iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** VII **Month of publication:** July 2020

DOI: https://doi.org/10.22214/ijraset.2020.30465

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue VII July 2020- Available at www.ijraset.com

Connecting People: A Statistical Study of Telecom Service Providers

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Abstract: ***Connectivity provided by telecommunication infrastructure provides a dominant platform and plays a vital role in realization of a smart city Growth is the prime aim for any company. With the changing times and growing competition, it has become essential for the technology-driven companies to identify their core competencies and have a competitive edge over others. Business matrices like net sales, profit after tax, market capitalization and level of satisfaction of the customers are important indicators depicting the stand of the companies in the market. A comparative analysis of the leading telecom service providers such as Bharti Airtel, Vodafone Essar, Idea Cellular, Reliance Communications,***
Keywords: Telecom Brand, Z- Test, Chi-square Test, KS-Test, ANVOA,P-value, Level of Significance, Graphical Representation

I. INTRODUCTION

The Telecom Services have been recognized all over the world as an important tool for socio-economic development for a nation. India is the booming market for telecom sector. It is ranked second in the telecom network provider all around the world. This industry has witnessed significant growth in subscriber base over the last decade with better network coverage and competition induced decline in tariff plans. Customer satisfaction has been the major challenge for the companies to retain customers. Almost every brand in the market today has reached parity in terms of the features and technology. Almost every big brand in the market today meets a certain threshold level of product and service performance. But certain brands exceed customer expectations.

It is getting tougher for the marketers to retain the customers. Till a few years back, they could be reasonably certain that they would retain a customer who was satisfied with the product and the quality of service they were providing. That is no longer enough. Study after study shows that customers' satisfaction alone is no longer a real measure of loyalty. Companies now need to try harder and absolutely delight the customer if they want to retain him/her in their fold.

This survey aims to get an overview of the telecom industry. Scope of the study is to understand the various services and products offered by the telecom service providers to their customers and to find out the perception of customers about the services being offered and the customer expectations. We also took into consideration the satisfaction levels of customers onto various facilities provided by their chosen telecom brands. We also analyzed the basis on which the customer chooses his/her telecom service provider. The impact of promotion strategies like advertisements, tariff plans, VAS of the telecom industries on the customers is also studied from this survey.

A. Statistical tools

1) *Graphical Tools:* Bar diagram, Multiple Bar diagram, Pie-Chart, Clustered bar diagram, Subdivided bar diagram.
2) *Tests:* Chi-Square test for independence, Proportion, KS test, Test for equality of mean, Colligation and Association test.
3) *Other Statistical Methods:* ANOVA.
4) *Software:* 1) R-software 2) MS-Excel

B. Objectives of Study

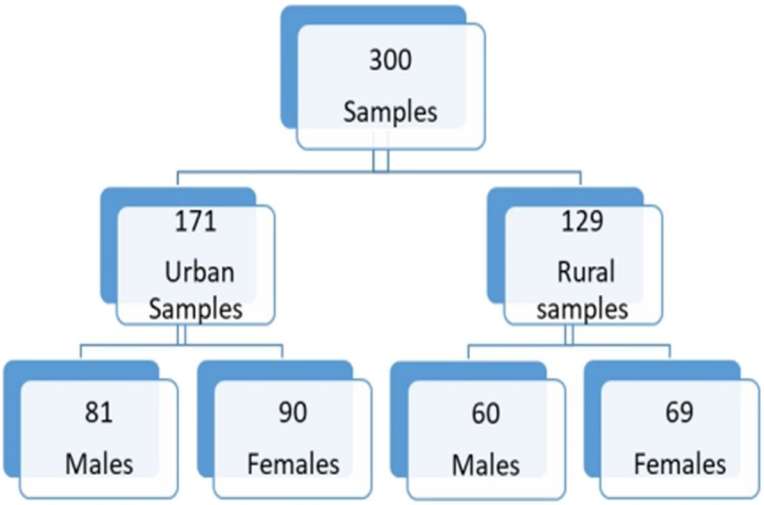
1) To get an overview of the telecom industry.
2) Explore the services and products offered by the telecom service provider to individual customers.
3) Understand the perception of customers with respect to services offered by the telecom service provider.
4) To study the customer satisfaction and understand their expectations.

