CHAPTER-2
LITERATURE REVIEW

2.1 INTRODUCTION

Power utilities in India need to improve their performance to ascertain their independence from regulator and government support for financial survival. Previous researches available emphasise importance of unbundling, technology up-gradation, policy improvement, business transformation, capacity building and demand side management in power utility. Detailed reports and committee findings clearly highlight financial weaknesses and state role in running utility. The situation of power utility businesses in various countries like USA, Chile, and Mexico with power reforms are successful while countries like China and Argentina experienced mixed response and Bangladesh is a failure. This is being studied to find the vibrancy in the business, giving appropriate weightage to the societies and economic systems of operation in that country.

The decision is to carry out business studies in different economies of the world having

a) Mixed economies like Chile-Latin America, Mexico and Argentina discussed in (Gautama S. Dutt et al., 1999); (Young-Hwan Moon, 2004); (Jaime Milan, 2001) with respect to Indian economic position and their successes.

b) Controlled economies in the vicinity of Indian context in China, Turkey and Bangladesh as reported in (Shaofengxu et al., 2006); (Nazif Hulagu Sohtaoglu et al., 1999) ;(M.S. Alam et al.,2004)

c) The open economies of free trade in USA as discussed in (Rasmiranjan Das, 2011).

d) Black and Veatch (2013) in their report on Strategic Directions in the US Electric Utility Industry, 2012[9] described how the business models are evolving and in what sense the sustainability is being arrived at for them. Changes in the policy landscape refers to policies concerning issues related to renewables, energy efficiency, electricity storage, and electricity production to meet climate-related goals and ensure electricity security (Valocchi, Juliano & Schurr, 2014; Tukker & Butter, 2007)[10]

Management of business activities on the route to sustenance needs sole improvement. However, this improvement involves incorporating innovation into business processes. Traditional business model exclusively focuses on maximizing profits through invested capitals. Conversely, emerging business models which focus on increasing the profit margin rates along with the customer satisfaction (Bade, 2015). PWC (2016) have discussed some potential models in the similar segment to help companies position them in the newer marketplace.

These results shall need comparison to the Indian context and be applied for strategy formulation in the Indian backdrop, as of today and as per the needs of the future.

Ample literature highlighting needs holistic approach towards implementation of central and state government schemes like Rajiv Gandhi Gramin Vidyutikaran Yojana (RGGVY), Restructured Accelerated power development & reforms programme(R –APDRP) and Accelerated power development & reforms programme (APDRP) etc. is also available. Importance of customer satisfaction, and effect of power sector reforms on customer is also being discussed in details. A need of change in approach of regulator towards finalisation of tariff, transparent power purchase methods, independence of distribution companies for direct power purchase, better co-ordination between government arms like Ministry of new and renewable energy, Ministry of power, Rural Electrification Corporation (REC) and

Bureau of Energy Efficiency (BEE) etc. and promotion of development of competitive markets is also highlighted in publications.

Power sector reforms were started in 2002 with privatization of power sector in Orissa and Delhi followed by enactment of electricity act-2003.Power sector reforms are predominantly influenced by the regulatory mechanism, political support (K P Kannan et al., 2004) and social environment. Success and failures of reforms and response of various state governments for reforms in various part of country has been elaborated in detail in various research papers. Load forecasting, competitive market mechanism, technology implementation and investments in power sector especially in form of FDI and their repercussions are also discussed. Effect of power reforms and deregulation of power sector on consumers is also emphasized with due comparison with reforms in various countries like China, Argentina, Bangladesh, Korea and Latin America, identified based on open, mixed and regulated economy respectively. Financial sustainability of power utility is currently a challenge in India, predominantly on account of increased gap in power purchase cost and approved tariff by regulator (Shunglu committee report, 2011). Various high level committee reports generated by agencies like CRISIL, Ministry of Power, IDFC and World Bank analyse reasons and way forward for financial sustainability of power distribution utilities in India.

2.2 OBJECTIVE OF LITERATURE REVEIW

Literature review is nothing but an evaluative report of studies found in the literature related to our selected area. In the subsequent discussion, learning from earlier research areas pertaining to the subject area has been described in brief, to establish an understanding of the topic under investigation. The following section aims to define and summarize various studies, models and case studies supporting the topic under study. The studies identified guide the researcher the manner in which study should be taken further. The study highlights the gaps in previous work, so as to address those gaps and come up with potential solutions. Since, our study aims to identify Strategies for Sustainability of Power Utilities in India; literature aims to examine influential

factors directly or indirectly affecting the performance of distribution Power utility business in India.

The objectives of the literature review are:

To study global power sector reforms to understand the policies and performance and compare on various parameters to explore effective strategies for implementation in Indian Power sector. This has been reviewed in detail in chapter 2 under section 2.6[11]

To identify and study the literature pertaining to business model for sustenance. This has been reviewed in detail in chapter 2 under section 2.5.1. To study Power sector reforms, policies, various Committees reports and evaluating the performance of various models in India. This has been reviewed in detail in chapter-4.

To review the technologies changes incorporated in Power sector to meet the increasing demand of electricity and review initiatives taken in India to meet customer expectations. This has been reviewed in detail in chapter-2 under section 2.5.2.

To evaluate literatures on various key themes such as financial health and stability of Power Utilities, tariffs and power purchase cost, Demand side Management, Regulator, Manpower competencies, Employee and customer satisfaction, Privatization &deregulation, Investment in Power sector and CSR which can help in sustenance of Power business. This has been reviewed in details in chapter-2 under section 2.5.3 to 2.13.

To identify the research gap in the existing literature review to formulate strategies for Research.

2.3 LITERATURE SEARCH PROCESS AND SCOPE

After identifying the problem statement, literature search process begins with reading of books and journals to get a brief overview on the topic. Online library, a large database of journal literature, is the first point of beginning our research process with. Here the purpose of successfully conducting the study is begun with searching global power sector reforms to identify characteristic features of foreign electric utility industry that helps it to stand apart in

comparison to Indian power utility sector. Following this, in-depth search is carried out to identify reports and published articles disclosing the policies and reforms governing Indian power distribution utilities. Further, research aims to identify best utility model in case of India, to increase electricity generation, transmission and distribution capacity of the country.

The search process is organized on the basis of factors influencing power sector. Key factors from existing reports and literatures are grouped together, highlighting the manner in which each factor contributes to sustainable growth of power sector. The literature is investigated on the basis of the key themes influencing power utility business model. Majority of the work is collected and analysed only after the enactment of Electricity Act-2003.Based on this literature, variables influencing utility business and research gaps are identified. A detailed description of such kind helps the researcher in recognizing profitable business model and initiatives to be taken to sustain competitiveness in Power sector.

Key words*: Business sustenance, Customer expectations, Power purchase, Tariff, regulator, Policies, reforms, Regulations, Investment, Political factors, Subsidy, CSR, Financial Health of Power utility, Unbundling, renewables, Challenges, Competencies.*

2.4 AUTHOR WISE DETAILS OF RESEARCH PAPERS GATHERED:

Table 2.1: Literature Papers with Inferences

Sr.No	Themes	Select authors	Context	Inference
1.	CHALLENGES TO DEVELOPMENT OF RENEWABLE ENERGY FOR ELECTRIC POWER SECTOR IN NIGERIA.[12]	Okafor & Joe-Uzuegbu (2010).	Nigeria	The study highlights the importance of renewable energy sources [12] to make a meaningful impact on the energy mix in the nation and while simultaneously deal with environmental issues.
2.	The Electric Power Sector in Cuba: Potential Ways to Increase Efficiency and Sustainability[13]	Belt (2009)	Cuba	A MARKAL/TIMES model was developed and used to analyse future capacity investment decisions in Cuba, reduce operating costs, meet the growing demands. In order to increase the efficiency of power system cost-effective alternate strategies and business models were discovered like hydropower, solar p.v. , wind etc.
3.	Power Sector in Developing Asia: current Status and Policy issues	Hong, Kim & Shin (2014)	Developing Asia: India, Japan, republic of Korea, China	Securing an affordable and reliable source of energy is vital for an economy. Government policies promoting growth in renewable energy are a must in all stages of economic development.
4.	Power Sector Development in Myanmar	Nam, Cham & Halili, (2015)	Myanmar	The results highlight the importance of innovative financing mechanism for maintenance of new power infrastructure project. Also, the study focuses that stable governance environment is must for power sector to be able to efficiently contribute to the country's output.

