CHAPTER 3
RESEARCH METHODOLOGY

Introduction
This chapter deals with the research methodology adopted to accomplish the objectives of the study. This chapter includes the rationale of the study, objectives of the research, method of sampling, technique of data collection, statistical techniques used to analyze the data, limitations of the study and finally the chapter plan. A brief account of each of these aspects is given below:

3.1 Rationale of the Study
The present research will be unique study and is likely to bring fruitful results in terms of information connected with automated banking services. In these days of highly competitive world and globalization the automated banking services are getting recognition day by day. Automated banking has made the banking services available to their irrespective of the location where he/she is. The biggest issue is that how the customer is responding to these automated services. What is difference in the perception of the people, who are banking with public, old private, new private and foreign sector banks? Research will assess the constraints about the effectiveness of customer centric automated services in retail banking, and try to suggest the required strategies. It is also hoped that the present research work will motivate further researches in this field and will contribute to Indian society as a whole.

The study would be both Exploratory and Descriptive. The objective of exploratory research is to gather preliminary information that will help define problems and suggest hypothesis. The objective of descriptive research is to describe things, such as the market potential for automated banking or the demographic and attitudes of consumers who are using automated banking services. The study has attempted to identify the factors that enable the use of customer centric automated services. At the same time, it also attempts to examine the various problems which the customers faces and their satisfaction level while banking through automated services.

3.2 Objectives of the Study
In the review of literature, the researchers made an attempt to identify the various research gaps prevailing in the scope of study and some areas where strategies are required. An analysis of the research gaps puts forth research questions. These questions, however, are
important to take the discussion to further level and may also help in identifying the research objectives of the present research study; following are the objectives of the study:

1. To study the level of awareness towards customer centric automated services among the customers of Delhi and four administrative divisions of Haryana.
2. To find out the factors that enable the use of customer centric automated services in banking practices.
3. To study the satisfaction level of customers and compare customer satisfaction in case of public sector banks, private sector banks and foreign sector banks.
4. To examine the variations in customer satisfaction in relation to the demographic variables and factors of customer centric banking practices.
5. To study the areas of overall strengths and weaknesses of public sector banks, private sector banks and foreign sector banks in terms of customer centric automated services offered to customers.
6. To study the impact of customer centric banking practices on profitability and productivity of banking sector in India.
7. To suggest suitable strategies to the banks for improvement in customer satisfaction.

3.3 Hypotheses
To achieve the aforesaid objectives, the proposed study intends to test the following null hypotheses:

1. **Hypothesis-1 (H 1):** The factors that enable the use of customer centric automated services do not differ across sector of bank i.e. public, private and foreign sector banks.
2. **Hypothesis-2 (H 2):**
   
   - H2.1 The factors that enable the use of customer centric automated services do not differ across occupation.
   - H2.2 The factors that enable the use of customer centric automated services do not differ across annual income.
   - H2.3 The factors that enable the use of customer centric automated services do not differ across level of education.
   - H2.4 The factors that enable the use of customer centric automated services do not differ across age groups.
H₂.5 The factors that enable the use of customer centric automated services do not differ across place of residence.

H₂.6 The factors that enable the use of customer centric automated services do not differ across gender.

H₂.7 The factors that enable the use of customer centric automated services do not differ across marital status.

3. Hypothesis-3 (H 3): Level of efficiency achieved through IT deployment varies among the public sector banks, new private sector banks, old private sector banks and foreign sector banks.

4. Hypothesis-4 (H 4): Technical efficiency of public sector banks, new private sector banks, old private sector banks and foreign sector banks improves with the deployment of IT over a period of time.

5. Hypothesis -5 (H 5): Scale inefficiency of public sector banks, new private sector banks, old private sector banks and foreign sector banks decreases with the deployment of IT over a period of time.

