

CHAPTER-3

RESEARCH DESIGN

3.1 INTRODUCTION

The analysis of the various studies and research reports reveals a common issue with the Power Utility model in India and that is Financial Sustainability. There is a description of problem based on financial numbers. No human perspective is involved or the solutions have not been proposed in accordance to the experts involved in this field. No concrete practical solutions have been laid down by various reports. Foreign models though have tried innovative things but have not been really adopted in Indian Scenario. So the core research question of the study is Methods and Strategies deployment for Converting Financially weak and regulated power Distribution utilities in India.

This chapter gives an overall blueprint of the study that is this section defines the strategy that will be used for integrating different modules of a study in a reasonable manner to address the research question and find out optimal solution for the problem. However, descriptive, exploratory, correlational, experimental, conclusive have been classified as some of the basic types of research designs that are been extensively used. In this research study, descriptive research design has been employed. Rationale of the study has been identified after extensive review of literature. The problem statement is been addressed. The objectives of the study have been framed upholding the topic under investigation. The subsequent portion of the report encapsulates sampling procedures, questionnaire design, and scale formation, validity and reliability tests of the instrument, data collection and analysis of the data collected.

Thus, exploratory research has been identified as most appropriate strategy for the purpose of the study.

3.2 RATIONALE OF THE STUDY

Literature review has discussed about the potential problems faced by Power Utility model in India. Although all the State Power Utilities are unbundled, distribution companies are making huge losses. With a view to utilize every possible alternative source of energy to meet the ever increasing electricity needs of the consumers, certain amendments needs to be made in current strategies of power sector. Therefore, the study was conducted to make amendments in the policies of power sector utility business in India in light of business sustainability. The study also aims to recollect factors affecting power sector reforms among mixed, open and control economies.

3.3 RESEARCH PROBLEM

Increasing Gap between Power purchase cost (ARR-Annual revenue requirement) and tariff Income is leading to losses to the power utilities and making its business sustainability difficult. There is an emerging need to critically examine factors responsible for this loss and formulate strategies to help power distribution business overcome this loss and sustain in the competitive business environment.

3.4 RESEARCH OBJECTIVE

The following are the objectives of the research work

- To identify factors affecting power sector utility business for different models
- To identify strategies for attaining business sustainability of a power utility company in one power utility

3.5 RESEARCH QUESTIONS:

Based on the research objectives mentioned above, the following research questions have been identified that needs to be answered through the following research work.

- What are the areas influencing the power sector distribution utility business?
- What are the strategies for attaining business sustainability of a power distribution utility company in India?

Based on the theme of the research question, research objectives for this study have been identified.

Table 3.1: Research Methodologies and Unit of Analysis

Sr. No	Methodology	Description/Unit of Analysis	Level of Analysis
1	Quantitative Analysis	Comparative study of various power utilities and identification of influential factors affecting utility performance	Multiple Utility level (different Models)
2	Quantitative Analysis	Selection of best performing model for factor loading and in depth analysis for IFE and EFE analysis. Identifying Business Proposal to expand in Core and Non-core Area	Utility level(PPP model)

3.6 SCOPE OF STUDY

The study examines various utility models and impact of several influential factors on the overall performance of the utility model. The 10 important factors influencing the utility business are highlighted in the current study, which includes technological up gradation, Asset Optimization, Capacity building, Business Prospects, Customer Satisfaction, Power Reforms, Competitiveness, Employee contentment, Political Preposition, Corporate Social Strategy. Quantitative analysis has been carried out in the following study for selecting the best performing model. IFE and EFE analysis presented in this study demonstrates several internal and external factors influencing performance of PPP –TPDDL. The analysis contributes to an understanding of several strategies for business to expand in core and non-core areas.

3.7 RESEARCH MODEL

Quantitative model of research has been adopted to meet the research objectives. A survey approach has been used, wherein quantitative data has been collected from the respondents with the help of a questionnaire. The data hence collected has been analysed using statistical procedures to establish the relationships between identified variables.

3.8 THE PHILOSOPHICAL WORLDVIEW PROPOSED IN THE STUDY

As specified by (Creswell, 2009) the current research work have characteristics of Pragmatic worldview. The research work following the similar kind of worldview arises out of genuine conditions, circumstances and outcomes rather than precursor conditions as in the case of positivism. Greater emphasis is placed on proposing optimal solutions for the problem been identified in the research question. This generally applies to mixed method of research where both quantitative and qualitative approaches can be used to collect relevant information pertaining to topic under investigation. In this case, both subjective as well objective meanings can provide supportive facts pertaining to the research. Here researcher has the liberty to choose the procedures, systems, and techniques of research that are most appropriate for the purpose of the study. Thus, for the mixed methods researcher, pragmatism opens the door to multiple methods, different worldviews, and different assumptions, as well as different forms of data collection and analysis.

