CHAPTER - 3
RESEARCH METHODOLOGY

3.1 Introduction:
The art and science of satisfying a target market through cleverly exploring, creating, and delivering value by generating profit after identifying their unfulfilled needs and desires is called Marketing. It suggests measure and specifies the volume of the identified market and the revenue prospective also directs which section of the company is proficient of serving paramount and promotes the befitting products and services. Opportunity identification, new product development, customer attraction, order fulfillment and maintaining faithfulness of employees are the major processes of marketing. A company that handles all of these processes exceptionally generally triumphs. But when a company falls short at any one of these processes, it will find difficult to sustain. The hidden aspect of process is the widespread market exploration, the research and development of suitable goods, the difficulty of pricing them correct, of opening up delivery system, and creating awareness about the product in market. Thus, Marketing unlike selling is a more comprehensive process and it sense the unfulfilled needs of community and produces novel and striking solutions.\[1\]

In the current scenario, practice of marketing has altered and enhanced vastly. E-marketing is the result of brilliant combination of modern communication technologies and the orthodox advertising standard that has been practiced since decades. The amazing combination of the two is the outcome of contemporary E-Marketing via electronic medium and more explicitly through the Web. The terms Internet marketing, Online Marketing and E-marketing are often substitution or mere identical terms that comprise both direct feedback marketing and indirect advertising module and employs an array of technologies to assist link businesses to their clientele. \[2\]

Companies must understand that the customers are no longer illiterate. They are getting more informed and have superior technology at their disposal like Internet. Hence now they have wide verity to choose and can buy as per their desire. In nutshell now customer is King and the power of manufacturer and the distributor has taken a backseat. \[3\]
The investment return exceed tremendously from E-marketing in comparison to conventional marketing strategies. Businesses these days have justly developed global reach. While conventional media has financial constrains to such magnitude of reach to huge multinationals, E-marketing surprisingly provides accessibility to potential consumers across the globe at a comparatively much less budget. It has opened new avenues and is truly a boon for smaller businesses. E- Marketing has opened doors for the marketer to achieve buyers in an extensive variety of ways and helps businessmen to sale any merchandise or service under the sun ranging from as diverse as consumer service and sales, public relations, information administration and many more. With the variety of new technologies becoming accessible round the clock helps in growing the scope. The major limitation of conventional marketing is that while it is mostly limited to promoting its brand's message in contrast e-marketing facilitates communication between consumers and companies. With 2 way communicqué channel, organizations can attract other customers with the responses of their consumers, making marketing more vibrant and adaptive. Thus E marketing, in ways never before imagined, offers an instantaneous impact. Since E-marketing offers service 24 x 7 for 365 days it closes the gap between providing information and extracting a consumer’s response, the customers purchasing routine gets a huge momentum and advertising expense can give a major boost in developing immediate leads. Today the ‘internet’ has become a productive platform for the business community because the audience on internet is a ‘crowd’ which has better purchasing potential and is looked upon as a population cluster that is mostly drawn from the middle class. Shrewd business people who know where to look can without much of a stretch discover access to the specialty markets they wish to target. Marketing posts are most helpful when they are presented directly to the target customers most likely to be interested. The Internet creates the ideal ambience for niche marketing to targeted groups.

Closed Loop Marketing depends upon regular measurement and review of the results of marketing initiatives. By incessantly tracking the reaction and success of a promotion, the seller can be far more active in adapting to consumers' needs and wants. With E-marketing, reactions can be examined concurrently and campaigns can be tweaked persistently. The combined effect of E-marketing with the immediacy of the Internet as a medium, results into nominal advertising expenditure, less wastage of time and effective campaigns. [4] Hence, research in this area is of paramount significance in the era of Google and globalization.
3.2 **Research Design:**

Research is essentially conducted within the guidelines of conceptual structure of investigation. It gives the outline to conduct data collection, measurement and analysis of data. Research is a systematic activity and hence such a guideline becomes a vital aspect of the methodology.

Planning is a significant feature in regard to the commencement of any type of research assessment. Before commencing any research investigation, the researcher has to sketch out a suitable action plan comprising of vital aspects that includes the aim of the investigation, the hypothesis of study and the diverse techniques to be adopted for gathering primary data is needed. Such a plan provides an outline of the research work to be commenced. In addition it gives guidelines about the kind of data to be collected that needs to scrutinized. A design of such type is termed as research design.

A research design provides the specifications for the watchful collection of relevant data and a befitting study that accomplishes the aim of research with accuracy, economy and excellence.

A research design, as a result, consists of three important aspects: plan, structure and strategy.

(i) The plan is just a guideline of research format on which the researcher performs his task.

(ii) The structure of the research is an extremely accurate guideline or the format.

(iii) The strategy elucidates the researcher about the direction of research spelling out the techniques.

In nutshell the research design can be easily called as blueprint of research.

