

IMPACT OF NETWORK CONNECTIVITY ON CUSTOMER SATISFACTION IN 3G AND 4G MOBILE PHONE SERVICES

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ABSTRACT

Purpose - This article aims to investigate the relationship between network connectivity and customer satisfaction in 3G and 4G mobile phone services. This impact of factor, indicates that consumer preference in mobile phone services.

Design/methodology/approach -518 respondents made up the study's sample; 197 of them used 3G services, while 321 of them used 4G services. This study employed a convenience sampling technique and a descriptive research methodology. A survey-questionnaire was used to gather the data. Reliability statistics and regression analysis provide the basis of the statistical section. SPSS version 22.0 was used to conduct the results.

Findings -According to the results, network connectivity has an impact on how satisfied customers are with mobile phone services. The study paper's findings also shown a strong and positive correlation between the independent factors (network connectivity) and the dependent variable (customer satisfaction).

Limitations - There are several issues with this study that can be fixed in future investigations. The study only looks at one state, to start. Future research may look at the entire nation or just a few states. Second, this research takes into account a limited number of service providers. Future research could make advantage of more service providers. The outcome may be different.

Contribution -This study fills a research gap on the significance of network connectivity in the telecom industry's impact on customer satisfaction in Telangana state, India.

Keywords – Mobile phone services, 3G and 4G, Customer satisfaction, network connectivity.

INTRODUCTION

A key component of operating any business for a longer period of time is customer satisfaction. If a service provider does not satisfy their customers, it will be quite difficult to keep them as customers. Customer satisfaction is significantly impacted by network quality (Nunnally, 1994). Customer satisfaction is influenced by the quality of the network. Consumers anticipate that network quality such as speech clarity and signal strength must be the operators' top priority (Kotler, 2000). Network quality is one of the key components of total service quality, (Haque et al., 2010; Chakrabarti et al., 2025). Without a high-quality

network and extensive coverage, no business can thrive in the marketplace (Chakraborty, 2013). The most crucial elements are the promotional offer, price (total cost), and network quality (Hossain, 2016). Almost all of the research on customer satisfaction in mobile phone services focuses on different areas such as pricing, call rate, value-added service, network coverage, and customer care, according to a thorough examination of the literature. This is a research gap since we cannot overlook the importance of network connection in determining customer satisfaction. The service provider can better satisfy their clients by filling the gap. This study fills a research gap by examining the significant impact of network connectivity on customer satisfaction in the telecom industry in Telangana state, India.

The 3G and 4G mobile phone services in Telangana state are the subject of this study. The influence of network connectivity on consumer satisfaction with 3G and 4G mobile phone services is examined in this article.

OBJECTIVES OF THE STUDY

- 1) - To study the impact of network connectivity on customer satisfaction in 3G mobile phone services.
- 2) - To study the impact of network connectivity on customer satisfaction in 4G mobile phone services.
- 3) - To study the comparative analysis of network connectivity in 3G and 4G mobile phone service providers.

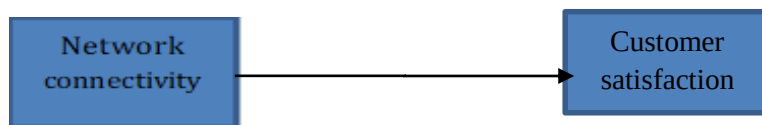
LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

