A STATISTICAL STUDY ON BRAND FAMILIARITY, PREFERENCE AND FUTURE SELECTION BEHAVIOR OF MOBILES AMONG BHARATHIAR UNIVERSITY STUDENTS

A project submitted to Bharathiar University in partial fulfillment of the requirements for the award of the degree of

MASTER OF SCIENCE

IN

STATISTICS WITH COMPUTER APPLICATIONS

Submitted by

ARUNPRASATH S
(Reg. No. 22STAB01)

Under the guidance of

Dr. R. JAISANKAR

PROFESSOR AND HEAD

DEPARTMENT OF STATISTICS

BHARATHIAR UNIVERSITY

COIMBATORE - 641 046

APRIL 2024

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CERTIFICATE

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This is to certify that the project work entitled **"A STATISTICAL STUDY ON BRAND FAMILIARITY, PREFERENCE AND FUTURE SELECTION BEHAVIOR OF MOBILES AMONG BHARATHIAR UNIVERSITY STUDENTS"** submitted to Bharathiar University, Coimbatore in partial fulfillment of the requirements for the award of the degree of **Master of Science in Statistics with Computer Applications** is a record of original work done by **ARUNPRASATH S (22STAB01)** during the period (2022-2024) of his study in the Department of Statistics, Bharathiar University, Coimbatore. This project work has not formed the basis for the award of any Degree/ Diploma/Associateship/ Fellowship or similar title to any of the candidates of any University.

Head of the Department

(Dr. R. JAISANKAR)

Professor and Head

Signature of the Guide

(Dr. R. JAISANKAR)

Professor and Head

DECLARATION

DECLARATION

I, **ARUNPRASATH S**, at this moment, declare that the project work entitled **"A STATISTICAL STUDY ON BRAND FAMILIARITY, PREFERENCE AND FUTURE SELECTION BEHAVIOR OF MOBILES AMONG BHARATHIAR UNIVERSITY STUDENTS"** submitted to the Bharathiar University in partial fulfillment of the requirements for the award of the degree of **Master of Science in Statistics with Computer Applications** is recorded of original work done by me under the supervision and guidance of **Dr. R. JAISANKAR, Professor and Head, Department of Statistics,** Bharathiar University, Coimbatore. This work has not formed the basis for the award of any Degree/ Diploma/ Associateship/ Fellowship or other similar title to any of the candidates of any University.

Signature of the Guide
(Dr. R. JAISANKAR)
Professor and Head

Signature of the Candidate
(ARUNPRASATH S)

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ARUNPRASATH S

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CHAPTER - I

CHAPTER - I

INTRODUCTION

Statistics may be defined as a science of numerical information that employs the processes of measurement and collection, classification, analysis, decision-making, and communication of results in a manner understandable and verifiable by others.

1.1. COLLECTION OF DATA

In Statistics, data collection is a process of gathering information from all the relevant sources to find a solution to the research problem. Helps to evaluate the outcome of the problem. Data collection methods allow a person to conclude an answer to the relevant question.

Depending on the type of data, the data collection method is divided into two categories, namely,

- Primary Data Collection
- Secondary Data Collection

1.1.1. PRIMARY DATA COLLECTION METHODS

Primary data or raw data is a type of information that is obtained directly from first-hand sources through experiments, surveys, or observations.

- **Observation Method:** Observation is used when the study relates to behavioral science. the method is planned systematically. is subject to many controls and checks. different types of observations are:
  - Structured and unstructured observation
  - Controlled and uncontrolled observation
  - Participant, non-participant, and disguised observation
- **Interview Method:** The method of collecting data in terms of verbal responses. is achieved in two ways such as

- Personal Interview - In this method, a person known as an interviewer must ask questions face-to-face to the other person. Individual interviews can be structured or unstructured, or they can be a direct investigation, focused conversation, etc.
- Telephonic Interview - In this method, an interviewer obtains information by contacting people on the telephone to ask questions or verbally express views.

➢ **Questionnaire Method:** The questions are mailed to the respondent in this method. should read, reply, and subsequently return the questionnaire. questions are printed in the definite order on the form. a good survey should have the following features:

- Short and simple
- Should follow a logical sequence
- Provide adequate space for answers
- Avoid technical terms
- Should have an excellent physical appearance, such as the color and quality of the paper, to attract the attention of the respondent

1.1.2. SECONDARY DATA COLLECTION METHODS

Secondary data is data collected by someone other than the actual user. means that the information is already available, and someone analyses it. secondary data includes magazines, newspapers, books, journals, etc. may be either published data or unpublished data.

Published data are available in various resources, including

- Government publications
- Public Records
- Historical and statistical documents
- Business documents
- Technical and trade journals

1.2. CLASSIFICATION

Classification is arranging the data into sequences according to common characteristics or separating them into related parts.

1.2.1. METHODS OF CLASSIFICATION

- **Geographical classification:** Classification is according to place, area, or region.
- **Chronological classification:** It is according to the lapse of time, e.g., monthly, yearly, etc.
- **Qualitative classification:** Data are classified according to the attributes of the subjects or items, e.g., sex, qualification, color, etc.
- **Quantitative classification:** Data are classified according to the magnitude of the numerical values, e.g., age, income, height, weight, etc.

1.3. PRESENTATION

Data presentation using various graphical formats to visually represent the relationship between two or more data sets so that an informed decision can be made based on them. There are three methods of data presentation:

- Textual
- Tabular
- Diagrammatic

1.4. STATISTICAL ANALYSIS

Statistical analysis refers to analyzing data collected to derive patterns, trends, or other meaningful conclusions. Involves the use of statistical methods of data analysis.

In general, Statistics can be broadly classified into many categories:

- **Descriptive Statistics:** Summarizes the observations.
- **Inferential Statistics:** Makes predictions or inferences about a population based on a sample of data.

- **Hypothesis Testing:** Involves testing hypotheses about population parameters using sample data and statistical tests.
- **Regression Analysis:** Models the relationship between variables to understand patterns and make predictions.
- **Data Visualization:** Uses graphical representations such as charts and graphs to convey information and trends in data.
- **Nonparametric test: Chi-Square Test -** Tests the association or independence between categorical variables. It is widely used in contingency table analysis, where it compares observed frequencies with expected frequencies.

The statistical method or techniques can be applied only when some data are available irrespective of the method of data collection. The data can be qualitative; they are quantified by using techniques like ranking, scoring, scaling coding, etc. The data are collected either by experiments or by survey method (direct or indirect) and they are tabulated and analyzed statistically. Whatever may be the resulting values obtained from the analysis, proper and correct inferences have to be drawn from these numerical values. These inferences lead to a final decision.

1.5. INTERPRETATION

Data interpretation is the process of reviewing data and drawing meaningful conclusions using a variety of analytical approaches. interpretation aids researchers in categorizing, manipulating, and summarizing data.

1.5.1. IMPORTANCE OF DATA INTERPRETATION

The following are some of the advantages of data interpretation in the business world, the medical sector, and the financial industry:

- Informed decision making
- Identifying trends and anticipating demands
- Cost efficiency

1.6. BUSINESS STATISTICS

Business statistics is a method of using statistics to gain valuable information from the data available to a company. techniques and principles of statistics are applied to gain insights that help to make better decisions. is a method of using numerical data that they collect from various sources. information can come from surveys, experiments, or other information systems in the company. helps organizations understand the reasons for multiple events in the present and predict the future. can be used in marketing, production planning, human resource planning, finance, etc.

1.6.1. USES OF STATISTICS IN BUSINESS

The following are the primary uses of statistics in various business activities:

1. With the help of statistical methods, quantitative information about the production, sale, purchase, finance, etc. can be obtained. type of information helps business people formulate suitable policies.
2. By using the techniques of time series analysis based on statistical methods, the person in business can predict the effect of a large number of variables with a fair degree of accuracy.
3. In business decision theory, most of the statistics techniques are used in making a business decision, which helps us to do business without uncertainty.
4. Nowadays, a large part of modern business is organized around statistical analysis and control systems.
5. By using 'The Bayesian Decision Theory,' businessmen can select the optimal decisions to directly evaluate the payoff for each alternative course of action.

1.6.2. SCOPE OF BUSINESS STATISTICS

1. **Statistics in economic planning:** All financial plans are formulated based on statistical data. success of the plan is also evaluated with the help of statistics. problems such as production, consumption, wages, price profits, unemployment, poverty, etc., can be expressed numerically.
2. **Statistics in business and management:** It helps people in business formulate policies regarding business and forecast future trends.

3. **Statistics in administration:** Efficient administration cannot be perceived with tics. Statistics have been used since the time of origin to collect information regarding military and fiscal policies.
4. **Statistics in research:** Statistical methods are extensively used in every research work. Which is in agriculture, health, or social science, statistics help carry out different types of research.

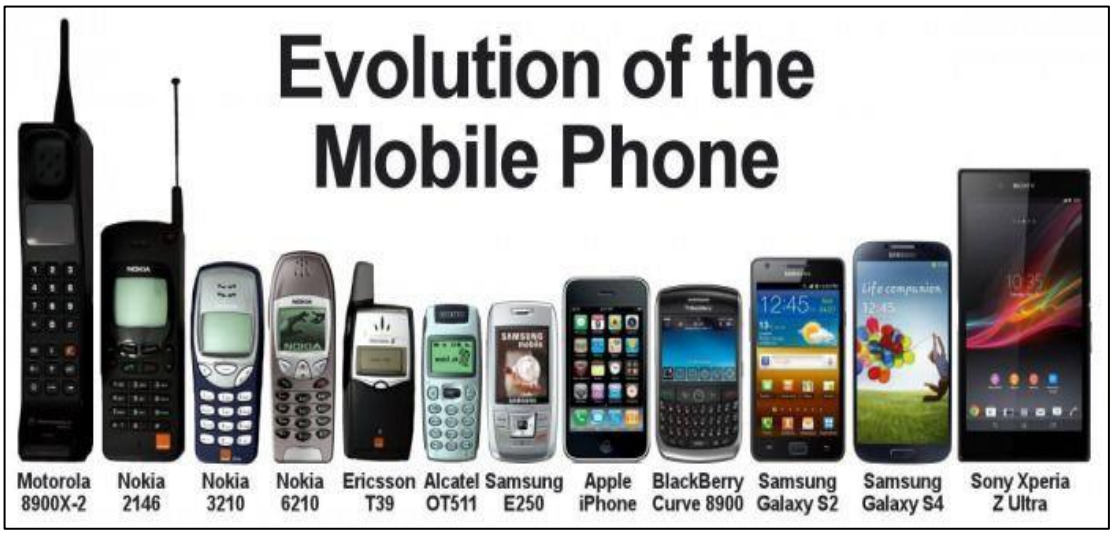
1.6.3. LIMITATIONS OF BUSINESS STATISTICS

1. Statistics is unable to explain individual items.
2. Statistics are unable to study qualitative characters.
3. Statistical results are not accurately correct.
4. Statistics deal with the average.
5. Statistics is only one of the methods of studying a given problem.
6. Statistics is liable to be misused.
7. Qualitative Aspect Ignored.
8. Too Many methods to study problems.
9. Results are actual only on average.
10. Statistical laws are not exact.

1.7. INTRODUCTION ABOUT MOBILE BRAND

The first handheld mobile phone was demonstrated by Martin Cooper of Motorola in New York City on April 3, 1973. The handset weighed a hefty 2 kilograms (4.4 lbs.). In 1979, Nippon Telegraph and Telephone (NTT) launched the world's first cellular network in Japan.

The first smartphone touchscreen was introduced by the IBM SIMON Company in 1994. the phone is called SPC (Simon Personal Communicator). introduced the first flip phone on January 3, 1996. 9000 was the first internet phone, released on August 15, 1996. first camera phone was a Kyocera VP210, Released in Japan in May 1999. The first Blackberry mobile was introduced in March 2002. The first flip mobile with a camera was introduced by Motorola Razr V3 in 2004. The first Apple iPhone was introduced in January 2007. The First Android phone was introduced by HTC Dream Company in October 2008. The first Samsung Galaxy GT-17500 was released in 2009. The first fingerprint mobile was introduced by Pantech Gi100 in 2004. The iPhone X introduced the first Face Unlock Mobile feature in November 2017.