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II. METHODOLOGY

Primary data collected by survey. Questionnaires prepared and customers approached to fill up the questionnaires. The questionnaire contains 30 questions which reflect on the type and quality of the services provided by the telecom sector to the customers. We have taken 5 telecom service providers which represent the public and private telecom industry in India are Jio, Airtel, Idea, Vodafone and BSNL respectively.



A. *Telecom Service Providers in India (Mishra A. et.al. 2015)*

1) BSNL Bharat Sanchar Nigam Limited (abbreviated BSNL) is an Indian state-owned Telecommunications company headquartered in New Delhi, India. It was incorporated on 15 September 2000 and took over the business of providing of telecom services and network management from the erstwhile Central Government Departments of Telecom Services (DTS) and Telecom Operations (DTO), with effect from 1 October 2000 on a going concern basis. It is the largest provider of fixed telephony, largest broadband services provider with more than 60% Market share, and fifth largest mobile telephony provider in India.

2) Airtel is formerly known as Bharti Tele-Ventures Limited (BTVL) is India's largest cellular service provider with more than 75 million subscribers as of August 2008. It also offers fixed line services and broad band services. It offers its TELECOM services under the Airtel brand and is headed by Sunil Mittal. The company also provides telephone services and Internet access over DSL in 14 circles. The company also has a submarine cable landing station at Chennai, which connects the submarine cable connecting Chennai and Singapore.

3) Vodafone Communication, previously Hutchison Essar is a cellular operator in India that covers 21 telecom circles in India. Despite the official name being Vodafone Communication, its products are simply branded Vodafone. It offers both prepaid and postpaid GSM cellular phone coverage throughout India and is especially strong in the major metros. Vodafone Communication provides 2G services based on 900 MHz and 1800 MHz digital GSM technology, offering voice and data services in 21 of the country's 23 license areas.

4) Idea Cellular Comparative Study of Major Telecom Providers in India. It is a wireless telephony company operating in various states in India. It initially started in 1995 as a joint venture between the Tatas, Aditya Birla Group and AT &T by merging '"Wings Cellular"' operating in Madhya Pradesh, UP West, Rajasthan and Tata Cellular as well as Birla AT & T Communications. Initially having a very limited footprint in the GSM arena, the acquisition of Escotel in 2004 gave Idea a truly pan-India presence covering Maharashtra, Goa, Gujarat, Andhra Pradesh, Madhya Pradesh, Chhattisgarh, Uttar Pradesh (East and West), Haryana, Kerala, Rajasthan and Delhi (inclusive of NCR).

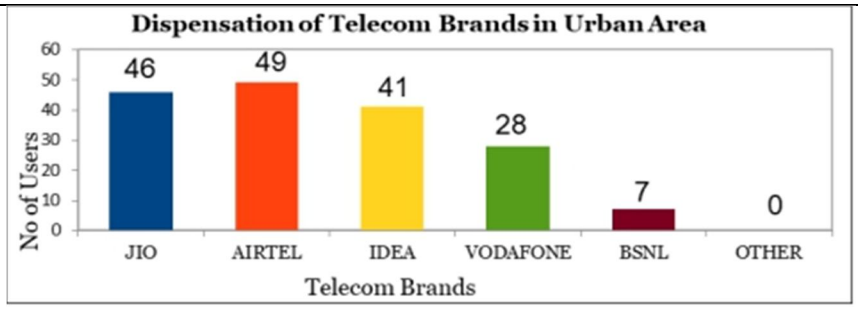
5) Reliance Communications along with Reliance Telecom and Flag Telecom is part of Reliance Communications Ventures (R Co VL). According to National Stock Exchange data, Anil Ambani controls Telecommunications Company. It is the flagship company of the Reliance-Anil Dhirubhai Ambani Group, comprising of power (Reliance Energy), financial services (Reliance Capital) and telecom initiatives of the Reliance ADA Group. Reliance Infocomm is currently managed by Anil Dhirubhai Ambani.

