CHAPTER 4

RESEARCH METHODOLOGY

The literature review done in the previous chapter helped to widen the arena of study of Open Access in the distribution sector. Based on it the research methodology was constructed.

4.1 RESEARCH NEED

The need for the research is as follows:

- Open Access Introduced in Electricity Act (EA)- 2003.
- Open Access is one of the most important schemes towards a more competitive electricity market.
- Open Access has been implemented in most of the states, yet is not effective completely as expected.
- There are many challenges in the implementation of Open Access across the country.
- The DISCOMs, being a state owned entity in nearly all states, the step towards a successful implementation is limited.
- The cross subsidy surcharges have created a lot of confusion in the implementation of the Open Access.
- Open Access has not been able to sustain inspite of supporting policies from the centre.

4.2 RESEARCH GAPS

Context: Electricity Distribution Through Open Access: Alternative Suggestive Framework

After the business problem was identified, review of the currently available literature related to the topic was carried out to find out - **What is known and what is unknown.** The sum up of the literature survey as shown in Table in Appendix brings out the Research Gaps (unknown areas).

It is observed that the following specific gaps unfolded progressively during various stages of literature review (Table Appendix). The Benchmarkingof OA distribution with reference to international framework UK Model has not been carried out so far. Benchmarking study may identify critical variables. These variables when used for primary data collection will help in addressing the business problem.

Research reveals the constraints and challenges in the way of promotion of OA in electricity distribution business in various states of India. It is evident that in depth framework study on OA has not been conducted in distribution sector suggesting a way forward.

Literature survey has included studies of distribution sectors of Latin American countries, electricity boards, research papers, reports of national government as well as international bodies about the reforms in electricity sector.

4.3 RESEARCH PROBLEM

A critical analysis of existing electricity distribution sector in India has been carried through literature survey. The critical factors affecting the performance of existing scheme of OA in distribution in India have been identified after comparison with international experience i.e. benchmarking with UK Model to suggest an alternative framework.

It is seen that the distribution companies dissuade the large consumers from switching to OA as this affects the financial health of distribution companies. Thrust area of research therefore to suggest alternative framework to incentivize the distribution companies to efficiently implement OA.

4.4 RESEARCH QUESTIONS

In the light of the above discussion the research questions arising are as follows:

1. What are strengths and weaknesses of the existing framework of OA in the electricity distribution sector in a diverse country like India and how does it compare with international experience (benchmarking with UK Model)?
2. What are the critical factors affecting the performance of existing scheme of open- access in distribution in India?
3. What modifications are required in Indian scheme of OA in distribution with the purpose of achieving its objectives in light of identified factors?

4.5 RESEARCH OBJECTIVES

The objectives of the research are as under:

1. To critically analyze the existing system of OA in electricity distribution of India and compare it with international experience (with focus on UK Model).
2. To identify the critical factors affecting the performance of OA in Indian electricity distribution sector.
3. To develop an alternative framework through OA with the intention that Power should be freely transported from a surplus area to a deficit area.

4.6 RESEARCH METHODOLOGY

Research Methodology is largely descriptive applied type, it carries out analysis with the help of appropriate statistical tools. The proposed research work has used questionnaire as a survey tool for qualitative research. Closed-ended questions helped in generating the numeric data for quantitative research, whereas open-ended questions are finally found useful in gathering data from respondent domain experts in three rounds using Delphi Technique.

Research Objective 1:

To critically analyze the existing system of OA in electricity distribution of India and compare it with international experience (with focus on UK Model).

Step I : A critical analysis of existing electricity distribution sector in India has been carried through literature survey. Focus of the literature survey has been limited to OA in distribution relying upon standard material of probable sources for secondary information.

Sources of data: Secondary information related to national/State experience include:

- Ministry of Power
- Central Electricity Authority, Government of India
- Central Electricity Regulatory Commission
- Electric Power Research Institute, Judges' college, Cambridge University
- Planning commission, India
- State Electricity Regulatory Commission, TERI,
- UK Regulator
- Latin American Regulators
- Forum of Regulators
- Works of distinguished Scholars on Energy Policy, Energy Economics

  Tool used for analysis: Tabulation Charts, statistical tools, Description Analysis, Pictorial representation.