A mobile phone (also known as a cellular phone, cell phone, or hand phone) is a device that can make and receive phone calls over a radio link while moving across a large region. connects to a mobile phone operator's public telephone network, providing access to that network. wireless telephone, on the other hand, can only be used within a short distance of a single, private base station.

Modern mobile phones enable a wide range of other services outside the telephone, including text messaging, MMS, email, Internet access, short-range wireless communications (infrared, Bluetooth), business applications, gaming, and photography. Are mobile phones that provide these and other types of computing capabilities.

The worldwide mobile phone industry is based on a variety of manufacturers and transport companies. The industry depends on advanced technology, and many manufacturers operate in multiple industries, using their technological skills, distribution networks, market knowledge, and brand recognition. The worldwide mobile phone market is currently dominated by large manufacturers such as Nokia, Apple, Samsung, Sony, Redmi, Realme, Vivo, and Poco. In addition to these businesses, several manufacturers operate both globally and locally.

1.7.1. MOBILE BRAND USERS

Smartphone users are commonly found in every country and enjoy the convenience of accessing anything while on the go and from the palm of their hand. Users in India range in age, with 53% falling into the 18-24 age group. out more about the characteristics of this group below.

Increasing income levels, lower internet, and the need to always stay connected are some of the causes that have driven India's smartphone market to become one of the world's largest., compared to other economies worldwide, India's smartphone use rate remains very low. demand is expected to increase since a significant percentage of the population does not own a phone or wants to switch from a feature phone to a smartphone.

1.7.2. CHINESE MANUFACTURERS IN INDIA

A decline in the global smartphone industry in 2019 and the impact of the coronavirus pandemic in 2020 limited smartphone sales in India. This time, Chinese smartphone manufacturers produced more than 60% of all phones sold in India. Xiaomi was the largest market shareholder in the Indian smartphone market. sold smartphones under the brands Mi, Redmi, and POCO.

The company's success can be attributed to a variety of things, including customizing its approach to the country's needs, changing supply chains to the country, and investing in the domestic distribution network and research and development., Oppo and Realme were among the other Chinese original equipment manufacturers (OEMs) operating in India.

1.7.3. INDIAN PHONE BRANDS

With the introduction of Chinese brands, established Indian smartphone makers were side-lined and lost market share. encourage localized manufacturing and raise the value of domestic phone manufacturing in India, the government established a production-linked incentive plan for large-scale electronics manufacturing companies, both domestic and international.

The smartphone industry, in general, is rapidly developing. average selling price of smartphones in South Asian countries was approximately Rs.18,342. 30 major companies attempted to achieve a significant market share in the Indian smartphone

market. In such a case, smartphone OEMs would have to commit a significant amount of cash. intense competition caused over 40 smartphone companies to leave the nation, including Sony and HTC.

1.7.4. MOBILE DEVICES

With a variety of smartphones and internet packages flooding the market, mobile communication has become an integral part of everyday life. smartphone industry in India saw steady growth over the years, around 71 percent of all Indian mobile subscribers owned at least one smartphone in 2023. and Samsung ranks prominently as the leading smartphone brand in India, drawing significant consumer interest., the iPhone has witnessed a growing popularity in the country, fueled by increasing purchasing power.

1.7.5. SERVICE PROVIDERS AND USAGE

Various private operators have taken over the wireless market, leading to fierce competition for the leading position in the mobile service market, mostly among Reliance Jio, Vodafone Idea, and Airtel, with Reliance Jio leading the market. Such as “Digital India” and “Make in India” also provided huge employment opportunities in the mobile manufacturing industry in the country since 2014. was expected that 3G would be phased out before the end of the decade or sooner, and by the end of 2028, around 700 million mobile subscriptions would be with 5G technology. the onset of 5G technology providing faster connection and better bandwidth, and the push to a cashless society by the coronavirus pandemic, the use of mobile services has been on the rise.

1.7.6. MOBILE BRAND PREFERENCES

Brand preference is strongly linked to brand choice which attracts consumers that can influence the consumer decision-making or their taste too and activate brand purchase. “Brand preference can be defined as the subjective, conscious and behavioral tendencies which influence consumer’s predisposition towards a brand”. the brand preferences of consumers will dictate the most suitable and successful Marketing Strategies. Of the indicators of the strength of a brand in the hearts and minds of customers, brand preference represents which brands are preferred under assumptions of equality in price and availability. of brand preference approach quantifies the impact of marketing activities in the hearts and minds of consumers and potential consumers. brand preference usually indicates more revenues (sales) and profit, also making it an indicator of the company's financial performance. has been a long-standing process from marketers and their lot of analysis to understand how customers form their preferences according to their interest in a specific brand. preference is closely related to brand choice which can facilitate consumer decision-making and activate brand purchase. the pattern of consumer preferences and their taste over the years across the population is a severe input for designing and developing innovative marketing strategies. also uncovers the heterogeneity of consumer choices leading to efficient market segmentation strategies., foreseeing consumer preferences & choices between brands is not an easy task as we all know that their preferences change with time.

1.7.6.1. TYPES OF PREFERENCES

The target customer might be interested in the product, but they may not necessarily choose it over competitors. To address this, the communicator should focus on building brand preference by highlighting the product's quality, value, performance, and unique features. The success of this effort can be measured by tracking an increase in target customer preference after the promotional campaign.

Therefore, the study of mobile phone brands holds immense significance in the current scenario for the communication system, and further research can aid in the development of innovative and sustainable communication solutions. The younger generation nowadays is more attracted to mobile phone brands. The usage of mobile phones among youngsters has risen rapidly. A youngster who is studying higher education also uses a mobile phone for educational purposes. They are highly

dependent on mobile phones to move from their residential places to their educational institutions. By considering all these things, the study has been designed to examine the usage and preference of mobile phones among the students of Bharathiar University.

1.8. OBJECTIVES OF THE STUDY

The primary aim of our study is to make a statistical investigation on mobile concerning the usage of which brand mobile. common public may use mobile brands even for goods communications and some agencies use mobile phones for finance, learning platforms, business, etc. Comprehension to make a study would be a difficult task and time-consuming, the present study has been confined to the usage of mobile phones among Bharathiar University students following are the objectives of the study

1. To identify the familiarity of various brands of mobile phones among the students.
2. To find whether the selection of mobile phones depends on various factors like age, gender, income, type of study, etc.
3. To identify whether the cost of mobile phones is associated with the family income.
4. To identify the main basis for selecting a new mobile phone.
5. To assess the satisfaction level of various brands as assessed by the mobile holders.
6. To study the brand loyalty measurement.

CHAPTER - II

CHAPTER-II

PROFILE OF THE STUDY AREA

This chapter contains the profile of the study area, its goals, and the method of data collection.

2.1 PROFILE OF THE STUDY AREA

The Government of Tamil Nadu established the Bharathiar University at Coimbatore in February 1982 Under the Bharathiar University Act, 1981 (Act 1 of 1982). erstwhile Postgraduate Centre of the University of Madras formed the core of the Bharathiar University, which was functioning at Coimbatore before 1982. Grants Commission (UGC) recognized Bharathiar University in 1985 for grants.

The University has 39 Departments, offering 54 post-graduate programs besides offering M.Phil. and Ph.D. Programs. The university covers the districts of Coimbatore, Erode, Tirupur, and the Nilgiris with 133 affiliated colleges.

The National Assessment and Accreditation Council has accredited the University with an 'A++' Grade in the fourth cycle assessment. The university is marching towards becoming a world-class university by garnering a ranking in the international arena. Higher Education Young Universities World Ranking ranked our university in the range of 201 to 250. We stand at 13th rank under the category of university and 21st among the top 100 institutions in the Moe's National Institute Ranking Framework's (NIRF) ranking. In 2021, Bharathiar University secured a ranking in the range of 801-1000 in the Times Higher Education World University Rankings.

2.2 THE UNIVERSITY MISSION

- To be innovative and inclusive, committed to excelling in teaching, research, and knowledge transfer and to serving the social, cultural, and economic needs of the nation.
- To innovate and offer educational programs in various disciplines through synergistic interaction with the industry and society.

- To impart knowledge and skills and to provide a learning environment to acquire attitudes to students and equip them to face the emerging challenges of the knowledge era.
- To provide equal opportunity to women students, differently abled, and minorities and prepare them to be equal partners in accomplishing the scientific and technological demands of the nation.
- To contribute to the advancement of knowledge through applied research leading to newer products and processes.
- To prepare the students to work for societal transformation with a commitment to justice and equality and emerge as job providers.
- To inculcate in students a global vision with skills of international competence.

2.3 METHODS OF DATA COLLECTION

A personal interview survey, also called a face-to-face survey, is a survey method that is utilized when a specific target population is involved. The purpose of conducting a personal interview survey is to explore the responses of the people to gather more and deeper information, based on this the data has been collected. The study is conducted among the students studying at Bharathiar University for the period (2023-2024). First, a complete list of postgraduate students and research scholars of the university who are all using mobile phones has been obtained from the office. From this list, a sample of students has been taken by the method of "Simple Random Sampling".

A questionnaire was prepared for the data collection in such a way that it covers student's preferences and usage patterns of mobile phones. The questionnaires were distributed randomly to the students and scholars of every department. Then filled-in questionnaires were received from the students and scholars through Google Forms. Some difficulties were faced while distributing a questionnaire to students and scholars. Those are incompleteness and inaccuracy of returns, non-respondents, etc. The questionnaire is attached as an annexure to this thesis. As per the requirements of the objectives of the study, the data were summarized and the statistical analyses were done through statistical software IBM Statistics **SPSS 21** and **Minitab 21.2**. The following chapter may present the methodology.

CHAPTER - III

CHAPTER-III

METHODOLOGY

The chapter is organized as follows Descriptive Statistics, Correlation, Chi-square test, Independent sample t-test, One-way ANOVA, and Kolmogorov-Smirnov test.

3.1. GRAPHICAL REPRESENTATION

Graphical representation refers to the use of intuitive charts to visualize clearly and simplify data sets. Data obtained from surveying is ingested into a graphical representation of data software. Then it is represented by some symbols, such as lines on a line graph, bars on a bar chart, or slices of a pie chart. In this way, users can achieve much more clarity and understanding than numerical study alone.

3.1.1. BAR CHART

A bar chart or bar graph is a chart with rectangular bars with lengths proportional to the values that they represent. The bars can be plotted vertically or horizontally.

Bar charts are used for plotting discrete (discontinuous) data i.e. data which has discrete values and is not continuous. Some examples of discontinuous data include 'shoe size' or 'eye color', for which you would use a bar chart. In contrast, some examples of continuous data would be 'height' or 'weight'. A bar chart is very useful if it is trying to record certain information whether it is continuous or not continuous data.

3.1.2. PYRAMID CHART

Pyramid charts, also known as pyramid graphs or diagrams, are graphical representations that resemble the shape of a pyramid. They display hierarchical data or the distribution of values across different categories. The bars represent different data sets, with the width of each slice indicating hierarchy. Ideal for showcasing data sets, proportions, or sequential steps, pyramid charts are best suited for limited categories and do not represent exact numerical values. They are also simple to understand, making them suitable for presentations, reports, and infographics.

3.1.3. PIE CHART

A pie chart is a circular chart divided into sectors, illustrating proportion. Its arc length and central angle are proportional to the quantity it represents. The earliest known pie chart is William Play Fair's statistical breviary of 1801. Although popular in business and mass media, it has been criticized for its difficulty in comparing different sections or data across charts. Pie charts are effective when slices represent 25-50% of data, but other plots like bar charts, dot plots, or tables may be more suitable.

3.2. DESCRIPTIVE STATISTICS

Descriptive statistics provides simple summaries of the sample and the observations that have been made. Such summaries may be either quantitative, i.e., summary statistics, or visual, ie., simple to understand frequency table. Either these summaries may form the basis of the initial description of the data as part of a more extensive statistical analysis, or they may be sufficient in and of themselves for a particular investigation. It is very helpful to examine the data to obtain a suitable set of relevant descriptive statistics. Descriptive statistics are the tools we use to summarize and describe the key characteristics of a data set. They don't make any inferences about a larger population (unlike inferential statistics) but rather focus on giving a clear picture of the data you have in hand.