5.	RENEWABLE ENERGY STRATEGIES FOR INDIAN POWER SECTOR	Ghosh, Ramana & Garg, (2008).	India	Renewable energy strategy needs to be integrated with liberalization of energy markets and withdrawal of direct government Interventions in energy sector, Public-private role in renewable energy Development needs to be redefined. The government policies should encourage more private participation and industry collaboration in R&D, Development of advanced indigenous manufacturing capabilities.
6.	From the Restructuring of the Power Sector to Diversification of Renewable Energy Sources: Preconditions for Efficient and Sustainable Electricity Market	LjerkaCerović,DarioMaradin,SašaČegar, Faculty of Economics, University of Rijeka	World	Augmenting the share of renewable energy sources in the national electricity systems [12] will increase **the environmental efficiency** in production and distribution of electricity and, consequently, energy sustainability of national economies.
7.	Smart Grid Development in India	Reji Kumar Pillai, Indian smart grid forum	India	**Smart Meters, Renewable Integration, Demand Management, Micro grids**
8.	Transformation of utility business with advanced technology	CEA Report 2010	India	Application of **Advanced Technology** like GIS,SCADA,SMART GRID has worked like enabler in efficiency improvement in Power Utilities
9.	A micro level study of an Indian electric utility for efficiency	Vinod Kumar Yadav,N P	India	Business Approach, **Technology enhancement**, long term planning, customer

	enhancement[14]	Padhy& H O Gupta[15]		role, efficiency of operation, **loss reduction**
10.	Technology Management Information System in Power Distribution Companies	Tiwari A.K., Chandra V. and PandeyAtul	World	Performance improvement through implementation of **technology** in power distribution company, automation and enhanced switch gears
11.	Technology development and implementation for power distribution automation system	Gupta R P,Suresh Chandra Srivastava	India	Centralized Monitoring and Control, Performance Improvement, and Distribution Automation
12.	Tariff revision and tariff adequacy	S K Chatterjee, IIT Kanpur	India	Huge gap of 10-40% in **tariff and power purchase cost**, Regulator approach not financially viable for power utilities
13.	Financial position of power utilities	Shunglu committee appointed by Ministry of Power	India	**Tariff revision** is a short term measure for improvement in financial position but long term ways and means need to be evolved
14.	A Reality check on subsidies for power tariff	World bank report	India	**Government policy of subsidy** for Agriculture consumers
15.	Effective Load Forecasting	S K Mittal	India	Rise in **power purchase cost** is predominantly contributed by ineffective load forecasting in power utilities
16	Learning from India-Defining profitable	Glen	India	Importance of **DSM** in **power purchase cost** optimization for Power utility, energy service

	DSM and ESCO PROGRAMS for a Utility	Weisbrod		company, investment and profit sharing model, scope in India
17	Impact of power sector reform on poor: case studies of South and South East Asia	A.R. Sihag, Neha Mishra, Vivek Sharma[16]	Global	Power sector reforms may be financially sustainable solution in few countries but **people oriented approach** is missing, basic services not met due to profitable business approach
18	Survey related to Power Quality Issues in Indian Electricity Market	Lokendra Pal Singh, Ravinder Singh Bhatia and Dinesh Kumar Jain	India	Specific problems pertaining to supply of power including voltage fluctuations, load shedding, metering, billing, time taken to give new Connection/ is connect /load enhancement/reduction etc.
19	Role of service quality in measuring Customer satisfaction in power Sector: A case of Dhaka Electric Supply Company	Wasim Jabber	Dhaka	Uncover the gap in DESCO service quality with reference to customer Expectation and customer perception.
20	Improving quality and access to services and supports in vulnerable neighbourhoods.	Satisfaction, C. (2007).		Reinventing government, introduction of Customer choice in public services, Personal budgets to shift the focus from supply to demand, A CENTRALIZED ASSET MANAGEMENT ORGANIZATION
21	IDFC Energy advisory board	IDFC ENERGY	India	**Financial health** of power utilities in doldrums. Autonomy and serious reforms and their

	proceedings	REPORT		necessity
22	Financial position of power utilities	Shunglu committee appointed by Ministry of Power	India	Financial information given by utilities needs to be checked for correctness along with honest approach towards timely tariff revision
23	Power distribution in India	CRISIL Annual Report	India	**Financial Sustainability** is common problem for all power utilities in India irrespective of area and type of functionality
24	Operational & Financial Viability of Distribution Utilities in Major States of India	Ashish Garg	India	To get a Policy & Regulatory Overview of the distribution sector in major states of India, To analyse the operational and financial performance of the respective state SEBs and compare them accordingly on various parameters.
25	The Power Sector in India: An Inquiry into the Efficacy of the Reform process	Saugata Bhattacharya	India	Weak relationship between ownership and profitability caused lag in performance for state utilities with respect to Private players
26	Global electric power reforms , privatization and liberalization of the electric power industry in developing countries[17]	R. W. Bacon and J. Besant-Jones, The World Bank, Washington, DC	Global	**Increasing demand of power**, competitive buying of power, and healthy environment for investment, **legal and regulatory framework**. Realignment of investment strategies.
27	Impact of Reform and Privatization on Consumers : A case	Goutam Kumar Kundu,	India	Social factors, financial capability of private players, failure of model due to onetime investment approach, **Customer aspirations**

	study of power sector reforms in Orissa[18]	BidhuBhushan Mishra		not met.
28	Distribution Sector Reforms In India	S. C. Tripathy and Tripta Thakur	India	Sustainable sources and privatization of electricity sector
29	Market Entry Barriers for FDI and private investors	Sun Xuegong, GuoLiyan, Zeng Zhen	China	Inadequate Regulatory System, Changes in Electricity reforms, encourage private investors to play a role in the electricity sector[19]
30	Power Sector reforms and restructuring in Korea	Young-Hwan Moon-IEEE	china	Cost based Pool, Deregulation and Privatization
31	FDI in power sector-NTPC Report	Financial express	India	Lack of proper support, **Capped regulatory framework** and worst financial health of power utilities is hampering FDI in power sector
32	Market operations in future Indian restructured power system scenario[20]	P. Kanakasabapathy, K. Shanti Swarup	India	Return on investment ,**FDI in power sector**, generation limitation and private players, Competitive power purchase through spot market
33	Power politics: Process of power sector reform in India. Economic and Political Weekly[21]	Dubash, N. K., & Rajan, S. C.	India	Forge a broader public consensus to reduce political and financial risk, Attract capital based on reduced risk

34	Human Capital Challenges in The Tamil Nadu Electricity Board Ltd., Under The Context of Electricity Act, 2003	Veeramani, C., & Chandrasekaran, R. (2016)	India	Focuses on designing an appropriate policy to create human capital and Competency in the electricity supply chain.
35	Competition Issues in the Indian Electricity Sector	Pati, S., & Pati, I. (2014)		Structural, regulatory and market reforms have been applied to electricity sectors in India, Trading has been recognized as an independent activity, Wholesale markets have improved their performance[22] helping to mobilize relevant Investments in new generating capacity in India.
36	Post-reforms training needs of front-line managers at Indian power distribution companies: A middle managers' perspective	Suresh Vishwakarma and Ruchi Tyagi		Identify competency area for training frontline managers –technical, management, commercial.
37	The Power Sector in	Saugata Bhattacharya	India	Improvements in revenues and cash flows of

	India: An Inquiry into the Efficacy of the Reform Process[17]	and Urjit R. Patel[17]		utilities.
38	Employee engagement in a public sector undertaking: An investigation. International Journal of Management Research & Business Strategy	Singh, A., & Sanjeev, R. (2013). 2(2), 93-100.	India	To identify the factors of employee engagement and also to examine the relationship between employee engagement and performance in the PSU.
39	Service quality evaluation in electricity utility industry: an empirical study in India[23]	S Sathpathy, S SMahapatra, S K Patel	India	**Customer satisfaction**, changing market, **competitive environment** in power utilities, end user equipment and their efficiency
40	QFD for utility services: a case study of electricity distribution company DESCO[24]	Anwar, M. R., Masud, A. K. M., Abedin, F., & Hossain, M. E. (2010)		Technical improvement, management of staff, formation of staff for line staff emission, routine maintenance, arrangement of logistic support, formation of staff for customer service, assign staff for collecting meter reading and sending bill, monitoring the activities of staffs, creating highly competent staff group
41	Financial position of power utilities	Shunglu committee appointed by	India	Elaboration on Role of SEB, Government, Regulator and MOP for effective improvement