In this research study, quantitative data has been collected for data analysis to address the research question. But since, the research study is dealing with a real world problem that needs to be addressed; the study is giving a mixed flavour of inquiry.

3.9 STRATEGIES OF INQUIRY

The strategies of inquiry are the types of quantitative, qualitative, and mixed methods designs or models that provide specific direction for procedures in research design (Creswell, 2009). In this research study, quantitative methodologies were adopted to identify variables impacting power sector

utility business. A questionnaire was prepared with preset questions for collecting viewpoints of the respondents and statistical tests were applied for generating optimal solutions, which can be further suggested to power sector to help it deal with the problems it might be facing. These are nothing but features of quantitative research approach. At the onset, exploratory approach was adopted to corroborate the variables, but later the research proceeded with quantitative approach.

3.10 OPERATING DEFINITION OF THE VARIBALES FOUND FROM LITERATURE SURVEY:

Table 3.2 encapsulates the definition of variables discovered from literature review, to have a deeper understanding of variables in context of topic under investigation. All these variables are independent variables with power distribution utilities operating in India been the dependent variable.

Table 3.2: Operating definitions of variables identified through literature survey [40]

S.No.	Components/Building Blocks/Variables
1.	Privatization and Deregulation: Deregulation is the process of removing or reducing state regulations, typically in the economic sphere. In power industry it is restructuring of rules that control and drive the electric power industry. Privatization of electric power industry means allowing private players to control generation, transmission of electricity.
2.	Regulatory and Legal Issues: Deals with laws pertaining to transmitting electricity, distributing electricity, trading electricity, creation of competitive market landscape etc.
3.	Political Influence and Subsidy: Power sector subsidies may be broadly defined as forms of financial or in-kind support provided by governments to electricity suppliers or consumers. Subsidies in the power sector arise in part because tariffs are regulated. And political norms and policies can influence productivity or distribution.
4.	Corporate Social Responsibility: The responsibility of the power industry to develop the entire community of India. In addition to

	internal development of employees, power industry initiatives to fulfil unmet electricity needs of customers.
5.	Tariff Revision: Tariff revision is compulsory for power sector to uncover the revenue gap and maintain consistency in electricity supply. Technological advancements, metering of systems requires constant revision of tariffs charged from customers as well as commercial industries.
6.	Financial Health: This section elaborates upon the financial health of distribution companies operating in India. It also elaborates cases for the same. Identification of financial health related issues will help the sector in overcoming financial losses.
7.	Investment Plans: This section briefs about regulatory framework encouraging investments in electric industry, to uphold business sustenance. Barriers to investments are highlighted to improve the overall scenario.
8.	Efficiency Improvements: Chances of electricity thefts and reasons for distribution losses are identified in this section, so that power industry could renovate on such reasons to improve the distribution scenario and minimize transmission related losses and other losses.
9.	Competitiveness: Sources for upgrading the quality of electricity supplied is been reviewed in this section to achieve greater customer satisfaction level.
10.	Asset Utilization: Asset utilization is a tool which aims at revealing your hidden plant by measuring the difference between what the asset is capable of producing and what it actually produces. This difference is referred to as the "opportunity gap." Effective asset utilization program identify causes of opportunity gaps.
11.	Energy Conservation: Electricity is a depleting energy source. In order to meet future ever-increasing requirements of electricity alternative sources of electricity like renewable sources needs to be identified and exploited. Also, optimal solutions needs to be identified that will be able to conserve significant amount of energy for future

	use.
12.	Customer satisfaction: An analysis of factors contributing to customer satisfaction will help power industry regain the trust of its customer's base. This recovering trust will encourage customers to pay whatever tariffs the industry demands. Measures of customer satisfaction will also help electric utility company in enhancing their service of operation.
13.	Employee Satisfaction: Employee satisfaction measures are gauged, to create a team of employees who are technically efficient and possess the required skills to gain competitive advantage in the market space. Identification of such measures will confirm long-term stay of employee within the organization.
14.	Employee Engagement: This is another important critical section of human resource management practices, which power industry, should focus. A highly engaged employee is likely to outperform than employee who is out of order. Employee engagement level can be enhanced by offering higher salaries, by providing higher responsibilities, by involving the employee in decision making process, by introducing training campaigns for career growth of the employees etc.
15.	Technology Up gradation: With rising globalization and technological evolution, power industry shall recognize measures to adopt upgraded sources of electricity to improve the efficiency of electricity supplied and to minimize transmission losses.
16.	Manpower Competencies: Manpower optimization and competency development will enhance the overall productivity of the organization, will align employee efforts towards organizational objectives, will provide the employee a platform to grow and develop.

