A Study of Impact of Mobile Phone on Society Based On Statistical Tools and Techniques

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Abstract:
Now a day's mobile phones have become an indispensable tool as communication plays a key role in all the aspects of life. It has become an essential accessory carried by everybody not only because they make it easy to keep in touch with people but because of the various facilities they offer especially the internet. The charm of mobile phone is more among society and the increasing use may result in dependence. Aim was to study the usage pattern and dependence of mobile phones among society. A cross sectional study conducted among 152 peoples and studied the pattern of usage of mobile phones, common problems encountered and its dependence using a questionnaire. Using Statistical tools we analyzed the data and our study shows Xiaomi mobile brand is more popular among the society and they are mostly preferred the Airtel' Sim card company peoples. Mostly peoples use mobile phones for calling and social media.
Key words: Chi-Square Test, Kruskal-Wallis Test, SMS, SIM, MMS)

I.   INTRODUCTION:

The first handheld cellular mobile phone was demonstrated by John F. Mitchell and Martin Cooper of Motorola in 1973, using a handset weighing 2 kilograms (4.4 lb). The first commercial automated cellular network (1G) analog was launched in Japan by Nippon Telegraph and Telephone in 1979. The first SIM card was developed in 1991 by Munich smart-card maker Giesecke & Devrient, who sold the first 300 SIM cards to the Finnish wireless network operator Radiolinja. Today, SIM cards are ubiquitous, allowing over 7 billion devices to connect to cellular networks around the world. Erstwhile Union Telecom Minister Sukh Ram and Chief Minister of West Bengal Jyoti Basu were the first two individuals to establish a mobile phone call in India, on Nokia mobile phones that were connected through airwaves operated by Modi-Telstra. On this day, exactly 25 years ago, a telephone call was made. In 1995, a few months after mobile telephony was opened up to private participation, Essar became the first company to start GSM operations in Delhi under the brand name, Essar Cellphones.A SIM card with a microprocessor base is similar to a mini-computer with its operating system, storage, and built-in security features. The SIM card can add, delete, and manipulate information within its memory on top of sending and receiving data. A SIM card can be replaced by users and slides easily into a slot within your phone or mobile device

A mobile phone is a telephone that can make and receive calls over a radio frequency carrier while the user is moving within a telephone service area. Telephones services use cellular network architecture and therefore mobile telephones are often called as cellular telephones. Modern mobile phones support variety of other services such as 'Text messaging, MMS, Email, Internet access, Bluetooth, Gamming Communication & Photography. Mobile phones which after these and more general computing capabilities and referred to as a "Smart phones" hence it become an indispensable tool as communication plays a key role in all the aspects of life. Today, mobile phones are equipped with features other than voice call that allow further communications and entertainments such as the Short message service (SMS), MP3 player, games, internet and videos which attracted people across all walks of life and consequently led to the increase in the number of mobile phone users across the world Sanjay D et.al.(2010) .There are about 3.3 billion mobile phone users when compared to 500 million in the year 2000. F.Samkange-Zeeb, M. Blettner(2009). Indians are increasingly using the mobile phones rather than the land line telephones and Indian market has emerged as the second-largest market for mobile phone handsets next to China. In India, use of internet is enormous, especially in the young population. Mobile Internet usage is growing the rate of nearly 85% per annum Singh BM.(2008).

Mobile phone dependence can be considered as a new diagnostic entity as it has properties of excessive use, withdrawal, tolerance and negative repercussions Chandra G et.al (2012). Prakash S. Chougule et.al (2020) studied the pattern of cell phone users and service providers based on statistical techniques in kolhapur

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district.Nomophobia is a term which is related to mobile phones usage Singh BM.(2008). It literally means no-mobile phobia that is the fear of being out of mobile phone contact. The person becomes anxious when there is no network or no balance or when run out of battery. Studies from United Kingdom revealed that 53% tend to be anxious and a study from Mumbai reports 58% could not manage without a mobile phone even for a day Katharine B (2008). Prakash S. Chougule et.al (2021) studied the usage pattern and dependence of mobile phones among college students. A cross sectional study conducted among 200 UG students and studied the pattern of usage of mobile phones, common problems encountered and its dependence using a questionnaire. Using Statistical tools we analyzed the data and our study shows Samsung mobile brand is more popular among the students and they are mostly preferred the Idea' Sim card company students.