**Conceptual Framework:**

Research may be described as documented prose work. The purpose of the research work is to determine replies to the quires applying scientific approach. Hence initially conception chart is made. Based on this new data is collected in relation to the research study. On the foundation of the new information gathered research procedure is prepared.
This design focuses on:
1. Defining and redefining a research problem.
2. Formulating objectives and hypothesis of the study.
3. Developing a research plan.
4. Collection of primary and secondary data.
5. Analyzing and interpretation of data.
6. Preparation of report.

3.3 **Methodology of the Study:**
Methodology can be defined as the technique in which a particular research assignment is carried out. It is a complicated process that engages numerous elements like the backdrop in which the research has to performed, meeting with multiple people, employing different devices, procedures and an appropriate organization skill. The study explores equally the frequency of design together with growth of plan support. It intends at escalating the understanding of the frequency of design with all its intricacy and also at the progress and validation of knowledge, methods and tools to enhance the investigated circumstances in design. Research methodology is adopted only after taking into account several factors like aim of research, kind of research, kind of data involved, type of devices to employed, sample of the study and variables used in study.

Researches categorized by methodology are: Qualitative and Quantitative.

**Qualitative Research:** Qualitative research investigates attitude, conduct and experiences. It follows an inductive research process that engages the compilation and study of huge narrative information so as to pick up bits of knowledge into marvels of intrigue. Data analysis contains code of information and synthesis of spoken data. The contains included in general qualitative research are theoretical or content investigation, interviews, remarks in the form of description or comments, focus groups, and open ended review.

**Quantitative research:** Quantitative research means an organized empirical analysis of quantitative properties and phenomena and their associations. It follows a priori investigation procedure and uses the compilation and analysis of quantitative or statistical information in order to clarify, forecast, and/or manages phenomena of interest. The endeavor of quantitative
research is to develop and utilize numerical models, theories and/or hypotheses relevant to phenomena. The procedure of calculation is vital to quantitative research because it provides the basic relationship among empirical observation and numerical expression of quantitative associations. Data investigation is mostly arithmetical. The factors included in General quantitative research methods consist of investigation of content or relational, experiments and conclusions drawn from scaled ratings, checklists analysis conducted applying closed-ended, validated scales.

Present study is based on quantitative research.

3.3.1 Problems tackled in the present Study:

1. Inability to get an actual experience of the merchandise.
2. Entire system is depending on internet therefore both the parties cannot do the interactive deal.
3. E-marketing can become one of the reasons for unemployment in Indian society.
4. Lack of awareness in the society about the e-marketing activity.
5. Unethical users are creating barriers in between online process.
6. The major hurdle in between users and companies is slow internet connections or no network connectivity.
7. Improper e-market mix will lead to failure of online business activity.

3.3.2 Objectives of the Study:

1. To understand importance and uses of e-marketing tools.
2. To study various reasons of adopting e-marketing.
3. To understand nature & behavior of online customer.
4. To study effectiveness of e-marketing and basic expectations from the society.
5. To know about online shopping security related issues.
6. To understand various mediums and techniques of e-marketing and their utilization.
7. To study utility of the e-marketing resources

3.3.3 Hypotheses of the Study:

A well-formulated hypothesis provides an essential basis for a researcher to begin
the inquisitive enquiry without wastage of much time and energy.

Scientific questions are always guided by the directional force of an appropriate hypothesis, for providing the right answers.

Testing of hypothesis:
The idea of factual derivation is to reach inferences about a populace on the premise of information gathered from a sample of that population. Hypothesis examination is the procedure used to analyze the strength of evidence from the sample and give an outline for making determinations related to the populace. It provides a method for understanding how dependably one can deduce observed results in a sample under scrutiny to the bigger populace from which the sample is haggard. The researcher formulates an explicit theory, evaluates data from the sample, and utilizes this information to choose whether they support the specific hypothesis.

The procedure of testing hypothesis is briefly described as follows:

1. Setting up a hypothesis:
The hypotheses are often statements about population parameters. Setting up a hypothesis is a basic piece of factual induction. Generally a few theories are advanced, either in light of the fact that it is accepted to be valid or on the grounds that it is to be utilized as a reason for contention, however has not been demonstrated. The two types of hypotheses are as follows.
   a. Null hypothesis: (Ho) The hypothesis of no difference or of equality. It is an extremely helpful tool in testing the importance of difference. It states that there is no factual difference in the sample and population in the particular matter under observation and that the difference found is just accidental and insignificant arising out of fluctuation of sampling. The denial of Null hypothesis signifies that the differences have only statistical significance and the acceptance of null hypothesis proves that the differences are due to coincidence.
   b. Alternative Hypothesis: (H1) It is the hypothesis which challenges the null hypothesis. It denotes those values that the investigator deems
to hold accurate and anticipate that sample data leads to acceptance of this hypothesis are true. It is the assumption that indicates the direct relationship among the variables.

For each null hypothesis there is a substitute hypothesis.