3.11 HYPOTHESIS:

It is a tentative prediction about the nature of the relationship between two or more variables. A hypothesis can be defined as a tentative explanation of the

research problem, a possible outcome of the research, or an educated guess about the research outcome. (Sarantakos, 1993: 1991) *f*

Hypotheses are always in declarative sentence form, and they relate, either generally or specifically, variables to variables. *f* “A hypothesis is a statement or explanation that is suggested by knowledge or observation but has not, yet, been proved or disproved.” (Macleod Clark J and Hockey L 1981)

The hypothesis is a clear statement of what is intended to be investigated. It should be specified before research is conducted and openly stated in reporting the results. NULL Hypothesis designated by: H_0 ALTERNATIVE Hypothesis designated by: H_1 or H_A .

Based on the Analysis, Kruskal Wallis Test was performed on the factors as the data were non-parametric. Details of the analysis were provided in chapter-5 (data Analysis and Findings)

Null Hypothesis: H_0 : Technology Adoption, Asset Optimization, capacity building, Business prospects, Customer satisfaction, Reforms in Power Sector, Competitiveness in Power sector, Employee contentment, Political participation, Corporate Social strategy do not predict the Strategies for Business Sustenance for Power Utilities in India.

Alternate Hypothesis: H_1 : Technology Adoption, Asset Optimization, capacity building, Business prospects, Customer satisfaction, Reforms in Power Sector, Competitiveness in Power sector, Employee contentment, Political participation, Corporate Social strategy do not predict the Strategies for Business Sustenance for Power Utilities in India.

3.12 RESEARCH METHODOLOGY

The purpose of the study is to identify factors affecting power sector utility business for different models and to identify strategies for attaining business sustainability of a power utility company in one of the power utility model. Literature review showcases the importance of importance of unbundling, technology up-gradation, policy improvement, business transformation, capacity building and demand side management in power utility. Exploratory

research methodology has been followed in this case wherein first observations are made and thereafter preliminary information is gathered. This study will provide an insight into the research methods that will be followed for the scope of the study. After identification of the problem statement, the data collection techniques, the data analysis techniques, the hypothesizing process and other elements of research have been undertaken.

3.13 SAMPLING PROCEDURE

“Sampling is the process of selecting a sufficient number of elements from the population, so that a study of the sample and an understanding of its properties or characteristics would make it possible for us to generalize such properties or characteristics to the population elements” (Sekaran, 2006).

3.13.1 TARGET POPULATION:

Yamane formula:

$$n=N/(1+Ne^2) \quad \dots \text{Eqn.}(3.1)$$

Where

n=Sample size

N= size of Population

e= the error of 5 percentage points

Confidence Coefficient=95%

Total Population: 2000 no's (Executives from PPP, Franchisee and SEB)

Derived sample size: 333

Total samples collected: 340

3.13.2 SAMPLE FRAME

A sample of 340 units were been considered from a total of 2000 executives belonging to Public Private Partnership model, Franchisee model or State Electricity Boards. The survey has been conducted for considered sample in the year 2013-2014.

3.13.3 SAMPLING TECHNIQUE

The study has used Stratified random Sampling Approach. All sample units were either collected through email or personally contacted & interviewed for the responses. Due to limited expertise in the sector, Judgmental sampling has been used. It is one kind of Non-probability sampling wherein researcher selects the respondents on the basis of his professional knowledge and expertise.

3.13.4 SAMPLE SIZE

The sample size for the study is 340, which include

- Data of Power utilities (SEB,PPP, Franchisee) has been collected from MSEDCL, CGL Limited, TPDDL, Torrent, Reliance Energy or alternatives
- Data of 40 no's top executives has been collected to get management thought process
- Data of 180 no's middle level employees in all three organizations has been collected
- Data of 120 no's junior/workman level employees has been collected to find out their approach towards business prospects.

3.14 INSTRUMENT DESIGN

Questionnaire was used for collecting data, on which statistical tests can be performed. The questionnaire (Appendix A) consisted of 81 questions distributed in two sections. The details of the instrument development, scale formation, questionnaire format, data collection, validity and reliability test are given in the subsequent sections.

3.14.1 QUESTIONNAIRE DEVELOPMENT

Structured accepted questionnaire was used in the survey - as they are consistent, homogenous, simple to manage, easy to tabularize and analyse.

[41]

Information sought- The prominent variables affecting power utility business as identified from review of literature has been presented to respondents in the form of a **5-point Likert** based questionnaire. The questionnaire designing has been done on the basis of prominent areas identified from the various reports and studies leading or affecting the financial position of Power Utility sector in India. Likert 5 pointer scale was used to rank the preference for a particular question, where 1 demonstrated strong disagreement and 5 indicated strong agreement. The questionnaire covered almost 16 variables identified from the past studies and current trends.

There were few independent variables were also included in the questionnaire which collected the demographic and profile data for the respondents.