Central tendency: This refers to the "middle" of your data set, giving you an idea of what a typical value looks like. Common measures of central tendency include

Mean: The average of all the values in your data set. This is a good all-purpose measure for symmetrical data but can be sensitive to outliers in skewed data sets. The mean is calculated by adding up all the values in your data set and then dividing by the total number of values. The formula for the mean is

$$\boldsymbol{mean} = \frac{\sum(\boldsymbol{x_i})}{\boldsymbol{n}}$$

where,

- x_i – represents each value in your data set.
- n – represents the total number of values in your data set.

Median: The "middle" value when your data is ordered from least to greatest. This is a good alternative to the mean when your data is skewed or has outliers, as it is not as influenced by extreme values.

Mode: The most frequent value in your data set. The mode can be useful for identifying the most common category or value, but it doesn't necessarily represent the center of the data.

Variability (or dispersion): This describes how spread out your data is,

Range: The difference between the highest and lowest values in your data set. This is a simple measure of spread, but it can be sensitive to outliers and doesn't take into account the distribution of the data within the range. Imagine a data set showing incomes. If one person in the data set makes a significantly higher income than everyone else, the range would be inflated by that outlier.

Variance: An average of the squared deviations from the mean. The variance is useful for statistical calculations, but it can be difficult to interpret in the same units as your original data. For example, if you're looking at weights in kilograms, the variance might be expressed in kilograms squared, which can be cumbersome to understand. The formula for variance is,

$$\boldsymbol{Variance} = \frac{\sum(\boldsymbol{x_i} - \bar{\boldsymbol{x}})^{\boldsymbol{2}}}{\boldsymbol{n}}$$

where,

- x_i – represents each value in your data set.
- n – represents the total number of values in your data set.

Standard deviation: The square root of the variance, giving you a measure of spread in the same units as your original data. The standard deviation is a commonly used measure of variability, as it tells you how much, on average, your data points deviate from the mean. A low standard deviation indicates that the data points are clustered close to the mean, while a high standard deviation indicates that the data points are more spread out. The formula for standard deviation is

$$\boldsymbol{Standard\ devation} = \sqrt{(\boldsymbol{variance})}$$

By using these various techniques, descriptive statistics helps us understand the basic properties of our data. This is a crucial first step in data analysis, providing a foundation for further exploration and potentially leading to more advanced statistical methods.

3.3 PERCENTAGE ANALYSIS

Percentage analysis is a method used to express data as a percentage of a total or base value, enabling understanding of the relative contribution of each component within a dataset. It is widely used in finance, business, economics, statistics, and demographics. Percentages allow for comparisons between different-sized groups or categories, provide a standardized way to express data, and track changes over time. They are also used to set percentage-based goals or targets, such as sales quotas, customer satisfaction ratings, or project completion rates.

Percentage analysis is a fundamental and versatile tool for data analysis. By understanding its core concepts, applications, and methods, you can effectively interpret and communicate data, identify trends, and make informed decisions.

$$\boldsymbol{Percentage} = (\frac{\boldsymbol{Part}}{\boldsymbol{Whole}}) \times \mathbf{100}\%$$

- $Part$ – The specific value you want to express as a percentage.
- $Whole$ – The total value that the "part" represents.

3.4 CHI-SQUARE TEST (χ^2) FOR INDEPENDENCE OF ATTRIBUTES

To perform this test first the observed data on the attributes are to be classified and tabulated in the form of the contingency table.

3.4.1 CONTINGENCY TABLE

A contingency table is a frequency table of observation frequency of attributes arranged in $(h * k)$ cells, where h and k are the numbers of rows and columns respectively. These frequencies are called cell frequencies. Once a contingency table is formed the expected frequencies are computed according to probability laws, and computing the statistics defined by makes the discrepancy between the observed and expected frequencies.

2 X 2 CONTINGENCY TABLE

The chi-square for a $2X2$ Contingency Table is defined by

	A	**B**	**TOTAL**
A	*A*	*B*	*A+B*
B	*C*	*D*	*C+D*
TOTAL	*A+C*	*B+D*	*N*

Null hypothesis (H_0):

There is no significant difference between Observed and Expected frequencies.

Alternative hypothesis (H_1):

There is a significant difference between Observed and Expected frequencies.

Test Statistics is, $\chi^2 = \frac{\sum(O_{ij}-E_{ij})^2}{E_{ij}}$

Which has a chi-square with $(r-1)*(c-1)$ degrees of freedom, where r is the number of rows and c is the number of columns in the contingency table.

The Expected frequencies are calculated by, H_0

Expected frequency of the $(i,j)^{th}$ **cell** $= \frac{(Total\ of\ i^{th}\ row\ x\ Total\ of\ j^{th}\ column)}{N}$

The Chi-square Statistics can also be calculated by, Where the sum is taken over all cells in the contingency table and the symbols O_{ij} and E_{ij} represent respectively, the observed and expected frequencies in the cell of the contingency table.

3.5 INDEPENDENT SAMPLE T-TEST

A t-test is used to compare two means. The Independent Samples t-test is used when there are two experimental conditions and different participants are assigned to each condition. This is a Hypothesis testing procedure that uses separate samples for each treatment condition (between object designs). We can use this test when the population mean and standard deviation are unknown, and two separate groups are being compared.

ASSUMPTIONS FOR THE INDEPENDENT T-TEST

- Independence - Observations within each sample must be independent.
- Normal Distribution - The scores in each population must be normally distributed.
- Homogeneity of Variance - The two populations must have equal variances.

Test Statistic:

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{S^2(\frac{1}{n_1} + \frac{1}{n_2})}} \sim t_{n_{1+n_2-2}}$$

where,

$$S^2 = \frac{1}{n_1 + n_2 - 2}\left(n_1 s_1^2 + n_2 s_2^2\right),$$

$$s_1^2 = \frac{\sum x_1^2}{n_1}\ \bar{x}_1^2$$

$$s_2^2 = \frac{\sum x_2^2}{n_2}\ \bar{x}_2^2$$

Here we consider a difference between 2 populations (μ_1 and μ_2) and we use 2 samples ($\bar{x}_1$ and $\bar{x}_2$) to estimate the difference. It tells us the average distance between the sample difference ($\bar{x}_1 - \bar{x}_2$) and the population difference ($\mu_1 - \mu_2$).

The independent samples t-test is used to test the hypothesis that the difference between the means of two samples is equal to zero (Null hypothesis, $H_0: \mu_1 = \mu_2$). Next follow the test statistic t, the Degrees of Freedom (DF), and the two-tailed probability P. When the P-value is less than the conventional 0.05., the null hypothesis is rejected and the conclusion is that the two means do indeed differ significantly.

3.6 CORRELATION ANALYSIS

The degree of relation between the variables under consideration is measured through correlation analysis. The measure of correlation called the correlation coefficient or correlation index summarizes in one figure the direction and degree of correlation. Correlation analysis refers to the technique used in measuring the closeness of the relationship between the variables.

The study of correlation is of immense use in practical life in practical life because of the following reasons

- Most of the variables show some kind of relationship. For example, there is the relationship between price and supply, income and expenditure, etc. With the help of correlation analysis, we can measure in one figure the degree of relationship existing between the variables.
- Once we know that variables are closely related, we can estimate the value of one variable given the value of another.
- Correlation analysis contributes to the understanding of economic behavior, aids in locating the critically important variables on which others depend, may reveal to the economist the connection by which disturbances spread, and suggest to him the paths through which stabilizing forces may become effective.

3.6.1 TYPES OF CORRELATION

Correlation is described or classified in several different ways. Three of the most important ways of classifying correlation are,

- Positive and negative.
- Linear and non-linear.
- Simple, Partial and multiple.

3.6.1.1 POSITIVE AND NEGATIVE CORRELATION

If the values of the two variables deviate in the same direction. If the increase in the other variable or if a decrease in the values of the values of one variable results, on average, in a corresponding decrease in the values of the variable, correlation is said to be positive or direct correlation. For example, price & supply of the commodity. On the other hand, correlation is said to be negative or inverse correlation if the variable deviates in the opposite direction. If the increase (decrease) in the values of one variable results, on average, in a corresponding decrease (increase) in the values of the other variable. For example, Temperature and Sale of Woolen Garment.

3.6.1.2 LINEAR AND NON-LINEAR

The correlation between two variables is said to be linear if corresponding to a unit change in one variable, there is constant change in the order variable over the entire range of the values. For example,

$$y = ax + b$$

The relationship between two variables is said to be non-linear or curvilinear. If corresponding to a unit change in one variable, the other variable does not change at a constant rate but at a fluctuating rate. When this is plotted in the graph this will not be a straight line.

3.6.1.3 SIMPLE CORRELATION

The distinction between these three types of correlation depends upon the number of variables involved in a study. If only two variables are involved in a study, then the correlation is said to be a simple correlation.

The formula for finding a simple correlation coefficient is given,

$$r_{xy} = \frac{\sum(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum(x_i - \bar{x})^2 \sum(y_i - \bar{y})^2}}$$

3.6.2 TEST OF SIGNIFICANCE OF CORRELATION COEFFICIENTS

The mean and standard deviation, etc., and the numerical characteristics of a population, and coefficient are also the same and are estimated from a sample of the bivariate population just like other sample estimates, it is also subject to fluctuations of sampling. It ρ is the population and r is its sample estimate based on n pairs of observation, the standard error of r is given by

$$S.E = \frac{1 - \rho^2}{\sqrt{n - 1}}$$

This standard error of r is of very little value in the test of significance, as the distribution of r is far from normal except for small values of r and large N $(n > 900, say)$. This value of t is based on $(n-2)$ degrees of freedom. It is important to note that we are testing the significance of the deviation of the estimate of the correlation coefficient from the hypothetical value zero. It is nothing but simply to test whether the observed coefficient r indicates a real correlation between the variables or it has arisen merely due to fluctuations of sampling. If the probability of getting a value of t, equal to or greater than the observed one, is less than 0.05, it is declared as significant.

It is to be compared with any hypothetical value ρ. t – Distribution is not satisfactory for a test based on

$$\boldsymbol{t = \frac{r-p}{S.E.(r)}} \qquad \text{unless } \rho = 0$$

3.7 KOLMOGOROV-SMIRNOV TEST (KS TEST)

The Kolmogorov-Smirnov (KS) test is a non-parametric method for comparing distributions, essential for various applications in diverse fields. In this article, we will look at the non-parametric test which can be used to determine whether the shape of the two distributions is the same or not.

Kolmogorov–Smirnov Test is a completely efficient manner to determine if two samples are significantly one of a kind from each other. It is normally used to check the uniformity of random numbers. Uniformity is one of the maximum important properties of any random number generator and the Kolmogorov–Smirnov check can be used to check it. The Kolmogorov–Smirnov test is versatile and can be employed to evaluate whether two underlying one-dimensional probability distributions vary. It serves as an effective tool to determine the statistical significance of differences between two sets of data. This test is particularly valuable in various fields, including statistics, data analysis, and quality control, where the uniformity of random numbers or the distributional differences between datasets need to be rigorously examined.

Null hypothesis (H_0): The sample follows a specified distribution.

Alternative hypothesis (H_1): The sample does not follow the specified distribution.

The probability distribution function (PDF) of the Kolmogorov distribution,

$$F(x) = 1 - 2\sum_{k=1}^{\infty}(-1)^{k-1}e^{-2k^2x^2}$$

where,

- n is the sample size.
- x is the normalized Kolmogorov-Smirnov statistic.
- k is the index of summation in the series

3.7.1 TWO-SAMPLE KOLMOGOROV–SMIRNOV TEST

The two-sample Kolmogorov-Smirnov (KS) test is used to compare two independent samples to assess whether they come from the same distribution. It's a distribution-free test that evaluates the maximum vertical difference between the empirical distribution functions (EDFs) of the two samples.