2. **Setting up the level of significance:**
   The confidence with which the investigator discards or retains the null hypothesis depends upon the noteworthy level adopted. The significant difference is usually denoted as a percentage, such as 5%. It is the probability of declining the null hypothesis, if it is authentic. By rejecting the hypothesis at the same level the researcher is in the danger of discarding the true hypothesis in 5 out of every 100 occasions. By examining at least 1 per cent level, the researcher turns down the possibility of making a false judgment but some elements of threat still persists (1 out of 100 occasions) that the wrong decisions are being made, i.e. the hypothesis may be accepted where it has to be discarded or conversely.

3. **Setting test criteria:**
   The third step in hypothesis examining process is to construct a test criterion. This engages choosing an appropriate probability distribution for application. Some probability distributions that are frequently used in testing procedures like z, t, f, and chi-square distribution and the equivalent statistic. The kind of distribution makes the decision about the required test to be conducted.

4. **Doing computation:**
   The hypothesis is examined utilizing befitting test statistic. A test statistic is a magnitude computed from the information gathered. Its value is used to choose whether the null hypothesis is to be discarded or retained. The selection of the test is based upon the implied probability model and the assumptions under inquiry.

5. **Making decisions:**
   The final and fifth step is to express the results and declare accurate statistical conclusions in an easy to understand method. The conclusions consist of two statements;
   1. Describing the results of the (null hypothesis) and
   2. Describing the results of the (alternative hypothesis).
The first declaration affirms the acceptance or rejection of the null hypothesis for the specific value of alpha or p-value for the test statistic. The second statement retorts the research queries affirming the sample statistic collected estimated the parameter hypothesized.

The conclusion depends upon the calculated value of the test paradigm falling in the locale of rejection or acceptance.

3.3.4 (Type) I and (Type) II errors:

In the testing of the hypothesis, there is a likelihood of two types of errors.

Discarding null hypothesis when it is true is type I error. Blunder to reject null hypothesis when it is false is called type II error.

The two errors may be represented in the tabular form as follows.

<table>
<thead>
<tr>
<th>Decision</th>
<th>Accept $H_0$</th>
<th>Reject $H_0$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$H_0$ (true)</td>
<td>Correct decision</td>
<td>Type I error</td>
</tr>
<tr>
<td>$H_0$ (false)</td>
<td>Type II error</td>
<td>Correct decision</td>
</tr>
</tbody>
</table>

The probability of type I one error is generally detected in advance and is understood as the level of significance of testing of the hypothesis. Type I error may be fixed at 5% or 1%. But in a fixed sample size (say n), dropping the risk of type I error inevitably amplifies the risk of type II error. Hence it is impossible to decline both types of errors concurrently.

For the present study the researcher formulated null hypothesis to test the level of significance due the following reasons:

a. The researcher aspired to refute the hypothesis regarding diverse features of online shopping. The refutation of hypothesis regarding relationship of online
shopping with regularity of shopping, buying of variety of products and satisfaction in connection to buying and with changeable gender, edification, earnings and profession. Also association of features of online shopping and problems of online shopping with above mention variables when it is really correct involved greater risk and hence it was taken as null hypothesis because then the likelihood of rejecting it when it was true would have been very small.

b. The researcher opted for a null hypothesis over the alternative hypothesis because using the null hypothesis decreases the hazards of errors in evaluation and there by the probability of deducing an incorrect conclusions. Hence, the researcher formulated the following null hypothesis to be tested statistically to draw inferences related to online shopping.

The researcher formulated the following null and alternative hypothesis to be tested statistically to draw inferences on online shopping.

**Null Hypothesis:**

1. Opinion of respondents for online shopping has no significant association with frequency of shopping, buying of the different range of products and satisfaction w.r.t. purchases.

2. Opinion of respondents for online shopping is independent of (not associated with) Gender, Education, Income and Occupation.

3. Features of online shopping have no significant association with frequency of shopping, buying of the different range of products and satisfaction w.r.t. purchases.

4. Features of online shopping are independent of (not associated with) Gender, Education, Income and Occupation.

5. Issues of online shopping are independent of (not associated with) frequency of shopping, buying of the different range of products and satisfaction w.r.t. purchases.

6. Issues of online shopping are independent of (not associated with) Gender, Education, Income and Occupation.

7. There is no significant dissimilarity between mean value responses of Graduate, Post-Graduate and Doctorate company executives related to E- Marketing Strategies of the Company.
3.3.5 Period of the study:
Seven financial years of data was considered for the purpose of the study i.e. from April 2009 to March 2016.