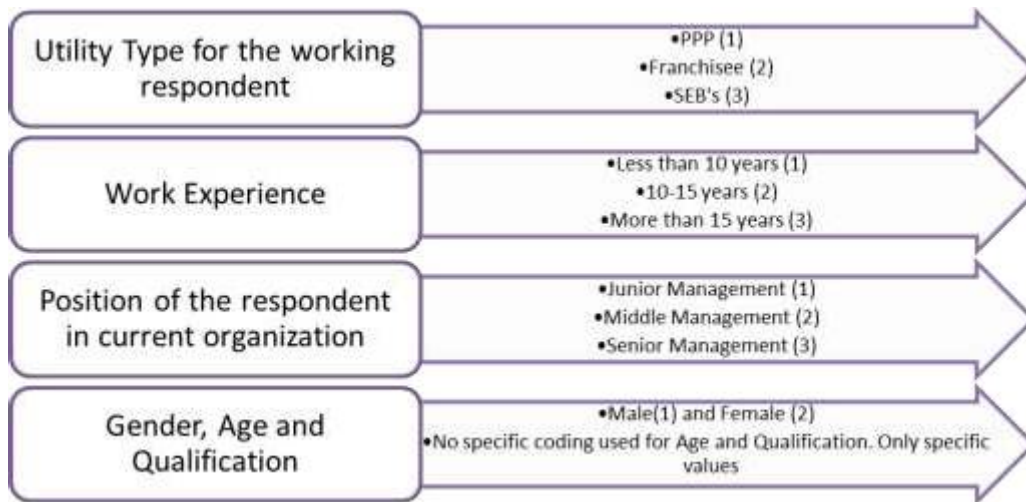


Figure 3.1: Constructs used for collecting data

Figure 3.1 represents variables and constructs which were been used for collecting data and performing test and come up with optimal solution. Data was collected from respondents belonging to all three types of utility model operating in India; PPP, Franchisee and SEB's. The respondents either belongs to working group with experience less than 10 years, 10-15 years or more than 15 years. Also, the participants either belong to junior management group, middle management group and senior management group. No discretion was laid out on the basis of age and qualification to collect the required amount of data.

3.14.2 SCALE FORMATION

In this research study, the variables identified from literature review are converted into questions that were administered to respondents belonging to utility models operating in India. The respondents were asked to give reliable opinions on issues been discussed in the questionnaire. Likert scale is used as a scaling technique to construct and manage the results. This scaling technique is easily understood. The responses generated are easily computable. It is a quick, well-organized and economical method of collecting data. The items that are need to be rated are generated from literature survey and were developed on 5-point Likert scale as follows

1 = “strongly disagree”

2 = “disagree”

3= “somewhat disagree”

4= “neutral”

5= “somewhat agree”

3.15 INSTRUMENT RELIABILITY

Reliability of the instrument is estimated to determine the consistency of the measurement tool used. This is done to ensure that similar responses are generated from survey, irrespective of the changing respondents. This evaluation is done to measure internal consistency of the questions representing different variables identified from review of literature. There are four methods of determining reliability of the instrument. These are Inter-observer reliability, Parallel-forms reliability, Test-retest reliability and internal consistency reliability, which has been regarded as the most prominent method used to validate the reliability of the instrument.

3.15.1 INTERNAL CONSISTENCY-RELIABILITY

Internal consistency reliability describes the uniformity of the results provided in a test, confirming that various items quantifying different constructs deliver reliable scores. There are three main techniques that are been used for measuring the internal consistency reliability including split-halves test,

Kuder-Richardson Test and Cranach's Alpha Test. However, Cronbach's Alpha Test, the most frequent used method has been estimated in the present study.

3.15.1.1 CRONBACH ALPHA

In the research study, Cronbach alpha is been used to validate the reliability of the instrument. Cronbach's alpha coefficient is calculated to gauge the internal constancy and reliability of the instrument. Cronbach's alpha measures the inter-relatedness of the items within the test. To sum up, Cronbach alpha calculates how closely a set of variables under investigation are inter-related to each other. The acceptable range of value ranges from 0 to 1 (Peterson, 1994). Clark and Watson (1995) advocated average inter item correlations of .15 to .50 across constructs, and for narrowly defined constructs, they advocated a range of .40 to .50 for average inter item correlations. Therefore, any value between the range of 0.40 and 0.50 is in the acceptable range. A low value of alpha could be due to a low number of questions, poor interrelatedness between items or heterogeneous constructs. The closer Cronbach's alpha coefficient is to 1.0 the greater the internal consistency of the items in the scale. [42]

