# CHAPTER 4
# LITERATURE REVIEW

Chapter two and three identified four research themes. Chapter three also outlined the underpinning theory. This chapter presents a detailed structured literature review on the themes identified in chapter three and chapter four and the underpinning theory. In the first half of the chapter, the researcher has established justification of identified themes followed by theme wise discussion on reviewed studies. The theoretical perspective is discussed with the theory of mixed oligopoly. The second part of the chapter explains the conceptualization process of research gap. The consolidated research gap is critically analyzed to reach research problem, research questions and research objectives following funnel approach as adopted and expanded by Miller, 2009.

## 4.1 INTRODUCTION

A literature review searches and evaluates the available literature around the specified subject of research (Swanson, 1997). Literature review surveys the scholarly articles, books and any other published information in the chosen area of study (Webster et al., 2002). The literature review provides the summary of existing literature by synthesizing the information (Galvan, 2006). The literature review also identifies the limitation of theories and formulates the area of further research (Labaree, 2009). Thus, the researcher also reviewed the literature on all the identified themes and underpinning theory. The researcher will identify research gaps (if any) based on the discussion of reviewed literature. Researcher for the purpose of present study used and expanded the funnel approach taken by Miller in 2009 to develop a framework for the analysis of politics in enterprise transformations. If any research gap is identified. Then the researcher in order to fulfill the purpose of the present study will first refine the research gap(s). He will then align the thematic and theoretical research gap(s) to sieve consolidated research gap. To check the consolidated research gap it would be critically analyzed to reach the research problem. The research questions probing the research problem would be outlined next. These research questions would indicate the research design for the present study (Leedy et al., 2010).

## 4.2 LITERATURE REVIEW ON IDENTIFIED THEMES

The introductory Chapter clearly establishes that the non-bifurcation of content and carriage in Indian Power Distribution Sector is leading to opportunity cost. Based on a preliminary understanding of the business problem researcher addressed the keywords in Chapter 2 and Chapter 3 to identify the research themes. These research themes are: -

1) Performance Indicators of Indian Power Sector
2) Regulatory Framework and Reforms in Power Sector
3) Global Power Markets and Competition
4) Global Experience in Retail Competition

### 4.2.1 JUSTIFICATION ON IDENTIFIED THEMES

1. **Theme 1:** The performance indicators of Indian Power Distribution Companies will provide an insight about the reasons leading to bad financial health and losses in Indian power distribution companies (See, Khurana et al., 2015; Banerjee et al., 2014)
2. **Theme 2:** To study the cases where significant improvement in performance has been observed in various countries because of the reforms. Various restructuring model has been also studied through this literature (See, Ajodhia, 2004; Thakura et al. 2005)
3. **Theme 3:** The comprehensive review and analysis of existing markets in the world as well as Electricity market of India - may indicate the relationship/impact of competition on prices leading to overall reduction in losses (See, Shukla et al., 2011; Joskow, 2004)
4. **Theme 4:** Liberalizing retail energy markets has become a tool for policymakers worldwide to introduce competition into a sector historically characterized by regional monopoly. Various retail practices need to be studied to understand the mechanism of bifurcating content and carriage (See, Yadack et al., 2016; Sioshansi, 2005)

Table 4.1 Relevant Studies Justifying Identified Research Themes

| **BUSINESS PROBLEM: 'Non-Bifurcation of Content and Carriage in Indian Power Distribution Sector is leading to opportunity Cost'.** *(Review on Keywords from the business problem has identified 04 research themes)* | |
|---|---|
| **Identified Research Themes** | **Relevant Studies Justifying Identified Research Themes** |
| Performance Indicators of Indian Power Sector | (Kannan et al., 2002), (Godbole, 2002), (Thakura et al. 2006), (Ranganathan et al., 2010), (Ghosh, 2012), (Mohanty et al., 2013), (Kiran et al., 2013) (Banerjee et al., 2014), (Pargal et al., 2014), (Khurana et al., 2015) |
| Regulatory Framework and Reforms in Power Sector | (Godbole, 2003), (Sankar, 2004), (Ranganathan, 2004), (Parameswara et al., 2005), (Balachandra, 2006), (Reineberg, 2006), (Tankha et al., 2010), (Yadav et al., 2010), (Dubash et al., 2011), (Vadra, 2012) |
| Global Power Markets and Competition | (Larsen et al, 1999), (Bacon et al. 2001), (Wang et al. 2005), (IEA, 2005), (Jamasb et al., 2005), (Shioshansi, 2006), (Grades, 2009), (Weight, 2009), (MacGill, 2010), (Boroumand, 2014) |
| Global Experience in Retail Competition | (Gunn et al, 1999), (Goett et al, 2000), (MacGill, 2000), (Outhred, 2000), (Bird et al, 2002), (Sioshani , 2005), (Giulietti et al., 2005), (Littlechild, 2010), (Xuejuan Su, 2014), (Abbott, 2014) |