Step II: Benchmarking study of UK model has been carried out on the basis of secondary data collected through above mentioned sources and identified parameters.

Sources of data: Secondary information as given in reference and inter alia include public sources of website of UK, US Regulators.

Tool used for analysis: Benchmarking was the method used to arrive at the factors on the basis of which further analysis was carried out. This process was used to identify the key features which make the UK third party access model superior to that of India's.[1] It provides the common ground for the comparative analysis between India and UK. It is a systematic identification, study, analysis and adaptation of the best practices of UK model into India's power sector. Hence External Competitive Benchmarking was used for the study to fulfill the first objective. Although competitive benchmarking was done, it was not competitor research that was carried out. This is because light was thrown on the best practices of UK which can be incorporated in the Indian power sector and not the performance measures of both the countries.[2]

Analysis based on international experience of OA implementation in British distribution system indicates that the success and failure experience of Argentina as well as Peru had been factored in and British consumers have benefited by choice of service provider in the last 30 years. The important parameters identified as given in the table below explained and compare the distinct gaps in policy framework of distribution sector in both the countries i.e. India and UK and suggest way forward.

Methodology:

Phase-I Self Analysis (Done in the Step-I) based on a diagnosis and analysis of the functioning of the benchmarked system or policy tool. (Jean-Luc Maire, n.d.)

It includes General description such as activities, understand the current policy of the selected countries, and document benchmarking objectives and scope, Document the current process.

Phase-II Pre Benchmarking: Defining good performance measure (above based on literature review)

Commercial Parameters

- Tariff pricing
- Categorization of consumers on the basis of their consumption
- HT market and LT market
- Level of cross subsidy in consumer tariff.
- OA charges.

Research Objective 2:

To identify the critical factors affecting the performance of OA in Indian electricity distribution sector.

Variable Identification

In continuation of Objective 1, be initially through secondary data now 28 found out (after India UK benchmarking), critical variables as evident are as under -

- Periodicity of Revision of cost reflective tariff.
- Unbundling of Utilities – Status.
- Industrial/Commercial Tariff.
- Low Domestic/Agricultural Tariff.
- High cross subsidy charges.
- Applicability of Electricity Duty on OA Power.
- In vogue Long Term PPA.
- Establishment of Regulators.
- Privatization of utilities.
- Creation of wholesale market.
- Existence/Independence of SLDC.
- Robustness of network.
- Long term firm power contract of OA consumers.
- Voltage wise loss.
- Separation of accounts of Discom.
- Network/wheeling charges separation.

The optimum sample size for our survey was reduced to 120 keeping in view the limitation of Research 500 questionnaires were dispatched.

Designing Questionnaire:

Face validity and construct validity approaches will be used to ascertain the validity of variables obtained from primary as well as secondary data. In order to frame our questionnaire we had to gather information on the current status of the industry and the problems plaguing it. This information we obtained from literature survey, benchmarking of Indian distribution with UK model.

Our questionnaire comprised of 30 close ended undisguised questions on a 5 point Likert Scale, with options being:

- Strongly agree
- Agree
- Indifferent
- Disagree
- Strongly disagree

The Questionnaire was designed in such a way that items divided into three parts -

- Distribution Sector (4)
- Electricity Industry Structure (4)
- OA (22)

Pilot was carried out, to test if statements are debatable and have discriminatory value on 32 respondents. An internal consistency was examined by using the Cronbach's Alpha Test. The Cronbach's Alpha was 0.842 implying a high validity and reliability. Thus not much of a need of change in Questionnaire was felt. Construct validity is meant to measure people's attitude. A few modifications were made based on the suggestions from industry experts, thenthe final data collection was done.

Sampling Plan and Sampling Procedure:

The random stratified sampling procedure was used to collect the samples for the survey. The target populations for the survey included any organizations or individual having stakes in the OA regime in distribution sector in India.