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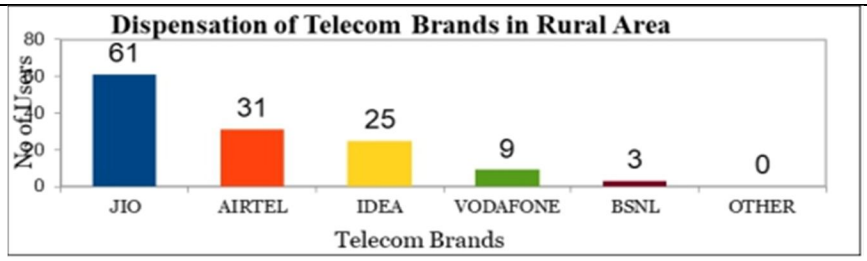
III. GRAPHICAL REPRESENTATION

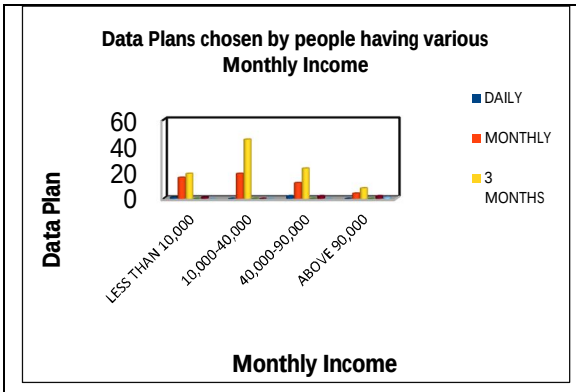
Area wise dispensation of telecom brands

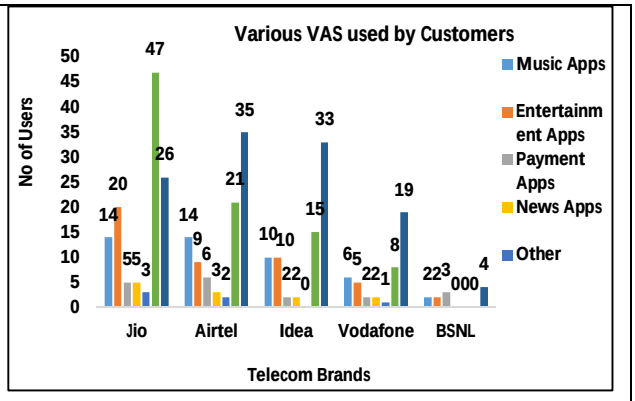
Brand	No of **Dispensation**
Jio	7
Airtel	49
Idea	41
Vodafone	28
BSNL	7
Other	0
Total	171