Table 3.3: Cronbach Alpha scores for the questionnaire

Sr.No	Questions (variables)	Factors	Cronbach Alpha(α)
1	Q19,Q6,Q12,Q34	Technology Adoption	0.604
2	Q48, Q49,Q50	Asset Optimization	0.619
3	Q29,Q30,Q24,Q28	Capacity Building	0.613
4	Q68,Q69,Q70	Business Prospects	0.609
5	Q15,Q16,Q17,Q18	Customer Satisfaction	0.643
6	Q34,Q33,Q32,Q31	Reforms in Power sector	0.637
7	Q45,Q46,Q47	Competitiveness in Power Sector	0.581
8	Q78,Q80,Q81	Employee Contentment	0.551
9	Q41,Q42,Q44	Political Propositions	0.567
10	Q53,Q54,Q55	Corporate Social Strategy	0.532

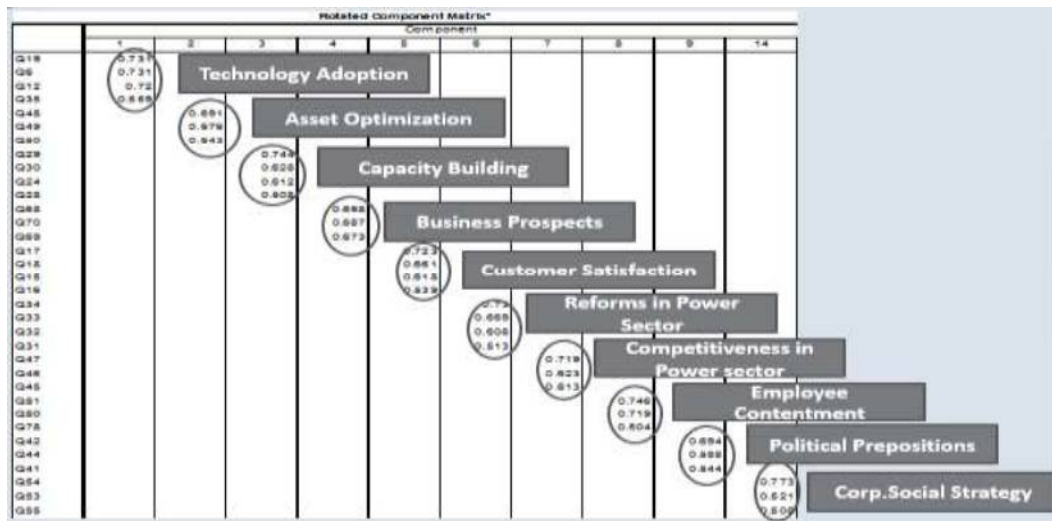
The alpha coefficient for all the sections in the questionnaire administered as part of the research work carried out was found to be more than 0.50 with no negative correlations seen among any of the items, thus suggesting that the items have relatively high internal consistency (George & Mallery, 2003; Nunnally, 1978; Cortina, 1993; Peterson, 1994). The Cronbach alpha scores conclusively prove the reliability of the instrument used for the research purpose of this thesis.

3.16 INSTRUMENT VALIDITY

- Face Validity – The degree to which the test or assessment measures, whatever it intends to measure. On the face value of the questionnaire, it was consulted with the experts from this field to give their comments. The researcher has a vast experience in the Power Utility Sector making it easier to check the face validity of the questionnaire. The designed questionnaire was distributed amongst the executives of power distribution companies operating in India and their validation of their understanding of the questionnaire helped in establishing the face validity of the instrument.
- Content Validity – The degree to which the study defines all possible aspects of a particular situation. Clear descriptions of the concept and its components were first extracted from the reports and all the important areas and points were taken into consideration. In this type of validity, respondents who have brief idea on area under investigation are given the questionnaire and their opinions are seek for, to gauge that every single minute detail of the study is been covered in the questionnaire and no relevant important discussion is been missed out. Nevertheless, content validity was established during the data collection process by administering the questionnaire to 25 people during the initial stage itself.
- Criterion Validity/Predictive Validity –This develops a new measurement procedure to measure the constructs or traits been identified. It is basically selection of measurement procedure to be used

which might include structured interviews, observation or surveys etc. The 5-point Likert scale was chosen to see if it can measure the responses and results were found to be satisfactory. This technique is used for measuring a group of subjects for a certain construct and then associating them with the results obtained at some point in the future. In other words Predictive validity can be defined as the extent to which the measure being used will allow you to predict future behaviours that this measure should be able to predict. Also, predictive validity helps to establish a measure's construct validity. In this instance as per the table 3.4 Q19, Q6, Q12, Q34 are correlated to one another to derive the Technology adoption factor. Similarly Q48, Q49, Q50 highly correlate with one another to derive Asset Optimization factor. Details of factors analysis were provided in Chapter-5. As per the Table 3.4, it conclusively proves that the instrument cleared predictive validity test – the ability to predict what it ought to predict.