		Ministry of Power		of power business.[24]
42	Subsidies to be borne by state governments	B P Nansi	India	**Subsidies** need to be borne by State government directly. SEB Financial health is affecting badly due to declaration of populous schemes by state government
43	Regulating technological change—the strategic reactions of utility companies towards subsidy policies in the German, Spanish and UK electricity markets.	Stenzel, T., & Frenzel, A. (2008)	German, Spanish and UK	Technology development, regulatory adaptation, long-term, stable investment horizon, low barriers for new market entrants. [25]
44	Reorganizing Power distribution in India	Rafiq Dossani	India	Power sector reforms, **economical efficiency**, **regulatory structure**, policy makers approach, reorganization of utility, political compulsion
45	The political economy of public utilities: A study of the power sector	K.P. Kannan&N. VijayaymohananPillai	India	**Political economy**, principal-agent relationship, **regulatory structure**, politico-economic implications, **cost of corruption**
46	The Political Economy of Indian Power Sector Reforms	Rahul Tongia	India	Tariffs must rise, A financially sustainable system must have higher end tariff
47	Introducing competition in	Rasmiranjan Das(2010)-	India	**Deregulation** in generation, competitiveness of energy cost, implementation of USA Model in

	power sector in India: Adoption of US Model	Emerald Journal		India and its feasibility
48	Service quality evaluation in electricity utility industry: an empirical study in India[23]	S Sathpathy, S SMahapatra, S K Patel	India	**Customer satisfaction**, changing market, **competitive environment** in power utilities, end user equipment's and their efficiency
49	Franchisee Model in Power distribution Business	PRAYAS Pune Review Report	India	Franchisee Model is successful model but limited scope as model is without ownership and financial authority
50	Regulated Utilities-Reinventing the classic business strategy	David Fernery and Bronco Terzic	Global	Market penetration, vertical integration, unrelated **diversification**, globalization
51	ESCO'S-The need of an hour for energy efficiency in India	Mr. ShishirAthale and Mohan Chavan	India	Need of energy conservation, energy audit, ESCO, **Investment**, profit sharing model, **demand side management(DSM)**
52	Sustainability in the electricity utility sector	World Business Council for Sustainable Development	Global	Implement Environmental Management Systems, Develop low pollution technologies and measures, Develop Greenhouse Gas Strategies, Promote renewable Energy Development
53	The leap towards sustainable	Confederation of Indian	India	Technology enablement for sustainability and energy efficiency, Demand side management,

	power in eastern India	Industry		Energy efficiency improvements
54	Analysis of created value added in electric power sector: A case study of Turkey	NazifHulagu Sohtaoglu	Turkey	Total Assets, Net value added approach for development and sustainability of power sector in Turkey
55	Governance and Service Delivery: A Study of Power Sector Reforms in Orissa[18]	BikashChandra Das, Institute of social and economic change,[18] Bangalore	India	Failure of private sector in power distribution, **investment in power sector** by private players, **efficiency improvement**, **social factors**.
56	Power Sector Reforms in Bangladesh: Electricity Distribution System	M.S. Alam, E. Kabir, M.M. Rahman, M.A.K. Choudhary	India	Preference to transmission and generation, loss control, collection–import (CI) ratio for increased revenue and various measures for efficiency improvement through **loss reduction**
57	The Reform of electricity power sector in the PR of China"[26]	ShaofengXu, Wenying Chen	China	Role of State power corporation in restructuring the power industry of China[26]
58	Power Sector Reform in Developing Countries: Mismatched	NjeriWamukonya	Global	Strategies and implementation in various countries, Support from government and social factors, financial perspective, **Regulator mechanism**

	Agendas			
59	Reforms of electricity power sector in PR of China	Shaofengxu, Wenyingchen	China	Characteristics of Power sector reforms in China,[27] effect of USA and UK Reforms, Competitiveness in suppliers of electricity
60	Power Sector Reforms in Argentina: an update	Gautam S. Dutt, Fernando G. Nicchi, Mario Brugnoni	Argentina	market-oriented approach - environmental regulation and rural electrification, performance analysis of power sector since the reforms
61	Power sector reform in developing countries: mismatched agendas.	Wamukonya, N.	Global	Important issues addressed by Electricity Act and their impact on power system restructuring.
62	Power sector reforms in Uttar Pradesh	Dr. F B Singh, Anita Kumari	India	economic development, reforms, plant load factor, power shortage, interests of consumer, T&D Loss, cross subsidy
63	Power sector reforms and restructuring in India	Khaparde, S.A. –IEEE	India	Effective features of electricity act, development of power market, lessons learned from initial reforms and co-ordination between state and centre for implementation of recommendations of EA Act-2003
64	Corporate Social Responsibility as Risk Management	Beth Kytle&John Gerard Ruggie.,2005	Global	To contribute sustainable power development by discharging corporate social responsibility

65	Better power for health: healthy public policy and sustainable energy in the Thai Power sector[28]	Sukkumnoed , Decharut	Thai	Classification of renewables, Contestation in the Market and Governance Structure, Single Buyer Model, Organized policy forums on the privatization process, The EGAT privatization plan, Improvement in Grid Access and Interconnection.
66	Environmental reporting by Indian Corporations	Sahay, A. (2004)	India	Emphasis on environmental reporting

2.4.1 LIST OF THEMES:

We have done a detailed literature survey through 66 nos. of research papers and have concluded on the following themes which have been used for further research study.

- Technology Up gradation
- Business sustenance strategy
- Power purchase cost and Tariff revision
- Customer expectations
- Financial health and stability of Power Utility
- Privatization and De-regulation
- Investment in Power Sector
- Manpower Competencies
- Employee Engagement and Customer Satisfactions
- Political, regulator and Competitiveness
- Demand side management &Energy Conservation
- Power sector reforms in India
- Corporate Social responsibility
- Power sector reforms across world.

2.5 THEMATIC REVIEW OF LITERATURE:

2.5.1 GLOBAL SUSSTAINABLE DEVELOPMENT:

The concept of Business Model

A business model is a conceptual framework that provides evidences to explain the manner in which business enterprises deliver value to their esteemed customers. The model encapsulates details concerning revenues, profits, costs and other essentials concerning issues pertaining to proper functioning of business enterprises. A business model is also referred to as financial architecture of business, which firms anticipate in order to deal with unanticipated changes in complex business environment and avoid the risk of collapse. The model provides an in-depth description of the process through which it can convert investments into profits. It also briefs about the benefits associated with the consumption of products and services provided by the firm (Teece, 2010). The model offers a valued tool for investigating and running the best practice in one particular business environment (Zott and Amit, 2008; Schaltegger et al., 2012)

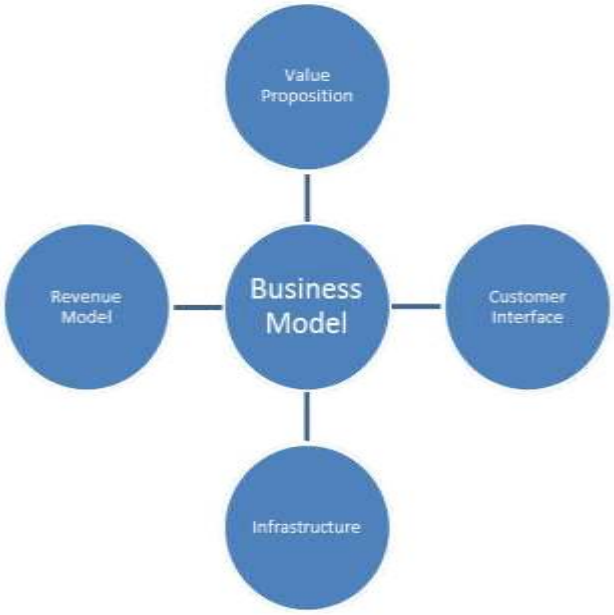

Figure 2.1: Pillars of Business model (Source: Osterwalder, 2004)