Kolmogorov–Smirnov Statistic,

$$D_{n,m} = sup_x|F_{1,n}(x) - F_{2,m}(x)|$$

where,

- sup denotes supremum, representing the largest value over all possible x values, $F_1(x), F_2(x)$.
- are the empirical cumulative distribution functions (ECDFs) of the two samples, respectively.

Each ECDF represents the proportion of observations in the corresponding sample that are less than or equal to a particular value of x.

3.7.1.2 ASSUMPTIONS

- The null hypothesis is both samples are randomly drawn from the same (pooled) set of values.
- The two samples are mutually independent.
- The scale of measurement is at least ordinal.
- The test is only exact for continuous variables. It is conservative for discrete variables.

3.8 ONE WAY ANOVA

In statistics, one-way ANOVA analysis of variance (abbreviated one-way ANOVA) is a technique used to compare means of three or more samples (using the F distribution). This technique can be used only for numerical data.

The ANOVA tests the null hypothesis that samples in two or more groups are drawn from populations with the same mean values. To do this, two estimates are made of the population variance. These estimates rely on various assumptions. The ANOVA produces an F-statistics, the ratio of the variance calculated among the means to the variance within the samples. If the group means should be lower than the variance of the samples, following the central limit theorem. A higher ratio therefore implies that the samples were drawn from populations with different mean values.

Typically, however, the one-way ANOVA is used to test for differences among at least three groups, since the two-group case can be covered by a t-test (Goseet, 1908). When there are only two means to compare, the t-test and the F-test are equivalent, the relation between ANOVA and t is given by $F = t^2$. An extension of one-way ANOVA is the two-way analysis of variance that examines the influence of two different categorical independent variables on one dependent variable.

$$\boldsymbol{F} = \left[\frac{\boldsymbol{s_t^2}}{\boldsymbol{\sigma_e^2}} \ \frac{\boldsymbol{1}}{\boldsymbol{(k-1)}}\right] \div \left[\frac{\boldsymbol{s_E^2}}{\boldsymbol{\sigma_e^2}} \ \frac{\boldsymbol{1}}{\boldsymbol{(N-k)}}\right] = \frac{\boldsymbol{s_t^2}}{\boldsymbol{s_E^2}}$$

Follows Snedecor's F (central) distribution with $(k-1, N-k)\ d.f$

Thus, if an observed value of F obtained from is greater than the tabulated value of F for $(k-1, N-k)\ d.f.$ at specified level of significance, (usually 5% or 1%), then H_0 is rejected at the level, otherwise we fail to reject H_0.

The above statistical analysis is very elegantly presented is, known as the analysis of variance (ANOVA) Table.

Source of variation	**Sum of squares**	$\boldsymbol{d.f.}$	**Mean sum of squares**	**Variance ratio**
Treatment (Ration)	S_t^2	$k-1$	$s_t^2 = \frac{s_t^2}{(k-1)}$	$F = \frac{s_t^2}{s_E^2} = F_{k-1,N-k}$
Error	S_E^2	$N-k$	$s_E^2 = \frac{s_E^2}{(k-1)}$	
Total	S_T^2	$N-1$		

3.8.1 ASSUMPTIONS

The results of a one-way ANOVA can be considered reliable as long as the following assumptions are met:

- Response variable residuals are normally distributed (or approximately normally distributed).
- Variances of populations are equal.
- Responses for a given group are independent and identically distributed normal random variables (not a simple random sample (SRS).

CHAPTER - IV

CHAPTER - IV

STATISTICAL ANALYSIS

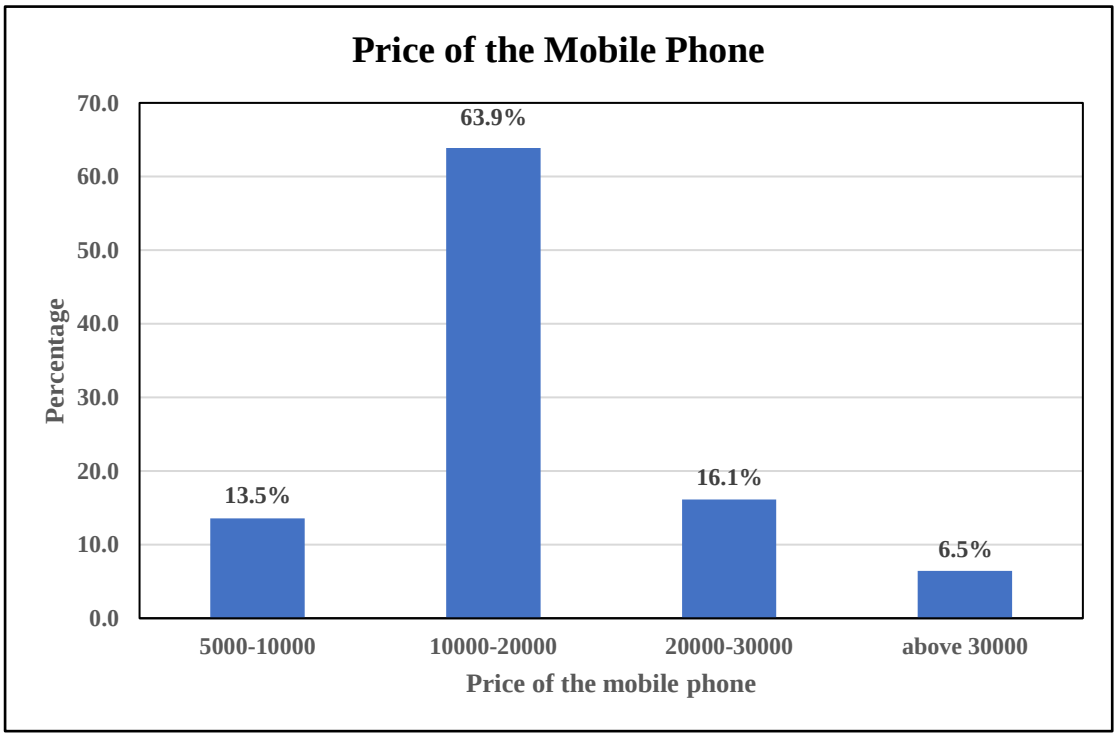
This chapter examines data received from Bharathiar University students via questionnaires. It employs specialized methodologies to thoroughly explore this data and respond to the study's objectives. The chapter shows the analysis and discusses the results and what we can learn from them, providing a more in-depth understanding of the issue under consideration. Data collected are arranged into tables. The data collected from 155 mobile user students is classified according to various aspects of the study. The data has been summarized, and appropriate diagrams and analysis have been performed.

4.1 DIAGRAMMATIC REPRESENTATIONS

4.1.1 BAR DIAGRAM FOR THE PRICE OF THE MOBILE PHONES

The bar diagram shows the distribution of mobile phone prices.

Fig.4.1.1 Bar Diagram for the Price of the Mobile Phones

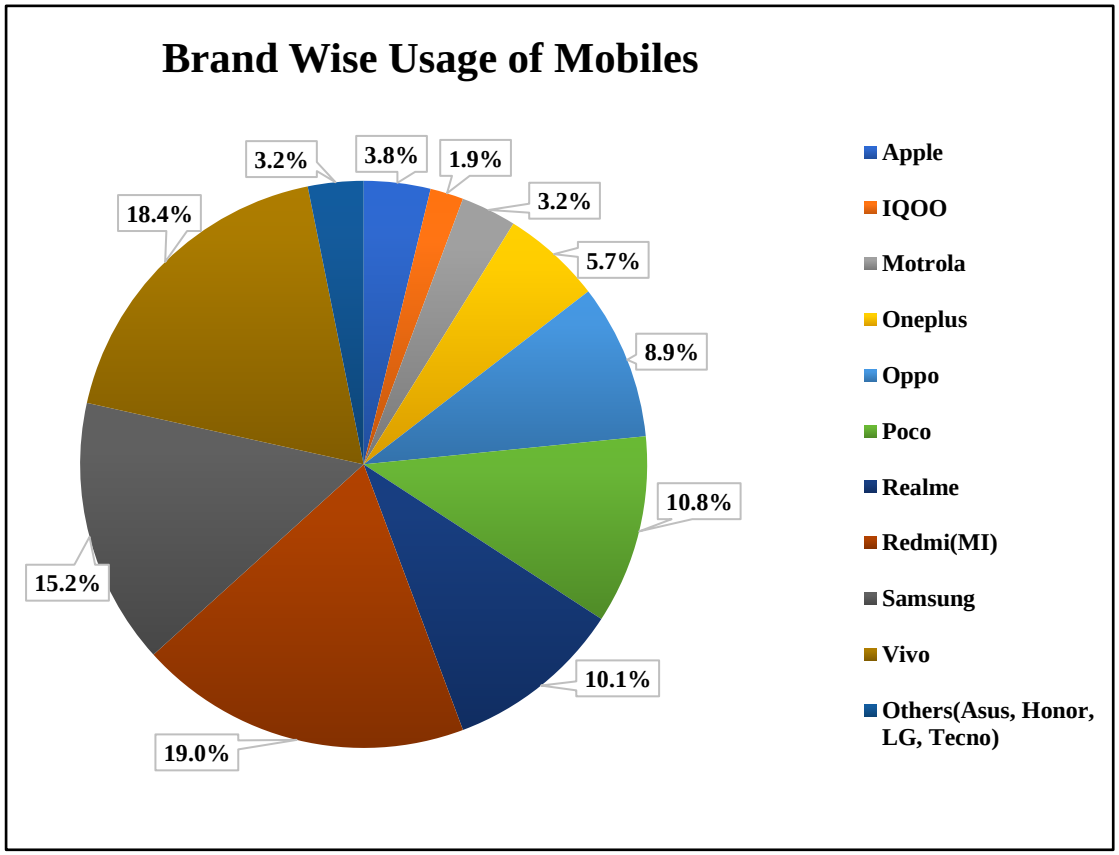


The Bar diagram shows that most students have mobile phones, which cost from ₹10,000 to ₹20,000. The second most common mobile phone price ranges from ₹20,000 to ₹30,000.

4.1.2 PIE CHART FOR THE BRAND WISE USAGE OF MOBILES

Data collected from the Bharathiar University students survey is shown in this pie chart, revealing brand-wise usage of mobiles among them. The survey focuses on students and offers valuable insights into current mobile brand trends.