Consumer satisfaction is based on how a person feels about the product in general after making a purchase. The degree to which the performance of a product aligns with the customer's preconceived notions about its functionality is frequently used to gauge satisfaction (Shankar and Mahesh, 2014). Comparable to personal interest, satisfaction is an objective that may be reached via the use of goods and services. As a rewarding, delightful experience, satisfaction is a desirable outcome of patronization or consumption (Lim et al., 2006). Loyalty and satisfaction are two different but closely linked concepts (Bennett and Rundle, 2004). Maintaining and following up is crucial to guaranteeing customer satisfaction. Every business activity in a normal corporation has the ability to affect customer satisfaction (Kim et al., 2004). Occupational position and monthly income level are the demographic variables that have the biggest impact on overall happiness. Network congestion is the main issue that MSP customers suffer, whereas call tariffs are the most important factor in choosing a mobile service provider (Oliver, 2014). High-quality customer service, inexpensive inter- and intra-network service fees, fast internet, and extensive and clear network coverage all have an impact on potential mobile phone service provider switchers (Akanferi et al., 2019). The most crucial current factors are network quality, call rate, coverage, and connection (Chakraborty, 2013). Customers have expressed pleasure with the following services: online recharge, validity, bonus, free roaming, festival offer, and GPRS. Nonetheless, the network's service quality, customer support, SMS packs, free call time, and connection fees have all been criticized by customers (Owiye, 2012; Matta et al., 2022). Most users have price sensitivity. Their ability to make purchases is influenced by the cost of 3G phones. In India, the leading factors influencing the uptake of 3G services are their speed and security (Agarwal and D.N, 2012). The most crucial elements are the promotional offer, network quality, and price (total cost).

Additional considerations include quickness, customer service center accessibility, and valued added service. When offering services via 3G mobile technology, the service provider has to pay attention to these elements (Hossain, 2016). Because pricing methods have a major detrimental effect on continued uptake, 3G providers need to concentrate on them. Overall, customers are pretty satisfied with the 3G services that the operator offers.

Based on the review of literature we propose the following model (**Figure 1**).

The proposed research framework theorizes that the variables network connectivity, impact customer satisfaction in mobile phone services.



HYPOTHESES

To check the relationship between dependent variable and the independent variables, two hypotheses were developed, which are as follows:

H₁: There is a significant relationship between network connectivity and customer satisfaction in 3G services (offered by Airtel, Vodafone Idea and BSNL).

H₂: There is a significant relationship between network connectivity, and customer satisfaction in 4G services (offered by Airtel, Vodafone Idea, BSNL and Reliance Jio).

RESEARCH METHODOLOGY

A quantitative approach was used in this study. The descriptive research design and convenience sampling methods were used in this study. A structured survey questionnaire was used to collect the data. The sample size was 518, in which 321 were using 4G services and 197 were using 3G services. The survey was conducted in Telangana various districts. Both 3G and 4G users' perspectives were shown in the survey. The study variables were measured using a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). For data analysis, the statistical package SPSS version 22.0 were used.

MEASURING INSTRUMENTS

These measures intend to capture the customer's opinion regarding network connectivity and customer satisfaction. Network connectivity and customer satisfaction were measured by a three-item scale. The respondents answered the questions by indicating their level of agreement/disagreement to the statement stated, using the scale from 1 for "strongly disagree" to 5 for "strongly agree".

The measurement of network connectivity and customer satisfaction were adapted from (Kim et al., 2004), (Lim et al., 2006), and (Sondoh et al., 2007). Question 1 and 2 were adapted from (Kim et al., 2004) of network connectivity but slightly modified to suit the nature of this study for 3G and 4G services. Question 3 was adapted from (Lim et al., 2006) of network connectivity but slightly modified to suit the nature of this study for 3G and 4G services. Question 1, 2 and 3 for customer satisfaction in network connectivity was adapted from (Sondoh et al., 2007) but slightly modified to suit the nature of this study for 3G and 4G services. A 5-point Likert scale ranging from (1) "Strongly disagree" to (5) "Strongly agree" was used.

DATA ANALYSIS AND FINDINGS:

518 customers, 301 (58.11%) are men, while the rest 217 (41.89%) are female. It may be deduced that male responders use the mobile phone services more than the female. It is observed that out of the total 518 customers, 256 (or 49.42%) are between the ages of 21 and 30; 154 (or 29.73%) are between the ages of 31 and 40; 76 (or 14.67%) are between the ages of 41 and 50; and the remaining 32 (or 6.18%) are over the age of 50 years. Majority of respondents fall within the 21-30 age range.