3.3.6 Population and Sample:
The researcher is trying to acquire information from population, which are valid, precise and which allows prediction. A sample from the largest group under study includes all individuals meeting and their distinct characteristics. Sample is a segment or division of the population. In case of a set consisting of all probable items in a massive population becomes too expensive or time consuming to do a comprehensive investigation of all of the items. Assessing or estimating traits or characteristics of the complete structure, method, scheme through representative example can be more resourceful while still providing the required information. The aim of sampling is to make an overview about the population that should have two significant characteristics.
1. It should be ample
2. It should be representative

Universe of the current study:
For the reason of proposed study, researcher has selected selective companies from various industries which are having offices in Mumbai region that is from Colaba to Mulund and Chuchgate to Dahisar the same time they have selected on the basis of feasibility to get an authentic data for desire study.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Segment</th>
<th>Name of Companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manufacturers</td>
<td>Automobile Mahindra &amp; Mahindra Ltd.</td>
</tr>
<tr>
<td>2</td>
<td>Manufacturers</td>
<td>Automobile Tata Motors Ltd.</td>
</tr>
<tr>
<td>3</td>
<td>Manufacturers</td>
<td>Furniture Godrej Interio</td>
</tr>
<tr>
<td>4</td>
<td>Manufacturers</td>
<td>Furniture Durian Industries Ltd</td>
</tr>
<tr>
<td>5</td>
<td>Service</td>
<td>Insurance ICICI Prudential Life Insurance Company</td>
</tr>
<tr>
<td>6</td>
<td>Service</td>
<td>Insurance Kotak Life Insurance</td>
</tr>
<tr>
<td>7</td>
<td>Manufacturers</td>
<td>Food &amp; Beverage Parle Agro Pvt. Ltd</td>
</tr>
<tr>
<td>8</td>
<td>Manufacturers</td>
<td>Food &amp; Beverage Nestlé India Ltd.</td>
</tr>
</tbody>
</table>
To legitimately be able to use a sample to extrapolate the outcomes to the entire populace requires the use of proper sampling techniques.

The sampling frame
Companies within Mumbai were used as the sampling frame. Moreover, the researcher achieved the representative sample by ensuring that respondents are involved in online shopping.

The sample size
The study used a representative sample size of 410 respondents from which there are 350 customers and 60 company executives involved in online shopping living in Mumbai.

Sampling techniques:
Sampling techniques can be grouped under two noteworthy sorts: Probability and Non-probability. The fundamental distinction between the two sorts is, in probability sampling, each unit has an equivalent shot of being chosen, and that possibility can be to a great extent evaluated, while in non-probability sampling it is not so.
a. Probability Sampling Techniques:

A probability sampling method is any technique of sampling that employs some form of arbitrary choice. The samples are assembled in a procedure that gives every one of the people in the population identical probability of being selected. The researcher employs arbitrary technique for the end result to be negligible or nonexistence of methodical and sampling bias and the sample is as a result representative of the complete population. The major types of probability sampling techniques are:

(i) Simple random sample
(ii) Stratified random sample
(iii) Cluster sample
(iv) Systematic sample
(v) Multi-stage sample

(i) Simple Random Sampling:

It is the easiest type of probability sampling. It is appropriate where population is comparatively diminutive and where sampling frame is complete and state-of-the-art. It is performed utilizing a table of random numbers, a PC generator of random number, or any other mechanical machine but it is usually hard to get a complete sampling frame to classify each member of the population. This technique is theoretically the easiest to understand but quite difficult to execute in a practical research project.

(ii) Stratified Random Sampling:

In this technique, the total population is bifurcated into strata or sections that have at least one familiar characteristic. Random sampling is then used to select a number credibly representing the population from each stratum.

(iii) Cluster Sampling:

In this technique the entire population of interest is split into clusters, or groups, and these clusters a random sample is chosen. Each cluster is mutually unique and collectively the clusters comprise the complete population. Then all units inside the selected clusters are selected. There is a little variability within clusters and huge variation between clusters. In reality, clusters tend to be found in terms of geographic areas.
(iv) Systematic Sampling:
Systematic sampling is very identical to simple random sampling and easier to execute. It is conducted through a few ordered measure by picking components from an arbitrarily orchestrated sampling frame such as every $k^{th}$ element ($k = N/n$) where the population size is $N$ and the sample size is $n$.

(v) Multi-stage Sampling
Multi-stage sampling is a sort of intricate sample design in which two or more levels of units are affixed one in the other. At each stage, a sample of the corresponding units is chosen. Initially a sample of primary unit is chosen, later, in each of those chosen; a sample of secondary unit is picked, and so on. All eventual units selected at the final stage of this process become the final sample.

b. Non-Probability Sampling:
In reality, because of the range of hurdles in obtaining an absolute sampling frame, it is risky to use probability sampling method. As a result, a few understandings could be made or roughly probability-type of sampling methods may be used. Non-probability sample is any sampling strategy where a few components of the populace have no probability of determination or where the probability of determination can’t be correctly determined. It includes the choice of components in view of supposition concerning the populace of interest, which outlines the standards for choice. Hence, because the choice of elements is non-probability, non-random sampling doesn’t permit the valuation of sampling errors. These conditions give rise to eradication prejudice, putting limits on how much data a sample can contribute about the population.

Information concerning the link among sample and population is restricted, making it to arduous to extrapolate from the sample to the population.