Table 3.4: Rotated component matrix showing the correlation (loading) of items (variables) on distinct factors



Note: Extraction Method – Principal Component Analysis
Rotation Method – Varimax with Kaiser Normalization

- Concurrent Validity – It is a kind of criterion validity which is used only when criterion measurements are made at the same time. It is been used confirm that results of a particular test correspond to those of a previously established measurement for the same construct. It was found

that most of the papers and research reports did not had any such measure but general statistical measures were taken into account and found good enough to conclude the various results. The items that measure same results correlate highly with each in comparison to items that measure different constructs. The instrument is supposed to qualify the concurrent validity criterion if it is able to able to distinguish between groups that it should theoretically be able to distinguish between as shown in Table 3.4. As per the table 3.4 Q19, Q6, Q12, Q34 which correlates to forms Technology factor does not co-relate with Q48, Q49, and Q50 which form Asset Optimization factor thereby conclusively proving that instrument clears concurrent validity criterion.

- **Convergent Validity:**

The instrument is supposed to qualify the convergent validity criterion if measures of constructs that theoretically should be related to each other are, in fact, observed to be related to each other. Inter-item correlation matrix gives the degree to which two or more items are related to each other shown in Table 3.5. Items Q29, Q30, Q24, and Q28 which represents Technology adoption factors shows a good degree of correlation among each other. Similarly items Q48, Q49, Q50 which represents Asset optimization factor also shows a good degree of correlation

Table 3.5: Inter-item correlation matrix proving convergent validity of the instrument

Technology adoption factor				
Variable Items	Q29	Q30	Q24	Q28
Q29	1	0.400	0.275	0.234
Q30	0.400	1	0.268	0.284
Q24	0.275	0.268	1	0.274
Q28	0.234	0.284	0.274	1

Asset Optimization factor			
Variable Items	Q48	Q49	Q50
Q48	1	0.443	0.347
Q49	0.443	1	0.269
Q50	0.347	0.269	1

- Discriminant Validity:

The instrument is supposed to qualify the discriminant validity criterion if the measures of the constructs that should not be related to each other are observed not to be related to each other. In other words, one can easily distinguish between constructs that are not similar to each other. Using the same example described in convergent validity, items Q29, Q30, Q24, and Q28 are related to each other which represent Technology adoption factors and similarly items Q48, Q49, and Q50 which represents Asset optimization factor are related to each other. However there is no correlation between the two groups and the inter-correlation matrix of all these 7 items should bring out the dissimilarity between these 2 groups. Table 3.6 shows the correlation matrix of all the 7 elements. It is observed that items Q19, Q6, Q12, Q35 (Technology adoption) have very low to negative correlation with Q48, Q49&Q50 (Asset Optimization) thereby conclusively proving that the instrument clears the discriminant validity measure. (Details of factor analysis tests are given in chapter-5 of this thesis)

Table 3.6: Inter-item correlation matrix proving the discriminant validity of the instrument

Items	Q19	Q6	Q12	Q35	Q48	Q49	Q50
Q19	1	0.42	0.456	0.321	0.084	0.037	0.035
Q6	0.42	1	0.474	0.42	0.018	-0.006	-0.105
Q12	0.456	0.474	1	0.389	0.024	-0.049	-0.025
Q35	0.321	0.42	0.389	1	0.059	0.04	0.072
Q48	0.084	0.018	0.024	0.059	1	0.443	0.347
Q49	0.037	-0.006	-0.049	0.04	0.443	1	0.269
Q50	0.035	-0.105	-0.025	0.072	0.347	0.269	1

As the instrument has cleared both convergent and discriminant validity it conclusively proves that the instrument clears construct validity criteria. The instrument used for the survey (Questionnaire) clears both the reliability (Cronbach alpha) and validity (construct validity) tests.

3.17 QUESTIONNAIRE FORMAT:

The questionnaire has a total of 81 questions. First of the questionnaire comprises of questions pertaining to technological changes integrated into the power utility business model and its impact on the power business in India. Next part of the questionnaire enlists questions describing power purchase cost and revised tariffs of the utility model. Furthermore, questions describes the satisfaction that customer derives from the utility model as perceived by the organization. Also the questionnaire gathers responses to see changes implemented by power sector business to address the problem of power losses and for improving efficiency. Next part encapsulates questions describing the inherent competencies of the utilities or contractors associated with the business model. The next section contains some specific questions describing the influential or negative impact of privatization and deregulation on operating utilities in India. Further section comprises of questions explaining the impact of political influence and competitiveness on performance of utilities in India respectively. Then the questionnaire enlists certain questions describing the initiatives taken by power sector for efficiently utilizing the assets, for managing increasing demands from customer's side, maintaining financial wealth. Subsequently questionnaire talks about investments opportunities in power sector, sustainable strategies adopted and measures adopted to empower employee participation and satisfaction.