It is seen that nearly 80 % of the respondents are within the age group of 21 to 40 who represent relatively young population. Out of 518 customers 208 (40.15%) have completed their graduation, 107 users (20.66%) have finished their post-graduation, 203 (39.19%) respondents are below graduates. It can be inferred that a large number users of the mobile services are educated. Of the 518 customers, 160 (30.89%) are students, 90 respondents are either a businessman or self-employed. More than half of the respondents (51.74%) are employees. It may be deduced that employees make up the majority of the customers (30.89%) of mobile phone services. out of 518 customers of mobile phone services based telecom sector, 156 customers (30.10%) are earning around Rs. 25,000 as monthly incomes. 178 customers (34.38%) belong to the earning category of Rs. 25,001 to Rs. 50,000 as monthly incomes. It is seen that 35% respondents have fairly good monthly income. And one-third of the respondents have income level within the bracket above Rs25,000 to Rs50,000/- It shows the affordability of the respondents for the mobile phone services. The questionnaire was designed to elicit information related to the mobile phone service usage. The respondents' opinion regarding the usage of mobile phone services like 3G or 4G, adoption of postpaid or prepaid recharge services. It is revealed from the responses that 197 (38.03%) of the 518 respondents were availing 3G services and the rest 321 (61.97%) were using 4G services. Use of postpaid or prepaid services, the respondents submitted that only 27 (5.21%) respondents were subscribing to postpaid services whereas more than 94% of respondents prefer to go for prepaid mode of services. To analyze the respondents' choice of network service providers under 3G and 4G mobile phone services, the researcher presented two tables showing the same. the classification of customers according to their 3G and 4G mobile phone services respectively. out of 197, 3G mobile network services customers, 85 customers (43.15%) are using Bharti Airtel mobile phone network services, 61 customers (30.96%) are using Vodafone Idea network services, and 51 customers (25.89%) are using BSNL network services. It is inferred that most of the customers (43.15%) are using Bharti Airtel mobile phone network services. out of 321, 4G mobile network services customers, 95 customers (29.60%) are using Reliance Jio mobile phone network services, 88 customers (27.41%) are using Bharti Airtel network services, 73 customers (22.74%) are using BSNL network services and 65 customers (20.25%) are using Vodafone Idea network services. It is inferred that most of the customers (29.60%) are using Reliance Jio mobile phone network services.

A)- RELIABILITY ANALYSIS

This study was based on 42 items to measure network connectivity and customer satisfaction in 3G and 4G mobile phone services. network connectivity and customer satisfaction for 3G services were measured with 18 items (6items for Airtel, 6 for Vodafone-Idea and 6 for BSNL) respectively. Network connectivity and customer satisfaction for 4G services were measured with 24 items (6 items for Airtel, 6 for Vodafone-Idea, 6 for BSNL and 6 for Reliance Jio) respectively. If any item with a minimum score of Cronbach's alpha 0.70, is an acceptable level for reliability measure (Nunnally, 1994).

B)- REGRESSION ANALYSIS FOR 3G NETWORK CONNECTIVITY

The hypotheses with respect to the inter dependence of the variables such as network connectivity, with the customers' satisfaction in each case of the service providers have been analyzed and presented in this section. The independent variable has been taken as the network connectivity of the Service providers like Airtel, Vodafone idea and BSNL providing 3G services in Telangana State. The

dependent variable is taken as the Customers satisfaction. On this basis the hypotheses have been tested and the results are interpreted below:

H_{1.1}: There is significant relationship between network connectivity and customer's satisfaction in terms of service provided by Airtel.

The following result is obtained after running simple linear regressions for Airtel-3G. The R-square value 0.18 explains the variations to the extent of 18%. The adjusted R square indicates that the independent factors (network connectivity) have a 17% influence on the dependent variable (the consumer satisfaction). The ANOVA result confirms the model to be significant at 95% level of confidence. The p-value shows the NC-Airtel-3G as $0.000 < 0.05$ at 95% level of confidence and the one sample t-test value for this variable is 4.30 which is more than the benchmark value of 2.40 indicating the variable to be statistically significant.

