Chapter-3
Research Methodology

The proposed Research Methodology aims to solve the research problem with extensive use of primary data. However, secondary data is collected to assess the market potential where the probable demand pattern is likely to grow and the factors affecting the same may it be techno commercial, consumer behavior, regulatory or environmental. The related primary data may be backed up by secondary data from reliable sources and published data from government agencies.

3.1 Statement of the problem:

Based on the outcome of the literature review it has been noted that there are factors which influence sustainability and there are problems and challenges being faced in the above perspective. The role of the government thus becomes facilitator and not the service provider and therefore the role of government relates more to policy making and ensuring implementation of the same in open market mechanism.

The study has been conducted with the background of following problems & prospects of private sector participation in the state of Uttar Pradesh with the domestic consumers in focus.

1. What are the factors influencing the sustainability of private sector participation in power generation in the geographical region of Uttar Pradesh.

2. What are the problems and challenges that confront private sector participation in Power generation in Uttar Pradesh

3. What is the role and impact of Government policies relating to private sector participation in Power generation in Uttar Pradesh.

4. What are the measures by which private sector participation in power generation in Uttar Pradesh could be increased.

5. What is the probable impact of private sector power generation on consumers in Uttar Pradesh.
3.2 Research Objectives:

In the common parlance Research refers to a search for knowledge and is a process of exhaustive investigation. Also it is an investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws.

The objective behind the entire endeavor is to understand the business potential of power sector with special reference to the possibility of private sector participation in power generation, its economic viability in terms of market driven mechanism for tariff structure and the effect of energy and power sector reform on this and the related ancillary industries.

The proposed study is aimed to find out, how the sustainable market can be established by the participation of private sector players in the field of power generation and distribution and the long term viability for the same. The objective is to analyze the pace of growth of power market in Uttar Pradesh within the limitations of Techno-Commercial aspects in the context of the factors of the neighboring states and within the framework of Indian power sector related policies.

Thus the objectives of the study lie within the frame of the following points.

1) To identify the factors affecting the sustainability of private sector participation in power generation in the geographical region of Uttar Pradesh.

2) To determine the problems and challenges that confront private sector participation in Power generation in Uttar Pradesh.

3) To assess the role and impact of Government policies relating to private sector participation in Power generation in Uttar Pradesh.

4) To devise measures by which private sector participation in power generation in Uttar Pradesh could be increased.

5) To determine the probable impact of private sector power generation on consumers in Uttar Pradesh.
3.3 Scope of Study:

The scope of study include the factors affecting sustainability in terms of implementation of Government policy, capital investment cost, fuel cost, operation & maintenance cost and modernization of transmission and distribution network. In view of the state government being the single buyer there had been problems relating to revenue collection and proper recoveries.

The future prospects of increasing demand due to population growth and economic development are of vital importance. Adoption of alternate source of power generation which includes wind and solar power etc. have also been touched upon to seek view of private power generation companies in the perspective of rising demand for power in both the aspects quantity and quality.

After the setup of a power generation project the fuel supply remains a critical issue for sustainability for which backward integration of fuel supply may be done for fuel security and gas based power projects can be set up for sustainability cost benefit solution.

Other problems and challenges have also been considered for the opinion of power generation companies such as land acquisition problem, risk of timely payment, inadequate cost recovery, and impact of load shedding and geographical risk of fuel security wherein coal assets are acquired abroad by the power generating company.

The various aspects related to policies of the government of Uttar Pradesh and issues of administration and beaurocratic functioning, simplification of procedure and license raj have also been discussed.

As it is expected that private sector industrial consumers prefer to install a captive power plant in case the option of subsidized power provided by the state government is eliminated the above study is limited to domestic consumers.
3.4 Testing of Survey questionnaire & Hypothesis testing

The survey questionnaire was administered in two categories, one addressed to the private power generation companies and other addressed to the end consumers. While the first questionnaire was meant to assess the impact of various factors affecting sustainability, problems and challenges that confront private sector participation, impact of government policies and measures by which private sector participation could be increased, the second questionnaire was meant for the response of end consumers for which hypothesis testing shall be done.