Source: Compiled by the Researcher

The above justification on the identified research themes based on the review of keywords from the business problem. It is safe vouch to say that the structural and regulatory reforms in Indian power sector enforced the introduction of competition in Indian electricity market. To further elaborate and develop an insight into the said statement the researcher will now present a discussion on intensively reviewed literature theme-wise.

### 4.2.2 THEME WISE LITERATURE REVIEW

The framework illustrates the process of the adoption of research evidence (Dobbins, Ciliska, Cockerill, Barnsley and DiCenso 2002). To produce a framework researcher should select the articles which explain either all or part of processes, models or theories required for developing the framework (Ward et al, 2014). Hence, in theme wise structured literature review, the researcher tries to select the articles which can be significant to develop a framework through identifying imperative factors as per the need of study. Theme-wise detailed structured literature is as below:

## THEME 1: PERFORMANCE INDICATORS OF INDIAN POWER SECTOR

India's Power Sector is a backbone of Indian economy (Ghosh, 2012). India's economic growth depends on the power availability and consumption pattern of electricity (Omer et al., 2013). Though Efficiency of power distribution utilities is a key issue for cost plus regulation thus have impact on the nation's economy (Førsund et al. 1998).

Major players in Indian power sector are government owned (Rao, 2002). Informal control of the State Government on Indian SEBs is more powerful than the formal control of regulatory commission (Lal, 2006). State Electricity Boards in India are loss-making organizations. The cost at which power purchase is purchased, rising continuously. There are signs of further weakening of the ability of state electricity boards to pay and sign for power purchase agreements (Carstairs et al. 1995). In order to meet social objectives, the government-owned utilities are sacrificing the sector efficiencies. Hence, the power system in India is continuously delivering unsatisfactory results (Thakura et al. 2006).

There is sharp fall in the financial health of State Electricity Boards (Rao, 2002). The loss amount of utilities comes out at Rs. 75,297 Crores in 2010-11, Rs. 102,411 Crores in 2011-12, Rs. 105,070 Crores in 2012-13 which clearly tells that financial losses of utilities are increasing significantly over the years (PFC, 2014). The loss-making power sector has been continuously supported through substantial borrowings from financial institutions. Total debt of sector rose to Rs. 3.5 trillion (~$77 billion) in the year 2011 which is equivalent to 5% of India's GDP (Khurana and Banerjee, 2015).

Even after 14 years of reforms initiation; the sector is unable to match the gap between the demand and supply (Thakura et al., 2006). The gap between average revenue realization and the average cost of supply is increasing continuously in Indian Power Distribution Sector (Kiran et al., 2013). The gap between average revenue and the average cost was 20% in 2011. The main reason for widening the gap is a continuous increment in power purchase cost (Khurana and Banerjee, 2015).

Movement of electricity in power transmission and distribution network produces technical losses. Non-technical losses arise due to tampering with the meter, theft of electricity, unauthorized use of electricity etc. (Khobragade et al. 2014). Usually, 30-40% of the power sector's investment ratio

goes to distribution system hence loss minimization is necessary to make the whole system efficient. The ideal ratio of losses in distribution segment is 3-6%, no developed country has the losses above than 10% (Ramesh et al., 2009).

In India, mounting AT&C losses are hampering the viability of power sector (Tripathy and Thaur, 2006). The National average of AT&C losses stands at 25.38% which is quite high (PFC, 2014). AT&C Losses can only be reduced to a certain extent. Their existence from the system cannot be removed fully (Stephenson, 2007). To reduce the losses, upgradation and strengthening in sub-transmission and distribution network is required (Soham Ghosh, 2012). The losses can be minimized through- feeder restructuring, implementation of distributed generation and placement of capacitors (Ramesh et al., 2009). A proper breakdown and computation of losses into technical and commercial heads may further help in minimizing the losses (Navani et al., 2012). Technical losses can be checked through i) network design and configuration; ii) record of- equipment specifications, load balancing, installation of shunt and series capacitor; iii) connections and joints; iv) HT: LT ratio; and v) HVDS implementation. The commercial losses can be checked through metering, billing, and collection (Kiran et al., 2013).