Fig.4.1.2 Pie Chart for the Brand Wise Usage of Mobiles

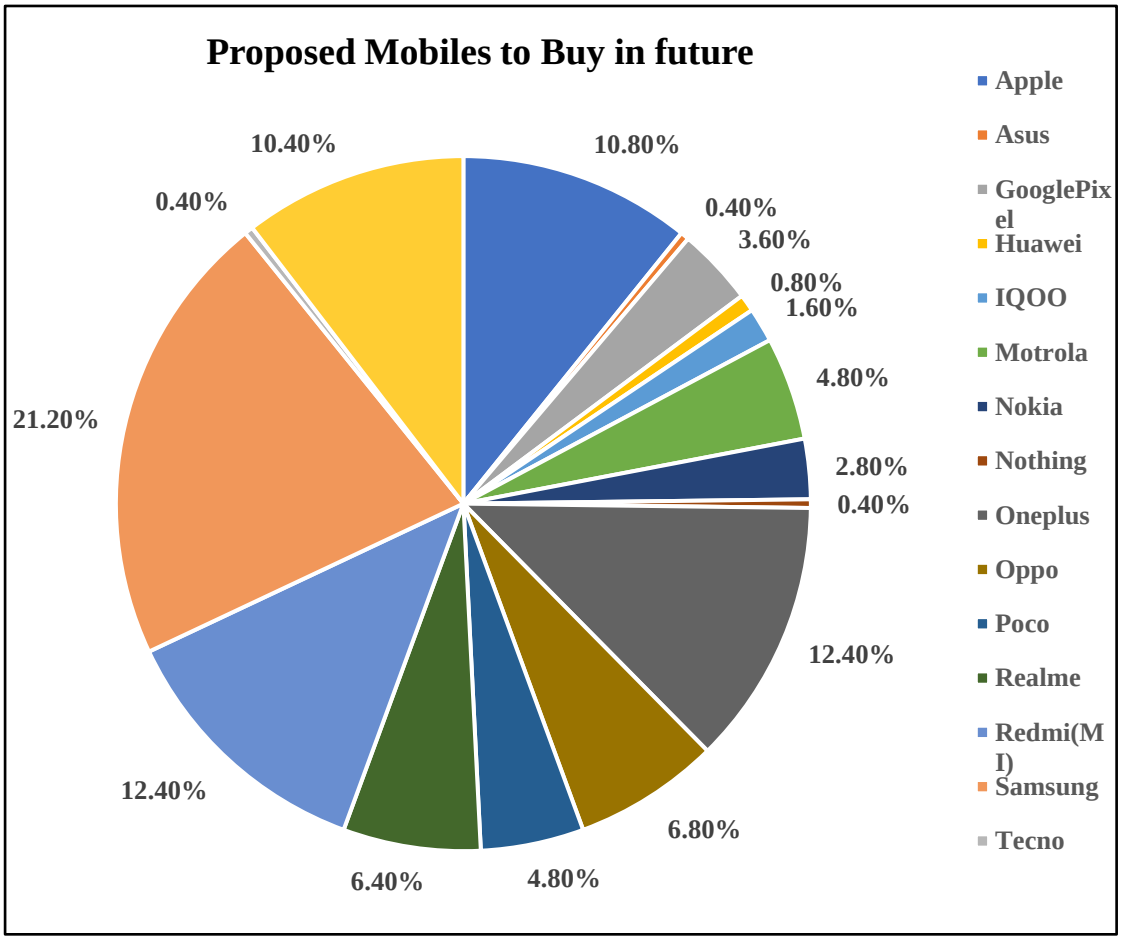


According to the pie chart above, 19% and 18.4% of students consider Redmi and Vivo the most popular mobile brands. Whereas Samsung is regarded as the second most popular mobile brand used by 15.3% of students, Poco, Real me, Oppo, and OnePlus cover 5-11%, respectively, and the remaining brands such as Apple, IQOO, Motorola, and others cover around 1-4%.

4.1.3 PIE CHART FOR THE PROPOSED MOBILES TO BUY IN THE FUTURE

This pie chart shows the mobiles that Bharathiar University students plan to buy.

Fig.4.1.3. Pie Chart for the Proposed Mobiles to Buy in the Future

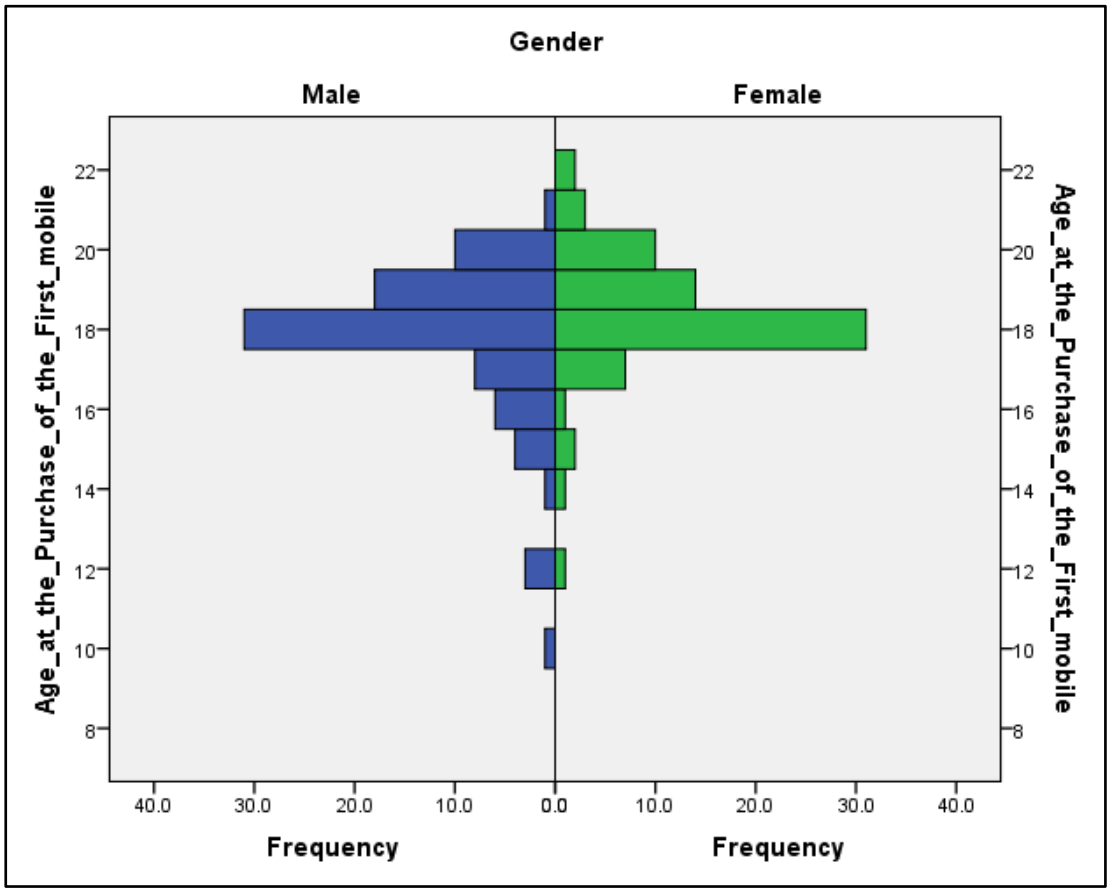


The pie diagram shows that Samsung is the most popular proposed mobile brand preferred to buy in the future among students, which comprises 21.2% of the total preferences.

4.1.4 AGE AT THE PURCHASE OF THE FIRST MOBILE

This pyramid chart demonstrates the Age at which the first mobile was purchased. It primarily focuses on identifying the Age at which both genders purchased their first mobile phone.

Fig.4.1.4 Pyramid Chart for age at the Purchase of the First Mobile

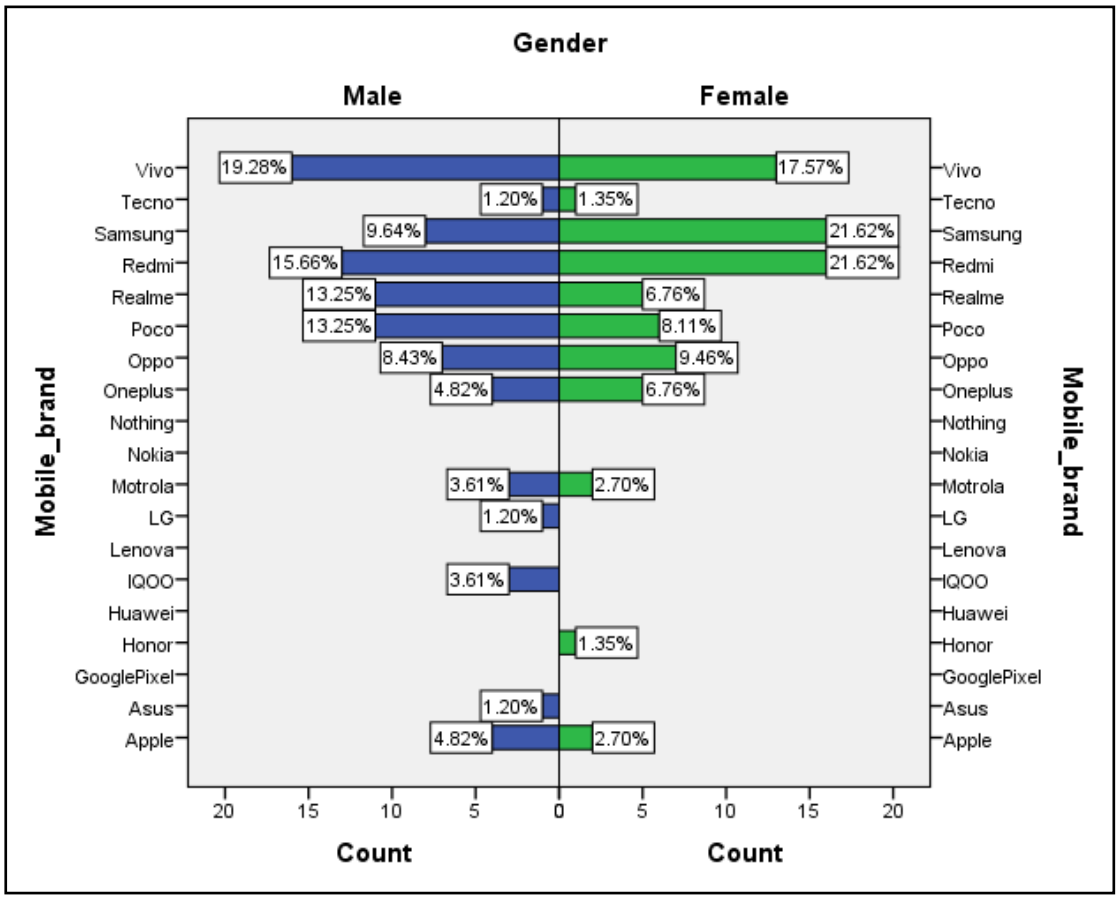


According to the pyramid chart above, students bought their first mobile phones at 18. At the Age of 18, both men and women purchased their first mobile phones.

4.1.5 GENDER WISE CLASSIFICATION OF MOBILE BRAND PREFERENCES

This pyramid chart shows the gender-wise preferences of the mobile phone brands in the selected population. The chart quickly visualizes the brand preferences among male and female students.

Fig.4.1.5 Pyramid Chart for Gender wise Classification of Mobile Brand Preferences

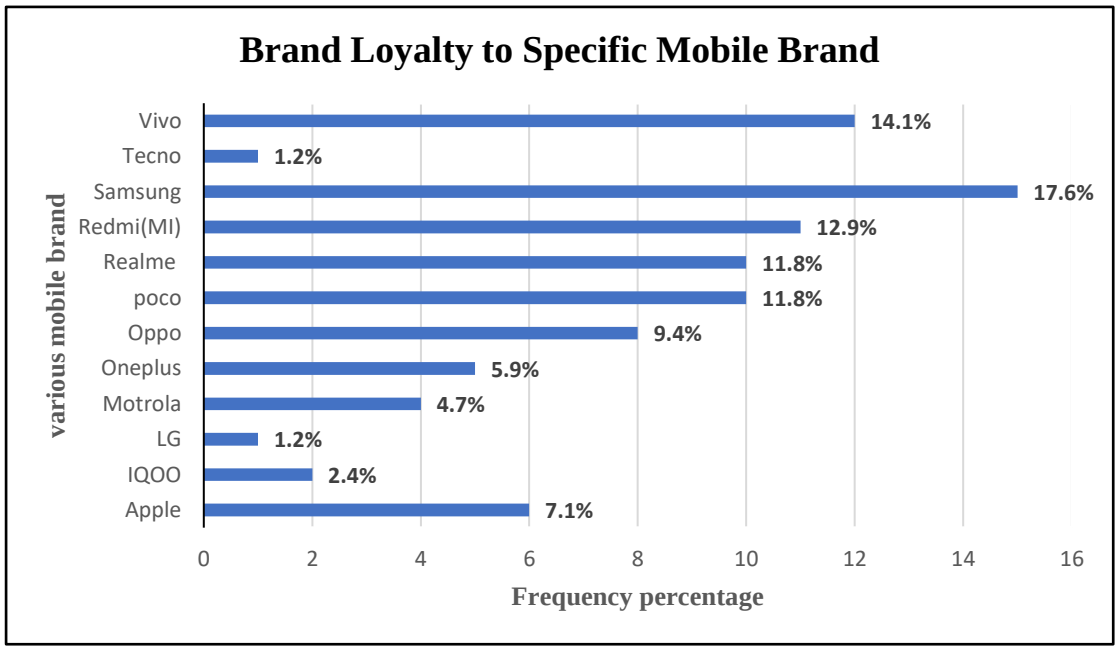


According to the pyramid chart above, 19.28% of male students use Vivo, while 21.62% of female students consider Samsung and Redmi as their preferred mobile brands.

