Chapter 3

Research Methodology

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3.1 Introduction

In the previous chapter, reviewed literatures available on the research topic were discussed. The reviewed literature mainly focused on three areas (1) Indian mobile industry, (2) Influence of brand and brand loyalty, (3) Study papers on some mobile service providers operating in India. Finally, research gaps from literature review were identified and conceptual framework developed, along with the framing of 13 hypotheses. In this chapter the steps for conducting the research is presented and the methods that have been used is discussed. The process through which data is collected and calculated will also be discussed, so that the research meets the expected standard.

Research can be described as the methodical examination in the study of materials and sources in order to ascertain facts and reach new conclusions. Research uses proven systematic method to explain problems and generate new information. According to Holme and Solvang (1997), “research method is a tool that can help solve problems and reach new knowledge”. Research studies are divided into two categories - basic research and applied research. Basic research refers to a methodical study to uncover new information and facts. The purpose of such research is to expand the knowledge or information domain of a particular field and not to solve an identified problem. Alternately an applied research is undertaken to investigation a problem through the use of established theories and knowledge.

The primary objective of this research is to identify and study the brand loyalty strategies of mobile service providers and to identify the factors determining brand loyalty so that mobile service providers can develop greater satisfaction to their customers. Understanding the parameters which influence loyalty also paves the way for increased customer loyalty.

3.2 Hypotheses of study

A hypothesis (plural-hypotheses) can be defined as a proposed explanation for a phenomenon. The word has originated from the Ancient Greek ὑπόθεσις (hypothesis) meaning "to put under" or "to suppose" (Hilborn, and Mangel, 1997). Testing a hypothesis requires a structured approach, in order to either prove or disprove it. In due course, a proved hypothesis may become part of a theory. Based on research objectives the following hypotheses are framed.

The hypotheses of the study are as follows:

1. Subscribers experience of network quality has a significant effect on brand loyalty.
2. The tariff charged for local calls has a positive effect on brand loyalty.
3. The promotional offers have a significant effect on brand loyalty.
4. The Company’s CRM strategy has a significant effect on brand loyalty.
5. The subscriber’s perception regarding brand positioning/image has a positive effect on brand loyalty.
6. The customer care executives competence has a positive effect on brand loyalty.
7. Subscribers experience with data/internet service has a significant effect on brand loyalty.
8. There is a significant difference in the attitude of subscribers towards network quality of different mobile phone service providers.
9. There is a significant difference in the attitude of subscribers towards tariff of different mobile phone service providers.
10. There is a significant difference in the attitude of subscribers towards Value added services (VAS) of different mobile phone service providers.
11. There is a significant difference in the attitude of subscribers towards data quality of different mobile phone service providers.
12. There is a significant difference in the attitude of subscribers towards CRM of different mobile phone service providers.
13. There is a significant difference in the attitude of subscribers towards brand image of different mobile phone service providers.

3.2.1 Constructing hypotheses:

A hypothesis is a proposed explanation for a phenomenon or certain assumption or guesses about a phenomenon. Hypothesis need to be tested by collecting information. On the basis of the information the hypothesis can have one of the three outcomes; right; partially right; wrong. These assumptions or hypotheses bring clarity, specificity and focus to a research problem. A hypothesis can be formed after a thorough review of literature and developing a knowledge base on the research topic. In the present research the hypotheses are framed from inputs received from respondents, literature survey and after interacting with Sr. Managers working in telecommunication company.

<table>
<thead>
<tr>
<th>Hypothesis No.</th>
<th>Key motivations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypothesis 1- 6</td>
<td>Input from the respondents during collecting responses at the questionnaire pre-testing stage and from literary evidence</td>
</tr>
<tr>
<td>Hypothesis 7</td>
<td>Input from the respondents during collecting responses at the questionnaire pre-testing stage and from telecom experts (Sr. Managers working in telecommunication Company)</td>
</tr>
<tr>
<td>Hypothesis 8-13</td>
<td>One of the key objectives of the research</td>
</tr>
</tbody>
</table>

3.3 Research Methodology

For the purpose of the current study, ‘deductive approach’ has been chosen. The deductive approach of research implies that the hypothesis about the situation has been derived from a
Theoretical framework, already available in the knowledge domains, which are to be tested empirically (Beiske, 2014). Monette et al (2005) described the deductive approach as a research process in which the researchers “deduces” or test the hypothesis through observation or factual data. In a deductive approach, the researcher develops a set of hypotheses from existing theory available in literature and using appropriate methodology tests the hypothesis and either accepts or rejects it (Snieder and Larner 2013).