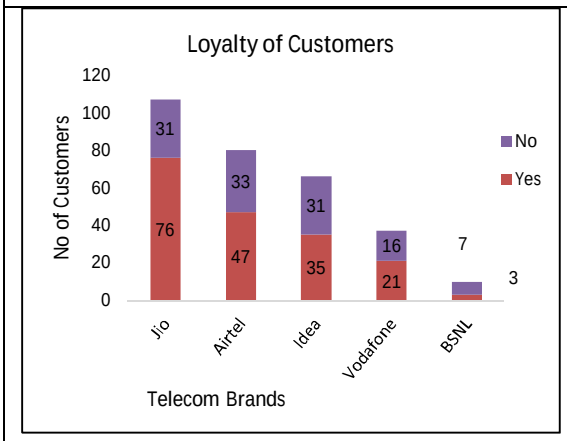


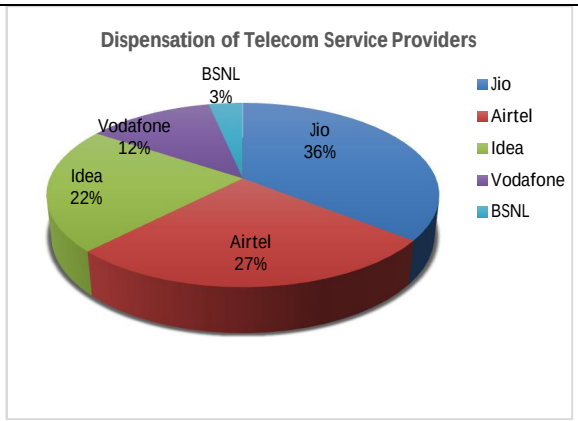
Brand	No of **Dispensation**
Jio	61
Airtel	31
Idea	25
Vodafone	9
BSNL	3
Other	0
Total	129











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IV. TESTING OF HYPOTHESIS

A. *Chi-Square Test*

1) Test for Independence of Average Daily Consumption of Data and Occupation

H_0: Occupation and Data Consumption of people are independent.

H_1: Occupation and Data Consumption of people are not independent

χ^2_{cal} = 1.8761 χ^2_{tab} = 21.0260

2) Test for Independence of Way of Recharge and Gender

H_0: Gender and Way of Recharge of users are independent

H_1: Gender and Way of Recharge of users are not independent.

χ^2_{cal} = 4.8282 χ^2_{tab} = 3.841

3) Test for Independence of Service Type preferred and Age Hypothesis:

H_0: Age and service type preferred by telecom users are independent.

H_1: Age and service type preferred by telecom users are not independent.

χ^2_{cal} = 8.6308 χ^2_{tab} = 18.3070

4) Test for Independence of Data Plan and Monthly-Income

H_0: Data Plan and Monthly Income of users are independent.

H_1: Data Plan and Monthly Income of users are not independent.

χ^2_{cal} = 3.4478 χ^2_{tab} = 24.9957

5) Proportion Test

i) Test for Jio users among Male (Rural and Urban)

Z_{cal} = 1.4588 Z_{tab} = 1.96

ii) Test for Jio users among Female (Rural and Urban)

Z_{cal} = 13.4302 Z_{tab} = 1.96

6) Analysis of Variance (ANOVA) for various telecom services used in different areas:

ANOVA Table

Source of Variation	DF	SS	MS	F_{cal}	P value	Z_{tab}
Telecom Services	4	2837.0	709.250	6.8444	0.0446	6.3882
Area	1	176.4	176.400	1.7023	0.2620	7.7086
Error	4	414.5	103.625			
Total	9	3428.0				

7) Kolmogorov-Smirnov Test (K-S Test)

D_{cal} = 0.0663 D_{tab} = 0.1573

8) Test for Equality of Mean of Call Rate Satisfaction Between Jio and Airtel

Z_{cal} = 2.0845 Z_{tab} = 1.96

9) Test for Equality of Mean of Call Rate Satisfaction Between Airtel and Idea

Z_{cal} = 2.0845 Z_{tab} = 1.96

10) Colligation and association between Satisfaction with Customer Care and Switch of Telecom Brands

Coefficient of association (Q) = − 0.2351

Coefficient of colligation (Y) = − 0.1193

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V. CONCLUDING REMARKS

After a statistical study of telecom service provider in India, it conclude that, majority of the customers in urban area prefer Jio, Airtel and Idea as their telecom connection and in rural area they prefer Jio and most examined facility is network coverage provided by Jio. In large number of people choose three month data plan. The highest numbers of customers using all the VAS provided by Jio. The average number of telecom users is different for different telecom brands and the number of telecom users is not affected by area.