3.4.1 Testing of statements on the survey administered to power generation companies

1) Related to sustainability of private sector participation in power generation in Uttar Pradesh
   
   1 a) Implementation of Govt. policy would significantly impact the sustainability of private sector power generation.
   
   1 b) Investment cost would have significant impact on the sustainability of private sector participation in power generation.
   
   1 c) Fuel cost would have significant impact on the sustainability of private sector power generation.
   
   1 d) Operation & Maintenance cost would have significant impact on the sustainability of private sector power generation.
   
   1 e) Modernization of transmission & distribution would have a significant impact on the sustainability of private sector power generation.
   
   1 f) Govt. being single buyer is impacting conversely on the sustainability of private sector power generation.
   
   1 g) An increasing trend of population growth in U.P. would significantly impact consumption of Electricity (power).
   
   1 h) A rising trend of economic growth in U.P. would significantly impact consumption of Electricity (power).

1 i) Private companies have a significant cost benefit if they undertake gas based power projects.
2) Related to problems and challenges that confront private sector participation in power generation in Uttar Pradesh

2 a) Risk of timely payment by distribution companies in U.P. would significantly impact privatization.

2 b) Lack of knowledge and experience by private entrepreneurs would significantly hinder the privatization process.

2 c) Land acquisition problems would significantly hinder the privatization process.

2 d) Fuel supply problems would significantly hinder the privatization process.

2 e) Inadequate infrastructure is one of the reasons that would significantly hinder the privatization process.

2 f) Inefficient transmission and distribution capacity would significantly hinder the privatization process.

2 g) Inadequate cost recovery would significantly hinder the privatization process.

2 h) Bias of state regulators for public sector corporations or against private sector companies would significantly hinder the privatization process.

2 i) Non payment of power generation bill would significantly hinder the privatization process.

2 j) Load shedding would significantly impact the potential of growth of private sector power companies.

2 k) Geopolitical risk in case of coal asset acquired abroad would have significant impact on privatization process.

2 l) Intervention by NGO’s would have significant impact on privatization process.
3) **Related to role and impact of Government policies relating to private sector participation in power generation in Uttar Pradesh**

3 a) Financial promotional and fiscal incentives can support the growth of private sector participation in power generation in U.P.

3 b) Improvement in administrative and bureaucratic functioning of the growth could significantly increase the pace of privatization in U.P.

3 c) Simplification of procedure would have a significant impact on the private sector participation in power supply and generation in U.P.

3 d) Reduction in administrative delays would have a significant impact on boosting private sector participation in U.P.

3 e) End of License Raj regime would have a significant impact on boosting private sector participation in U.P.

3 f) Improvement in overall policies of the Government would have a significant impact on privatization in power generation in U.P.

4) **Related to measures by which private sector participation in power generation can be improved in Uttar Pradesh**

4 a) Backward integration of fuel supply by private companies would have significant impact on security.

4 b) Private companies have significant prospects relating to producing electricity through renewable energy sources in U.P.

3.4 .2 **Hypothesis Testing:**

Based on the objectives and the problem statements relating to end consumers of Uttar Pradesh, following are the hypothesis made which are required to be tested with the help of primary data based on the survey questionnaire meant for end consumers of power on the basis of various demographic parameters such as area/district, age occupation & income group.
H1: Hypothesis related to Impact of Market driven (non-subsidized) price mechanism to improve the availability and reliability of power in U.P.

Hypothesis H1a: There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various areas/districts.

Hypothesis H1b: There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various age groups.

Hypothesis H1c: There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various occupation.

Hypothesis H1d: There is no significant difference in the mean value in the expectation that Market driven (non-subsidized) price mechanism can be an option to improve upon the availability and reliability of power in U.P. across various income groups.