**Figure 3.1: Flow diagram for deductive approach**

![Flow diagram for deductive approach](image)

The present study attempts to inquire under the framework of quantitative and descriptive studies in the view of the overall objectives and the hypotheses of the research. As a part of the descriptive research, a multiple cross-sectional research design has been adopted as there are many samples and response from each sample has been obtained only once.

### 3.3.1 Steps in the research process

The methodology for conducting the present study has been arranged in the following order:

1. Identification of the research problem
2. Literature review
3. Developing the objectives
4. Identifying variables
5. Types of measurement scales
6. Sample Design
7. Collecting the data
8. Analysis and interpretation of data
9. Preparation of the report

#### 3.3.1.1 Identification of the Research Problem

After liberalization of the telecom industry, there was a spurt in growth of the industry after the entry of private telecom service providers. As a result customers had the option of selecting their preferred mobile service provider and even use number portability to later switch companies in case of dissatisfaction. To reduce the effect of switching companies are using strategies like service reliability, addressing to subscribers grievances quickly and efficiently. Service providers are also developing customizable service packs as per individual requirement. A subscriber having less requirement of talk time but more of internet usage thus can be satisfied with a personalized mobile usage plan. Mobile telecommunication is an industry where profitability cannot be attained at the first instance, but only through repeat purchases by loyal and satisfied customers. The present research is conducted to find consumer’s perception and attitude towards these loyalty strategies.
3.3.1.2 Literature Review

Literature review is a vital step in research. It helps in creating concepts in the direction of the identified research problem. Its functions are (Malhotra, 2013):

a) Make the research problem more understandable.
b) Bring clarity and refinement to the research methodology.
c) Develop understanding on the research subject.
d) Developing a conceptual framework or setting for highlighting the findings.

The procedure used for reviewing the literature in the present study is as follows:

At the beginning, a general search about brand, loyalty strategies, reason for subscribers to change their present mobile service provider and recommendations provided by various authors/ researchers was concluded. Next a thorough review of various journals and books, in the area of management and social science was conducted which pertains to the central theme of the PhD thesis title. The relevant information is then abstracted and structured so that it describes the theoretical and conceptual knowledge base within the papers domain in a chronological way.

The research papers are sourced from peer reviewed journals and databases like Ebsco, Cygnus, Global Information, Inc (professional research reports) and Emerald. For the literature review newspaper reports and case studies are also consulted. The papers which were obtained from online databases are sourced using a key word search (brand, loyalty strategies, customer retention, mobile service providers etc.). All the papers were screened on the basis of relevance to the research topic. The reviewed papers were then classified into the following main themes; Indian mobile industry, influence of brand and brand loyalty and study papers on some mobile service providers operating in India. The last step of the review of literature comprises writing up the literature review in a structured format to constitute a chapter in the PhD thesis.

3.3.1.3 Developing the objectives

Objectives are the goals that a researcher aims to attain through the research study. For navigating a research in the correct direction it is important to develop the objectives clearly. Objectives communicate the key associations the researcher wants to determine and highlight the thrust area of the research. Generally, each objective is numerically listed and contains only one aspect of the study. The following research objectives have been prepared for the present study:

• To evaluate the significance of different factors responsible for determining subscriber loyalty in the mobile telecommunication industry in Hooghly district.
• To evaluate the role of different demographic factors of mobile subscribers and its influence in mobile usage.
• To formulate a model to predict subscribers brand loyalty.
3.3.1.4 Identifying Variables

Identifying and defining variables help in ‘fine tuning’ the research problem. A variable can be described as a symbol, figure or character which can have different values (Kerlinger, 1986). In the present research the variables are identified through literature review and refined through focus group interviews done during pilot survey. Variables used in this research work have been classified into three broad categories:

(a) **Dependent Variables**: The value of a dependable variable is influenced by or ‘depends’ on some other variable/s (Kumar, 2011). In the present research, consumer/subscribers loyalty or unwillingness to change their mobile service operators is defined as the dependent variable. Subscriber’s loyalty can be estimated using independent and extraneous variables.