Utility Business Model: The global power sector is highly dependent on production through fossil fuels. But, power utility sector that is completely dependent on fossil fuels or any other depleting energy source for production of electricity is neither a sustainable nor a profitable path. In order to deal with opposition forced by sustainable energy system, power sector needs to integrate the component of sustainability to identify alternative sources of energy and retain sufficient amount of electricity for future use. The former utility business model has constantly been confronted by altering market conditions. India being a developing nation is evolving at an enormous speed. Altering living conditions have rapidly changed the electricity demand of the consumers (Schmidt et, al., 2012). Between 2012 and 2040, annual consumption of electricity is anticipated to increase by 3.2% (Deloitte, 2015). Utilities present in India are expected to integrate strategies to handle the impulsive demands of the consumers which might require investments into renewable. Unlike traditional utility models, which put emphasis on selling maximum electricity, the changing power sector is identifying novice energy efficient sources to confirm the feasibility of novel revue streams such as distributed energy, smart metering, Bundled Home Services, EV infrastructure development and management, PV Charging, Rooftop Solar etc. Apart from this utility companies have constantly been threatened by non-utility private enterprises providing products and services in the similar segment. This kind of competition from external private players mandates companies to increase its market outreach. Current study illustrates a new promising business model specifically in the context of Indian electricity generation market segment. Two generic business models — each with an own underlying business logic — are identified in the literature: Customer-side renewable energy business models [29] and utility-side renewable energy business models. [30]

Renewable energy business model - Utility perspective: This business model comprises large scale projects with a capacity ranging from one to a few hundred megawatts. The main technologies for this application are on- and offshore wind energy, [24] large-scale photovoltaic systems, biomass and biogas plants, as well as large-scale solar thermal energy like concentrated

solar power. The value proposition in this business model is bulk generation of electricity [25] (Nimmons and Taylor, 2008). The electricity is fed into the grid and delivered to the customer via the conventional electricity value chain. Therein, the interface of the customer comprises of power purchase agreements on a B2B level, rather than a relationship with the end-customer. As for the overall business model, these projects are similar to traditional centralized power plants [30] than those like the small-scale renewable energy projects on the customer-side.

Renewable energy business model – Customer perspective: This business model comprises of energy generation in small-scale systems close to the point of consumption, [31] also referred to as distributed generation. The main technologies for this application are solar photovoltaic (PV) systems, micro-wind turbines, and micro-combined heat and power systems (micro-CHP). This distributed form of renewable electricity generation is often seen as a potential pillar of the future energy landscape and associated with substantial environmental benefits [29] (Alanne and Saari, 2006; Omer, 2008). [32]

In addition to the need to change the business models so as to integrate the provision of renewable energy, the electricity sector also faces problems owing to structural reforms related to

(1) New technologies

(2) Changes in the policy landscape, and

(3) The presence of more demanding customers.

Technology is related to factors such as the introduction of smart grids, demand side management, more widespread electricity generation, and storage technologies, all of which lead to the network becoming more complex as power and information are required to flow in multiple directions. Changes in the policy landscape refers to policies concerning issues related to renewables, energy efficiency, energy storage, and energy production to meet climate change targets and energy security (Valocchi, Juliano & Schurr, 2014; Tukker & Butter, 2007). Renewable energies are considered as the most important

apparatus available in fighting and mitigating climate change and in reducing the negative effects associated with electricity production. Finally, demanding customers refers to the fact that customers now expect to receive more from utilities than reliable power supply at reasonable rates. Customers demand more control over their electricity consumption in order to save electricity, save money, and be more environment friendly (Gsodam et, al., 2015). This makes all the more necessary the business models for renewable energies and a sustainable electricity system. [10]

Strategies of Sustainable Business in Power sector

The concept of Sustainability

The concept of sustainability focuses on building business models that only not generate higher profits for the company but also places greater emphasis on social-economic needs of the community. The company dedicatedly works to either remove or considerably reduce the spillover effect of business operations on natural surroundings. Due consideration is placed that company activities does not impend any kind of dangerous impact on the environment in which it operates. The economic gains or the technological progress of the enterprise should not impose any damaging effect on the society at large. The company activities rather should eliminate communal problems like poverty reduction, problem of unemployment and pollution, full-exploitation of natural resources and avoiding wastage, enhancing health as well as quality of lives, preserving bio-diversity, eradicating gender biasness and providing equal employment opportunities to young as well as disabled and aged people (Danciu, 2013). However, former studies have found that maintaining healthy stakeholder relations is a pre-requisite strategic process that companies should adopt for business sustenance (Bansal, 2005; Sharma, 2002). Harrison and Freeman (1999) were the first one to study the role of stakeholders in fostering overall performance of the firm.

Four strategies for better sustainability of the company:

SS1: **Risk Management-** It has a decisive role for company strategy success and it should include all departments and operations. Becoming a sustainable company needs leadership, commitment,

employee engagement, stakeholders and disciplined mechanisms for execution with business management. Risk management is required for evaluation and to mitigate any sustainability risks that may occur due to existing and emerging environmental, governance and social risks. The risks relating to the environment are carbon emissions due to climate change, drought and flood, constrained resources and their diversity or biodiversity and pollution. The governance risks would include the corporate policy if not complied, compensation and bribery, lack of compliance to regulations and so on, as the major risks. The reputation management is one of the most significant parts of the sustainability of the business. Risk management deals the risk by design and implementing procedure to minimize loss or financial impact of losses that do occur (Vaughan, 1997). The corporate reputation is an integral part of the company performance, and forms an intangible asset greater than the brand. Risk Management address risk before mitigation action as well as the risk that remains after the counter action that has been taken (Ga0, 2006).

SS2: Sustainable innovation. It is the need of the hour that the company demands for innovation not only in the technical areas, but also in the fields related to social and environmental domains. The sustainable innovations are critically dependent on qualified workforce, management systems results and are stakeholders oriented, dialog between stakeholders along the value chain, interactions between the actors of economy, state and civil society, changes in business development and jobs creation. Model exploring the innovation territory beyond compliance and optimization suggest the need for a fundamental shift in innovation thinking and practice. This shift moves from a passive or reactive relationship with environmental and social considerations through the development or redesign of sustainable offerings to find novel ways of delivering and capturing value, which will change the basis of competition(Nidumolu, Prahalad & Rangaswami, 2009:60). Imagining new outcomes and understanding; and leveraging the interdependence of system

components(Sebode, Jeanrenaud & Bessant,2012).The sustainable product innovation should follow strategies that target the design and the development of products with a reduced amount of non-renewable resources and preferably from renewable resources, reduced costs, zero pollution, zero waste, biodegradable packing and environment neutral.

SS3: Sustainable competitive advantage: A sustainable competitive advantage is that competitive advantage which could be maintained on a long-term period, in opposition with one competitive advantage which results from short-term strategies and operations. Strategy within the 1980's mainly focused on management of external factors as the source of competitive advantage (Porter, 1985). According to neoclassical economists the market is one of the perfect competition characterized by homogeneous good, countless buyers and sellers with timely information and who have no influential power over the goods and services they deal with (Collins and Montgomery, 1997; 26) The sustainable competitive advantage can leverage the sustainability to increase all business values if it becomes an integrated part of the global sustainable strategy of the business. Integrating sustainability in operations and processes with the value chain is another aspect of sustainable competitive advantage.

SS4: Eco-efficiency: It should be noted that the aspect of environmental sustainability is generally present in the domain of development of the product. A significant quantum of studies focus on the development technique to evaluate existing technologies to select those that produce least neutral impact (advance, 2006; Figge and Hahn, 2005; Jappur et al., 2008; Gonzalez-Jimenez et al., 2001). One major technique for eco-efficiency is increasing the resource productivity, which allows the products to be easily dissembled and once dissembled, to be reused or composed. Jappur et al. (2008), the use of eco-efficiency products in strategy involves combining the environmental performance and the economic performance of the means of production so at to promote corporate sustainability thus becoming a vital factor for business success.