Generally, losses occur if distribution system does not receive a required technological update (Tyagi and Vishwakarma, 2017). The need for the technological update was the by-product of restructuring and unbundling. Restructuring and unbundling are required to make the power sector efficient and viable through downsizing the operations (Thakura et al., 2006)

Due to the low performance of the sector, finances of state electricity boards have reached to an alarming level. Hence there is an emergency to find a solution (Karmacharya, 2012). In 1991 restructuring and reforms were initiated, sector was liberalized and opened up for private players (Thakura et al., 2006), though the significant success in the direction of the efficient sector could not be achieved (Finger et al., 2006). Inefficiencies are continuously having a detrimental effect on economic growth of a nation (Navani et al., 2012). Though there are signs to further reform the sector to increase the operational and financial performance of the sector (Edvardsen et al. 2003).

Information Technology can also be utilized to make operations efficient (Upadhyay, 2013). Recently, following initiatives are taken with the help of IT: i) fulfilling RAPDRP guidelines; ii)

exercising Anti-theft drives; iii) Meter replacement; iv) Energy accounting and audit at different levels; v) Demand Side Management programs (Khobragade et al. 2014).

Despite the efforts made, challenges in Indian power sector are increasing continuously (Ghosh, 2012). Reforms and restructuring were practiced but they were unable to introduce competition in distribution sector (Singh, 2010). Hence there is an imperative need to introduce third generation reforms in Indian Power Sector to improve the operational and financial efficiencies (Agrawal et al. 2017). Policy makers are suggesting the implementation of globally practiced retail competition model in Indian power sector for better results in performance (SCOE, 2014).

The outcome of the discussion on reviewed literature on Performance Indicators of Indian Power Sector:

1) Little attention is paid to the assessment of performance indicators for the empirical assessment of the impact of structural reforms on the Indian electricity sector outcomes. It is argued that there is lack of scholarly attention to assessing best international practices to reduce the losses in the distribution segment. Though some studies have highlighted the need for such an assessment, there is lack of empirical evidence to prove it.
2) The Overly focus is laid on the economic dimension of reform without paying adequate attention to other aspects such as the relationship between losses and bad financial health. It is contended that losses and bad financial health. At best, if the losses and financial health of DISCOMs have received peripheral focus in few studies less attention is paid upon the process of reforms and restructuring and its impact on the reduction on losses.

The above review on the first research theme 'Performance Indicators of Indian Power Sector' highlights following research gaps:

1) Less attention is paid to the best international practices to reduce distribution losses.
2) Less clarity on the extent of restructuring and its impact on reducing distribution losses.
3) Lack of scholarly attention on assessment of the relation between DISCOMs financial health and distribution losses.

## THEME 2: REGULATORY FRAMEWORK AND REFORMS IN POWER SECTOR

Reforms and Restructuring may have different forms (Meyer, 2011). All forms of restructuring are successful although success ratio depends on many factors. A common approach has been found in the globally practiced reforms. This common approach includes: 1) Opening up of power markets 2) Unbundling of vertically integrated industry 3) Introduction of Open Access. Though this approach has a central theme for the restructuring of the market: higher profits for utilities and lower electricity prices for consumers (Huneault, 1999). All forms of unbundling have a certain cost associated with it. Separation of generation from the network and retail activities is the costliest approach (cost increase from 19 to 26%). If integrated generation and transmission are being separated from distribution and retail, cost increases from 8 to 10%. Unbundling of transmission from remaining supply leads to cost increase by 4% (Meyer, 2011).

Traditional networks are infrastructure focused and have natural monopoly effect (Kunneke et al., 2007). Separation of the network from core activities of generation, trade, sales, and metering removes the monopoly effect. The separation removes the conflict of interest and allows competition in associated commercial and core activities. Since the ownership, organization and regulation part of Electricity Supply Industry have been changing continuously, the regulatory part must be carefully designed in order to ensure efficient and adequate incentives. Ownership and regulatory part of the industry may be separated from other activities for better results (Newbery, 2002).

Experience of deregulation variates across the various nations of the world. Many success stories and many challenges emerged out in the process of deregulation. Some of the key challenges are complex market design, volatility in spot price, insufficient investment, the absence of market power; high set up cost, high generation cost, uneven distribution of benefits etc. (Woo et al., 2006). To handle such challenges, quality regulations are needed to be drafted worldwide (Ajodhia, 2004).