It is seen that the network connectivity is the independent variable and the customer satisfaction is the dependent variable. From the data computed above, a regression model emerges as under;

$$Y_{(CS)} = \alpha + \beta (X_1)$$

Where, α is the constant and β is the coefficient of the independent variable Network connectivity of Airtel-3G. Now, the model can be expressed as follows:

$$Y_{(CS)} = 1.30 + 0.42 (\text{NC-Airtel-3G})$$

H_{1.2}: There is significant relationship between network connectivity and customers' satisfaction in terms of service provided by Vodafone-Idea.

The following result is obtained after running simple linear regressions for Vodafone-idea-3G. The R-square value 0.13 explains the variations to the extent of 13%. The adjusted R square indicates that the independent factors (network connectivity) have a 11% influence on the dependent variable (consumer satisfaction). The ANOVA result ($0.004 < p < 0.05$) confirms the model to be significant at 95% level of confidence. The p-value showing in the coefficient shows the Vodafone-idea-3G as $0.004 < 0.05$ at 95% level of confidence and the one sample t-test value for this variable is 2.96 which is more than the benchmark value of 2.40 indicating the variable to be statistically significant.

It is seen that the network connectivity is the independent variable and the customer satisfaction is the dependent variable. From the data computed above, a regression model emerges as under;

$$Y_{(CS)} = \alpha + \beta (X_1)$$

Where, α is the constant and β is the coefficient of the independent variable Network connectivity of Vodafone-Idea-3G. Now, the model can be expressed as follows:

$$Y_{(CS)} = 2.07 + 0.36 (\text{NC-Vodafone Idea-3G})$$

H_{1.3}: There is significant relationship between network connectivity and customer's satisfaction in terms of service provided by BSNL

The following result is obtained after running simple linear regressions for BSNL-3G. The R-square value 0.16 explains the variations to the extent of 16%. The adjusted R square indicates that the independent factors (network connectivity) have a 14% influence on the dependent variable (consumer satisfaction). The ANOVA result ($0.005 < p < 0.05$) confirms the model to be significant at 95% level of confidence. The p value showing in the coefficient table below as $0.005 < 0.05$ at 95% level of confidence and the one sample t-test value for this variable is 2.95 which is more than the benchmark value of 2.40 indicating the variable to be statistically significant.

It is seen that the network connectivity is the independent variable and the customer satisfaction is the dependent variable. From the data computed above, a regression model emerges as under;

$$Y_{(CS)} = \alpha + \beta (X_1)$$

Where, α is the constant and β is the coefficient of the independent variable Network connectivity of BSNL-3G. Now, the model can be expressed as follows:

$$Y_{(CS)} = 2.11 + 0.40 (\text{NC-BSNL-3G})$$

From the above analysis, it is observed that all these three service providers namely Airtel, Vodafone and BSNL have been significantly experiencing the problems of network connectivity. The varying degrees of coefficients shown in the models above prove the point. A comprehensive table is prepared and presented below in Table 1 to observe the differences along with simple regression models developed.

Table 1: Comprehensive Table showing the models (Customer satisfaction as dependent variable and Network connectivity as independent variables)

Service Providers	Independent variables	α	β	Model
Airtel	Network Connectivity	1.30	0.42	$Y_{(CS)} = 1.30 + 0.42 (\text{NC-Airtel-3G})$
Vodafone		2.07	0.36	$Y_{(CS)} = 2.07 + 0.36 (\text{NC-Vodafone Idea-3G})$
BSNL		2.11	0.40	$Y_{(CS)} = 2.11 + 0.40 (\text{NC-BSNL-3G})$

It is observed from the above table that network connectivity is strong in case of Airtel followed by BSNL and Vodafone as is evidenced from the beta coefficients. Thus, it can be concluded that with respect to the parameters such as network connectivity, the performance of Airtel is the best among all signifying that the customers are satisfied with the services of Airtel.