Objectives:
- To study the dependency between gender and no. of SIM.
- To study the dependency between area and range in house.
- To study the dependency between gender and area.
- To study Dependency between area and no. of SIM.
- To study the dependency between gender and type of SIM.
- To check significance between age and gender.
- To check significance between yearly income and brand of mobile.
- To study independence between using mobile and status.
- To study independence between network speed and area.
- To study independence between handset purchase with status.
- To check independency between port service provider in area.
- To test the sequence of respondence given by respondent is random or not.
- To test the equality of port the service provider in rural and urban area.

II. Methodology:

Both the qualitative and quantitative methods are used for data collection. Primary data was collected with the help of survey technique through questionnaire. We collect 152 samples taken through direct interaction.

Statistical Tools used:
- Graphical Tools: Bar diagram, Pie chart
- Test: Chi-Square Test, Kruskal-Wallis test
- Non Parametric Test: Run Test, Mann-Whitney Test,
- Other Statistical Methods: NOVA
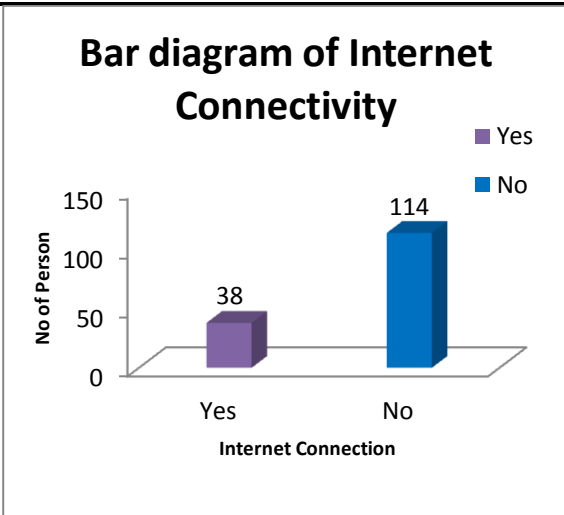
Software used:
- MS-Word
- MS-Excl

Method of Data Collection: For this study, we have collected primary data from 152 peoples from Rural and Urban areas.
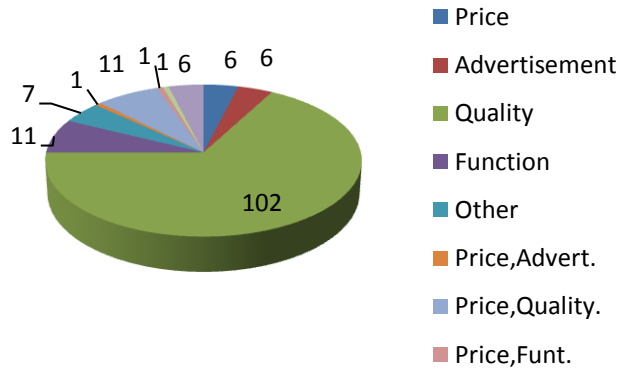
GRAPHICAL REPRESENTATION:

| Internet Connection	No of Person
Yes	38
No	114
Total	152

Choosing Model	No of person
Price	6
Advertisement	6
Quality	102
Function	11
Other	7
Price, Advert.	1
Price, Quality.	11
Price, Funt.	1
Advert, Funt.	1
Quality, Funt.	6

Choicewise Model Distribution

- Price
- Advertisement
- Quality
- Function
- Other
- Price,Advert.
- Price,Quality.
- Price,Funt.