Sustainable Business practices of Power Sector

1. **Transition to a clean energy future:** The energy mix employed by power utility companies for the production of electricity is swiftly changing. Frantzis et, al, (2008) suggest that transitioning from fuel-based production system to renewable energy sources is the most promising approach for utility business model. Additionally, digitization and modernization of the power grid facilitates exponential growth in electricity supplied. Despite the fact that, renewable energy projects are not viable enough to deliver returns as distributed by traditional power plants, yet they minimize the risk of failure and is a workable approach from financial point of view. (Khor & Lalchand, 2014)
2. **Enhancing grid safety and security:** A detailed review of literature suggest that in addition to uninterrupted supply of electricity, providing safe as well as reliable electricity supply is yet another goal of power sector. The electric power grid is a complex web of power plants, interrelated transmission lines and other distribution facilities that are constantly exposed to both malicious as well as natural events like thefts and storms respectively. These activities can cause serious harm to electric infrastructure of different utility companies, thereby disturbing the smooth flow. Technology enabled power grids not only make the system better controlled and ensure smooth undisturbed flow of electricity (AT Kearney, 2012).
3. **Customer Solutions:** Unlike former power sector, existing utility models provide tailor-made services to fulfil the increasing needs of their customers. Demand management activities are undertaken to incorporate flexibility both within peak hours and non-peak hours. Measures are adopted to significantly reduce tariffs being charged from customers. Numerous technologies are analysed that considerably recover power quality which is supplied and minimizes the risk of minutest fluctuations. By involving consumers utility companies can expand revenue sources (Richter, 2011).

4. **Service Innovation:** Modern distributed utility models in power sector aims at minimizing adoption barriers and providing new accessible providers to uninterruptedly offer new-fangled types of energy services in parallel with the regulated utility. Innovating rights and simplified financial arraignments stimulates external third party entities to develop novice renewable distributed generation projects.
5. **Separation of carriage and Content**: For sustenance of power business, 'separation of carriage and content' is a potential strategy implemented by electricity providers. As per the strategy, a private distribution company is just responsible for delivering electricity to end-to-end consumers. However, another private companies deals with the process of revenue collection. Power retail and power distribution are recognized as two distinct functions, where retail business is responsible for buying electricity from generators and distribution business manages the final distribution process that is, connect with end consumers directly (Kumar & Gyanpuri, 2014.)
6. **Wealth dynamics:** From 2017 to 2030, the middle class population is anticipated to grow beyond 172 percent. Fulfilling ever-increasing demand of the population is yet another challenge for the business. Resources to fulfil this demand are scanty. The benefits many companies have enjoyed owing to "cheap" labour in the developing countries, in the past two decades, would likely be worn out by the growth and the power of global middle class.

Sustenance of Business Management

Gentailer model: This kind of utility model controls all the activities related to power sector. It is not only responsible for generating electricity but also selling electricity to consumer segment. This model basically pays a premium to buy energy to supply directly to the consumers that is act as a third party medium that collects monthly premium for the services that they deliver. The company identifies potential market spaces and manages power load imbalances. This model makes use of smarter technologies to predict

chargeable tariffs easily. Here the utility engages into network partnerships with other potential players of the market.

Pure play merchant model: This kind of utility model is likely to retain and control generation as well as selling function. The only difference is that this utility model supplies into the wholesale market at competitive prices rather than dealing with end-to-end consumers. This model engages into bilateral contracts with other big industrialized market players. Assets are built and financed by investors on a speculative basis, pre-contracted in part or in full or acquired from another generator.

Grid developer model: This utility model procures, improves/builds, retains and conserves transmission assets that connect generators with operators of distribution system. The grid developers involved in this kind of model connect with load centres and manage electricity supply to deal with imbalances between demand and supply. It also encourages investors to invest into novice cleaner technologies to sustain continuous flow of electricity.

Network manager model: This model operates as monopolistic players to manage the distribution of assets and provide uninterrupted access to electricity both to retail service providers as well as generators. This model typically manages load imbalances to manage demand and supply gap. Its activities are more or like similar to the activities of distribution system operator.

Product innovator model: It is an enterprise that offers both electricity and behind the meter products to the consumers. It emphasizes on expanding energy supplies and deals with evolving expectations of the customers. Customers are given the permission to control the smart meters as per their energy requirement, which ultimately helps the company in analysing consumption pattern of consumers. It also integrates new-frangible products into the existing product line to avoid fraudulent events. The subsequent section of the literature examines global power sector and amendments made by utility models operating in advanced economies. An understanding of such

kind is helpful for the study because it helps discovering future potential strategies that can be implemented in the context of study area.

2.5.2 TECHNOLOGICAL UPGRADATION

In order to review the technological progress in electricity market, a study was undertaken in the year 2014 by Cerovi & Maradin (2014) with a motive of identifying alternative sources of energy that can easily replace conventional form of resources. The study highlights the emergent need of identifying renewable sources of energy for long term survival of power sector because of diminishing fossil fuels.[33] The study emphasized the fact that share of renewable energy sources will not only improve the productivity of power sector but will also safeguard the consistent supply of electricity round the year. Much of emphasis was placed on restructuring of power sector, to minimize the exploitation of fossil fuels, the primary source which contributes to maximum share in global electricity production that creates harmful effects on environment. Another report in which Reji Kumar Pillai establishes the need of strengthening existing electricity network of India by incorporating IT and automating electricity system to meet the ever-increasing demand of electricity. In the similar context CEA Report (2010) elucidates the influential role of automation in acquiring, monitoring and controlling the supply of electricity. Vinod Kumar Yadav Padhy& H O Gupta (2010) [34] have shown that that numerous electricity distributions in Uttarakhand have scope for progressions in inclusive efficiency of power sector by adaptation of Advanced Technology. However, study conducted by Tiwari A.K., Chandra V. and Pandey Atul (2008) have addressed the imperative role of Information technology in enhancing overall productivity of the power sector and minimizing the operational costs as well as cost incurred in upholding the consistent performance of the system. As per (Gupta& Srivastava, 2004), automation of electricity power distribution system will not only enhance the reliability and quality of electricity supply but will also reduce the operational problems associated with electricity distribution network.

2.5.3 POWER PURCHASE COST AND TARIFF REVISION

Chatterjee (2011) identifies gaps in power shortages, which can be recovered by revising power tariffs on regular course of duration to bear the added cost burden on account of distribution losses, uncovered revenue and purchase costs. However, any sort of time-lag in revision of tariffs is likely to impact the financial health of the power sector. Moreover, Shunglu committee appointed by Ministry of Power in his discussion have emphasized that tariff revision is a short term measure adopted by power utilities to deal with financial losses. In the similar context a report on A Reality check on subsidies for power tariff identifies the need to incorporate new power sector reforms to deal with financial losses and significant investments to enhance the quality of electricity supplied. The importance of load forecasting has been highlighted in the study conducted by Mittal () to make important decisions including purchasing and distribution of electric power, load switching, tariffs, transmission of electric powers and institutional developments. Consequently, discussion made by Weisbrod (1998) has suggested measures to enhance power utility processes. The discussion also highlights how management of demand for electricity can help in reducing costs, while simultaneously upholding the revenue generated.

2.5.4 CUSTOMER EXPECTATIONS

In order to meet customer satisfaction, studies were conducted to identify measures influencing customer satisfaction pertaining to area under investigation. Firstly, the study conducted by Sihag, Misra and Sharma (2004) examines the impact of power sector reforms in India on poor population of the region.[20] The paper analyses that power sector reforms were implemented to help Indian population have an equal access to electricity. The paper has drawn a comparison between Philippines Act that places a mandate on electricity provision to rural areas and Indian power reforms where there is no such provision that ensures equal access to electricity to poor population of country. Another survey conducted by Singh, Bhatia, and Jain (2014) addresses the problems associated with performance of power distribution

companies in Delhi and gives certain recommendations to deal with the problems thereby, enhancing customer satisfaction level and trust for the industry.