4.1.6 BRAND LOYALTY TO SPECIFIC MOBILE BRAND FOR GRAPHICAL REPRESENTATION

This bar chart represents the percentage of students loyal to a particular mobile brand. The primary goal is to determine which brand has the highest brand value among students.

Fig.4.1.6 Bar Chart for the Brand Loyalty to Specific

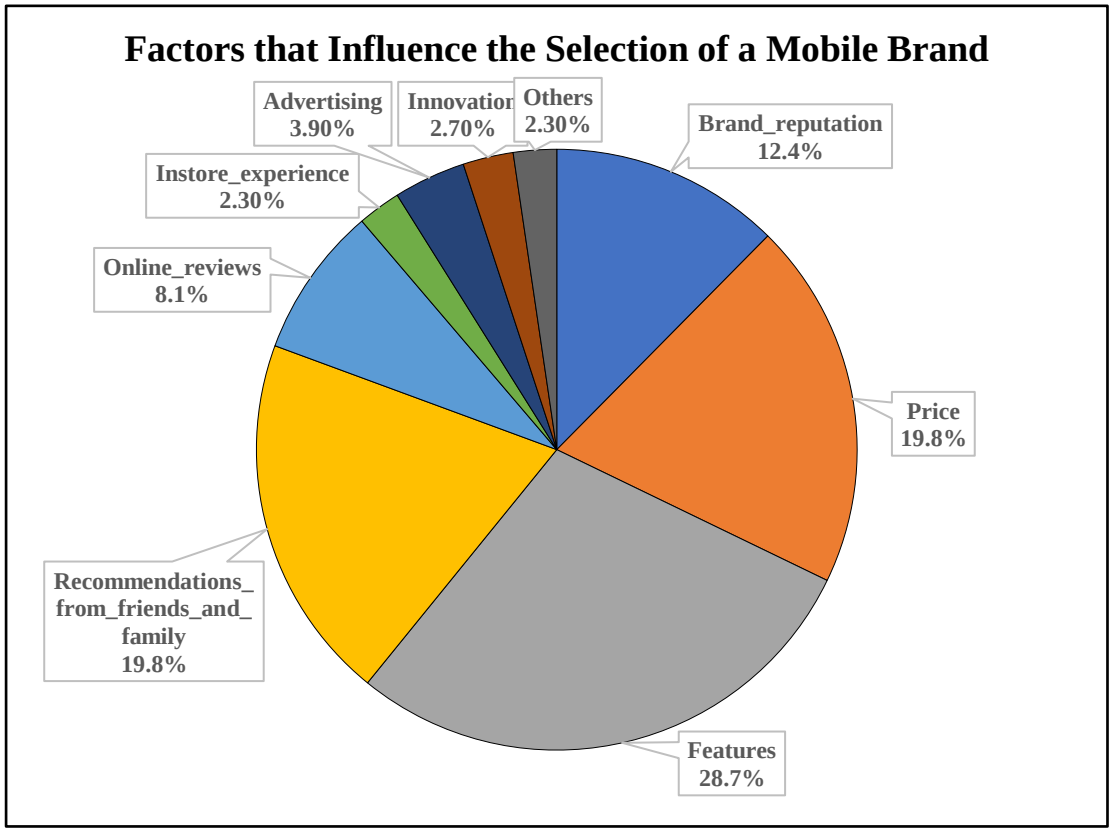


Based on the data, Samsung exhibits the most vital brand loyalty among the mobile brands listed, capturing 17.6%. Vivo follows closely behind at 14.1%. These two brands have established a dominant position in terms of customer preference among Bharathiar University Students.

4.1.7 GRAPHICAL REPRESENTATION FACTORS THAT INFLUENCE THE SELECTION OF A MOBILE BRAND.

This pie chart represents the factors influencing the students for a particular mobile brand selection, such as Features, Price, Recommendations from friends and family, Online Reviews, in-store experience, Advertising, Innovations, Brand Reputation, and others.

Fig.4.1.7 Pie chart for the Factors that Influence the Selection of the Mobile Brand

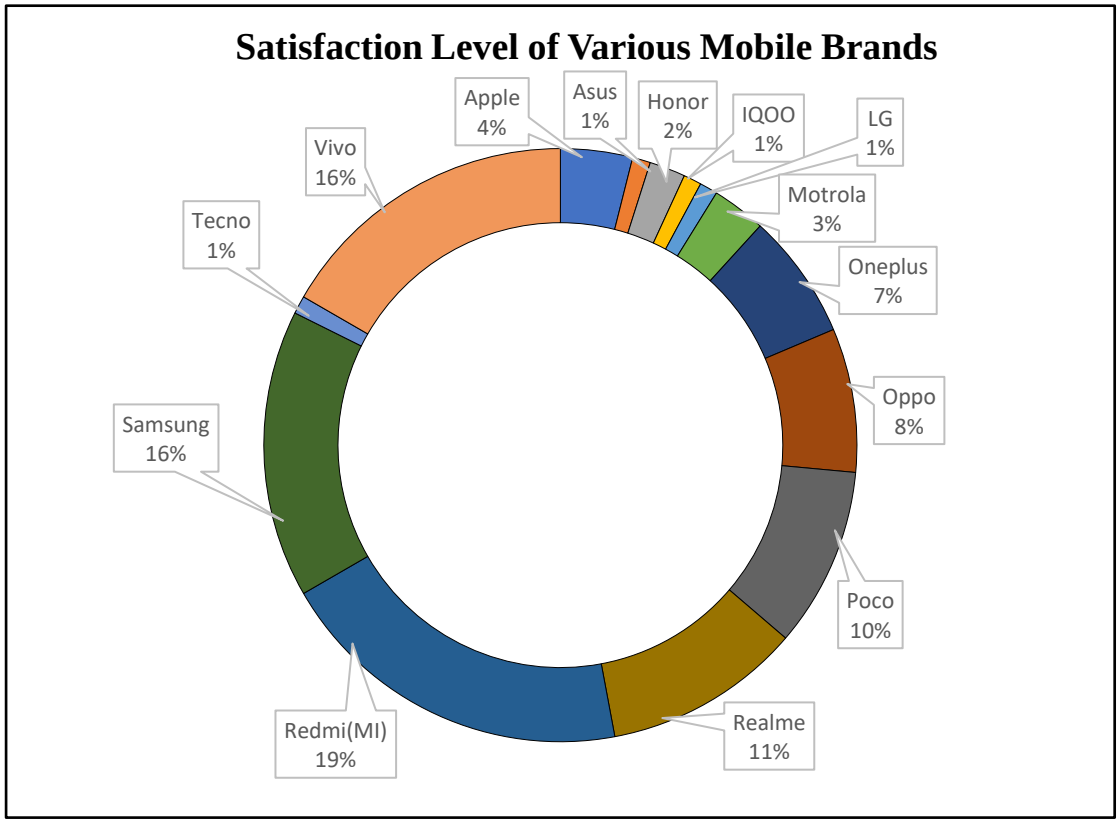


The pie chart shows the impact of several factors on mobile phone selection. The chart shows features are the most crucial factor, accounting for around 28.7%. Price and recommendations from friends and family are next, with 19.8%. The third most important factor is brand reputation (12.4%). This graph shows that these four factors account for over 70% of the influence on mobile phone choices among students.

4.1.8 GRAPHICAL REPRESENTATION FOR SATISFACTION LEVEL OF VARIOUS MOBILE BRANDS

The doughnut chart visualizes the satisfaction level of various mobile brands (with unequal proportion) currently used by the students.

Fig.4.1.8 Doughnut Chart for Satisfaction Level of Various Mobile Brands



The chart clearly shows the satisfaction levels of various mobile phone brands (in unequal proportions). Samsung is the most satisfied brand, with 19%, followed by Vivo Mobile with 16% and Real Me Mobile with 11%.

4.2 DESCRIPTIVE STATISTICS

4.2.1 THE PERCENTAGE ANALYSIS OF PROPOSED MOBILES TO BUY IN THE FUTURE IS CALCULATED BELOW FOR BOTH GENDERS.

The data collected from all the 155 sampled students are summarized, and the percentage analysis on the proposed mobile to buy in the future is calculated below:

Table.4.2.1

proposed mobile brand to buy in the future and Gender					
			Gender		Total
			Male	Female	
Proposed mobile brand to buy in the future	Apple	Count	22	5	27
		% within Gender	26.5%	6.9%	
	Asus	Count	1	0	1
		% within Gender	1.2%	0.0%	
	Google Pixel	Count	5	4	9
		% within Gender	6.0%	5.6%	
	Huawei	Count	1	1	2
		% within Gender	1.2%	1.4%	
	IQOO	Count	3	1	4
		% within Gender	3.6%	1.4%	
	Motorola	Count	9	3	12
		% within Gender	10.8%	4.2%	
	Nokia	Count	4	3	7
		% within Gender	4.8%	4.2%	
	Nothing	Count	1	0	1
		% within Gender	1.2%	0.0%	
	OnePlus	Count	18	13	31
		% within Gender	21.7%	18.1%	
	Oppo	Count	8	9	17
		% within Gender	9.6%	12.5%	
	Poco	Count	6	6	12
		% within Gender	7.2%	8.3%	
	Realme	Count	11	5	16
		% within Gender	13.3%	6.9%	
	Redmi	Count	15	16	31
		% within Gender	18.1%	22.2%	

	Samsung	Count	23	30	53
		% within Gender	27.7%	41.7%	
	Tecno	Count	0	1	1
		% within Gender	0.0%	1.4%	
	Vivo	Count	13	13	26
		% within Gender	15.7%	18.1%	
Total		Count	83	72	155

Most male students proposed the Samsung mobile brand (27.7%), with Apple following in second (26.5%), whereas most female students proposed the Samsung mobile brand (41.7%), with Redmi following in second (22.2%).

4.2.2 DESCRIPTIVE STATISTICS FOR THE NUMBER OF MEMBERS IN THE FAMILY

The data collected from all 155 sampled students are summarized, and the descriptive statistics on the number of members in a family are calculated as follows:

Table.4.2.2

Descriptive Statistics							
	N	**Mean**	**Std. Deviation**	**Skewness**		**Kurtosis**	
	Statistic	**Statistic**	**Statistic**	**Statistic**	**Std. Error**	**Statistic**	**Std. Error**
Number of family members	155	4.61	1.448	1.637	.195	3.308	.387

From the above table, it can be observed that the average number of members in a family is approximately five, with a standard deviation of 1.448.

4.2.3 DESCRIPTIVE STATISTIC FOR ANNUAL INCOME

The data collected from all 155 sampled students are summarized, and the descriptive statistics for annual income are calculated.

Table.4.2.3

Descriptive Statistics							
	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Annual income	155	235929.68	400075.521	7.430	.195	73.014	.387

The above table shows that the average annual income in a family is approximately Rs. 2,36,000, with a standard deviation of Rs. 4,00,076.

4.2.4 DESCRIPTIVE STATISTICS FOR MOBILE PHONE COST

The data collected from all 155 sampled students are summarized, and the descriptive statistics are based on mobile phone costs and annual income.

Table.4.2.4

Descriptive Statistics

		Annual income				
		N	Mean	Standard Deviation	Minimum	Maximum
Price of the mobile	5000-10000	21	146429	119499	48000	500000
	10000-20000	99	229890	457841	46000	4350000
	20000-30000	25	306000	326761	50000	1200000
	Above 30000	10	326500	304887	60000	1000000

From the above table, it can be observed that most of the students have their mobile phones in the range of 10000-20000, where their average family income is around Rs.229890 with a standard deviation of Rs. 457841 as their annual income ranges from 46000 to 4350000 while only minimal number of students are having their mobile phones which costs above 30000 with an average of Rs. 326500 and standard deviation Rs. 304887 which ranges their annual income from 60000-1000000.