Type of internet	No of person
Router	26
Dongle	5
Other	6
None	115
Total	152

Network Device
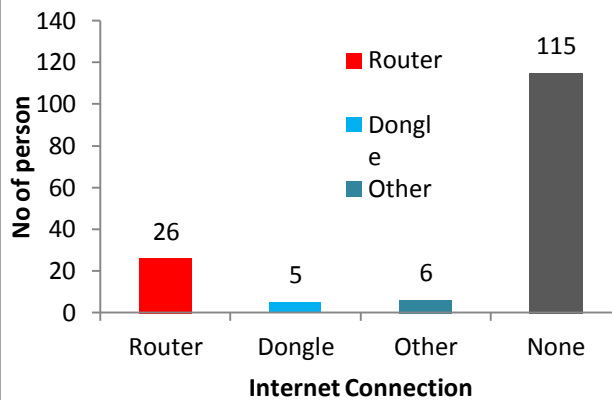
Port service	No of person
Yes	61
No	91
Total	152

Service Portal
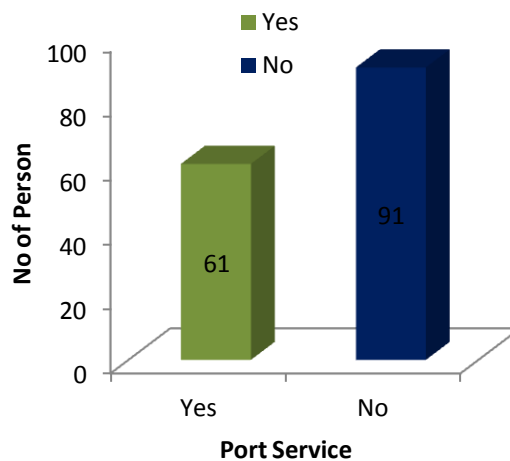
Purpose	Frequency
Calling	52
S.media	5
Edu	22
Entain	7
Oth	1
Calling, S.media	23
Calling, Edu	2
Calling,Entain	6
S.media,Edu	9
S.media,Entain	1
Calling,S.media,Edu	8
Calling,S.media,Entain	7
Calling,Edu,Entain	1
Calling,S.media,Edu,Entain	1
Calling,S.media, Edu,Entain,oth	7

Purpose
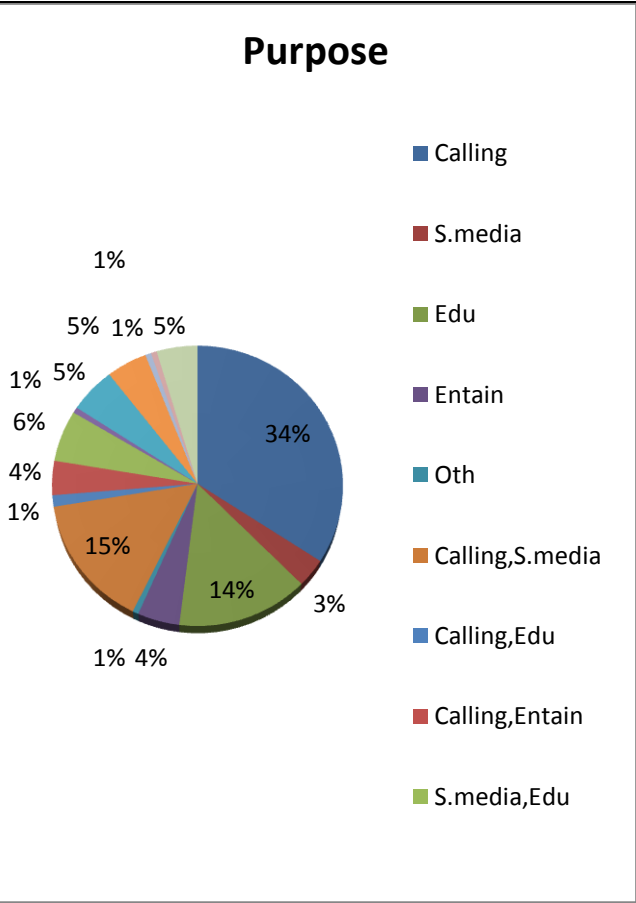
Mobile Network	No of person
Idea	16
Jio	43
Vodafone	5
Airtel	45
VI	5
Other	4
Idea, Jio	2
Idea, Vodafone	1
Idea, Airtel	8
Idea,VI	1
Jio, Vodafone	5
Jio, Airtel	9
Jio,VI	3
Vodafone, Airtel	2
Airtel,VI	2
Airtel, Other	1