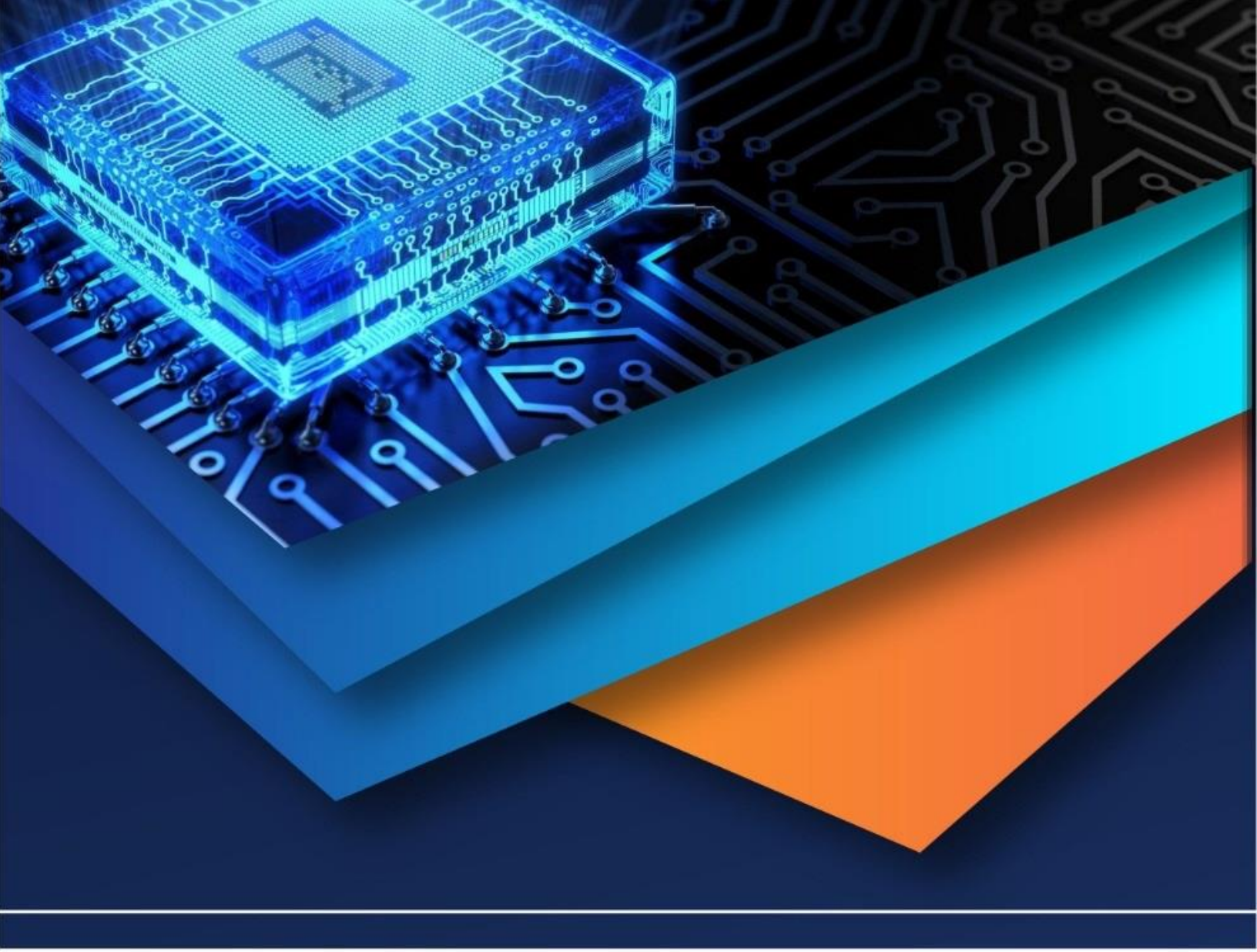
Most of the customers are satisfied with their telecom while a few are very dissatisfied with the facilities provided by their telecom and most the customers will switch their telecom brand if another telecom has better services. And maximum number of customers does not visit the official website of their telecom while some visit the website frequently. The attributes Occupation and data consumption of people are not related to each other also gender and mode of recharge are not independent. But age and service type preferred by telecom users and data Plan and monthly income of users are independent. There is significant difference between average call rate satisfaction for Jio and Airtel. And there is negative association between Satisfaction with Customer Care and Switch of Telecom Brands.

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