Mainly the sectorial reforms were initiated after the 1990s in different parts of the world, including India (Rajan, 2000). The power sector in India is the joint responsibility of both Central and State Government (Dossani, 2004). Power sector reforms in the country were initiated when the sector was suffering from high losses and had a high issue pertaining to subsidies. Investments were

lacking and hence demand graph was not able to get synchronized with the supply graph (Singh, 2005). Thus government initiated the restructuring process to scale up the techno-economic performance of the utilities as electricity boards were suffering from serious financial problems (Parameswara et al., 2005). Optimal utilization of available resources was also planned (Singh et al., 2004). Reforms in the country happened in a sequence. Despite the sequential reforms, present regulatory policies of Indian power sector are not sufficient to make the sector efficient and viable. The reason is: reforms in distribution segment are still pending (Dossani, 2004). Tariff revisions are also getting neglected (Upadhyay, 2014).

Since the first step of reforms is taken by India in 1991, many alternative restructuring paths have been tried by the government to do structural changes, but very little amount of achievements are attained in line with the goals of reforms. The sector is continuously performing poorly. Energy deficit and peak shortage is still a challenge (Bhattacharyya, 2007). A paradigm shift in Indian power sector was expected by the enactment of Electricity Act 2003 (Thakur et al. (2004). Electricity Act 2003 tried to set a milestone in the history of Indian power sector reforms. Provision of the act had a significant impact on structural changes and policy-related issues of power generation, transmission and distribution (Thakura et al. (2005). Electricity Act 2003 encourages power generation from the captive power plant and introduces the provision of Open Access. Two level regulatory system (state level and central level regulatory bodies) has been retained by the act. The act tries to move out from single buyer model and increases competition in a generation (Joseph, 2010).

The act proved good tablet to ill Indian power sector, though some uncertainties and issues are there which needs to be addressed like the dominance of some generation companies may lead to increase in tariff. (Thakur et al., 2004). The country is now visualizing the benefits of reforms as a reduction in overall AT&C losses is seen during recent years. Demand Side Management and Energy Audit are the fields which further require the attention of power managers for proper planning (Bajaj, 2006). Future reforms may be more focused on consumer satisfaction, tariff, and pricing, theft, and corruption (Parameswara, 2005). Since carrying out the reforms in the distribution sector is a difficult task especially in the absence of global standard practices. Hence a substitute institutional structure may be practiced in the distribution segment (Dossani,

2004). Present conditions for future reforms are suitable to establish the wholesale market but not to introduce the retail competition (Singh, 2004).

Studies on regulatory framework also discuss reform scenario in different countries across the globe.

World bank suggested unbundling of the vertically integrated sector into separate manageable activities for increasing the competition. But since the suggestion was common for all countries and was not aligned with the local economic and political conditions, it could not get enough success. Hence a common single solution of reforms and restructuring for all countries may not be suggested (Yi-chong, 2006)

Reforms in various developing countries of Southern Asia were initiated due to the pressure of external funding agency. They were started after 1990 and till now no significant example of reforms has been set. Poor transition management, slow adaptation, low acceptance and instability of governments are the main causes. (Bhattacharyya, 2007). The objective of reforms in various countries was to match the power demand and sustainable development. Although the recent crisis in Brazil and California raised the concern that what should be the way to carry out reforms? It is true that the reform agendas are often judged against the social and environmental objectives. It is also true that the main concerns of the reforms are related to economy and finances, not with the issues of social and environmental aspects (Wamukonya, 2003; Antonette, 2005).

The European Union is also undergoing through power reforms. Countries of European Union are restructuring the respective power industry to increase the competition. The increment in competition is basically an act to enhance the welfare (Ortmann et al., 2008). In the United Kingdom, reliable service was provided by the old regulatory arrangements of the power industry. In that era, the industry did not lose money and did not face challenges in order to raise the cost of capital. At present, the country follows the semi-competitive model which is supposed to provide better benefits to customers. Under this new regime, electricity suppliers will have greater supply efficiency (Hyman, 2010). Netherland is presently in process of preparing a law to mandate the forced ownership unbundling of Distribution Network Operators. The same may be followed by the privatization of commercial and core activities. A framework of ownership unbundling for Netherland is also suggested (Kunneke et al., 2007).

In Nordic countries, national reregulation gained the short run efficiency, increase in demand and increase in transmission capacity. Significant progress has been made to make the market competitive. Future investments in production are supposed to enhance the efficiency gain. Some amount of compensation should be associated there while introducing the common carriage (Bjorvatn, 1993).