Network Type
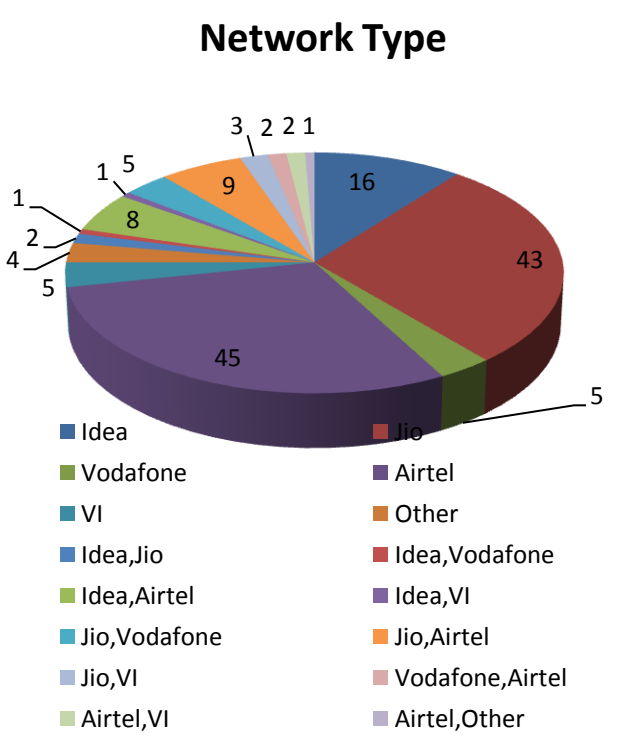
Use of sim	No of person
Call Rates	16
Scheme & Offer	15
Advertisement	4
Network	106
Customer Care	0
Call Rate,schme & offer	1
Call rate, Advert	1
Call rate, Net	3
Schm & offer, Advert	1
Schm & offer,Net	4
Schm & offer,Advert,Net	1

Sim Use

Use of Chat Application	No of person
None	10
Fb	1
Whatapp	81
Telegram	6
insta	7
Other	5
Fb,What	8
What,Telegram	2
What,Insta	18
What,Other	1
Telegram,Insta	1
Fb,What,Telegram	2
Fb,What,Insta	3
What,Telegram,Insta	3
Fb,What,Telegram,Insta	4

Chat apps use

rand of Mobile	No of person
India	97
China	50
America	0
Other	5
Total	152

Mobile Brands

Testing of Hypothesis:
A)   **Chi- square test:**
a)   **Chi- square test for independence of area and gender.**

H0: The attributes gender and area are independent. V/S
H1: The attributes gender and area are not independent.
α= level of significance=5%

Observation table:

gender		Area		Total
		Rural	Urban	
	Male	68	15	83
	Female	54	15	69
	Total	122	30	152

$\chi^2{}_{cal} = \sum \frac{(O_i - E_i)^2}{E_i}$ =0.3197971 and $\chi^2{}_{table}$ = 3.84146

$\chi^2{}_{cal} < \chi^2{}_{table}$

b) Chi- square test for independence of gender and no. of sim

H0: The attributes gender and no of sim are independent. V/S
H1: The attributes gender and no of sim are not independent.
α= level of significance=5%

Observation table:

		No. of SIM		
		Single	Dual	Total
Gender	Male	43	40	83
	Female	46	23	69
	Total	89	63	152

$\chi^2{}_{cal} = \sum \frac{(O_i - E_i)^2}{E_i} = 3.428033$ and $\chi^2{}_{table}$ = 3.84146

$\chi^2{}_{cal} < \chi^2{}_{table}$

c) Test for area and range in house

H0: The attributes area and range in house are independent. V/S
H1: The attributes area and range in house are not independent.
α= level of significance=5%

Observation table:

		Range in house		Total
		yes	No	
Area	Rural	106	16	122
	Urban	27	3	30
	Total	133	19	152

$\chi^2{}_{cal} = \sum \frac{(O_i - E_i)^2}{E_i} = 0.026697892$ and $\chi^2{}_{table}$ = 3.84146 and $\chi^2{}_{cal} < \chi^2{}_{table}$

d) Chi- square test for independence of area and no f sim

H0: The attributes area and no of sim are independent. V/S
H1: The attributes area and no of sim are not independent.
α= level of significance=5%

$\chi^2{}_{cal} = \sum \frac{(O_i - E_i)^2}{E_i} = 1.12657773$ and $\chi^2{}_{table}$ = 3.84146

$\chi^2{}_{cal} < \chi^2{}_{table}$

e) Chi- square test for independence of gender and type of mobile

      H0: The attributes gender and type of mobile are independent. V/S

      H1: The attributes gender and type of mobile are not independent.