Since the significance value is less than 0.05, We accept our hypothesis that the dependent and independent variables have a meaningful connection. It is evident from the study that there is a significant relationship between the independent variable (network connectivity) and the dependent variable (consumer satisfaction). With a standardized coefficient $\beta = .42$, Airtel's network connectivity is the first among the three service providers. This indicates that Airtel is more successful than BSNL and Vodafone, which have standardized coefficients $\beta = .40$ and $\beta = .36$ for 3G services, respectively.

C)- REGRESSION ANALYSIS FOR 4G NETWORK CONNECTIVITY

There are four major players providing 4G mobile phone services in Telangana state. These are; Airtel, Reliance Jio, Vodafone Idea and BSNL. Data furnished by 321 customers using 4G services were put to regression analysis on the same parameters of their experiences like network connectivity. The hypotheses developed for the purpose have been put to regression analysis. The results are analyzed and interpreted hereunder accordingly.

H_{2.1}: There is significant relationship between network connectivity and customer satisfaction in terms of service provided by Airtel.

The following result is obtained after running simple linear regressions for Airtel-4G. The R-square value 0.72 explains the variations to the extent of 72%. The adjusted R square indicates that the independent factors (network connectivity) have a 72% influence on the dependent variable (consumer satisfaction). The ANOVA result confirms the model to be significant at 95% level of confidence. The p-value shows the NC-Airtel-4G as $0.000 < 0.05$ at 95% level of confidence and the one sample t-test value for this variable is 15.07 which is more than the benchmark value of 2.40 indicating the variable to be statistically significant.

It is seen that the network connectivity is the independent variable and the customer satisfaction is the dependent variable. From the data computed above, a regression model emerges as under;

$$Y_{(CS)} = \alpha + \beta (X_1)$$

Where, α is the constant and β is the coefficient of the independent variable network connectivity of Airtel- 4G. Now, the model can be expressed as follows

$$Y_{(CS)} = 0.36 + 0.85 (\text{NC-Airtel-4G})$$

H_{2.2}: There is significant relationship between network connectivity and customer satisfaction in terms of service provided by Reliance Jio.

The following result is obtained after running simple linear regressions for Reliance Jio -4G. The R-square value 0.87 explains the variations to the extent of 87%. The adjusted R square indicates that the independent factors (network connectivity) have 87% influence on the dependent variable (consumer satisfaction). The ANOVA result confirms the model to be significant at 95% level of confidence. The p-value shows the NC-Reliance Jio -4G as $0.000 < 0.05$ at 95% level of confidence and the one sample t-test value for this variable is 25.46 which is more than the benchmark value of 2.40 indicating the variable to be statistically significant.

It is seen that the network connectivity is the independent variable and the customer satisfaction is the dependent variable. From the data computed above, a regression model emerges as under;

$$Y_{(CS)} = \alpha + \beta (X_1)$$

Where, α is the constant and β is the coefficient of the independent variable network connectivity of Reliance Jio- 4G. Now, the model can be expressed as follows:

$$Y_{(CS)} = 0.03 + 0.93 (\text{NC-Jio-4G})$$

H_{2.3}: There is significant relationship between network connectivity and customer satisfaction in terms of service provided by Vodafone Idea.

The following result is obtained after running simple linear regressions for Vodafone Idea -4G. The R-square value 0.84 explains the variations to the extent of 84%. The adjusted R square indicates that the independent factors (network connectivity) have 84% influence on the dependent variable (consumer satisfaction). The ANOVA result confirms the model to be significant at 95% level of confidence. The p-value shows the NC- Vodafone Idea -4G as $0.000 < 0.05$ at 95% level of confidence and the one sample t-test value for this variable is 18.30 which is more than the benchmark value of 2.40 indicating the variable to be statistically significant.

It is seen that the network connectivity is the independent variable and the customer satisfaction is the dependent variable. From the data computed above, a regression model emerges as under;

$$Y_{(CS)} = \alpha + \beta (X_1)$$

Where, α is the constant and β is the coefficient of the independent variable network connectivity of Reliance Jio- 4G. Now, the model can be expressed as follows

$$Y_{(CS)} = 0.28 + 0.92 (\text{NC-VI-4G})$$

H_{2.4}: There is significant relationship between network connectivity and customer satisfaction in terms of service provided by BSNL.