In OECD countries, reforms did open up the market and competition has been introduced via wholesale market and retail market. The countries where the vertically integrated structure was found, industry unbundling of distribution and transmission has been done from generation and supply. Results show that retail introduction reduced the power prices and increased the price gap between household consumers and industrial consumers. Although it is not necessary that introduction of wholesale market reduces the power price. Restructuring in the US electricity industry is taken as the largest reorganization of a single industry in the world (Hattori et al., 2004). Few pieces of evidence are present there which can prove that customers are benefited from the restructuring, though benefits in terms of efficiency improvement and price cost reduction through reforms in wholesale markets can be seen (Kwoka, 2008). In last decade, reform of reforms has been seen in US electricity markets and the sector is now moving slowly towards competition. Substantial benefits from reforms are materialized but reform process further requires careful attention to re-design the power market (Hogan, 2002). Retail competition is introduced in Australia through the deregulation of electricity markets. Australian consumers are now getting exposed to electricity prices (Shufan et al., 2011).

Russian Federation followed Standard restructuring model. The standard model includes the complete vertical unbundling of generation from the transmission with the objective to introduce competition in generation activities (Pittman, 2007). In Turkey, Electricity market law was passed in February 2001. Earlier, the Turkish electricity market was vertically integrated and owned by public hands. Reforms unbundled the market into generation, transmission and distribution segments. An independent regulator and competition in generation and retail were introduced. Some generation and distribution companies were privatized. Past investments in the sector were insufficient, though fresh private sector investments give new hopes to the sector (Ozkyvrak, 2005).

In line with worldwide reform initiatives, Incentive regulations have been deployed in various countries. But the regulations pertaining to the quality of service are still lacking in the industry. Blackouts occurred globally, convey the immediate need for quality service regulations (Giannakis et al., 2005). Improvement in the quality is associated with the overall productivity of the electricity sector. Incentive regulations comprise the comparison between referred benchmarked performance vs actual performance of the utilities. Regulation about benchmarking and quality management are lagging behind the incentive regulations to achieve the efficiency in service. Benchmarking is a most common practice which is being followed globally to set the standards (Jamasb et al., 2002). Although choose between available benchmarking methods it still an issue and it majorly depends on the ground realities (Jamasb et al., 2000).

The outcome of the discussion on reviewed literature on Regulatory Framework and Reforms in Power Sector:

1) Studies cover the reform and restructuring process adopted globally. Changes in regulations and associated framework is discussed for the USA, Turkey, Australia, Russia, United Kingdom, Netherland and in the group of Nordic countries, European Union, OECD and Southern Asia. Reforms in regulations were made there mainly for efficiency improvement and to meet the demand of power. Though literature covers that part significantly, they do not explicitly cover further regulatory changes required to introduce the last phase of reforms.
2) Excessive emphasis is made on the regulatory dimension of unbundling without paying adequate attention to other aspects such as separation of carriage and content in existing DISCOMs. Less attention is paid to the process of regulations and its impact on the reduction on losses. Regulatory provisions and model of restructuring required to introduce retail competition in India has not been suggested.

The above review on the second research theme 'Regulatory Framework and Reforms in Power Sector' highlights following research gaps:

1) The review of the literature on the amendments on regulations in global power market highlights need for more studies in this area.

2) Although various studies regarding the impact of reforms are available in the literature studies showing the importance of global experience on ownership unbundling are rare.
3) There is a lack of scholarly attention on regulations required for the separation of carriage and content from existing distribution companies.

**THEME 3: COMPETITION IN GLOBAL POWER MARKETS**

Literatures reassesses traditional and vertically integrated structure of power sector through the economic, technological and cultural changes throughout the world (Kwoka, 2002; Delmas, 2005). Before 1990, most electricity utilities were vertically integrated. Little variation and uncertainty in price were there as regulators fixed the various components of price for Power Generation, Transmission and Distribution. Deregulation was seen in the power markets to introduce competition in generation and supply segments (Escribano et al., 2011). The deregulation and restructuring indicate the major transformation in the electricity industry. This transformation is introducing several opportunities (Bajpai et al., 2009). A significant effect is materialized especially in those countries where state-owned electrifies utilities were very poor (Joskow, 2008). Reason for the restructuring may differ country to country. Some of the reasons are: to provide choice to end consumer, to have reliable and quality power, and to generate more opportunity for new service and products through the motivation. Some countries did restructuring for unbundling, corporatization and privatization while some other did to decentralize the government control and increase in privatization. (Srivastava et al., 2011).