(b) **Independent Variables**: These are the variables or factors responsible for changing the dependent variable. In other words, change in independent variable also causes change in the dependent variable (Black and Dean, 1976). Through extensive literature review and interviews with experts from mobile telecommunication industry, the variables are identified. The major factors which affect the satisfaction and loyalty of mobile users are understood as independent variable. The independent variables of the research are as follows:

(i) Network Quality: Network strength, Network congestion, Line disconnection/call drop.

(ii) Tariff rates (call charges): Local/STD and ISD tariff charges, top up plans/rate cutters to customize service, Satisfaction with roaming charges.

(iii) Customer Care: Customer care service, response time, quality of IVR (Interactive voice responder) system and website, presence of exclusive/mini stores of mobile service operators.

(iv) Data Service Quality: Mobile Internet connection quality, tariff, data offers, satisfaction with data card/internet dongle supplied by the service provider

(v) Value Added Services (VAS): Satisfaction to VAS like astrology/cricket updates/daily jokes/NSE update/social network.

(vi) Media communication/ Brand Image: Subscriber’s perception regarding own image (self) with brand image, effectiveness of promotion.

(c) **Intervening Variables / Extraneous Variables**: While measuring the relationship between dependent and independent variables, some variable affect the relationship positively or negatively. These variables, which affect the association among a dependent and independent variable is known as Intervening and Extraneous variables. Intervening variables, like extraneous variables, can change the research outcome and so becomes important for a researcher to take note of. While measuring the independent variables like network quality, tariff structure, etc., it is compulsory to quantify, network coverage, network congestion, satisfaction in using value added services etc. These variables, demonstrate the association among dependent and independent variables, are known as intervening variables. The dependent variable
may get influenced by extraneous variables but will not cause any change directly to the dependent variable. Demographic factors are extraneous variable.

The following extraneous variables are studied for the present research:

- Age of subscriber
- Occupation
- Average monthly expenditure on mobile service
- Subscriber’s gender
- Type of mobile service
- Average income
- Residence (Urban/Rural)

3.3.1.5 Types of measurement scales

Measurement is crucial for any scientific or social study. Correct and precise measurement of a variable is important to test the hypothesis. The different measurement scales are nominal, ordinal; interval and ratio scale (Stevens, 1986).

Nominal or classificatory scale: This type of scale is used to classify persons, substance or responses based on similarity. For instance, people or respondents can be grouped based on similar gender like male and female.

Ordinal or ranking scale: Ordinal scale not only categorizes individuals, objects, responses, etc., based on common characters, but also ranks the objects in a certain order. Variables like socioeconomic status, attitude, income of individual members of a group, etc. can be ranked using this scale.

Interval scale: Interval scale has all the characters of ordinal scale, but has a starting and ending point. For example, temperature scale in a thermometer is an interval scale.

Ratio scale: In ratio scale all the properties of nominal, ordinal and interval scales are observer and in addition it has a uniqueness, i.e. a fixed zero point. This point is the starting point of the scale. Ratio scale is used to measure many types of variables like income, age, height, weight etc.

The present study uses data of both nominal and ordinal scale.

3.3.1.6 Sample design

In research situations where the universe is large, conclusions about the research problems are reached by taking a sample. A sample can be defined as a unit or segment of the population or universe which represent it in behavior and character. Preferably a sample should represent the universe in all character, from which it has been selected.
3.3.1.6.1 Type of sampling methods

**Probability sampling**

- Simple random sampling: Each element which makes up the universe has the same prospect of being chosen. This sampling method is generally used if the universe is homogeneous (McBurney, 2002).
- Stratified random sampling: The members of the universe are grouped according to common character of the members like age or income for instance and then samples are selected randomly from each identified group.
- Cluster sampling: In this sampling method the universe is segmented into different groups like districts in a city. From the different groups the researcher randomly chooses some cluster.

**Non probability sampling**

- Convenience sampling: The researcher selects the sample based on own discretion and ease. For instance, accessibility to some sample or prior acquaintance with sample.
- Judgment sampling: The researcher uses own opinion to choose a sample from the universe.
- Quota sampling: Bases on the researcher’s convenience a fixed number or quota of samples are selected from each group or category.

As mobile is a portable device, it can be carried to any location, and the subscribers are also migratory in nature, moving to Kolkata or other nearby towns/villages for occupational and other activities. Three towns and one village are chosen in Hooghly district as the geographic location of the sample. The 3 towns are Uttarpara, Konnagar and Srerampur. The village chosen is Nabagram. In the present study convenience sampling technique has been adopted. Convenience sampling is used in the present research as the researcher had convenience of accessibility with the sample respondents. Time frame for data collection was May 2013 to December 2013.