The major types of non-probability sampling techniques are:
(a) Quota sampling
(b) Judgment sampling
(c) Convenience sampling
(d) Snowball sampling
(a) **Quota Sampling:**  
In quota sample, the populace is initially divided into mutually exclusive sub-divisions, similarly as in stratified sample. At that point finding is utilized to choose the subjects or units from every portion in view of a specific proportion Sampling is done until a particular number of units (quotas) for a scope of sub-populac es have been chosen. Since there are no guidelines as to how these quota's are to be packed, quota sampling is really a means for fulfilling sample size purpose for select few sub-populations.

(b) **Judgment sampling:**  
This method depends on the finding of the researcher concerning who ought to be included in the sample. There is an unknown likelihood of inclusion in the sample for any given case. This is not practiced frequently, as it is tricky to justify.

(c) **Convenience Sampling:**  
Non-probability sampling technique means Convenience sampling where subjects are selected because of their suitable accessibility and closeness to researcher.

The subjects are chosen since they are effortlessly accessible. It is sometimes referred to as disorganized or accidental sampling. This method is generally employed amid preparatory research endeavours to get a gross estimate of the outcomes, without bringing about the cost or time required to choose a random sample.

Now we give details of population, sample, sample techniques etc, as below.

**The sampling method:**  
A probability random sampling procedure was used. This sampling method was adopted, because it was economical and less time-consuming for the researcher to collect the data.
Sample of data:
Random sampling technique is used in order to draw 10 samples from the universe.

<table>
<thead>
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<td>3</td>
<td>Service</td>
<td>Insurance</td>
<td>ICICI Prudential Life Insurance Company</td>
</tr>
<tr>
<td>4</td>
<td>Manufacturers</td>
<td>Food &amp; Beverage</td>
<td>Parle Agro Pvt. Ltd</td>
</tr>
<tr>
<td>5</td>
<td>Service</td>
<td>Education</td>
<td>K.J.Somaiya College of Arts and Commerce</td>
</tr>
<tr>
<td>6</td>
<td>Service</td>
<td>Telecommunication</td>
<td>Idea Cellular Ltd</td>
</tr>
<tr>
<td>7</td>
<td>Service</td>
<td>Health Care</td>
<td>P.D. Hinduja Hospital</td>
</tr>
<tr>
<td>8</td>
<td>Manufacturers</td>
<td>Pharmaceuticals</td>
<td>Cipla Ltd</td>
</tr>
<tr>
<td>9</td>
<td>Service</td>
<td>Banking</td>
<td>HDFC Bank Ltd.</td>
</tr>
<tr>
<td>10</td>
<td>Service</td>
<td>Infrastructure</td>
<td>GVK Power and Infrastructure Ltd.</td>
</tr>
</tbody>
</table>

Source: www.google.com/Company detailed profiles are mentioned in Annexure-I

3.3.7 Data collection and measuring instrument
The researcher used a self-administered survey to conduct the study. The study used structured questionnaires to collect data. This method was chosen for its versatility, as well as the accuracy of the data, since all respondents were asked the same questions.

(a) **Primary Data Sources**
Questionnaire.

(b) **Secondary Data Sources**
Books, Magazines, Company Reports, Websites, Search Engines, Journals etc.

(c) **Pre-Testing Questionnaire**
Pre-tested the questionnaire with 50 (40 customers + 10 executives) respondents. Thereafter changes were made to the questionnaire with specific reference to wording, sequence and language.

3.4 **Analysis of Data**
(a) Analysis of data can also be described as the procedure of transforming data with the objective of extracting helpful information and formulating conclusion. Application of statistical methods depends upon the type of data and the question included.
‘Analysis’ means the process of computation of certain measures along with exploring for examples of relationship that exist among information bunches.

“Thus analysis is a process where relationships or differences favoring or contrasting with original or new hypothesis; should subject to statistical tests of importance in order to establish with what legitimacy information can be said to demonstrate any conclusions.”

Examination, primarily in case of reviews, engages estimating the values of unidentified parameters of the population and testing of hypothesis for portraying inferences. Analysis thus may be classified as descriptive analysis and inferential analysis which is generally called as statistical analysis.

In statistical applications, data analysis is segmented into descriptive statistics and inferential statistics.

For the purpose of analysis researcher used statistical package SPSS version 21. Plus excel add-in MegaStat is also applied.

3.4.1 Descriptive Statistics:

The term ‘Descriptive’ statistics means to depict the essential elements of the information in a study. They offer easy synopsis about the sample and the measures. In addition with straightforward illustrations investigation, they outline the commence of in every way that really matters each quantitative examination of data.

Descriptive analysis is mostly the study of distribution of one variable. This study helps us to locate profiles of organizations, work groups, people and different subjects on any of complex qualities, for example, estimate, pieces, effectiveness, inclinations and so on.