H2: Hypothesis related to immediate privatization of power generation and distribution to improve power generation & distribution in U.P.

Hypothesis H2a: There is no significant difference in the mean value in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. across various areas/districts.

Hypothesis H2b: There is no significant difference in the mean value in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. value across various age groups.

Hypothesis H2c: There is no significant difference in the mean value in the expectation that Poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. across various occupations.

Hypothesis H2d: There is no significant difference in the mean value in the expectation that poor power generation and distribution by existing companies should be addressed by immediate privatization in U.P. value across various income groups.
H3: Hypothesis related to environmental impacts on large size plants/capacity addition of power plants in U.P.

Hypothesis H3a: There is no significant difference in the mean value in the expectation that large size plants/further capacity addition of power plants will have environmental impacts across various areas/districts.

Hypothesis H3b: There is no significant difference in the mean value in the expectation that large size plants/further capacity addition of power plants will have environmental impacts across various age groups.

Hypothesis H3c: There is no significant difference in the mean value in the expectation that large size plants/further capacity addition of power plants will have environmental impacts across various occupations.

Hypothesis H3d: There is no significant difference in the mean value in the expectation that large size plants/further capacity addition of power plants will have environmental impacts across various income groups.

H4: Hypothesis related to high capital investment and likely of increased tariff in open market of power generation in U.P.

Hypothesis H4a: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non-subsidized pricing) system across various areas/districts.

Hypothesis H4b: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non-subsidized pricing) system across various age groups.

Hypothesis H4c: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non-subsidized pricing) system across various occupation groups.

Hypothesis H4d: There is no significant difference in the mean value in the expectation that due to high capital investment there may be rise in tariff under open market (non-subsidized pricing) system across various income groups.
H5: Hypothesis related to privatization which may not have any effect on subsidies provided for household consumers in U.P.

Hypothesis H5a: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization, across various areas/districts.

Hypothesis H5b: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization, across various age groups.

Hypothesis H5c: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization across various occupation.

Hypothesis H5d: There is no significant difference in the mean value in the expectation that Subsidy should be continued to be provided (upto a fixed consumption) to households even after privatization, across various income groups.

H6: Hypothesis related to privatization which may result on pricing of power based on price band method for the amount of power consumed initially subsidized upto a certain level and subsequently on actual market price (non-subsidized) mechanism.

Hypothesis H6a: There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price - non-subsidized mechanism) is a better option, across various areas/districts.

Hypothesis H6b: There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price - non-subsidized mechanism) is a better option, across various age groups.

Hypothesis H6c: There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price - non-subsidized mechanism) is a better option, across various occupations.

Hypothesis H6d: There is no significant difference in the mean value in the expectation that Pricing of power based on price band method for the amount of power consumed (initially subsidized upto a certain level and subsequently on actual market price - non-subsidized mechanism) is a better option, across various income groups.
power consumed (initially subsidized up to a certain level and subsequently on actual market price - non subsidized mechanism) is a better option, across various income groups.

H7: Hypothesis related to private companies in power generation that may have stronger incentive to comply with quality standards and other regulatory obligations.

Hypothesis H7a: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, across various areas/districts.

Hypothesis H7b: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, across various age groups.

Hypothesis H7c: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, across various occupations.

Hypothesis H7d: There is no significant difference in the mean value in the expectation that Private companies in power generation would have stronger incentive to comply with quality standards and other regulatory obligations, across various income groups.

H8: Hypothesis related to the need of privatization of transmission / distribution to be done before privatization of power generation in Uttar Pradesh.

Hypothesis H8a: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P. across various areas/districts.

Hypothesis H8b: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P across various age groups.

Hypothesis H8c: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P across various occupations.
Hypothesis H8d: There is no significant difference in the mean value in the expectation that Privatization should be done first for transmission / distribution before privatization of generation in U.P. across various income groups.

H9: Hypothesis related to privatization which may have the impact of reducing power deficit through the addition of power generation capacity by private companies

Hypothesis H9a: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies across various areas/districts.