4.3 TEST FOR INDEPENDENCE OF ATTRIBUTES (CHI-SQUARE TEST)

Our research focuses on fourteen unique categories that influence mobile phone brand-wise usage and proposed mobile brands to buy in the future. These categories could include a person's field of study, gender, household income, etc. To determine whether there is an association between mobile brand choice and each of these factors, we used chi-square tests to ensure attribute independence. These tests allow us to establish whether there is a statistically significant relationship between sex (or any other factor) and a person's brand-wise usage of a mobile phone.

4.3.1 COMPARISON BETWEEN GENDER AND MODE OF MOBILE PHONE PURCHASE

The contingency table below is used to conduct chi-square tests for independence of attributes to test whether there is an association between gender and the mode of the purchased mobile phone.

Null hypothesis (H_0):

There is no association between gender and the mode of the purchased mobile phone.

Alternative hypothesis (H_1):

There is an association between Gender and the mode of the purchased mobile phone.

Table.4.3.1.1

Gender and mode of the purchased mobile phone Cross tabulation					
			Mode of the purchased mobile phone		**Total**
			Offline	**Online**	
Gender	**Male**	Count	54	29	83
	Female	Count	50	22	72
Total		Count	104	51	155

Table.4.3.1.2

Chi-Square Tests			
	Value	**Df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	5.647[a]	4	.227
Likelihood Ratio	5.834	4	.212
Linear-by-Linear Association	2.537	1	.111

The above table shows no evidence to reject the null hypothesis, as the p-value is greater than 0.05. Hence, it is concluded that the mode of the purchased mobile phone has no association with gender.

4.3.2 COMPARISON BETWEEN NATIVE AND AGE AT THE PURCHASE OF THE FIRST MOBILE

To test whether there is any association between the Native place and the Age of the first mobile purchase, the Chi-Square test was applied, and the contingency table was formed.

Null hypothesis (H_0):

There is no association between the native place and the age at which the first mobile was purchased.

Alternative hypothesis (H_1):

There is an association between the native place and the age at which the first mobile was purchased.

Table.4.3.2.1

Native and age at the purchase of the first mobile Cross tabulation													
		age at the purchase of the first mobile											Total
		10	12	14	15	16	17	18	19	20	21	22	
Native	Urban	3	1	2	3	6	26	8	6	2	0	0	57
	Semi-urban	0	0	4	1	5	13	9	5	2	1	1	41
	Rural	1	1	0	3	4	23	15	9	0	1	1	57
Total		1	4	2	6	7	15	62	32	20	4	2	155

Table.4.3.2.2

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.453[a]	20	.371
Likelihood Ratio	25.733	20	.175
Linear-by-Linear Association	.840	1	.359

The above table shows that there is no evidence to reject the null hypothesis, as the p-value is greater than 0.05. Hence, it is concluded that the age at which the first mobile purchase is made has no association with the native place.

4.3.3 COMPARISON BETWEEN GENDER AND SATISFACTION LEVEL OF CURRENT MOBILE BRAND

To test whether there is any association between Gender and the satisfaction level of the current mobile brand, the Chi-Square test was applied, and the contingency table was formed.

Null hypothesis (H_0):

There is no association between Gender and the satisfaction level of the current mobile brand.

Alternative hypothesis (H_1):

There is an association between Gender and the satisfaction level of the current mobile brand.

Table.4.3.3.1

Gender and Satisfaction level of current mobile brand Cross tabulation							
		Satisfaction level of current mobile brand					Total
		Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied	
Gender	Male	7	7	21	28	20	83
	Female	3	2	15	35	17	72
Total		10	9	36	63	37	155

Table.4.3.3.2

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.647[a]	4	.227
Likelihood Ratio	5.834	4	.212
Linear-by-Linear Association	2.537	1	.111

The above table shows that there is no evidence to reject the null hypothesis, as the p-value is greater than 0.05. Hence, it is concluded that the satisfaction level of the current mobile brand has no association with Gender.

4.3.4 COMPARISON BETWEEN THE COST OF THE MOBILE PHONE AND THE MODE OF PURCHASING

To test whether there is any association between the cost of the mobile and the mode of purchasing, the chi-square test uses the contingency table below to conduct chi-square tests for attribute independence.

Null hypothesis (H_0):

There is no association between mobile costs and purchasing modes.

Alternative hypothesis (H_1):

There is an association between mobile costs and purchasing modes.

Table.4.3.4.1

Cost of the Mobile phone and Mode of purchasing Cross tabulation							
		Mode of purchasing					Total
		EMI	Cash	Debit card	UPI	Credit card	
Cost of the Mobile phone	5000-10000	1	14	2	3	1	**21**
	10000-20000	13	46	13	21	6	**99**
	20000-30000	2	12	4	5	2	**25**
	Above 30000	2	4	0	1	3	**10**
Total		**18**	**76**	**19**	**30**	**12**	**155**

Table.4.3.4.2

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.186[a]	12	.356
Likelihood Ratio	11.903	12	.453

The above table shows that there is no evidence to reject the null hypothesis, as the p-value is greater than 0.05. Hence, it is concluded that there is no association between the mobile phone cost and the purchasing mode.

4.3.5 COMPARISON BETWEEN GENDER AND FREQUENT UPGRADATION OF MOBILE PHONES

To test whether there is any association between Gender and Frequent Upgrade of mobile phones, the contingency table below is used to conduct chi-square tests for attribute independence.

Null hypothesis (H_0):

There is no association between Gender and Frequent Upgradation of mobile phone.

Alternative hypothesis (H_1):

There is an association between Gender and Frequent Upgradation of mobile phone.

Table.4.3.5.1

Gender and Frequent Upgradation of mobile Cross tabulation							
		Frequently upgrade mobile phone					Total
		Every year	Every 2-3 year	Every 3-4 year	Every 4-5 years	Rarely or never	
Gender	Male	23	15	14	6	25	**83**
	Female	11	9	3	12	37	**72**
Total		**34**	**24**	**17**	**18**	**62**	**155**

Table.4.3.5.2

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.478[a]	4	.002
Likelihood Ratio	17.162	4	.002

The above table shows that they reject the null hypothesis, as the p-value is less than 0.05. Hence, it is concluded that the association between Gender and Frequent Upgrade of your mobile phone.

4.3.6 COMPARISON BETWEEN GENDER AND PRICE OF THE MOBILE PHONE

To test whether there is any dependency between the gender and price of the mobile phone, the following contingency table is formed to conduct a chi-square test for the independence of attributes.

Null hypothesis (H_0):

There is no association between Gender and the price of the mobile phone.

Alternative hypothesis (H_1):

There is an association between Gender and the price of the mobile phone.

Table.4.3.6.1

Gender and Price of the mobile Cross tabulation						
		Price of the mobile				Total
		5000-10000	10000-20000	20000-30000	Above 30000	
Gender	Male	12	52	12	7	**83**
	Female	9	47	13	3	**72**
Total		**21**	**99**	**25**	**10**	**155**

Table.4.3.6.2

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.548[a]	3	.671
Likelihood Ratio	1.587	3	.662
Linear-by-Linear Association	.064	1	.800

The above table shows that there is no evidence to reject the null hypothesis, as the p-value is greater than 0.05. Hence, it is concluded that the no association between Gender and the price of the mobile.

4.3.7 COMPARISON BETWEEN GENDER AND CUSTOMER SERVICE SATISFACTION LEVEL

To test whether there is any dependency between gender and customer service satisfaction level, the following contingency table is formed to conduct a chi-square test for the independence of attributes.

Null hypothesis (H_0):

There is no association between Gender and Customer service satisfaction level.

Alternative hypothesis (H_1):

There is an association between Gender and Customer service satisfaction level.

Table.4.3.7.1

Gender and customer service satisfaction level Cross tabulation							
		customer service satisfaction level					Total
		strongly dissatisfied	Dissatisfied	neutral	satisfied	strongly satisfied	
Gender	Male	8	7	33	16	19	83
	Fe male	0	1	33	25	13	72
Total		8	8	66	41	32	155

Table.4.3.7.2

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.895[a]	4	.005
Likelihood Ratio	18.495	4	.001
Linear-by-Linear Association	3.670	1	.055

The above table shows that they reject the null hypothesis, as the p-value is less than 0.05. Therefore, we can accept the alternative hypothesis. Hence, it is concluded that the association between Gender and customer service satisfaction level.

4.3.8 COMPARISON BETWEEN GENDER AND CAMERA QUALITY SATISFACTION LEVEL

To test whether there is any dependency between gender and camera quality satisfaction level, the following contingency table is formed to conduct a chi-square test for the independence of attributes.

Null hypothesis (H_0):

There is no association between Gender and camera quality satisfaction level.

Alternative hypothesis (H_1):

There is an association between Gender and camera quality satisfaction level.

Table.4.3.8.1

Gender and camera quality satisfaction level Cross tabulation							
		Camera quality satisfaction level					Total
		strongly dissatisfied	Dissatisfied	neutral	Satisfied	strongly satisfied	
Gender	Male	11	11	23	22	16	83
	Female	4	11	15	26	16	72
Total		15	22	38	48	32	155

Table.4.3.8.2

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.526[a]	4	.339
Likelihood Ratio	4.646	4	.326
Linear-by-Linear Association	2.107	1	.147

The above table shows that there is no evidence to reject the null hypothesis, as the p-value is greater than 0.05. Hence, there is no association between Gender and Camera quality satisfaction level.

4.3.9 COMPARISON BETWEEN GENDER AND OPERATING SYSTEM SATISFACTION LEVEL

To test whether there is any dependency between gender and operating system satisfaction level, the following contingency table is formed for conducting chi-square for independence of attributes.

Null hypothesis (H_0):

There is no association between Gender and operating system satisfaction level.

Alternative hypothesis (H_1):

There is an association between Gender and operating system satisfaction level.

Table.4.3.9.1

Gender and operating system satisfaction level Cross tabulation							
		Operating system satisfaction level					Total
		strongly dissatisfied	Dissatisfied	neutral	Satisfied	strongly satisfied	
Gender	Male	5	14	17	31	16	83
	Female	1	1	23	35	12	72
Total		6	15	40	66	28	155

Table.4.3.9.2

Chi-Square Tests			
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	14.942[a]	4	.005
Likelihood Ratio	17.296	4	.002
Linear-by-Linear Association	3.545	1	.060

The above table shows that they reject the null hypothesis, as the p-value is less than 0.05. Hence, it is concluded that there exists an association between Gender and operating system satisfaction level.

4.4 STATISTICAL SIGNIFICANCE OF PREFERENCE OF MOBILE BRAND (INDEPENDENT SAMPLE T-TEST)

Gender and native place may differ regarding mobile brand usage, and independent two-sample t-tests are used to test the significance of these differences. The details are as follows.

4.4.1 COMPARISON BETWEEN MALE AND FEMALE

Males and females may differ, especially when learning about mobile phones. Hence, we decided to compare males and females concerning the age of purchasing the first mobile phone in our research. To test whether Age at the purchase of the first mobile phone significantly differs between males and females, a two-sample t-test has been applied.

Null hypothesis (H_0):

There are no significant differences between males and females concerning the age at which the mobile phone was purchased.

Alternative hypothesis (H_1):

There are significant differences between males and females concerning the age at which the first mobile phone was purchased.

Table.4.4.1.1

Group Statistics					
	Gender	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Age at the purchase of the first mobile phone	**Male**	83	17.75	1.968	.216
	Female	72	18.36	1.613	.190

Table.4.4.1.2

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
The first mobile was bought at Age	Equal variances assumed	1.184	.278	-2.105	153	.037	-.614	.292	-1.191	-.038

Table.4.4.1.3

Test

Null hypothesis		$H_0: \mu_1 - \mu_2 = 0$
Alternative hypothesis		$H_1: \mu_1 - \mu_2 > 0$
T-Value	**DF**	**P-Value**
-2.10	153	0.982

From the table, it can be observed that the p-value is 0.037, greater than 0.05. Hence, the null hypothesis is rejected, and it is concluded that there is a significant difference between males and females concerning the age of the purchase of the first mobile phone. Therefore, it can be concluded that males purchased their mobile phones at an early age compared to females.