Significant changes in the banking sector have happened after the entry of old private, new private and foreign banks as a result of economic liberalization. Public sector banks (PSBs) under the pressure of competition, have adopted several initiatives including technology as one of them. PSBs as compared to their counterparts deployed IT slowly and gradually. IT is the major determinant of banks’ productivity and it is reasonable to believe that higher levels of IT diffusion would result in higher levels of productivity. But level of performance depends upon, differences in the deployment, use and effectiveness of IT. Efficiency of IT deployment is expected to be different for public sector banks, new private sector banks, old private sector banks and foreign sector banks because of differences in their approach to handle the problems like lack of the requisite expertise for taking decisions related to IT, technical assistance, employees resistance to accept changes, huge rural branch setup etc. But under the pressure of competition and with the experience, overall average IT efficiency of public sector banks, new private sector banks, old private sector banks and foreign sector banks is expected to increase gradually over the period of time. Reorganization of branches is happening due to introduction of newer channels like ATMs, computerization in banking, credit cards, debit cards, Internet Banking, Mobile banking, RTGS/NEFT/ECS and computer literate employees. This is expected to bring consistent improvement in scale efficiencies.
3.4 Research Methodology
Research Design

Data Collection
The study is based on primary and secondary data, both. Secondary data was collected to understand the concept of automated banking, its advantages, security issues related to it, websites elements etc. The various research applications and secondary sources used for the purpose of the study include annual reports of various banks, magazines, journals and newspapers. The review of the existing literature helped in finding out the various reasons as to why the customers banks through internet and also in suggesting various strategies to public, old private, new private and foreign sector banks. As to how they can change their consumer’s perceptions. They also helped in framing the objectives of the study. In order to collect the data for analysis purpose a questionnaire was developed after discussion with some of the people who use automated banking and after carefully going through the literature related to automated banking.

Due care was taken in developing the questionnaire to suit the targeted respondents with regards to their linguistic standard and awareness of the subject matter. A pilot survey was conducted in Gurgaon and Delhi. As an outcome of the pilot study some of the questions and statements were amended and improved and few questions were added while few options were modified, so that perceptual difference could be avoided as much as possible. While conducting the survey, due care was given to the different variables of respondents, i.e. gender, marital status, occupation, annual income, level of education, sector of bank, age group and place of residence.

Developing Research Questionnaire

To develop the construct and to begin the scale development process a comprehensive review of literature related to automated banking, perception, reasons, problems, satisfaction and various strategies which banks are using to attract the customers was undertaken. On the basis of these viewpoints and others, the questionnaire was developed. The major components of the research instruments are: awareness level of the customers regarding automated banking, various reasons to use automated banking, various enquiries and transactions carried out by the customers, various problems faced by customers and their satisfaction level while using various automated banking services considered. All the
responses on variables related to this study were obtained on 5-point Likert scale. According to Burns and Bush (1998), the value of the Likert scale format lies in the fact that respondents are asked to indicate how much they agree or disagree with the statement. In this survey, respondents were asked to indicate how much they agree or disagree with the various statements.

Collection of Secondary Data

In order to achieve objective sixth i.e. ‘To study the impact of customer centric banking practices on profitability and productivity of banking sector in India’, the required data for the study period on input variables i.e. Total Number of ATMs, Fully Computerized Branches / Core Banking Solution (CBS), Total Outstanding Number of Debit Cards Per Computerized Branch (CBS), Total Outstanding Number of Credit Cards Per Computerized Branch (CBS), Total Number of Computer Literate/Technical Employees Per Computerized Branch (CBS) and output variables i.e. Business Per Employee (B.P.E.), Profit Per Employee (P.P.E.) and Business Per Computerized Branches (B.P.C.B) required for applying DEA (Data Envelopment Analysis) technique has been compiled from secondary sources such as RBI trend and progress reports from 2009 to 2014 and Prowess database, a corporate database developed by Center for Monitoring of Indian Economy (CMIE) and various reports from the database on Indian economy from 2009 to 2014. DEA-Solver software has been used to solve linear programming model.

Sampling Design and Sample Size

The population of study comprised of the users of automated services residing in Haryana and Delhi. To achieve the objectives of the study, Delhi and four administrative divisions of Haryana were selected to conduct survey for sampling. Four administrative divisions of Haryana are (i) Hisar division, (ii) Rohtak division, (iii) Ambala division and (iv) Gurgaon division. To collect information from sample selected, a stratified convenience sampling method was adopted. Study considered total 750 respondents; out of which 600 were surveyed from four administrative divisions of Haryana (150 from each administrative divisions) and 150 respondents were from Delhi. Further the study also considered sector wise representation i.e. public, private and foreign sector banks.

The determination of sample size is based on (Smith, M. F. 1983). As our population is infinite and in infinite population total 600 respondents are considered sufficient to generalize
the results. Hence here in total 750 respondents were considered to achieve the objectives of the study.

