferred Cell Phone feature: easiness of use		
STFY	Is the user satisfy with the current used service		
Quality of Service (Qos) Rate	The users rate for the service quality 1: Very High 2: High 3: Medium 4: Low 5: Very Low	Discrete variable (1,2,3,4,5)	

A.3: Parameter estimates for user satisfaction models, N=1,458.

Variables		Model 1: SATISFY	Model 2: BRAND		Model 3: PREFTUR			
Main	Sub	Y=1	Y=1	Y=2	Y=1	Y=2	Y=3	Y=4
		Satisfy	Koreans	Others	Color	Multi-media	Battery	Ease of Use
Constant	Constant	-0.242	-1.092 ***	-3.75 5***	-3.205 ***	-2.967 ***	-2.925 ***	-2.628 ***
Gender	FEMALE	Reference						
	MALE	0.748 ***	-0.125	0.345*	0.231	0.291	0.3398*	0.067
Location	ERBIL	-0.477 ***						
	SULI	Reference						
	DHOK	-0.270						
Age	AGE	0.00033*	-0.021 ***	0.011	0.0302 ***	0.0402 ***	0.0388 ***	0.053 ***

Income	IN-COME	-0.00018			-0.33D-04	0.002	-0.48D-04	-0.18D-04
Education	PRIMS	-1.01***	-0.234	0.063				
	MIDS	-0.81***	-0.678**	0.225				
	HS	-0.627***	0.105	-0.01				
	COLLEGE	Reference						
	POSTGRAD	-0.279	-0.933**	-0.218				
Occupation	None		-0.543	0.361	0.601	1.730***	1.605***	0.595
	PRIVATE		0.40537*	0.471*	-0.095	0.084	-0.275	-0.108
	STUDENT		0.459***	0.313	0.593***	0.171	0.125	-0.624***
	PUBLIC				Reference			
Purpose of Use	WORK	Reference			0.251	-0.348	-0.202	0.221
	SOCIAL	-0.112	0.033	0.673***	1.295***	0.548	0.553	0.7481**
	ENTMNT	-1.112***	0.644**	1.624***	1.714***	1.454***	0.881*	-0.201
	OTHEPRPS	0.568**	-0.021	0.922***	Reference			
Price	Price	-0.193						
Preferred Features	TECH		-0.214	0.081				
	MEDIA		0.86019***	0.067				
	BATTERY		-0.50479	0.878***				
	COLOR		1.16517***	1.032***				
	Ease of Use		Reference					
Brand Name	NOKIA				Reference			
	KOREAN				1.372***	1.066***	-0.325	0.157
	OTHEBND				0.971***	-0.008	0.784***	-0.036

SP NAME	AsiaCell		Reference		Reference			
	Korek		0.16556	0.191	-0.228	-0.053	0.162	0.346 **
	Other S P		0.45312	1.902 ***	-0.611	-1.071**	-0.552	-0.496
	Other S P		0.45312	1.902 ***	-0.611	-1.071**	-0.552	-0.496
Likelihood Ratio LR-test		120.826 (13 df)	290.11 (40 df)		379.23 (60 df)			

***, **, * Denote statistical significance at 10%, 5% and 1% level (two-sided test) respectively

A.4: Correlation matrix, N=1458.

	LOCAT	GENDER	AGE	EDUCAT	OCCUP	INCOME	SPNAME	SATISFY	HANDTYP	PREFTUR	HOURUSE	USPRPOS	QOSRATE
LOCAT	1												
GENDER	0.009	1											
AGE	0.186	-0.176	1										
EDUCAT	-0.068	0.042	-0.166	1									
OCCUP	-0.019	0.021	-0.368	0.226	1								
INCOME	-0.015	-0.031	0.109	0.176	-0.027	1							
SPNAME	-0.577	0.042	-0.194	0.021	-0.048	0.054	1						
SATISFY	0.087	-0.158	0.043	0.146	0.020	0.012	-0.100	1					
HANDTYP	-0.032	-0.024	-0.021	-0.033	-0.008	0.018	0.137	0.013	1				
PREFTUR	-0.039	0.015	0.113	0.027	-0.128	0.044	0.026	0.075	-0.149	1			
HOURUSE	0.017	-0.006	0.015	0.092	-0.059	0.500	0.112	0.002	0.126	-0.027	1		
USPRPOS	-0.039	0.132	-0.206	0.016	0.108	-0.118	0.043	-0.025	0.138	-0.144	0.022	1	
QOSRATE	0.021	-0.089	-0.005	0.013	0.020	-0.104	-0.075	0.302	0.004	0.022	-0.044	0.148	1