The categories on the basis of which the samples stratified were -

- Generators (Public Enterprises, IPPs and CPPs)
- Distribution Utilities
- Transmission Utilities
- Non-Governmental Organizations
- State Electricity Regulatory Commissions
- OA Consumers
- SLDCs, RLDCs
- Power Exchanges
- Indian Utilities
- Consulting Agencies
- State Energy Departments
- Educational Institutions
- Individual Power Experts (Government Senior Officers, Academicians and Retired Power Officers)

For a fairly reliable result, the sample size could be : 100 – 150

In general there are rules of thumb stating that the sample size should 5 times of the total number of variables. However for a niche sector like power which has its unique features working on a sample size of not more than 120 seemed more prudent.[3] This makes it easier for the novel nuances to be captured through the factor analysis. The sample size of 120 had been taken, proportionately distributed across different players in the ratio of the number of stakeholders.

Table 4.1: Overall Sample Size

S.No.	Source	No.	% of Sample	Calculated Sample size	Actual Sample size
1.	Government Senior Officers (Director and above)	100	135/3389*100	4	12
2.	NGOs	5	135/3389*5	1	2
3.	Electricity Regulators	30	135/3389*30	1	3
4.	OA consumers	2500	135/3389*2500	100	44
5.	Financial Institution	50	135/3389*50	2	2
6.	Distribution Companies	70	135/3389*70	3	13
7.	Load Dispatch Centers	30	135/3389*30	1	5
8.	Power exchanges	3	135/3389*3	1	2
9.	OA Association	1	135/3389*1	1	1
10.	Generators	600	135/3389*600	24	36
	Total	**3389**		**138**	**120**

Data Collection

Questionnaire Research Strategy involved sending out emails to 500 respondents, followed by out telephonic conversations for filling up survey tool along with a few personal interviews.

Research Objective 3:

To develop an alternative framework through OA with the intention that Power should be freely transported from a surplus area to a deficit area.

Methodology

The framework methodology is used to analyze qualitative data as it provides thematic or qualitative content analysis.[4] This methodology is used for large scale policy research. The framework method provides highly structured output. Due to its highly qualitative nature it is often stated as following a deductive procedure of arriving at the final conclusion. This method required no software and the analysis is completely subjective to the paradigm in which the research is carried, which in this case in the power sector.[5]

In order to construct an alternative suggestive framework for open access in the electricity business in India a systematic study of various literatures was carried out. The structure of the third party access in United Kingdom contributed to provide the factors that have an impact and which may be improved in the Indian scenario. These factors were tested and validated through a primary survey. The responses of the various stakeholders like buyers, traders, utilities, generators, financial institutions and industry experts were recorded. To further the analysis, panel discussions were carried out which delved deeper into the issues at stake.

Based on the validation of gaps along with the stakeholder perspective, benchmarking of Indian open access scenario on the basis of the UK analogy, factor identification and experts opinion survey, an alternative suggestive framework was deduced to improve the acceptance of Open Access in the distribution sector.

The framework uses the bottom down approach, starting at the macro level of addressing policy implementation issues of tariff subsidization and enhancement of competition in the wholesale market. The micro level addresses the problem of redesigning the OA structure such that pan caking of OA charges do not occur. Finally in order to incorporate the external environment, issues related to transmission like congestion management, scheduling and balancing parameters were addressed.

Delphi Technique has been employed to develop an alternative framework based on 4 major factors extracted through factor analysis meeting Research Objective 1 & 2. Probable variable obtained from secondary as well as UK benchmarking was used for survey.

Based on the components extracted, an unstructured Opinion Survey was constructed in First round, a set of questions was framed for Second round, and improved open questionnaire was employed in Third round, through one to one personal interview carried with each Eminent Personality individually employing Delphi Technique.

Tools used for analysis: The results of the objective 1 threw light on the differences in the Indian third party access system, in comparison to that of UK. The second objective highlighted critical factors affecting the open access system in India.

Based on the results, gaps in the Indian Open access system were identified. Followed by which a set of open ended questions were designed for response from power sector experts from NGOs, exchanges, government institutions.