4.4.2 COMPARISON BETWEEN RURAL AND URBAN

To test whether there are any significant differences between Rural and Urban students regarding the Age at the purchase of the first mobile phone, a two-sample t-test has been conducted by taking the null hypothesis that there is no significant difference between Rural and Urban students regarding the Age at the purchase of the first mobile phone.

Null hypothesis (H_0):

There is no significant difference between rural and urban students regarding age when purchasing their first mobile phone.

Alternative hypothesis (H_1):

There is a significant difference between rural and urban students regarding age when purchasing their first mobile phone.

Table.4.4.2.1

Group Statistics					
	Native	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Age at the purchase of the first mobile phone	urban	98	17.88	1.981	.200
	Rural	57	18.30	1.523	.202

Table.4.4.2.2

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
The first mobile was bought at Age	Equal variances assumed	1.376	.243	-1.383	153	.169	-.421	.304	-1.022	.180

From the table, it can be observed that the p-value is 0.169, greater than 0.05. Hence, there is no evidence to reject the null hypothesis, and it is concluded that there is no significant difference between rural and urban students regarding age when purchasing their first mobile phone.

4.4.3 COMPARISON BETWEEN MALE AND FEMALE

Males and females may differ in many aspects, especially in learning the aspects of mobile phones. Hence, it has been decided to conduct a comparative study between males and females concerning the duration of the mobile phones they use. A two-sample t-test was applied to test whether the duration period of mobile phones significantly differs between males and females.

Null hypothesis (H_0):

There are no significant differences between males and females in terms of the duration of mobile phones.

Alternative hypothesis (H_1):

There are significant differences between males and females in terms of the duration of mobile phones.

Table.4.4.3.1

Group Statistics					
	Gender	N	Mean	Std. Deviation	Std. Error Mean
Duration period of mobile phone.	Male	83	3.49	1.374	.151
	Female	72	3.29	1.486	.175

Table.4.4.3.2

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Duration of mobile	Equal variances assumed	1.076	.301	.880	153	.380	.202	.230	-.252	.656

From the table, it can be observed that the p-value is 0.380, greater than 0.05. Hence, there is no evidence to reject the null hypothesis, and it is concluded that there is no significant difference between male and female students concerning the duration of mobile phones. Hence, it is concluded that the duration period of mobile phones does not differ significantly.

4.5 CORRELATION

4.5.1 CORRELATION BETWEEN THE PRICE OF THE CURRENT MOBILE AND ITS SATISFACTION LEVEL.

To check whether there exists any correlation between the price of the current mobile and its satisfaction level. A correlation analysis is performed, and the observed correlation coefficient is tested for significance. The details are given below.

The correlation between the price of the mobile and the satisfaction level of the current mobile brand is computed and is given below.

Table.4.5.1

Correlations				
			Price of your mobile	**satisfaction level**
Spearman's rho	**The price of the current mobile**	**Correlation Coefficient**	1.000	.218**
		Sig. (2-tailed)	.	.006
		N	155	155
	Satisfaction level	**Correlation Coefficient**	.218**	1.000
		Sig. (2-tailed)	.006	.
		N	155	155

The correlation between the price of the current mobile and the satisfaction level of the same is studied, and it is observed that there is a weak positive correlation between them.

4.6 ANALYSIS BASED ON TWO INDEPENDENT SAMPLES - KOLMOGOROV SMIRNOV TEST

4.6.1 NORMALITY FOR GENDER-BASED ON AGE AT THE PURCHASE OF THE FIRST MOBILE

It has been decided to conduct a comparative study between males and females regarding their age at the mobile purchase. To test whether Age at the purchase of the first mobile is typically distributed between males and females, a two-independent sample test (Kolmogorov Smirnov test) is conducted.

Null hypothesis (H_0):

The age distribution at purchasing the first mobile phone for males and females is normally distributed.

Alternative hypothesis (H_1):

The age distribution at purchasing the first mobile phone for males and females is not normally distributed.

Table. 4.6.1.1

Descriptive Statistics					
	N	**Mean**	**Std. Deviation**	**Minimum**	**Maximum**
Age at the purchase of the First mobile	155	18.03	1.832	10	22
Gender	155	1.46	.500	1	2

The above descriptive statistics table shows that the age at the purchase of the first mobile mean is 18.03, and the standard deviation is 1.832.

Table.4.6.1.2

Frequencies		
	Gender	**N**
Age at the purchase of the First mobile	Male	83
	Female	72
	Total	**155**

Table.4.6.1.3

Test Statistics		
		Age at the purchase of the First mobile
Most Extreme Differences	**Absolute**	.111
	Positive	.111
	Negative	.000
Kolmogorov-Smirnov Z		.691
Asymp. Sig. (2-tailed)		.726

From the above table, it can be observed that the p-value is 0.726; hence, the no evidence to reject the null hypothesis, and it is concluded that there is the Age at the purchase of the mobile phone for that Gender (male and female) could be normally distributed.

4.7 ONE-WAY ANOVA

4.7.1 BETWEEN AGE AND THE PRICE OF MOBILE PHONE

It has been chosen to compare the price of the mobile phone with the age group. The table below shows the mean and standard deviation of Age corresponding to the cost of the mobile phone. A one-way ANOVA was conducted to determine if the average Age given by different prices of mobile phone holders is homogeneous. The ANOVA table is displayed below.

Null hypothesis (H_0):

The Age and price of the mobile phone are not significant.

Alternative hypothesis (H_1):

The Age and price of the mobile phone is significant.

Table.4.7.1.1

Descriptive								
Age								
	N	**Mean**	**Std. Deviation**	**Std. Error**	**95% Confidence Interval for Mean**		**Minimum**	**Maximum**
					Lower Bound	**Upper Bound**		
5000-10000	21	22.14	1.558	.340	21.43	22.85	20	27
10000-20000	99	21.98	1.813	.182	21.62	22.34	20	30
20000-30000	25	22.60	2.273	.455	21.66	23.54	20	30
above 30000	10	23.50	2.173	.687	21.95	25.05	21	27
Total	155	22.20	1.912	.154	21.90	22.50	20	30

Table.4.7.1.2

ANOVA					
Age					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	25.769	3	8.590	2.415	.069
Within Groups	537.031	151	3.556		
Total	562.800	154			

The p-value is observed to be greater than the significance level (0.05). Hence, there is no evidence to reject the null hypothesis. Therefore, it is concluded that the Age and price of mobile phones are not significant.

4.7.2 COMPARISON OF THE PRICE OF THE MOBILE AND SATISFACTION LEVEL

It was chosen to compare the level of satisfaction supplied by the price of your existing mobile phone from a consumer viewpoint. The mean and standard deviation of your mobile's price are shown in the table below. To determine if the average price of your mobile given different satisfaction levels is homogeneous, a one-way ANOVA has been conducted with the null hypothesis that the average price of your mobile given different satisfaction levels of various mobile brands is homogeneous. The resulting ANOVA table is displayed below.

Table.4.7.2.1

Descriptive								
Satisfaction level								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
5000-10000	21	3.48	1.030	.225	3.01	3.95	1	5
10000-20000	99	3.60	1.133	.114	3.37	3.82	1	5
20000-30000	25	4.08	.954	.191	3.69	4.47	1	5
above 30000	10	4.20	.919	.291	3.54	4.86	2	5
Total	155	3.70	1.095	.088	3.52	3.87	1	5

Table.4.7.2.2

ANOVA					
Satisfaction level					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	8.232	3	2.744	2.347	.075
Within Groups	176.516	151	1.169		
Total	184.748	154			

The p-value is observed to be greater than the significance level (0.05). Hence, the no evidence to reject the null hypothesis. Therefore, it is concluded that the satisfaction level of mobile brands at various prices is not significantly different.

CHAPTER - V

CHAPTER – V

SUMMARY AND CONCLUSION

Nowadays, the usage of mobile phone brands is becoming very high and almost every family has one or more than two mobile phones. A statistical study on brand familiarity, preference, and future selection behavior of mobiles among Bharathiar University students.

The following facts are observed in our study.

- The most popular price range for mobile phones among the students is ₹10,000 to ₹20,000, followed by the ₹20,000 to ₹30,000 range. This suggests that a significant portion of the students prioritize affordability when choosing a mobile phone.
- Redmi and Vivo are the most popular brands, with 19% and 18.4% of students using them respectively. Samsung is the second most popular brand, used by 15.3% of students. Poco, Realme, Oppo, and OnePlus are all moderately popular, with usage ranging from 5% to 11% for each brand. The remaining brands (Apple, IQOO, Motorola, and others) are less popular, with usage ranging from 1% to 4% each.
- Samsung is the most popular choice for students' next phones (21.2%). Other brands are close behind in a tie (around 10-12% each for Redmi, OnePlus, Apple, and Vivo). This means there's no clear winner after Samsung. Students choose phones for different reasons. Some might value affordability (Redmi), while others prefer specific features (OnePlus) or a trusted brand (Apple).
- The students mostly bought their first mobile phones at the age of 18. At the age of 18, both men and women purchased their first mobile phones.
- The student Gender-wise classification of mobile brands 19.28% of male students use Vivo, while 21.62% of female students consider Samsung and Redmi to be their most used mobile brands.
- Samsung most supreme with the highest brand loyalty (17.6%) among the students surveyed. Vivo is a strong contender at 14.1%, following Samsung closely. These two brands are the clear favorites for Bharathiar University students when it comes to mobile phones.

- The most important factor (28.7%) for students when choosing a mobile brand. Price and recommendations from friends and family come in at a close second (around 19.8% each). Brand reputation is also a significant influence (12.4%). Interestingly, these four factors together account for over 70% of the reasons why students pick a particular mobile brand. So, when students are shopping for a new phone, they highly prioritize the features it has, how much it costs, what their friends and family recommend, and the brand's overall reputation.
- Samsung holds the top spot with 19% of students reporting the highest satisfaction. Vivo comes in second with 16% of students satisfied. Realme follows with around 11% of students satisfied.
- It is observed that for student Gender-wise classification of a proposed mobile brand to buy in the future 19.28% of male students preferred Vivo, while 21.62% of female students consider Samsung and Redmi to be their most preferred mobile brands.
- It is observed that for students family income average is approximately 2,36,000 with a standard deviation of 4,00,075.521.
- Most students own phones in the ₹10,000 to ₹20,000 range, which aligns with the average family income of ₹229,890. A smaller number of students own phones above ₹30,000, and their average family income is also higher ₹326,500.
- There is no association between male and female with respectively mode of the purchased mobile phone.
- There is no association between urban, semi-urban and Rural with respectively age at the purchase of the first mobile.
- There is no association between male and female with respectively satisfaction level of the current mobile brand.
- There is no association between offline and online with respectively cost of the mobile phone.
- There is association between male and female with respectively frequently upgrade your mobile phone.
- There is no association between male and female with respectively price of the mobile phone.
- There is association between male and female with respectively customer service satisfaction level.

- There is no association between male and female with respectively camera quality satisfaction level.
- There is association between male and female with respectively operating system satisfaction level.
- There is a significant difference exist between Male and Female concerning the age of the purchase of the first mobile phone. Hence, it is concluded that Male purchased their mobile phone at an early age when compared to Female.
- There is no significant difference between rural and urban students concerning age at the purchase of their first mobile phone. Hence, it is concluded that the age at the purchase of the first mobile phone does not differ significantly.
- There is no significant difference between male and female students concerning the Duration period of mobile phones. Hence, it is concluded that the duration period of mobile phones does not differ significantly.
- There is a weak positive correlation between phone price and student satisfaction with their current brand. This means that there's a slight tendency for students with more expensive phones to report higher satisfaction, but the connection is not very strong.
- The students' age at the purchase of the first mobile phone for that Gender (male and female) could be normally distributed.
- There is no significant difference between age and price of the mobile phone.
- There is no significance difference between satisfaction level in various price of mobile brands.

Due to the shortage of time and other resources the study is confined to the students of Bharatiyar University only. Extensive studies in different regions and in different institutions will definitely helpful for understanding the behaviour of youth in India which would in turn be helpful for making special type of policies and plans for the youth development.

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