Hypothesis H9b: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies, across various age groups.

Hypothesis H9c: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies, across various occupations.

Hypothesis H9d: There is no significant difference in the mean value in the expectation that Power deficit can be reduced by addition of power generation capacity by private companies across various income groups.

3.5. Type of Research

The study is mainly descriptive and partially exploratory in nature, however extensive use of primary data along with the secondary data processing and opinion poll of customers is incorporated to assess the situation close to practicality. The emphasis is to analyze the present situation and the likelihood of the movement of the trend based on the data collected in view of the present Techno-Commercial viabilities under the given set of conditions and known/established facts.

The use of both Primary and Secondary data has been done taking into account the secondary data as well, however in view of the limitations and disadvantaged of secondary data (as that have already been collected for purpose other than the problem at hand) primary data generation has done based on the outcome of secondary data available. Information is sourced
from books, newspapers, trade journals, industry portals, government agencies, trade associations, monitoring industry news and developments and through access to unpaid/paid databases (such as EBSCO) for secondary data collection.

A Summary of research design used for this study is presented in the following exhibit.

Conclusive Research: Information needed is clearly defined and the research process is formal and structured. Sample is representative and data analysis is quantitative.

Descriptive Research: It describes the relation between independent and dependent variable. It has a structured research design conducted normally through surveys.

Cross Sectional Design: Involves the collection of information from any given simple of population elements only once
3.6. Population/Universe

The primary data which is the survey output is exhaustively analyzed to understand the situation from various angles such as from and under the government policy, power deficit, tariff plans & changing market conditions across various age groups, income groups, occupation and areas.

The population universe is the Power market comprising of six major cities under discussion. The criteria for selection of samples is based on the secondary source report of CRISIL (Research Outlook 2007-08 to 2011-12: Sector: Power) regarding top 20 major potential cities/districts of Uttar Pradesh. Three each of two groups namely Muzaffarnagar, Kanpur, Agra & Allahabad, Varanasi, Gorakhpur have been considered for the survey administered personally during Oct 2012 to Nov 2012 taking 60 samples from each city/district totaling 360 samples.

In another survey targeted to get response from the prospective private sector power generation companies of India willing to set up new power projects the sample size was about 25 power generation companies (67 respondents).

3.7. Sampling procedure

The primary data which is the survey output samples is exhaustively analyzed to understand the situation from various angles such as from factors affecting the market and under the controlled market conditions. An average of 60 number of samples from six cities/districts/area of Uttar Pradesh totaling to 360 samples.

The survey was done through a detailed questionnaire to ‘End consumers of power’ (Electricity) who were contacted at the office of the electricity bill collection center. Among the persons available there every fifth person was requested to fill the questionnaire. In case of unwillingness of any such the next person available was contacted.

Another questionnaire was made for responses from the ‘Private sector power generating companies’ of India who can be prospective companies for setting up of new
plants in Uttar Pradesh was administered electronically. Snow ball technique was used for getting the details of various key personnel of private power generation companies which aggregated to 67 respondents from about 25 companies. Follow up was done telephonically for the sent questionnaire over email to power generating companies.

Few of the people who were not available through electronic survey were sent the questionnaire directly in word file attachment and view were incorporated. For validation of the hypothesis a structured technique of data collection in the form of questionnaire is used for different purposes. The questionnaire is designed accordingly so as to specify the information needed.

Based on the survey method classified by mode of administration the questionnaire is designed / based on the Mall intercept personal interview method the feedback of which is collected to make samples of the same.

In the sampling process potential sources of error can be Random sampling error & response errors (in non-sampling error) as there is no inclusion of non-response error.