<table>
<thead>
<tr>
<th>Table 3.2: Sampling and Data collection details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Defining the Population</strong></td>
</tr>
<tr>
<td>Sampling Methods</td>
</tr>
<tr>
<td>Sampling Units</td>
</tr>
<tr>
<td>Sampling Elements</td>
</tr>
<tr>
<td>Sample Size</td>
</tr>
<tr>
<td>Time frame for data collection</td>
</tr>
</tbody>
</table>
3.3.1.6.2 Sample size determination

Sample size is defined in research as the number of respondent from whom the primary data will be collected. The area chosen for the study is Hooghly District in West Bengal, which consists of a sizable rural and urban population (Rural-61.38% and Urban-38.62%) of which male members are 2,819,100 and female members are 2,701,289 (Census of India, 2011). Since the universe is vast, sample size was determined using pilot survey. Pilot survey was done on 200 subscribers for deriving the standard deviation. After that sample size was determined through statistical method with 95% confidence. As the value of standard deviation \( \sigma \) is found out, using the following formula:

\[
\frac{z^2 \times \sigma^2}{e^2}
\]

The calculated value of standard deviation \( \sigma = 0.72 \)

The table value of \( z \) is observed at 95% confidence.

\( z = 1.960 \)

With standard error of .06 the required sample size for the research is found to be 560. Sample size was increased by 10 % and rounded up to 620, to minimize systematic errors associated with sample size determination.

3.3.1.6.3 Sample selection

The sample is selected from 3 towns (Uttapara, Konnagar and Srerampur) and 1 village (Nabagram) in Hooghly District, West Bengal, India. In the survey area various mobile service providers are operating. From the filled in questionnaire it was seen that there are more number of Vodafone, Airtel, Reliance and BSNL subscribers, than subscriber of Tata Docomo and Idea.

<table>
<thead>
<tr>
<th>Primary Mobile</th>
<th>Airtel</th>
<th>Vodafone</th>
<th>Reliance</th>
<th>BSNL</th>
<th>Tata Docomo</th>
<th>Idea</th>
<th>Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>96</td>
<td>120</td>
<td>102</td>
<td>135</td>
<td>75</td>
<td>78</td>
<td>14</td>
<td>620</td>
</tr>
<tr>
<td>Percent</td>
<td>15.5</td>
<td>19.4</td>
<td>16.5</td>
<td>21.8</td>
<td>12.1</td>
<td>12.6</td>
<td>2.3</td>
<td>100.0</td>
</tr>
</tbody>
</table>

3.3.1.7 Collecting the data

Both primary as well as secondary data are used in this study. Primary data collection requires a structured approach. Depending on the data type, questionnaire length and time period, data can be collected through various methods. It is customary for a researcher to first obtain permission and disclose the relevance of the research and mention that the data
collected will only be used for preparing the PhD thesis report. 700 questionnaires were distributed to respondents and 620 completed questionnaires was received which was finally used for analysis. Secondary data used in the research is collected from: research papers, books, newspaper, government report (like TRAI, DoT, Rajya Sabha session paper, CAG report) report of consultancy firms (like JuxtConsult, J. D Power and Associates, Nishith Desai Associates, etc), mobile service operator’s website, magazine etc.

3. 3.1.7.1 Methods of data collection

Research data can be classified as primary and secondary data. The response collected directly from the respondent, for the first time, exclusively for the purpose of research is known as primary data and the respondents are known as primary data source. Whereas a secondary data is collected from some existing source like published journal, newspaper, company annual report, etc. and these sources are known as secondary data sources (Anderson and Arsenault, 1998). Primary data collection is done through the following methods:

**Observation method:** Through this method data is collected by the researcher through observing respondents activities. It can be participative and non-participative in nature. During non-participative observation the researcher plays the role of a passive observer and remains uninvolved with respondent’s activity. But during participative observation method, the researcher is occupied in the process and becomes an observer as well as a member of the observed group. In this research the researcher has become a participative member as he is also a mobile subscriber.

**Survey method:** This method is appropriate for gathering descriptive information. This method is divided into two types: structured and unstructured surveys. In structured surveys the surveyor asks a set of questions in a logical sequence to respondents. In unstructured surveys a surveyor uses an interactive format of asking the questions. On the basis of the response of the initial question the next questions are asked. Survey method can be used to gather various types of data, but in some situations or particular questions respondents may show hesitation to answer quoting privacy concern. In the present study 620 respondents were surveyed for primary data collection.