Descriptive analysis is more precisely targeted at a particular aspects or dimensions of research. Such studies disclose latent relationship between variables, thus setting the stage for more elaborate research later. The analysis with one variable is called ‘One-Dimensional’ analysis, where as two variables are known as ‘Bivariate’ analysis and for
more than two variables is termed as ‘Multivariate’ analysis. For descriptive analysis we use following statistical tools:

**Measures of central tendency:** These are distinctive examples of depicting the focal position of a recurrence conveyance for a gathering of information. Focal inclination is measured in 3 ways: Mean Median and Mode. The mean is basically the normal score of dissemination. The Median is the inside, or center score inside a dissemination. The Mode is the most continuous score inside a circulation. In a typical conveyance, the Mean, Median and Mode are similar.

There are three noteworthy sorts of evaluations of middle tendency which are used in this study.

(i) **Mean:** The Mean or average is perhaps the most frequent method used for relating middle tendency. To calculate the mean every value are added and at that point divided by the figure of values.

(ii) **Median:** The Median is an additional method of central location for a variable. It is the value in the centre when the information is gathered in rising order. With an odd figure of notes, median is the centre value. An even number of observations has no single value. In this matter the median is definite as the common average of the values of middle two observations.

(iii) **Mode:** The Mode is the recurrently happening value in the arrangement of scores. To conclude the mode, the scores are ordered as in case of median, and then count each one. The most repeatedly occurring value is the mode.

**Measures of Variation:** Measures of variation assist us to sum up how spreads out these scores are spread out. To explain this spread, a number of statistics are on hand, includes the quartiles, range, variance, standard divergence and absolute deviation.

Measures of variation decide the scope of the dispersion, with respect to the measures of middle tendency. Where the measures of middle tendency are express information focuses, measures of variety are lengths between different focuses inside the dissemination. Variety is figured as far as mean deviation, range,
standard deviation and variance.

There are four kinds of Measures of Dispersion used in the research study

(i) **Range**: Range is the difference between the biggest and smallest observation.

(ii) **Mean Deviation**: Mean deviation is the net sum of deviations of the items of a given data from one of the averages of that data divided by numbers of item.

(iii) **Variance**: Variance is described as the total of squared deviations around the mean divided by the population size.

(iv) **Standard Deviation**: The standard deviation is identified as a positive square root of the variance.

**Multivariate Analysis**: Researchers generally are interested in relationships between two or more variables. Covariance and correlation are descriptive methods of the association between 2 variables. Covariance is described as the total of the products obtained by multiplying the deviation each value from its mean of two data divided by number of values minus 1. For given data, the product moment correlation coefficient is defined as follows:

\[ r_{xy} = \frac{S_{xy}}{S_x S_y} \]

Where, \( r_{xy} \) : correlation coefficient, \( S_y \) : standard deviation of y, \( S_x \) : standard deviation of x, \( S_{xy} \) : covariance.

### 3.4.2 Inferential statistics:

The inferential statistics is used to make inferences from the given data to more common circumstances; while descriptive statistics is basically employed to describe the data.

Inferential analysis is applied to generalize the results achieved from a random sample (probability) back to the populace from which the specimen was drawn. This examination is just vital when: a specimen is drawn by procedure of random; and the reaction rate is high. Henceforth, this sort of examination is most certainly not suitable when: non-probability methods of selection are used; inferential
statistics happen from the fact that sampling naturally incurs sampling blunder and thus a sample is not expected to flawlessly stand for the population. The procedures of statistics of inferential are (1) parameter(s) estimation and (2) statistical hypotheses testing.

Inferential analysis is employed to generalize the results derived from a random sample (probability) back to the populace from which the specimen was haggard. Inferential statistics are commonly used to respond cause-and-effect questions and make forecasts. In the present study researcher used this analysis for hypothesis testing.

Statistics plays a key role in research as it works as a device in designing study analyzing its information and representing conclusions there from. Most research studies result in a huge quantity of raw data which must be condensed so that the same can be read with ease and can be utilized for further analysis.

Descriptive statistics is concerned with the expansion of certain indices from raw data, whereas inferential statistics is concerned with the process of generalization. Sampling statistics are also recognized as inferential statistics and are chiefly focus on 2 major types of problems:
1. The estimation of population parameters and
2. Testing of hypothesis.

Inferences on population parameters are generally drawn on the basis of sample observations, particularly when the population is large; hence it becomes practically impossible to enumerate all the sampling units belonging to such huge population. Such hypothesis about the population is termed as statistical hypothesis and hypothesis is tested on the basis of sample values. This hypothesis is tested with in-hand evidence and a decision is made whether to accept this hypothesis or discard it.

In the context of statistical analysis we generally speak regarding null hypothesis and alternate hypothesis.
Null hypothesis (H0) and alternate hypothesis (H1) are usually symbolized respectively.

Researcher has used these measures of statistical analysis according to the prerequisite of data analysis. For testing hypothesis or test of significance we use both parametric and non-parametric tests. Parametric tests presume within properties of the population from which we draw samples. Such assumptions may be regarding population parameters, sample size etc. In this type of research parametric tests are used. Important parametric tests are as follows:

(i) chi-square test of independence (non-parametric test)
(ii) Levene’s test for testing Homogeneity of Variances.
(iii) parametric test ANOVA for testing Equality of Means
(iv) Parametric test Welch and Brown-Forsythe for testing Robust Tests of Equality of Means.