To analyze the profitability and productivity, 24 banks (6 form public, 6 from new private, 6 from old private and 6 from foreign sector banks) have been selected on the basis of highest assets and income holding by banks during the study period. The number of banks selected i.e. 24 are more than three times than that of number of inputs and outputs. The DEA (Data Envelopment Analysis) Research Model is said to be computationally more convenient when the number of DMUs are larger than the total number of inputs and outputs by at least three times (Dyson R. G., Allen R., Camanho A. S., Podinosky V. V., Sarrico C. S., and Shale E. A., 2001).

**Table 3.1: Selected Sampled Banks for Application of DEA Model**

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Sampled Banks</th>
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<tbody>
<tr>
<td></td>
<td>Public Sector Bank</td>
</tr>
<tr>
<td>1</td>
<td>State Bank of India</td>
</tr>
<tr>
<td>3</td>
<td>Bank of Baroda</td>
</tr>
<tr>
<td>4</td>
<td>Bank of India</td>
</tr>
<tr>
<td>5</td>
<td>Canara Bank</td>
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<tr>
<td>6</td>
<td>Union Bank of India</td>
</tr>
</tbody>
</table>

**3.5 Data Analyses/Statistical Techniques**

**For the analysis of the primary Data Following Statistical Techniques are Used**

Once the collection of the data completed, several statistical techniques were applied in order to perform the analysis of data collected by way of survey responses. At the outset coding of responses were performed. Coding is a process of assigning numerical codes or other
characters symbols. The data from questionnaire is transferred to coding sheets. The responses were coded depending on the number of options available for each question.

**Univariate Techniques**

The collected data was analyzed with the help of appropriate techniques such as finding Percentages, Mean and Standard Deviation.

**Multivariate Techniques**

For further analysis, the researcher used multivariate analysis techniques i.e. Factor Analysis. The study used the Principal Component Analysis and Varimax with Kaiser Rotation method of Factor analysis.

**Factor Analysis**

For the purpose of analysis related to customer satisfaction, factor analysis was used to reduce the number of statements in to major factors. Each factor comprised of like statements, which were inter-related. The factor analysis through Principal components and Varimax with Kaiser Rotation was carried out over 38 statements of satisfaction. The factor analysis reduces the 38 statements related to satisfaction in to 12 factors. In this consideration items having loadings less than 0.40 were dropped and only 32 statements in context of automated services users were kept for further analysis.

It was also ensured that the measurement instrument is compiled with the prerequisites of validity and reliability. Burns and Bush (1998) and Cooper D. and Schinder P. (1998) refer to various methods of assessing reliability (the degree that a measure supplies consistent results), such as test-retest, split-half reliability and Cronbach’s alpha. The latter is useful in indicating the degree to which instrument items are homogenous and reflect the same underlying construct. Testing of reliability of scale is very important as it shows the extent to which a scale produces consistent results if measurements are made repeatedly. Reliability can be defined as extent to which the measures are free from the random error. Its value varies between 0 to 1 but an alpha coefficient of 0.6 and above is considered to be good for research in social science (Malhotra 2004) and (Cronbach 1990). In the present study, Cronbach’s alpha scale has been used as a measure of reliability. The latter is useful in indicating the degree to which instrument items are homogeneous and reflect the same
underlying construct. Cronbach’s alpha of the whole scale and for the set of the items on each factor for customers was used to assess the consistency, which was found satisfactory.

Kaiser-Meyer-Oklin (KMO) measure of sampling adequacy (ASA) and Barlett’s Test of Sphericity (Bartlett, 1950) has also been applied. The Kaiser-Meyer-Oklin is a useful method of measuring the adequacy of data for factor analysis. The KMO value lies between 0 and 1 (Kaiser, 1974) and values below 0.5 imply that the factor analysis, may not be appropriate generally, a value greater than 0.5 is desirable. High values indicate that factor analysis is appropriate.

Bartlett Test of Sphericity is the third test applied in this study for appropriateness of the data set for factor analysis. This test value should be significant, i.e. having significance value less than 0.5, which indicates that the appropriate for Factor Analysis.

**Hypothesis Testing**

Further to test the Hypothesis the collected data was also analyzed with the help of t-test and ANOVA by using SPSS software 19 for windows.