Table 3.7: Break-up of the variables in the questionnaire

S. No.	Name of Variable	Number of questions	Questions number
1.	Technology Up-gradation	5	Q1 to Q5
2.	Power Purchase cost, Tariff revision	7	Q6 to Q12
3.	Customer Satisfaction	5	Q13 to Q17
4.	Efficiency Improvement/Loss reduction	6	Q18 to Q23
5.	Manpower Competencies	5	Q24 to Q28
6.	Privatization and deregulation	6	Q29 to Q34

7.	Regulatory and Legal issues	5	Q35 to Q39
8.	Political influence/subsidy	5	Q40 to Q44
9.	Competitiveness	5	Q45 to Q49
10.	Asset Utilization	6	Q50 to Q55
11.	Energy Conservation/Demand side Management	6	Q56 to Q61
12.	Financial health and stability	4	Q62 to Q65
13.	Investment in Power sector	7	Q66 to Q72
14.	Corporate Social responsibility(CSR)	4	Q73 to Q76
15.	Employee Engagement	3	Q77 to Q79
16	Employee Satisfaction	2	Q80 to Q81

3.18 DATA COLLECTION:

The Questionnaire is circulate to 340 respondents covering the Executives of PPP, Franchisee and State Electricity Board. The research is supported by data from both **Primary** and **Secondary** sources. Data collection from primary sources was predominantly conducted through structured Interview method using a questionnaire that was developed using the variables that emerged from literature review. The validity and reliability of the questionnaire was pre-tested using Cronbach's alpha test and was in compliance of the qualification criteria of $\alpha > 0.5$. Several scholarly journals, industry papers, conference proceedings, trade bodies, government publications were used for secondary data research [40]

The source points have been kept large and varied so as to reduce the biasedness in the data. The source of secondary data includes:

- Various Journals and Research publications in the area of Power Utility performance in India
- Private sector and independent consultant reports on Power Sector and Utilities in India

- Various government department's reports to assess the current statistics and position in the power utility and generation for India
- Web articles, Blogs and News Reports to capture the global position of various emerging and developed countries in the area of Power Utility
- Various policies from Ministry of power, BEE and CERC has been studied in detail by referring various government publications and reference book
- Sampling like records, reports, operational logs, data entry documents, complaints, and various types of forms.

Some of the prominent reports in Indian public sector are as follows:

- Reports of Planning Commission of India
- Financial reports of power utilities
- High level committee reports appointed by MOP
- Annual performance reports of Ministry of power
- Reserve bank of India reports
- World bank reports for FDI in power sector
- Central Electricity Authority (CEA), Govt. of India
- Central Electricity Regulatory Commission (CERC), Govt. of India
- Electricity Act-2003
- Power exchange reports

The source of primary data includes:

- Important policy makers in MOP, Govt. of India
- State Energy Development Agency
- Office bearers of Indian Electrical industries- IEEMA
- Thought leaders of IGIDR- Economic research in power and energy, Mumbai
- Key independent thought leaders in the field of Power in India
- Leading academicians in India involved in Power generation, transmission and Distribution research

All the primary and secondary data sources for the study have not been reported to keep the confidentiality clause for this research study.

3.19 QUANTITATIVE ANALYTICAL TOOL USED

Data has been statistically analysed using SPSS and PHStat. Initially Cronbach's Alpha test will be used to check the reliability of the data. Further the data will be reduced to identify the factors after performing the KMO-Bartlett's test. All the factors will undergo Shapiro Wilk Test to check the normality of the data. Based on the Normality of the data Parametric or non-parametric test will be formed. For empirical results and statistical inferences Factor Analysis, One way ANOVA (Kruskal-Wallis test for non-parametric data) [43] were used to report the findings. For strategic analysis, IE Matrix analysis and SWOT analysis will be used based on the Quantitative data analysis of best performing model. In the current research major objectives of arithmetical analysis were to reduce the set of variables into smaller number of controllable factors and then use those factors as independent variables to forecast the impact on the dependent variable (performance of power utility business model in India). Factor analysis is a multivariate technique used to examine the interdependence amongst the variables of the study. The variables considered in the study were categorized and reduced to derive the factors. After identifying factors different models were compared for different factors to report if there exist any significant difference between utilities with respect to these factors. Furthermore, SWOT, IE analysis, IFE and EFE matrix were used as strategic management tools for analysing major strengths and weaknesses in functional areas of businesses and propose the optimal business strategy in core and non-core business areas to overcome financial losses.

- Data Analysis tool: **SPSS Version 21.0**
- Data Reliability Technique: **Cronbach Alpha Test**
- Data Reduction Technique: **Factor Analysis** (Checked with KMO Bartlett Test)
- Data Normality Testing Technique: **Shapiro Wilk Test**
- Statistical Testing: **Kruskal Wallis Test** (non-parametric test)

The research methodology adopted for this research work is given in Figure 3.2.