In our study researcher applied different parametric as well as non parametric tests. Details of which are given below.

**Chi-Squared Test:**
A Chi-Squared test, also called test or Chi-Square test, is one statistical hypothesis test in which the sample distribution of the examination measurement is a chi-squared division when null hypothesis is accurate, or any in which this is asymptotically accurate, denoting that the sample distribution; (if null hypothesis is precise) can be made to estimated a chi-squared distribution as closely as preferred by making the sample size large enough.

_Pearson's Chi-Squared test is utilized to survey two sorts of examination:_
tests of _independence and goodness of fit_

a. A test of _goodness of fit_ found whether or not an experimental _frequency distribution_ varies from a theoretical division.

b. A _test of independence_ considers whether paired notes on 2 variables, articulated in a _contingency table_, are independent of other.
**Calculate the test-statistic:**

The test-statistic value is

\[ X^2 = \sum_{i=1}^{n} \frac{(O_i - E_i)^2}{E_i} \]

where

- \( \chi^2 \) is statistic of Pearson's cumulative test,
- \( O_i \) is frequency of an observed;
- \( E_i \) is (theoretical) an expected frequency, asserted by null hypothesis;
- \( n \) is the number of cells in the table.

**Analysis Of Variance – ANOVA:**

The ANOVA test is parametric test used to ascertain the effect independent factors (variables) have on the dependent factor (variable) in a fading analysis. The ANOVA test is the first step in recognizing factors that are influencing a given data set. ANOVA test results can then be used in an F-test on the importance of the regression formula overall.

The presumptions of the one-way ANOVA for independent specimens are:

1. The scale on which the dependent factor (variable) is measured has the properties of an equivalent interim scale
2. The \( k \) samples are independently and randomly drawn from the basis population(s);
3. The source population(s) can be rationally supposed to have a normal distribution; and
4. The \( k \) samples have approximately equivalent factors (variances)

The aim to examination of variance is to establish whether population means differs. The null and alternative hypotheses are stated: \( H_0 \) is \( \mu_1 = \mu_2 = \ldots = \mu_k \)

\( H_1 \) is at least one population mean differs where \( \mu_i \) represents the mean of population \( i \).

A more generalized form of the null and alternative is:

\( H_0: s^2_{\text{Between}} \leq s^2_{\text{Within}} \)
H1: $s^2_{\text{Between}} > s^2_{\text{Within}}$

Where $s^2_{\text{Between}}$ represents the variance between groups in the population and $s^2_{\text{Within}}$ represents the variance within groups. When the variance between groups is considerably larger than the variance within groups, the null hypothesis will be rejected.

**ANOVA Table and $F$ statistic**

It is conventional to organize ANOVA statistics into a table as follows:

<table>
<thead>
<tr>
<th>Source</th>
<th>Sum of Squares</th>
<th>Degrees of freedom</th>
<th>Mean Squares</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between</td>
<td>$SSB$</td>
<td>$df_B = k-1$</td>
<td>$S^2_B = SSB / df_B$</td>
</tr>
<tr>
<td>Within</td>
<td>$SSW$</td>
<td>$df_W = N-k$</td>
<td>$S^2_W = SSW / df_W$</td>
</tr>
<tr>
<td>Total</td>
<td>$SST = SSB + SSW$</td>
<td>$df = df_B + df_W$</td>
<td>$F$ stats = $S^2_B / S^2_W$. The ratio of Mean Square Between and Mean Square Within is the $F$ statistic.</td>
</tr>
</tbody>
</table>

If $F$ table is greater than $F$ stats we do not reject null hypothesis. Similarly if the $p$ value is the region under the arc to the left of the $F$ statistic then we do not reject null hypothesis.

Below the null hypothesis, this statistic test has an ‘$F$’ sample distribution with $df_1$ and $df_2$ degrees of freedom. The test is one-tailed, concentrating on the upper extent of the sampling distribution. The ‘$p$’ value is the region under the arc to the right of the ‘$F$’ statistic.

**Kolmogorov - Smirnov**

In insights, the (K–S test) Kolmogorov–Smirnov test is a nonparametric trial of the equity of relentless, one-dimensional likelihood disseminations that can be utilized to recognize an example with a reference likelihood dispersion (one-specimen K–S test), or to complexity two examples (two-example K–S test). The Kolmogorov–Smirnov measurement evaluates a space between the observational appropriation capacity of the specimen and the aggregate conveyance capacity of the specified dissemination, or between the experimental dispersion elements of two examples. The invalid circulation
of this measurement is assessed under the invalid theory that the examples are drawn from a similar dissemination (in the two-specimen case) or that the example is drawn from the specified appropriation (in the one-specimen case). For every situation, the disseminations considered under the invalid theory are determined dispersions yet are generally unhindered.