The following result is obtained after running simple linear regressions for BSNL -4G. The R-square value 0.78 explains the variations to the extent of 78%. The adjusted R square indicates that the independent factors (network connectivity) have a 77% influence on the dependent variable (the consumer satisfaction). The ANOVA result confirms the model to be significant at 95% level of confidence. The p-value shows the NC-BSNL-4G as 0.000 < 0.05 at 95% level of confidence and the one sample t-test value for this variable is 15.58 which is more than the benchmark value of 2.40 indicating the variable to be statistically significant.

It is seen that the network connectivity is the independent variable and the customer satisfaction is the dependent variable. From the data computed above, a regression model emerges as under;

$$Y_{(CS)} = \alpha + \beta (X_1)$$

Where, α is the constant and β is the coefficient of the independent variable network connectivity of Reliance Jio- 4G. Now, the model can be expressed as follows

$$Y_{(CS)} = 0.21 + 0.88 (\text{NC-BSNL-4G})$$

In the foregoing paragraphs, the customers' satisfaction as an outcome of the three variables such as network connectivity with respect to the 4G services provided by the four players namely Airtel, Vodafone, BSNL and Reliance Jio was analysed using the regression equations. The results are shown in the comprehensive below:

Table 2: Comprehensive Table Showing the Models

Service Providers	Independent variables	α	β	Model
Airtel	Network Connectivity	0.36	0.85	$Y_{(CS)} = 0.36 + 0.85 (\text{NC-Airtel-4G})$
Vodafone Idea		0.28	0.92	$Y_{(CS)} = 0.28 + 0.92 (\text{NC-Vodafone Idea-4G})$
BSNL		0.21	0.88	$Y_{(CS)} = 0.21 + 0.88 (\text{NC-BSNL-4G})$
Jio		0.03	0.93	$Y_{(CS)} = 0.03 + 0.93 (\text{NC-Jio-4G})$

It is observed from the above that as regards network connectivity, the beta coefficient of Reliance Jio is the highest among all which signifies the customers are highly satisfied with the service provided by Jio. It indicates the level of satisfaction being different for each of the service providers with respect to the independent criteria namely; network connectivity.

The significance value is less than 0.05, We accept our hypothesis that the dependent and independent variables have a meaningful connection. It is evident from the study that there is a significant relationship between the independent variable (network connectivity) and the dependent variable (customer satisfaction). Reliance Jio's network connectivity is the primary variable among the four

service providers (Airtel, Vodafone Idea, BSNL, and Reliance Jio). Its standardized coefficient $\beta=.93$ indicates that it is more effective than Vodafone Idea, BSNL and Airtel, which have standardized coefficients $\beta=.92, .88$, and $.85$ in 4G services, respectively.

CONCLUSION AND RECOMMENDATION

Customer satisfaction is influenced by the independent variable, as this study demonstrates. In the modern world, cell phones have become indispensable. We might claim that the type of consumer determines how satisfied they are. Customers desire strong network connectivity. Customer satisfaction, the dependent variable, and network connectivity, the independent variable, are shown to be significantly and favorably correlated in the study. The findings clarify how aspects of network connectivity affect consumer satisfaction.

Compared to the other two service providers, Airtel ($\beta=.42$) is crucial for network connectivity in 3G services. For 4G services' network connectivity Reliance Jio ($\beta=.93$) is significant in comparison to Airtel, BSNL, and Vodafone-idea. Network connectivity ($\beta=.93$) in 4G is a more significant factor than network connectivity ($\beta=.42$) in 3G, according to the comparison analysis.

LIMITATIONS AND FUTURE DIRECTIONS

There are some drawbacks with this study that can be fixed in future investigations. The study only looks at one state, to start. Future research may look at the entire nation or just a few states. Second, only a small number of service providers—three in 3G and four in 4G—are used in this research. Future research could make advantage of more service providers. Perhaps things will turn out differently. Therefore, we propose that future research should look at the national level or other states and include more service providers.

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