**Analysis of Variance (ANOVA) and t-test**

These tests were use to examine the differences in the mean values of the dependent and independent variables. Essentially, analysis of variances (ANOVA) is used as a test of means for two or more populations. ANOVA can include more than one independent variable. Furthermore, at least one of the independent variable must be categorical and categorical variables may have more than two categories. In ANOVA there are several different groups (Malhotra, 2006). For example, the difference in the opinions of the customers lying in different occupation, income, age group, sector of the bank, place of residence having difference in their educational qualification.

A t-test, on the other hand, involves a single, binary independents variable. For example the difference in the preference of male and female or married and unmarried respondents could be tested by conducting a t-test (Malhtora, 2006).

In this study, Post-Hoc test is also applied to check the patterns and/or relationships between subgroups of sampled population. It is implemented after application of one way ANOVA. After selecting the significant factors from one way ANOVA, Levene Statistics values calculated and these values are tested for their significance. On significant Levene
Statistics values, Games-Howell test is applied and on non-significant Levene Statistics values, Tuckey test is applied to test the significant relations between different groups.

**For the Analysis of the Secondary Data DEA (Data Envelopment Analysis model) has been Applied**

**DEA (Data Envelopment Analysis) Research Model**

The study is executed by dividing the public sector banks, new private sector banks, old private sector banks and foreign sector banks in three categories i.e. “most efficient”, “moderately efficient” and “less efficient” on the basis of IT efficiency scores, obtained through application of DEA technique. DEA is widely used in banking sector to measure the efficiency of the banks ‘Jayaraman A. R. and Srinivasan M. R., (2014)’. Data Envelopment Analysis is a non parametric linear programming based data analysis methodology introduced by Charnes, Cooper and Rhodes in 1978. Building on the ideas of Farrel (1957), the seminal work “measuring the efficiency of decision making units” by Charnes Cooper and Rhodes (1978), Nandkumar and Singh A., (2014) applies linear programming model to estimate an empirical production technology frontier for the first time. Since then, here have been a large number of books and articles written on DEA or applying DEA on various set of problems other than comparing efficiency across DMUs (Decision Making Units) within organisation, DEA has also been used to compare efficiency across firms. To understand the reasons of differences in IT efficiency, the identified IT success factors are measured for each category of sampled banks and comparison is made between different categories of sampled banks. DEA model has variety of functions to measure the efficiency of DMUs like CCR, BCC, FDH, Cost, Revenue, Profit models etc. (Cooper W.W., Sieford L.M., and Tone K., 2000; Zhu J., Chen Y., Cook W. D., Li N., 2009).

Efficiency = Weighted Sum of Inputs / Weighted Sum of Outputs

**Identification of variables**

To compare the efficiency of IT deployment of public sector banks, new private sector banks, old private sector banks and foreign sector banks and divide the banks in three categories i.e. “most efficient”, “moderately efficient” and “less efficient”, the technique of data envelopment analysis (DEA) has been applied. Based on literature survey, the variables selected for DEA input and output are shown in Table 3.2.
Table 3.2: Input and Output Variables for Application of DEA

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Input Variables</th>
<th>Output variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Total Number of ATMs</td>
<td>Business Per Employee (B.P.E.)</td>
</tr>
<tr>
<td>2.</td>
<td>Fully Computerized Branches / Core Banking Solution (CBS)</td>
<td>Profit Per Employee (P.P.E.)</td>
</tr>
<tr>
<td>3.</td>
<td>Total Outstanding Number of Debit Cards Per Computerized Branch (CBS)</td>
<td>Business Per Computerized Branches (B.P.C.B)</td>
</tr>
<tr>
<td>4.</td>
<td>Total Outstanding Number of Credit Cards Per Computerized Branch (CBS)</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Total Number of Computer Literate/Technical Employees Per Computerized Branch (CBS)</td>
<td></td>
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</tbody>
</table>

(Detail attached in appendix tables)

In order to compare the efficiency of IT deployment of public sector banks, new private sector banks, old private sector banks and foreign sector banks, information technology related parameters are taken as input variables and performance parameters are taken as output variables. Based on the efficiency scores obtained by applying DEA technique, banks have been divided into three categories i.e. “most efficient”, “moderately efficient” and “less efficient”. Factors constituting IT success model are identified on the basis of in-depth interviews with bank employees, websites of the banks and past studies on the subject.