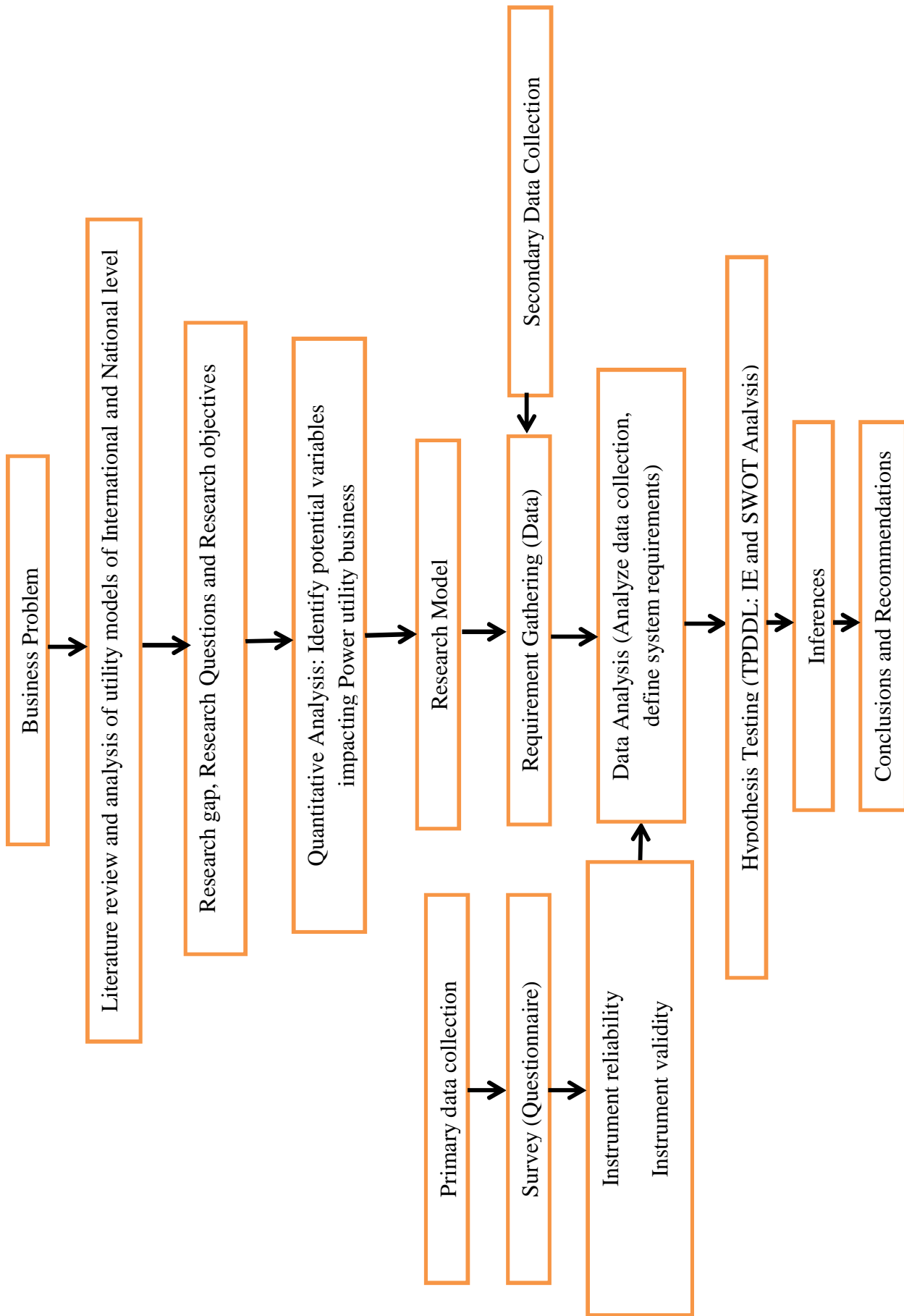


Figure 3.2 Research Methodology Flow Chart

3.20 CONCLUDING REMARKS

After deeply reading and analysing existing literature, the chapter research designs introduce the relevance of the study or motivation for conducting the study. Then the chapter discusses about the problem statement. The chapter enlists various objectives the study aims to fulfil. Research questions were been identified, that the study aims to look answers for. Exploratory research methodology and judgmental sampling is been adopted to collect sample units for collecting responses during time interval 2013-14. It also includes a detailed description of the instruments (population definition, sample selection, methods of data collection) used to implement this methodology. An effective questionnaire was designed using a 5-point Likert scale, covering variables been identified from past studies and current trends. The chapter concludes with specifying statistical tool been used to report the findings and this methodology will be used in the data analysis chapter. The next subsequent chapter summarizes the evolution of power sector in India and chronic problems faced by the Power Distribution Utility in India.