2.5.5 FINANCIAL HEATLH AND STABILITY OF UTILITY

In the current section of literature review, the financial position along with most suitable distribution model is identified for long-term business sustenance of power distribution model of India. Firstly, the report organized by IDFC Energy advisory board (2011) identifies the role of private investors in catering the unmet demands of electricity through renewable sources of energy. [35] The discussion has also placed great emphasis on identifying measures to reduce transmission losses, uncover the revenue gap, encourage capital flows for enhancing the distribution network and focus on quality of service provided to the customers. The report also stresses upon the importance of investments from financial institutions to renovate the financial position of power sector. Shunglu committee appointed by Ministry of Power identifies reasons behind the financial losses of State Electricity Boards and also recommends measures to deal with these losses. CRISIL Annual Report (2012) also addresses the weak financial position of power sector in India and come up with optimal solutions to safeguard long-term economic sustainability of state Electricity Boards. Lastly, study conducted by Garg (2014) has come up with optimal solutions to improve the operational and financial viability of power distribution utilities operating in India including tariff revision, power load forecasting, and improvements in business planning, strengthening power distribution network, and meeting customer expectations

2.5.6 PRIVATIZATION AND DE-REGULATION:

Restructuring of power sector reforms in India led to deregulation of power industry. This deregulation was done to encourage multiple private players involve in the process of generation of electricity. Also, it was done to automate the process of generation and transmission which will not only reduce the cost that has been charged from the consumers but will also supply

excess power to consumers. In the similar context, a study conducted by Bhattacharya addressed the role of private players in meeting the increasing commercial and industrial electricity demand. Bacon and Jones (2001) discussed that restructuring of reforms is a result of poor performance of state owned electricity boards, accumulated financial losses, inadequate access to electricity and desire to recover revenue gap. Liberalization and privatization of power sector is recognized as a prominent solution to raise the amount of electricity supply, while simultaneously control the transmission losses. The study emphasized the need to encourage financial investors to provide the required capital investment to the sector. Similarly, Kundu& Mishra (2011) identified that liberation of power sector removes the constraints of public control imposed on power sector. The discussion in the study placed emphasis on consumer unmet need of electricity. Tripathy& Thakur (2012) have shown that involvement of private groups in power sector is likely to reduce the demand–supply gap in the distribution of electricity. However, Xuegong, Liyan & Zhen (2013) have stated in their study that despite of the unbundling of reforms to boost the participation of private players in China's competitive market, the market lacks the competitiveness because of lack of appropriate regulatory and legal framework. Consequently, Korean electric market also witnessed changes in conventional reforms of power sector on account of deregulation and privatization.

2.5.7 INVESTMENT IN POWER SECTOR

In order to analyse the prominent reason behind accumulating financial losses, potential investment policies and sources are been reviewed in the subsequent section to recover the poor status of distribution companies. Firstly, report generated by NTPC revealed that to keep pace with the soaring demand of electricity, power sector of India requires huge capital and proper support from government thereby, removing restrictions on FDI and its related policies. Another study directed the need to have a suitable pricing scheme for the potential future growth of Indian electricity market. Lack of political support inhibits FDI flow into the sector. Dubash & Rajan, (2001) reviews the outcomes of power sector reforms with respect to social society and

environmental outcomes. The study also highlights the imperative role of private sector in amplifying the level of investments made in the sector and supporting sustainable development for long-term usage.

2.5.8 MANPOWER COMPETENCIES

A study conducted by Veeramani & Chandrasekaran (2016) have emphasized on the importance of training for building appropriate competencies and skills amongst employee of power sector, to meet the increasing demand of human capital of power sector.

2.5.9 EMPLOYEE ENGAGEMENT AND CUSTOMER SATISFACTION

The discussion made in the subsequent section determines the impact of employee engagement level on organizational performance, specifically in the context of power sector. Study conducted by Singh & Sanjeev (2013) identifies factors for retaining employees in public undertaking apart from incentives and higher salaries. These factors include job contentment, career growth and development opportunities encouraging employees to work with dedication and focus.

Sathpathy, Mahapatra, & Patel (2011) focused their attention on identifying elements of contributing to customer satisfaction level. The study recognized various quality aspects of electricity supply that holds utmost importance to customers. A review of such kind will help the regulatory environment in framing policies beneficial for growth and development of overall sector.

2.5.10 POLITICAL, REGULATOR AND COMPETETIVENESS:

Shunglu committee appointed by Ministry of Power has presented the financial losses undertaken by power sector before and after funding. The report has analysed the role of state Electricity board, Government role in implementing certain measures to recover financial accumulated loses. Nansi (2004) stated that "Subsidies should be borne directly by state governments" to give relief to the State Electricity boards. Also, need for installation of smart meters was identified to conserve energy for future use. The discussion

made by Nasi placed greater emphasis on improvising state government policies.

Dossani (2004) recognizes reform policies as well as other institutional characteristic features. The study analyses that it is viable for current distribution reform to supply effective electricity to maximum coverage area. Therefore, policy makes of respective states are required to reorganize the reforms in the distribution sector for efficient distribution of electricity. Kannan & Pillai (2001) in their study discussed about the political economy of public utilities in special context of Kerala. Tongia (2004) analysed that governmental expenditure was not enough to meet the shortages of Indian power sector capacity. Though reforms brought upon some significant changes but still role of state cannot be ignored. State electricity boards were now responsible for separating the key functions of electricity boards. Privatization brought about a revolutionary change in operational management of SEBs. Also the paper recognized the need to amplify power tariffs at regular intervals to deal with revenue gaps.

Das (2010) identifies the need of incorporating competitiveness in market pertaining to power sector. Das recognized the potential benefits of implementing USA model as in the context of India, which will help the distribution sector in acquiring power through open competitive bidding. Satapathy et al (2011) in his study discovered reasons behind the rising expectations of consumers from power sector. The study declared that growing competition between utilities and changing legislation are amplifying the dissatisfaction level of customers. A great deal of attention needs to be placed on meeting the electricity needs of the customers of the quality as perceived by customers. Public private partnership has been recognized as an optimum solution for dealing with technical and commercial losses of power sector and meeting the customer requirements.

2.5.11 DEMAND SIDE MANAGEMENT AND ENERGY CONSERVATION

The discussion made by Fernery &Terzic (2005) identifies prominent strategies for public utilities including conglomerate diversification, market penetration, vertical integration, related diversification and globalization. These strategies will enable public utilities create a competitive market segment. ESCO is a business firm that identifies the need of conserving sustainable energy for future use. ESCOS can help the Indian industry to significantly reduce its energy costs through economically attractive measures and can help Indian companies become more attractive in global market. Another report documented by World Business Council for Sustainable Development summarizes sustainable strategies to conserve significant amount of energy for future use. The report also reviews sustainable strategies for minimizing the environmental impact of electrical reforms. Confederation of Indian Industry sums up power as a key infrastructural requirement of a developed nation. The report not only promotes measures to improve efficiency of energy sources but also posits the potential benefits of renewable sources of energy to manage unmet demands of the consumers. A substantial part of report encapsulates technological developments for improving energy efficiency and coverage area. Lastly, study conducted by Sohtaoglu (1999) proposes several solutions for dealing with problems concerning power sector.

2.5.12 POWER SECTOR REFORMS

Dash (2007) identified the prominent role of governance in power sector and its policy formation. Power sector comprises of complex functional activities like transmission, generation, distribution of electricity and role of state in governance procedure of power sector cannot be ignored. In order to assess the governance of power sector the study conceptualized factors like characteristic features of service delivered, role of customers and efficiency of power sector and suggested solutions to help sector in overcoming revenue gaps specifically for the case of Orissa. Another study conducted by Alam et al, (2004) identified measures for improving efficiency of electricity supplied while simultaneously dealing with transmission losses. In the similar context,

Xu& Chen (2006) analysed the importance of unbundling of power reforms specifically for China. The paper also identifies future challenges in Chinese market and prominent reforms of China power sector. NjeriWamukonya also emphasized the role of reforms to meet the developmental challenges of Power sector. Wamukonya, (2003) also addressed issues pertaining to electricity sector in developing countries.[37] An analysis of power sector reforms in different developed countries can help India analyse the best suitable model as in the context of Indian economy. It can also help India in implementing strategies similar to those that have been implemented in developed countries.

2.5.13 CORPORATE SOCIAL RESPONSIBILITY:

Development of rural sector is mandatory for development of Indian economy. Study conducted by Kytle & Ruggie (2005) recognized that for business sustenance of power sector it is expected to adopt measures to fulfil the community needs of electricity. Provision of development programs for enhancing skills and competencies of workers is an initiative of the company to undertake development measures for its internal workforce. Similarly, the sector is expected to meet the unmet needs of poor population of rural areas.

2.6 POWER SECTOR REFORMS ACROSS THE WORLD:

2.6.1 OVERVIEW OF POWER SECTOR REFORMS IN GLOBAL ECONOMIES:

The current study tries to identify the various power utility models existing in India and analyse them for the various strategies which can be useful in covering up their losses.

The recommended solutions are viable enough and are being implemented successfully in different parts of the world. The various financial sustainability options are either adopted from existing models or have been introduced in customized manner for the Indian market scenario.