On each year of data, CCR output-oriented model (output maximization) and BCC output-oriented model (output maximization) have been applied. Efficiency scores between 0 and 1 have been obtained for every bank, for the each year. Weill (1990) pointed out that a time lag exists between investment made in IT and performance of the organization. Brynjolfsson (1993) also found a time lag of two to four years before the strongest organizational impact of information technology is being felt. Similarly, Hoffman J. J., Carter N. M., and Cullen, J. B., (1994) also observed that full effects of any change are not likely to affect performance for several years. For this reason, to categorize the banks, average of the efficiency scores obtained from CCR output-oriented model of each bank for the period 2009 to 2014 have been computed. The minimum and maximum average efficiency scores obtained for the period 2009 to 2014 are found to be 0.27 and 1.0 respectively. The range of efficiency scores i.e. 0.27 to 1.0 has been divided into three intervals to categorize the banks as “most efficient”, “moderately efficient” and “less efficient” as shown in Table 3.3.
Table 3.3: Categorization of banks on the basis of average efficiency scores

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Categories</th>
<th>Average efficiency score for the period 2008-2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Most Efficient</td>
<td>&gt; 0.75 to 1.0</td>
</tr>
<tr>
<td>2</td>
<td>Moderately Efficient</td>
<td>&gt; 0.50 but &lt;= 0.75</td>
</tr>
<tr>
<td>3</td>
<td>Less Efficient</td>
<td>0.27 to 0.50</td>
</tr>
</tbody>
</table>

3.6 Limitations of the Study

No research study will be completed unless its limitations are highlighted. Limitations help us to understand the proper perspective of the study. This helps in generalizing the study in an appropriate manner and considering the reliability of the study. Research studies which involve sampling techniques have inbuilt weaknesses. As such studies do not give direct representation to the population rather their findings are dependent on indirect representation, which may or may not represent the population truly. Another common constraint of social sciences is that of uncontrollable factors.

As every study has certain limitations, the present research work is also not free from limitations which are as follows:

1. The present study is confined to measure the effectiveness of various automated banking services, problems in automated banking in urban areas ignoring the rural areas.

2. The results of the study may not represent the respondents of whole of India due to diversity in culture, language, life style, literacy rate, customs, traditions, developments of various states of India, etc.

3. No primary data collected through sample survey is free from bias and inaccuracy in one respect to another, the data collected and used in this study may not be free from certain errors particularly with respect to the respondents’ adequate comprehension of the subject.
4. Since some automated banking services i.e. internet banking, mobile banking and NEFT/RTGS are relatively new concepts in India, the researcher faced some difficulty in getting the questionnaire filed due to the non serious attitude of the respondents.

5. The limitations are natural and bound to occur, the study throws an attention to the understudied but highly important area of banking industry to satisfy their customers. This will work as conservatory for bankers in channelising their thinking route and providing new extent to their efficiency and effectiveness efforts. This study will work as a basis and floor way for advance research.

3.7 Organization of the Study

In order to present the whole research work in a coherent way, the entire study has been divided into following chapters. The complete array of these chapters is described as under:

Chapter I is all about introductory aspects and has been divided into certain paragraphs which include meaning of automated banking; evolution of banking automation in banking sector, reforms in banking sector and technological changes and various delivery channels of automated banking services such as ATM, Debit Cards, Credit Cards, Internet Banking, Mobile Banking and RTGS/NEFT/ECS etc.

Chapter II reviews literature. It seems discreet to survey maximum possible literature so that researcher cultivates knowledge by having ideas with the applicable researches in the field. The review related to role of information technology in banking, dimensions of automated services and automated service quality, factors enabling the use of customer centric automated banking services, delivery channels of customer centric automated services and profitability and performance of Indian commercial banks are included in this chapter.

Chapter III deals with the research methodology adopted to carry out the study. It exhibits the rationale of the study, objectives of the research, method of sampling, technique of data collection, statistical techniques used to analyze the data, hypothesis framed and limitations of the present study.

Chapter IV presents the awareness and knowledge of customers towards various automated services and analysis of the perception of the customers with respect to these services.
Chapter V presents the various factors which enable the use of customer centric automated services and the variation of perception across various demographic variables. Further it also compares the customers’ satisfaction in case of public sector banks, private sector banks and foreign sector banks.

Chapter VI contains the impact of customer centric banking practices on profitability and productivity of banks with the use of DEA model.

Chapter VII contains major findings and suggested strategies to the bankers and decision makers regarding automated banking to provide better services to their customers.

The entire research work is followed with detailed questionnaire, bibliography on the subject and appendix tables as annexure.