### 3.8. Questionnaire Development and Administration

Development of research instrument involved identification of constructs, method of survey to be employed, questionnaire design, pretesting of questionnaire and administration of final questionnaire. The broad methodology adopted in developing the survey instrument used in the study is illustrated as following exhibit. The same is followed by a discussion on the steps involved in the design.
Specify Information and source

Selection of Survey Method

Develop Questionnaire
- Measurement Scales
- Question content & Wording
- Response Format
- Sequence of questions.
- Physical Layout

Pilot Test (32 end consumers)

Finalization of Questionnaire

Questionnaire Distribution and Administration
- Population
- Sampling Frame
- Sampling Method
- Sample Size
- Final Sample

Assessment, Refinement and Validation of Measurement Scales

Fig 3.1 Questionnaire Development

Source: Adapted from Naresh K Malhotra (2007)
3.9. Selection of Survey Method

The decision to choose a survey method may be based on number of factors which include sampling, type of population, question form, question content, response rate, and duration of data collection (Aakar, Kumar & Day, 2002). In view of the nature of the study it was decided to personally administer the structured research instrument developed for the study. The language used in the questionnaire was mainly Hindi as the target population of Uttar Pradesh is well versed in Hindi. Otherwise too, Hindi is widely spoken and understood in Uttar Pradesh. The main benefits of the method adopted are listed below.

a. The questions can be answered by ticking the proper response format and with an interviewer present respondents could seek clarity on any questions (Aaker et al., 2002 Boyd, Westfall & Stasch, 2003)

b. The respondents are more motivated to respond as they are not obliged to admit their confusion or ignorance to the interviewer (Hays, 1998; Boyd et al., 2003)

c. A higher response rate can be assured since the questionnaire are collected immediately once they are completed (Malhotra, 2007)

d. This method offered highest degree of control over sample selection (Malhotra, 2007)

However, it was time consuming as wide geographic region was to be covered comprising six districts of Uttar Pradesh.

Since the domain was covering six major cities of Uttar Pradesh which were selected on the basis of being high potential area of eastern and western circles of Uttar Pradesh, 3 each cities of the two circles were chosen (CRISIL report basis).

In other survey questionnaire meant for power generation companies the views were taken electronically submitted to 67 respondents (about three top management level executives of about 25 companies) and follow up was done telephonically. The details of these executives were taken through snow ball techniques so as to collect the respondents from the top private power generation companies.
As only one respondent was taken to be adequate from one power Generation Company, the 16 responses received from different companies were considered for analysis taking the mean values.

3.9.1 Measurement Scales

As this study aims to measure consumer perception towards the electric power supply quality, Likert scale was supposed to be the best suited on a five point scale.

Two type of questions were posed to end consumer 1) one Likert scale 2) along with few multiple choice (with open ended options) to assess the market potential. Similar questionnaire was made for survey of power generating companies.

These scales were then assumed to be interval scales, (Likert) as is commonly practiced in social science research (Perry, 1998; Hayes 1998) further interval scales were used to measure the subjective characteristics of respondents. For example, in this study, respondents were asked about their expectations and perception in relation private sector participation in power generation. This scale was used due to its strength in arranging the objects in specified order as well as being able to measure the distance between the differences in response rating (Malhotra 2007).

3.9.2 Question content and wording

The questions were designed to be short, simple and comprehensible. Care was taken to avoid ambiguous, vague, estimation based, generalization type, and leading, double barreled and presumptuous questions (Boyd et al. 2003)

3.9.3 Response format

Two types of response format were chosen: labeled & open ended multiple chance answer, so as to obtain respondents, perception towards private sector power generation companies. Apart from the simplicity in administration, it was easy to code for statistical analysis (Burns & Bush, 2002; Luck & Rubin, 1999). Labeled scale response format is appropriate in marketing research as it allows the respondents to respond to
attitudinal questions in varying degrees that describes the dimension being studied (Aaker et. al., 2002 Boyd et al. 2003). The other advantages of this scale are listed below.

a. It yields higher reliability coefficients with fewer items that the scales developed using other methods (Hayes 1998)

b. The scale is widely used in market research and has been extensively tested in both marketing and social science (Garland, 1991)

c. It offers a high likelihood of responses that accurately reflect respondent opinion under study (Burns et al. 2002, Wong, 1999, Zikmund, 2000)

d. It helps to increase the spread of variance of responses which in turn provide stronger measures of association (Aaker et al. 2002, Wong, 1999)

e. In relation to the number of scale points, there is no clear rule indication and ideal number. However, many research acknowledge that opinions can be captured best with five to seven point scale (aaker et al., 2002 Malhotra, 2007) Keeping the same in mind, five point Likert scale was used in this research.