Black and Veatch (2013) in their report on Strategic Directions in the US Electric Utility Industry, 2012[9] described how the business models and evolving and in what sense the sustainability is being arrived for them. The major areas implemented and analysed were:

Trends in an Open Economy: USA

- Electrification of Transportation leading to more consumption
- Lots of Mergers & Acquisitions
- Better Customer Engagement leads to lesser defaulter cases
- Better Economic Regulations & rates are key for sustainability
- Intelligent Infrastructure like Smart Grid will rule the globe in Power Distribution
- Exploitation of renewable sources of energy is also one of the foremost problem of power sector

The results on the above framework in US had a significant impact on the Utility sector as shown below:

M&A IMPACTS ON OPERATIONAL COSTS

Function	Mean Four-Year Cost Change[1]		Statistic	Comment
	Merger Group	Non-Merger Group		
Generation Non-Fuel O&M	-0.64%	8.90%	-2.06	Significant at >90%
Transmission O&M	-27.70%	17.39%	-4.67	Very highly significant
Distribution O&M	3.75%	4.83%	-0.33	Much weaker merger impact
Customer Service	0.04%	24.01%	-3.72	Highly significant
A&G	-5.30%	7.08%	-2.12	Significant at >90%
Total Non-Fuel O&M	-2.42%	9.68%	-1.64	Significant at almost 90%

Source: Black & Veatch analysis of FERC-reported cost data

[1] Real reduction in cost from year before to three years after close

Figure 2.2: Impact of Merger & Acquisition (Business Integration) on operational cost

Tarzey and Axby (2006) presented the various options with the Utility condition improvement in UK market with lots of financial sustainability models. They presented options regarding Utility Businesses and Assets management.

Trends in Mixed Economy UK, Argentina, Chile

- Technology Up gradation is key in assets management
- Integration of the Power Utility with other businesses is a proven successful formula
- Workforce Scheduling and Optimization can improve the efficiency of the whole business process
- Remote Monitoring and Intelligent alarms as a part of good infrastructure is beneficial

UK Utility derived several benefits from above trends such as:

- Benefits & Savings
- Maintenance Scheduling: £200,000 savings in Year 1
- Resource Utilization: saving of 4.5 full time equivalent posts
- Combining Asset Management across multiple services: annual savings of around £275,000 per annum
- Customer Service: 40% reduction in written complaints
- Field Service Costs: 40% reduction in number of call outs needed

Similarly, report by IEA (2006) for Power Sector Reforms in China also suggests the ways in which China has progressed over the time by implementing various new options in its Private Sector. And Yokoyama (2007) presented the Utility sector improvement in US and Japan with already mentioned strategies.

Argentina

- Restructuring and privatization has increased the number of private players operating in electricity market. More than 40 companies are working to increase the electricity generation capacity of the country, which earlier was controlled by 25 companies. With increasing number of private players entering the power sector, power sector is able to recover the between demand and supply. As, well as trade restrictions

were removed. Argentina and Brazil merged their respective electricity markets in the year 1997 to encourage free competition among power generating companies.

- Grid open access is governed by rule stating "merit order, or economic dispatch". According to the rule, only the electricity produced by the most efficient supplier is shipped first.
- The traditional barriers restricting new independent power and supplier groups to enter Argentina is eliminated to encourage cross-border competition among private players in the industry segment.

Chile

- CHILE is characterized by a highly competitive environment in the power sector. The country witnessed an increasing trend in the number of power generating companies. [38] The number which was 11 in 1996 slowly and steadily arose to 26 till 2000. Majority of electricity is generated by numerous private players existing in the country.

- Privatization also removed constraints on new investment and access to capital.

- The percentage of areas receiving uninterrupted access to electricity also increased from 70 percent to 97 percent. Transmission lines were improved to eliminate T&D losses and cases of thefts. As, a result of privatization distribution sector was enhanced to a level that electricity was now distributed to the entire nation. Transmission and distribution loses decreased from 24% in the year 1986 to 7% in the year 1998.

Trend in a Controlled Economy- China

- National power grid integration aims to identify alternative sources of energy that can be used to generate electricity. Simultaneously, reforms were implemented to fulfil ever increasing demand of China. The power sector reforms of China aim to fulfil the overall development of the economy. China took several measures to align the

development strategy with power sector reforms and policies to integrate demand into generating units and analysing strategies to fulfil future needs of electricity.

- Considerable remedial actions were taken to identify sustainable sources of energy to improve operational efficiencies and reduce environmental impact. The actions implemented over a period of time aims to separate out the environmental policies from the economic regulation of the power sector.

Table 2.2: Trend Analysis of power sector in different economies

Countries	Argentina(Mixed)	Chile(Mixed)	USA(Open)	China(Controlled)
First Initiative	Unbundling both vertical and horizontal and putting restrictions on cross ownership,2002	Regulation of Contracts between generators and distributors,2004	Mergers & Acquisitions and vertical unbundling,1995	National Grid Integration and unification of Govt. and business functions,1985
Ownership	More than 40 private distribution Utilities	100% privately owned	Public and private Utilities and PPP models	Province based Electricity boards as sole owners with (SETC)
Countries	Argentina(Mixed)	Chile(Mixed)	USA(Open)	China(Controlled)
Investment	Provision for Foreign investment and private investment	100% private investment in distribution and generation	Provision for Public Private and foreign investment	100% FDI in generation with plans to do the same in distribution
Price setting	Prices lowered by 30% and spot pricing was incorporated	Prices lowered by 25% and set by administrative system	Prices lowered by 35% through utility competition	Different power price setting by State Council
Competitiveness	Incorporations of Gas Turbines to increase participation	Reforms focusing on promoting private investment rather than increasing competition	100% Open Access	Open access included in reform to increase competition
Consumers	Dismantling of Cross Subsidy	Subsidy based on capacity usage (kwh)	Provision for subsidy	No subsidy initially
Access to Electricity	97.20%	99.40%	99.60%	99.20%
Renewables	Integrated and mandated	Target of 70% usage by 2015	Mandatory and Targeted for 100% dependency on	Mandatory Target of 170 GW by 2020

			renewables	
Flexibility	Flexibility in Operation and management	Rigidity in regulatory system	Flexibility and rules to change for efficiency	Strict laws
Social welfare	CSR used as tool for performance improvement as integral KPI	Giving voice to stakeholders	Profits to be spent on social needs like education and health	Providing uninterrupted power to customer
Regulatory Process	Accountable and company dominant	National Energy commission monitors the process	Multi-level regulatory system with transparency in Policy	Improving transparency through systematic public consultations
Innovation	Focus on reducing technical and non-technical losses	Reducing technical loss and expanding use of renewables	Implementation of Smart metering and its exclusive mutual use	Increasing efficiencies in wind energy
Mergers and Acquisitions	Incorporations of Generation for competition	50-50 partnering of generation and distribution	Power utility and Gas Utility has been integrated	Unification of other Govt. functions in electricity business
Growth	8.80%	7.10%	16%	26%

Key findings of Global Power reforms

1. Power Sector reforms were driven for **reduction of Losses** in Mixed and Closed Economies.
2. Promotion of Foreign direct investment and **participation of private companies** is highlight of all three economies.
3. Independence from Fossil fuels and **integration of renewables_**was focused in US , Turkey and Chile
4. Discipline in Power sector especially in Generation and Distribution by appointment of regulator or National Energy commission(CNE in Chile)
5. Development of **competitive markets**
6. Tariff Rationalization- **Cost Reflective Tariff**, Tariff based on Consumption in Chile, Subsidies for poor people in Argentina and TOU tariff in USA.

7. Power reforms were driven by economic crisis and Social Need at Argentina in 2002.
8. **Integration of Power Utilities** has protected business interest in US and South East Asia.

Key takeaways for Indian Context- Renewable Energy Integration

To reduce the dependability on import of Energy resources like Oil and Gas, India need to harness renewable potential in Power Generation comparable with Global leaders like USA.