3. 3.1.7.2 Contact methods

Primary data can be collected from respondents in various ways. In research generally multiple methods are used simultaneously to reach out to respondents. The different contact methods are:

Postal Mail and Electronic Mail- With this method the researcher can gather more information, spending comparatively less amount of money, from respondents scattered over a large geographic area. It is also convenient for respondents as they can answer in their free
time. But some time respondents need to be reminded through a follow-up phone call or e-mail to return the filled in questionnaire.

Telephone- Asking respondent’s questions through telephone have both advantages as well as disadvantages. It is definitely the quickest method of collecting information from respondents scattered over a large geographic area in a very cost effective way, but detailed questions using attitude measurement scales for example cannot be administered very well. Again interviewer’s manner of speaking and time of call may affect the respondent’s answers.

Personal interview- This method of data collection required considerable time, effort and money, if travelling is required to visit respondents place. Precise information can be collected as respondents doubt in a question can be clarified instantly by the researcher. Along with recording respondents’ data, the researcher also observes the respondent, and understands the actual reaction/feedback about a question which may not be possible in other contact methods. Personal interviews are of two forms-

- Individual or Intercept interviewing- This type of interviewing is done on a one to one basis. Prior appointments need to be taken explaining the purpose of the research.
- Group or Focus Group Interviewing – This method involve around 10 respondents. The researcher disclosed the research problem to them. The gathering is organised in a relaxed environment and snacks are provided to simulate a comfortable setting. This method particularly helps to identify the variables that can be studied and constructed as questions in a questionnaire.

3. 3.1.7.3 Tool for data collection

The tool for collecting primary data used in the present study is a structured questionnaire. A questionnaire is made up of a series of questions presented in a logical order for respondents to answers. Questionnaires are called a schedule if the researcher asks the research questions personally and collects the response. Five point Likert scale is used in the research questionnaire to determine the strength of respondent agreement or disagreement.

Questionnaire construction

Initially, decision was taken regarding making the questionnaire in the open or closed ended format. For better tabulation and data comparison, decision to make all the questions closed ended was taken, after taking into account the research variables, type of data to be collected and sample composition. The wording and structure of questions was kept simple for better understanding. Finally, length of the questionnaire was kept as short as possible and the entire questions must be arranged in a logical flow. Next the questions were grouped into specific topic to make it easier to understand. After the questionnaire is constructed pilot test is done. 30 respondents are requested to fill the questionnaire and the researcher asks if they have understood all the questions properly.
Reliability and Validity of Questionnaire

Piloting or pilot test is done to check the validity and reliability of a questionnaire (Norland, 1990). Answers to the following questions are sought at this stage-

1. Is the questionnaire valid and correspond to the content?
2. Is the questionnaire suitable for the target respondents?
3. Can the questionnaire collect all the data required for the present research?

Answering the above questions and exercising readability test increases questionnaire validity.

Reliability indicates the accuracy of the questionnaire (Norland, 1990). Pilot study was used to find out if the questionnaire consistently measures the subscriber’s attitude as expected through the five point Likert scale (Nunnaly, 1978). Data from the pilot test are then examined using SPSS (Statistical Package for Social Sciences) Cronbach's alpha. The output provides the "correlation matrix" and "view alpha if item deleted" column (Hatcher, 1994). The items/statements that show 0s, 1s, and –ve value are removed. Then it is observed if any change occurs in the column "alpha if item deleted". If the value increases the correction is properly done. If the alpha value is 0.7 or more, the question, it is understood to be reliable (Cronbach, 1951).

In the present study, we see all the factors have more than 0.7 Cronbach’s alpha score and are within acceptable range.