3.9.4 Sequence of Questions

The questionnaire was short having eleven question to the end consumers & thirty four questions to the private power generation companies. The questions were framed based on the outcome of the literature review and making comprehensive question based on that.

3.9.5 Pilot Study

The preliminary questionnaire was pre tested. The aim was to ensure that the questions were eliciting the required responses, identify ambiguous wording or errors before the survey was carried out on a large scale (Zikmund, 2000, Burns et al. 2002, Malhotra, 2007). It should be noted that prior to pretesting, three management professors and two peer scholars were asked to review the questions and give their opinions in the quest for content validity. Some overlapping questions were detected and hence were dropped.
from the list. After the review process, the questionnaire was ready to be pre tested in an exploratory survey.

The survey of end consumer started off in October 2012 with the selection of group of respondents based on convenience sample which is common for pilot tests (Zikmund, 2002, Boyd et al. 2003) in all 32 questionnaires were distributed to consumers to power to check for clarity of the measurement items. Consumers were asked to complete the questionnaire and also give open ended answers of their in few questions. A total 30 usable responses were obtained and based on the feedbacks of pilot study the questionnaire was slightly revised and reliability was established. The pilot scale study has shown a Chronbach alpha value of 0.82576739 which is quite an acceptable value.

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Content validity of the scales used in the current research is established by their origins from the extant literature. The new items that are used for the first time have been developed through a careful review of the extant literature on the practical manifestations of the respective construct. Extensive discussions were held among Management Professors & peer Research Scholars who reviewed the questionnaire and confirmed that it (with minor change in words of few items) had face validity. After
evaluation of the questions, it was judged that all of these were appropriate for measuring consumer’s attitude about service quality of power supply in Uttar Pradesh.

3.10 Administration of Final Questionnaire

The sampling process included several steps: definition of the population, establishment of the sampling frame, specification of the sampling method, determination of the sample size and selection of the sample (Malhotra 2007)

Step 1: Population. The target population for this study was defined as individuals of the select cities who are the end consumer of electricity (power) in the given city. A separate survey was conducted to private power generation companies with respondents from the top executives of private power generation companies.

Step 2: Sampling frame. The sample frame comprised of people of domestic household (about 360 from six districts) who are end consumer of power and are willing to participate in the survey. For power generation companies the views were taken electronically submitted to 67 respondents (about three top management level executives of about 25 companies)

Step 3: Sampling method. The sampling method used was convenience sampling and the required data was obtained using intercept technique of having personal interview of the random identified consumers (who were willing to participate) to fill & complete the survey questionnaire.

Step 4: Sample Size. Next step involved determining the sample size of this study. The required sample size depends on factor such as the proposed data analysis techniques, financial support and access to sampling frame (Malhotra, 2007) the data analysis are very sensitive to sample size (Tabachnick & Fidell, 2001, Garson 2007) As a general rule of thumb. Data from at least 300 cases is deemed comfortable, 500 considered as very good and 1000 as excellent (Comrey & Lee, 1992 Tabachnick et al, 2001, Garson 2007) since this survey was required to be done by personally the end were contacted
at the office of electricity bill collection by taking alternate persons and a sample size of 60 each totaling 360 was targeted for the questionnaire meant for end consumers.

In a separate questionnaire a target of 25 private sector power generation companies were made for views of the private sector power companies to get their view electronically by submitted it to 67 respondents of about 25 companies.