The two-example K–S test is a standout amongst the most valuable and general nonparametric techniques for recognizing two specimens, as it is delicate to separate in both area and state of the observational total circulation elements of the two specimens.

The Kolmogorov–Smirnov test can be improved to give as an integrity of fit test. In the unique instance of testing for ordinariness of the appropriation, tests are institutionalized and recognized with a standard typical conveyance. This is like setting the mean and fluctuation of the reference dissemination identical to the example appraisals, and it is realized that utilizing these to characterize the particular reference dispersion changes the invalid conveyance of the test measurement: see underneath. Various reviews have found that, even in this adjusted frame, the test is very little solid for testing ordinariness than the Shapiro–Wilk test or Anderson–Darling test. In any case, different tests have their individual disadvantages. For example the Shapiro-Wilk test is known not to function admirably with many ties (numerous indistinguishable values).

**Welch's t test:**
In insights, Welch's t test is an adjustment of Student's t-test got ready for use with two examples having conceivably unequal differences. In that capacity, it is an inexact answer for the Behrens–Fisher issue. It is sometimes referred to as the "Two-sample unpooled t-test for unequal variances" but "Welch's t-test" is favored for brevity.

Welch's t-test describe the statistic \( t \) by the formula below:

\[
    t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{s_1^2}{N_1} + \frac{s_2^2}{N_2}}}
\]

where \( \overline{X}_1 \), \( s_1^2 \) and \( N_1 \) are the \( i^{th} \) sample mean, variance and size, respectively. Not at all like in Student's t-test, the denominator is not in light of a pooled difference
assess. The degrees of opportunity related with this change gauge.

The degrees of opportunity \( \nu \) related with this fluctuation gauge is approximated utilizing the Welch–Satterthwaite condition:

\[
\nu \approx \frac{\left( \frac{s_1^2}{N_1} + \frac{s_2^2}{N_2} \right)^2}{\frac{s_1^4}{N_1^2} + \frac{s_2^4}{N_2^2}}
\]

Here \( \nu_i = N_i - 1 \) the degrees of freedom associated with the \( i^{th} \) variance estimate.

**Brown-Forsythe test:**

In measurements, when a typical one-way ANOVA is performed, it is expected that the gathering fluctuations are factually equivalent. On the off chance that this supposition is not legitimate, then the subsequent F-test is invalid. The Brown–Forsythe test is a factual test for the fairness of gathering differences in view of playing out an ANOVA on a change of the reaction variable. The Brown–Forsythe test measurement is the F measurement coming about because of a conventional one-way examination of change on the supreme variations from the median.

The changed reaction variable is developed to quantify the spread in every gathering. Let

\[
z_{ij} = |y_{ij} - \bar{y}_j|
\]

Where \( \bar{y}_j \) is median of cluster \( j \). The Brown–Forsythe experiment statistic is the replica F statistic from a one way ANOVA on \( z_{ij} \):

\[
F = \frac{(N - p) \sum_{j=1}^{p} n_j (z_{ij} - \bar{z}_j)^2}{(p - 1) \sum_{j=1}^{p} n_j (z_{ij} - \bar{z}_i)^2}
\]

Where ‘\( p \)’ is the no. of clusters, \( n_j \) is the number of interpretation in cluster \( j \), and ‘\( N \)’ is the sum number of interpretation. Also \( \bar{z}_j \) are the group means of the \( z_{ij} \) and \( \bar{z}_i \) is the overall mean of the \( z_{ij} \).

In the event that the fluctuations are in fact heterogeneous, strategies that take into account this, (for example, the Welch one-way ANOVA) might be utilized rather than the standard ANOVA. Great [1994, 2005], taking note of that the deviations are directly reliant, has altered the test in order to drop the excess deviations.
Levene’s Tests:
Factual tests more often than not include making different suspicions about the attributes and parameters of the populace being inspected. For your situation, you are playing out the "t-test" to test theories around 2 inspected bunches. One of the suppositions made by the standard "t-test" is that the 2 populaces being inspected have EQUAL VARIANCES. The motivation behind the Levenes Test is to test and confirm that this equivalent difference supposition is sensible.

3.5 Scope and Limitations of the Study

A) Scope of the Study:
This study is focusing on:

b. Comparison between traditional and online marketing.
c. To develop security solutions.
d. Studying consumers behaviour and impact of E-marketing on their decision making process.

B) Limitations of the Study:
Being a social science research the study is not free from limitations. Certain limitations are enlisted as follows:

a. The time period considered for the study is quite short.
b. The survey of consumers has been restricted to Mumbai region only.
c. Primary data is much depending upon the co-operation of respondents.
d. Authenticity of data is much dependent on honesty and willingness.
e. The sample size could have been increased for a more accurate analysis of data.
f. Whatever efforts have been made to cross check and verify the accuracy of data, the possibility of some errors still remaining cannot be entirely ruled out.

Conclusion:
The data collected by using the methodology described in this chapter laid to the foundation for the next step of the research process.