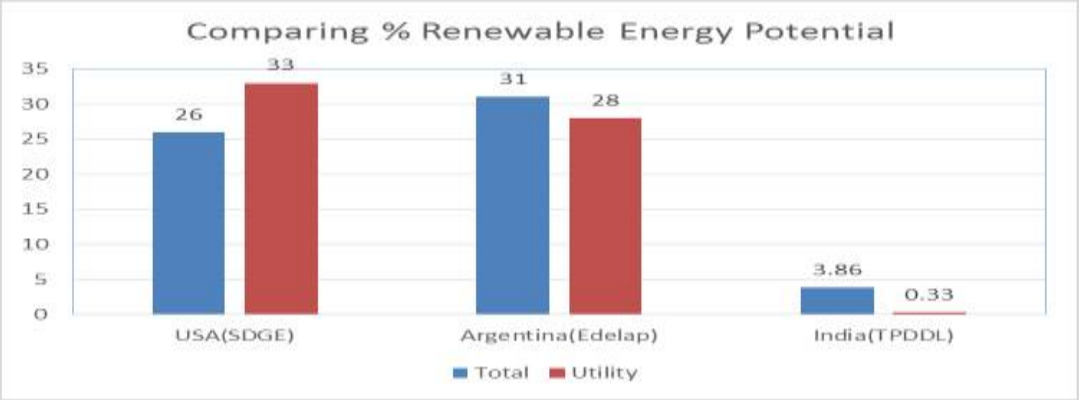

Figure 2.3: Renewable energy Potential usages

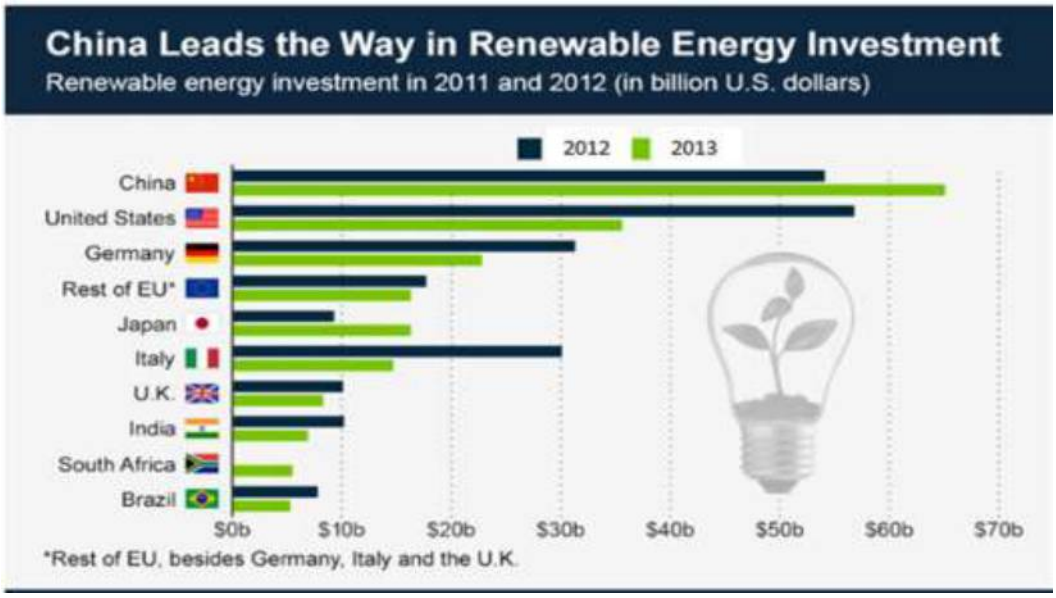

Figure 2.4: Worldwide Renewable Energy Investments

It is evident that China is a present leader in Renewable energy investment. Regulatory compulsions like fixation of RPO and policies encouraging Investment are necessary for India to compete with other countries like China and increase Renewable share.

Integrated Utility in the World

Integration of Power Utility with water and Gas Distribution business has helped in enhancing business sustenance globally. Some of the key benefit of integration of Utilities is

- Increased Customer Satisfaction
- Common Billing system
- Effective & Efficient Manpower Utilization-Multi-skilling
- Operational cost reduction
- Better resource planning
- Effective Financial management
- Common IT infrastructure.

2.6.2 GLOBAL POWER SECTOR REFORMS AND LEARNING:

Current study aims to recognize several potential power utility models existing in India and other parts of the world. A clear understanding of different models is needed to analyse strategies for sustainability of power utilities in India. Dissatisfactory service provided by state owned electricity utilities and incompetence of government to assemble adequate investment to expand electricity capacity, led to the launch of an exhaustive power sector reform.

Sustainable energy regulation and policymaking for Africa explains that restructuring and privatization of power utilities are the major reforms that have been implemented in Africa. The report also mentions that all distribution and generation entities of the country are neither fully owned by public sector nor by private sector. Rather, private sector is granted with an authority to own some assets under the terms specified in a legal contract. The report claims that corporatization of state owned utilities has overall enhanced the financial performance of sector of the country. Black and Veatch (2013), summarized the manner in which evolving sustainable business models will

upkeep the competitiveness in power sector. West Bengal Power Sector Reforms: Lessons Learnt and Unfinished Agenda, 2009 also viewed restructuring, as a mandatory requirement of power sector to bring in operational proficiency in the state owned utilities of West Bengal. Similarly, report by IEA (2006) for Power Sector Reforms in China identifies the need to look for renewable and modern sources of energy to boost economic growth and make significant investments into sustainable power grid projects. The decade of 80's observed augmented reforms and restructuring of the sector in U.K. and rearrangement of the sector in the U.K. and the USA. Taking lead from the U.K and USA model developing countries like Argentina, Chile, Brazil and Philippines also introduced the reforms process. [39]

2.7 OVERALL RESEARCH GAPS

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. After clearly understanding the pre-established literature, literature talks about significance of technology up gradation for power utility business model but does not propose any strategy for suitable strategy for business sustenance. Methods to enhance customer satisfaction and means by which power purchase cost can be reduced are not provided in the literature. Literature speaks on Privatization and deregulation but doesn't focus on the best business model for sustenance. Manpower competencies and need for training is missing in the literature. Literature is scanty for the need based Employee engagement initiatives. Strategies for sustenance in this competitive environment were not focused. There is no comparative study of reforms across the world to have a gist of the reforms which can be implemented directly in India. Cost associated with generating electricity through renewable sources is comparatively greater than the one that was incurred while generating electricity through fossil fuels. Business sustenance in power sector requires sound financing mechanism which is not explained in the literature properly. Literature does not provide any information on socio-cultural, political and technical barriers from external environment and

problems faced like availability of land use, market access and infrastructure availability.

- Policies of power sector utility business in India has not been studied from business sustainability point of view.
- Comparison of power sector reforms among mixed, open and control economies is not available in existing literature.
- Literature is scanty regarding comparison of business framework of different prevailing models of power distribution utilities in India.
- Factors affecting business sustainability of power sector utilities in different models are not known.
- Limited literature is available on various sustainability strategies pertaining to Stakeholders namely Employees and Customers.
- Limited literature is available as Strategic guidelines for power utilities from Sustainability point of view**.**

2.8 VARIBALES IDENTIFED FROM LITERATURE REVIEW

Based on the detailed literature review, following are the 16 variables identified to determine the performance of power distribution utility business. These parameters have henceforth be used to develop the questionnaire to assess the power distribution utility business.

1. Privatization and Deregulation
2. Regulatory and Legal Issues
3. Political influence and subsidy
4. Corporate Social responsibility
5. Tariff Revision
6. Financial health
7. Investment plans
8. Loss control
9. Efficiency Improvements
10. Asset Utilization
11. Energy conservation
12. Customer Satisfaction

13. Employee Satisfaction
14. Employee Engagement
15. Technology Up gradation
16. Manpower Competencies

2.9 CONCLUDING REMARKS

Through a review of literature, current trends and various factors affecting power distribution utility business were identified. The study organizes literature on the basis of determinants affecting power utility business. Light has been thrown upon gaps pertaining to each study. These gaps represent a base for conducting the study further. Majority of papers reports that augmenting the share of renewable energy sources in the national electricity systems will increase the environmental efficiency in production and distribution.[12] Most of the earlier studies identified pitfalls in the existing policy structure of the sector. In accordance with existing literature tariff revision is short term solution for the problem. The government needs to take measures to augment the financial viability of the sector and come up with optimal solution for future use. International power sector reforms in open mixed and closed economies and key takeaways from the comparative studies of above as a strategy for implementation in Indian power distribution is also discussed in review. Amendments in legal and regulatory framework can reshape the existing power sector reforms of the country. The literature helps us in determining need for conducting study, need for sustainable sources of energy, sustainable strategies for power business, issues relating to Performance improvement through implementation of technology in power distribution, changing market and competitive environment in power sector, etc. These challenges now set a context to discuss the measures that the Indian Government is expected to take in the future through the implementation of corrective policies. The subsequent section encapsulates a proper research design. It is kind of a blue print that is used to gain deep insight into problem statement along with details pertaining to data collection methods, sample size, methodology, questionnaire design that will be used for generating valuable solutions.