Step 5: Final sample. In all 377 consumers were randomly approached during the months of Oct 2012 – Nov. 2012, who were willing to participate in the study. Convenience sampling approach was used to collect the data from end consumers who were approached individually during the said periods at local electricity billing stations. Out of the 377 questionnaire distributed 375 were returned a total of 15 questionnaires were rejected as they were incomplete in various respects. This resulted in 360 usable responses.

In another survey targeted to get response from the prospective private sector power generation companies of India willing to set up new power projects the sample size was 25 power generation companies was administered key personnel of these companies electronically with follow up done over telephone.

3.11. Analysis Techniques

The final step was to select the appropriate statistical tools for analyzing the data. It involved steps such as coding the responses, cleaning, screening the data and selecting the appropriate data analysis strategy (Hau, 2005, Malhotra, 2007) for systematic approach, research elements namely the research problem, objectives, characteristics of data and the underlying properties of the statistical techniques need to be understood (Malhotra, 2007) to meet the objectives of the study, the following types of analysis were performed.

Descriptive analysis refers to the transformation of raw data into a form that would provide information to describe a set of factors in a situation that will make them easy to understand and interpret (Hau, 2005) this analysis gives a meaning to data through
frequency distribution, mean and standard deviation, which are useful to identify differences among groups.

**Inferential analysis** refers to the cause effect relationships between variables inferential statistics used for this research were Analysis of variance (ANOVA), Chi square test / Kruskal Wallis test. ANOVA has its strength over other multivariate analysis because it maximizes the differences among group membership of variables as a whole and helps to understand groups dimension differences (Hair et al, 1998)

The data were analyzed using MS Excel 2000 spreadsheet program & SPSS Statistical analysis Software. Appropriate statistical tools like Chi Square test / Kruskal wallis test and one way ANOVA have been applied on the collected data. to analyze the respondents with their perception of power supply in Uttar Pradesh (Boyd et al. 2003).

The analysis includes the following: Chi Square test, Kruskal wallis test and ANOVA, using software tools (SPSS, Excel etc.).

The outcome of the Survey Questionnaire based on the hypothesis is being analyzed using Chi Square test & Kruskal Wallis test for the given set of observed frequencies (n) which are subject to (k) independent restrictions (constraints) for an expected growth rate of the market per year while taking a given level of significance (say 0.05).

To test the hypothesis Chi Square ($\chi^2$) shall be calculated and if the calculated value is equal to zero, there is perfect agreement between observed and expected frequencies. For a given null hypothesis if the significance value is $> 0.05$ then null hypothesis is accepted, otherwise it is rejected.
3.12 Limitations of the Study

Although efforts were made to carry on research that was theoretically and empirically sound, the study suffers from several limitations:

a. A general lack of reliable independent statistics regarding the satisfaction of end consumer of electricity (power) was observed. In view of the ever continuing monopoly and the sector being a state government entity no substantial secondary source of data was available nor does any survey exist by the service providers.

b. The study is restricted to specific cities of Uttar Pradesh. As only select areas of U.P. were taken from the select potential areas/ cities based on the CRISIL report, the study covers about 60 representative samples from the given places however their market size may vary.

c. The study assumed that the respondents were all individual customers whose individual perception and expectations relating to service quality controlled the decision regarding the available service and not taking into account possible impact of Govt policy or family influence.

d. The identified variables may have been influenced by the interest and the knowledge limitations of the customers, regardless of the attention & effort, and thus may not be considered to be exhaustive. Additionally collecting respondent’s data on expectation and perceptions of the availability and quality at the same time could have compromised the reliability of the data.

e. The privatization of power generation is in early stage of growth in Uttar Pradesh and distribution of few areas are being privatized under government policies therefore the study may have got influenced in view of the policies of Government of Uttar Pradesh.

Although this study had a number of constraints, the research was successfully conducted. This success may be attributed to the development and application of a robust and flexible research design supported by valid and reliable research instrument that enable the researcher to minimize the effects of the aforementioned limitations.