Table 3.4: Cronbach’s Alpha

<table>
<thead>
<tr>
<th>Factor</th>
<th>Number of Variable</th>
<th>Statements/Variables</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Quality</td>
<td>4</td>
<td>1. Network strength is good within the city.</td>
<td>0.79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Network strength is good even outside city and in metro stations/lifts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Network does not have congestion and connects in a short time.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Line does not get disconnected during conversation.</td>
<td></td>
</tr>
<tr>
<td>Tariff rates (call charges)</td>
<td>9</td>
<td>1. Local tariff charges are quite reasonable.</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. STD and ISD tariff charges are quite reasonable.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Roaming tariff charges are quite reasonable.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Great top up plans available helps customize my service.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>5. Recharge points (retailers) are easily available.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6. Incoming call charges while roaming are low.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7. Outgoing call charges while roaming are low.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8. Great promotional offers available.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9. Lower call rates within own network.</td>
<td></td>
</tr>
<tr>
<td>Value Added Service</td>
<td>4</td>
<td>1. Additional services are very unique in sync with social happenings.</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Charges are low and short validity low price top ups available.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Face book/similar Apps can be accessed free.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Schemes for making low charge ISD to UK/USA/Gulf etc available.</td>
<td></td>
</tr>
</tbody>
</table>
| Data Service Quality | 6 | 1. Internet connection speed is good.  
2. Data charges are low.  
3. Interchanging between data plans are very easy.  
4. Service providers often give offers/free download.  
5. Data card supplied by the service provider good and low priced.  
6. Data Expense. | 0.73 |
|----------------------|---|--------------------------------------------------------------------------------------------------------|---|
| Customer Care Service Quality | 7 | 1. Customer Care Executives behavior is excellent.  
2. Customer Care Executives problem solving capacity is excellent.  
3. Even if call to customer care executive is chargeable (not free call) but it helps me with my queries/problems.  
4. Response time is quick.  
5. IVR (Interactive voice responder) system is very good.  
6. Website is user-friendly and informative as well as updated.  
7. Exclusive stores (e.g. Vodafone-mini store) helpful/located within reach. | 0.83 |
| Media communication | 4 | 1. The brand matches my lifestyle and social status.  
2. Most friends/relatives in the same network.  
3. The commercials (Advertising) create a lasting image about the brand.  
4. The brand keeps the commitments conveyed in the commercials. | 0.76 |

**Structure of the research questionnaire**

The questionnaire used in the research study contains a brief introduction of the researcher, justifies the purpose of data collection and seeks the cooperation of the respondent. The questionnaire is grouped in nine sections with a total of 50 questions. The first part covers general questions related to subscriber’s mobile usage pattern like the name of the mobile service operator, monthly mobile expense, switching preferences etc. In the second part onwards, except the last part, all the questions are constructed in Likert scale. Part two of the questionnaire covers the service parameter- network quality. Respondents are asked to rate their present service provider based on network strength, network congestion and call drop during conservation. Questions related to tariff rates (call charges) are placed in the next part. Subscriber’s perception regarding local, STD/ISD, roaming charge, promotional top-up plans and availability of convenient recharge point are covered. The fourth part was designed using the questions related to value added service for e.g. astrology/cricket updates/daily jokes/NSE updates/social network. The next groups of questions are structured on respondent’s views on mobile data service. Parameters like internet connection quality, price and ease of interchangeability between data plans are mainly recorded. The next part of the questionnaire, i.e. sixth part is constructed on customer care service quality. Questions associated with factors like customer care executive’s behavior, problem solving ability, response time, IVR (Interactive voice responder) system, website and availability of exclusive stores like mini stores, are covered. Part 7 of the questionnaire is on understanding promotional effectiveness of mobile service providers. The eighth part is an open ended question for recording comments or any other information as the respondents feel right. The
final part covers the demographic data of the respondent like Name (Optional), Occupation, Residence (Urban/Rural), Gender, Age and Annual Income.

3. 3.1.8 Analysis and Interpretation of Data

This step is a crucial part of the PhD thesis as data collected through surveys are analysed in line with the research objectives.

The following steps are initiated on the raw data collected through questionnaire:

1. Editing- involves examining the filled in questionnaire to check for incomplete questionnaires. Questionnaires in which vital data are not filled in should be summarily rejected.
2. Classification- the data from the questionnaire is then arranged in groups.
3. Tabulation- is the method of abridgment of raw data and putting it in a compressed form for further study. Data are displayed in a table under common heads using columns and rows. Data tabulation in the present research is done using Microsoft Excel software.

Data Analysis Methods

Qualitative Data Analysis: For analyzing qualitative data a method known as content analysis is done. It involves examining of the contents of various literature related to the main theme of the research topic. The literature review portion was consulted during this step and relevant data and information extracted from them for inclusion in the analysis portion.