      α= level of significance=5%

Observation table:

Gende r	Type of Mobile								Total
	Samsung	Xiaomi	Vivo	Oppo	Realme	iphone	Nokia	Other	
Male	13	24	12	11	8	0	1	14	70
Female	15	20	10	6	8	0	0	10	54
Total	28	44	22	17	16	0	1	24	152

 1) Run Test:

We want to test the sequence of respondance given by respondent is random or not. Then by using Non parametric Run test.

To Test Randomness (Male and Female)

Here we obtain the sequence of male and female is

M FF MMMMM FFFFF MM FFF M FFF M FFFFFFFFF M FF MMMMMM FFF M FFFF MMMM FF M F MMMM F MM F MM FF M F MMM FF MM F MM FFF M FF M F MMMMMMMMMMMM F M F MMM FFF MMMM FFF MMMMM F MMM FF MMM FF MMMMM F MMMM FFF MM F M FF M F

    Ho**:** The given sequence is not random. VS

    H1: The given sequence is random.

     α= level of significance=5%

CALCULATION:

    The obtained as follows,

    n= 152>20 (i.e. n is large)

    r= 62,   n1 = 83, n2 = 69

    $E(r) = \frac{n+1}{2}) = \frac{152+1}{2} = 76.5$

    $V(r) = \frac{n(n-2)}{4(n-1)} = \frac{152(152-2)}{4(152-1)} = 37.7483$

     Test statistics is,

       $|z| = \left|\frac{r-E(r)}{\sqrt{V(r)}}\right|$ $= \left|\frac{62-76.5}{\sqrt{37.7483}}\right|$ $= 2.3600$

   Critical value: at 5% level of significance

    Zα/2=1.96

    |Z| >Zα/2

2) Mann- Whitney Test:

To test the equality of port the service provider in rural and urban area.

H0: The performance of Mobile design and Battery backup is same. Vs

H1: The performance of Mobile design and Battery backup is not same.

α= level of significance=5%

Observation Table:

Performance	Mobile Design	Battery Backup	Total
Poor	3	3	6

Average	18	22	40
Good	99	69	168
Very good	21	42	63
Excellent	11	16	27
Total	152	152	304

n1 = No of observation in sample 1st = 5

n2 = No of observation in sample 2nd = 5

R1 = sum of ranks of availability of 1st sample= 25.5

R2 = sum of ranks of availability of 2nd sample= 29.5

Test statistics:

n1=5, n2= 5, R1=25.5, R2=29.5

$U1 = n1*n2 + (\frac{n1(n1+1)}{2}) - R1$ and $U2 = n1*n2 + (\frac{n2(n2+1)}{2}) - R2$

$U1 = 5*5 + (\frac{5(5+1)}{2}) - 25.5 = 14.5$ and $U2 = 5*5 + (\frac{5(5+1)}{2}) - 29.5 = 10.5$

U=min (U1, U2) = min (14.5, 10.5) = 10.5

Critical value:

$C = [U \leq U\alpha/2]$

$U_{n1n2, \alpha}/2 = U_{(5*, 5)}$, 0.05/2 = 2

III. CONCLUSION:

➢ The attributes gender and area are independent.
➢ The attributes gender and no. of SIM are independent.
➢ The attributes area and range in house are dependent.
➢ The attributes area and no. of SIM are not independent.
➢ The attributes gender and type of mobile are independent.
➢ There is significance difference between different age group.
➢ There is no significance difference between brand of mobile and yearly income.
➢ There is independency between using mobile and status.
➢ There is dependency between network speeds with area.
➢ There is independency between handset purchases with status.
➢ The attributes port service provider and area are independent.
➢ The sequence of male and female is random.
➢ The performance of mobile design and battery backup is not same.
➢ There is significance between performances of service provider.

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