Quantitative Data Analysis: In case of a small sample size with less number of variables, data calculation can be done manually, using pen, paper and a calculator. In the present research computers and statistical software’s were used for analyzing data. Microsoft Office suit Excel is used for preparing the base tables. IBM SPSS version 21.0 is used for statistical calculations and draw bar/pie charts for graphical data representation. The validity of hypothesis and sub hypothesis is assessed through Anova and Chi Square test, along with data representation through frequency and graphical methods. The data are analysed at 95% significance level. Using SPSS cross tabulation various analysis have been done. For reliability test Cronbach’s Alpha scores are calculated. For model creation and validation Logistic Regression has been done along with Omnibus Tests of Model Coefficients, -2 Log likelihood, Cox and Snell R Square and Nagelkerke R Square test.

Cross tabulation and Chi-square test

Cross tabulation is a statistical process that consolidates categorical data and tabulates the frequency of variables. These tables are used to illustrate the association of categorical data. Chi-Square tables are also calculated bases on cross tab tables. Chi-Square is used for data analysis between a categorical independent variable and a categorical dependent variable (Dewberry, 2004). It is a non-parametric test used in hypothesis testing. It is ideal in analysis
where the sample is big in size. Statistically it is denoted as $X^2$. Chi-square can be explained as sum of squared difference of observed (Obs) and the expected (Exp) data divided by the expected (Anderson et al., 2008). This test also establishes the dependency or interdependency of a categorical data. The test is done in the present study for the following reasons:

- To establish significance of association between two variable.
- Test the research hypothesis.

Chi-square is calculated using the following formula

$$X^2 = \sum_{all \ cells} \frac{(Obs - Exp)^2}{Exp}$$

**ANOVA test:**

Anova is a statistical test which analyzes variance. This test is done to compare between two or more means which helps the researcher to draw various results and predictions about two or more sets of data. Anova test includes one-way Anova, two-way Anova or multiple Anova depending upon the type and arrangement of the data. In the present study one-way Anova is used. One-way Anova has the following test statistics:

$$F = \frac{MST}{MSE}$$

Where,

- $F$ = Anova Coefficient
- MST = Mean sum of squares due to treatment
- MSE = Mean sum of squares due to error.

Formula for MST is given below:

$$MST = \frac{SST}{p - 1}$$

Where,

- SST = Sum of squares due to treatment
- $p$ = Total number of populations
- $n$ = Total number of samples in a population.

Formula for MSE is given below:

$$MSE = \frac{SSE}{N - p}$$

Where,

- SSE = Sum of squares due to error
- $S$ = Standard deviation of the samples
- $N$ = Total number of observations.
3. 3.1.9 Preparation of the report

Writing the thesis is the last stage and informs the reader what has been done, the discovered facts and conclusions of the findings. A PhD thesis is structured in the following way (UNSW, 2014):

**Title Page:** The title page contains the thesis title, name of research scholar, supervisor, University name, scholar registration number, supervisor affiliation and year of thesis submission.

**Table of Contents:** In this section the list of topics covered in the thesis either as chapters or as subheadings are mentioned. This section also contains a list of tables and figures used in the thesis.

**Acknowledgements:** In this section the researcher acknowledges the supervisor, institute director, college review committee members, research respondent, friends, etc.

**Introduction:** This section provides a background theme of the research. It includes the justification for the conducting research.

**Review of Literature:** This section elaborates the review result of various papers based on the research topic.

**Research Methodology:** This part of the thesis illustrates the research methodology followed in the study.

**Results and Discussion:** The analysis and the final outcome of the research are discussed in this chapter. This section contains tables, graphs, pie charts and associated statistics. Interpretation and research hypothesis are also tested.

**Suggestions Conclusion and Future direction:** In this section a researcher sums up the findings and draw conclusions from them. This portion also highlights the future direction of research in the area. Suggestions developed from research are included here.

**List of References:** This part of the thesis contains details of the journals, articles etc that are used in the research. Commonly referencing is done in APA or American Psychological Association style.

**List of Bibliography:** This part lists relevant sources used in the research but have not been cited in the text.

3.4 Conclusion

In Chapter 3 methodology used in the research are discussed. Rational for the research methodology used were discussed along with details regarding sample size determination,
questionnaire development, data collection procedures and analytical tools used etc. were outlined. Various books were consulted to properly examine and construct the research methodology. Statistical software IBM SPSS 21 was used to analyses the primary data collected through the questionnaire. The data analysis is discussed in the next chapter. It is divided into three primary parts. The first part illustrates the descriptive statistics through frequency tables and bar graphs. The second part presents the results from hypothesis testing and the third part illustrates the models created.