In the worldwide restructuring of the power sector, power transmission and distribution are taken as a natural monopoly and continue to be regulated (T. Gomez et al., 2000). Perception towards the existence of a natural monopoly in generation segment is changed but this perception is same for the power transmission and distribution segments (Burtraw et al., 2000).

Competition has been developed in power markets through the restructuring (Shukla et al., 2011). Reduction in energy prices is taken as the biggest benefit of competition. (Srivastava et al., 2011). Promised benefits like a decrease in prices and competitive markets are achieved by the deregulation at the state and federal level. Reduction in price may be the result of pressure created by regulators. Contradictory, a few analysis of power prices paid by end consumers shows that

power prices are also raised in some cases. Competition in other industries has benefited in price reduction but the same may not be true for electricity industry (Blumsack et al., 2006).

Creation of retail and wholesale competition market is very difficult and challenging from a technical and political angle. A proper choose between various available competing solutions leads to make market efficient and better performer than others (Joskow, 2008). In a competitive scenario, a major advantage of the price of electricity is computed and determined by the ratio of demand and supply. Here generators provide competitive power in capacity market and on the other hand, suppliers provide competitive power to consumers (Escribano et al., 2011)

Liberalization in European Power Market is taken as the World's widest cross jurisdiction reform which involves integration of different state level and national level markets. Main countries which led to the reforms were Argentina, Chile, New Zealand and Australia. Other countries of the world achieved limited progress in reforms. The reform process in the US has been slow down after the California power crises and many state-level governments did not process their plan to further reform their sector (Jamasb et al. 2005). 1995 was the most important year in the history of Finnish power market from the angle of sectoral reforms. Continuous introduction of liberalization is the unique feature of electricity market of Finland since its inception. It is true that structure of Finnish electricity market is unique but literature gives less focus on the Finnish case. They often take New Zealand and the United Kingdom as a successful reform stories while cases related to Sweden and Norway are usually exampled among Nordic countries. Finland has high diversity in a generation hence early competition was seen in the industry (Olivier et al., 2000). In India, initiatives taken for restructuring were: incorporation of the availability based tariff, grid code, open access, power trading and the establishment of power exchanges (Shukla et al., 2011). Outhred (1998) illustrates the case of Australia. The process of reform in Australian power sector was started five years ago. Functional separation of the utilities into generation, transmission, distribution, and supply of electricity was done in this process. The country saw corporatization, privatization, and formation of National Electricity Market (usually known as NEM). NEM is a multi-region electricity market which is monitored and regulated at central federal government level while the establishment, monitoring and regulatory part of the retail electricity market are being handled by the state government.

Lessons should be learned from California and Enron cases as these cases were a big failure in the history of power sector reforms. Although Industry experts say that these experiences had different root causes and it was unable to avoid them. The incomplete restructuring was one of the root causes. Ohio experienced low switching rate even after one year of completion of the restructuring. Retail service providers in Ohio are required to provide detailed financial status which makes them enable to provide the service (Smith, 2002).

In the wholesale electricity markets where participants are limited, interconnections may provide a solution to increase the competition. Kalman filter technique is used by (Nepal et al. 2011) to find the degree of market integration between Irish Single Electricity Market and other mature, large wholesale electricity markets of Europe. The establishment of common electricity market may secure the power supply, stimulate competition and may have gains of international cooperation through sharing reserves, combining the consumption on a national level, analyzing the production patterns etc. (Zachmann, 2008). Countries of the world which share a border with each other are having pressure to interconnect their power system. The process of integration of system worldwide is going on different levels. Nordic countries are the first one who achieved the full integration of their power markets and are advanced in infrastructure and regulatory point of view. All four countries of the Nordic group have similar potential to export and import the power. On the other side, South and North American Countries did the partial integration of their system with neighboring countries (Olivier, 2004). Europe did focus to develop a single electricity market. Internationally price of electricity has been fallen due to different factors: fall in product prices, fall in factor prices, fall in technological price, an increase of trade, changes in regulatory environment and the change in the consumption pattern etc. The policy of Single Market can be more effective in the medium term (Zachmann, 2008). Low market integration exists between these markets. The market integration ratio between Great Britain and Irish Single Electricity market is only at 17%. Increment in trade of renewable generation and higher liquidity of wholesale markets can be the helping factors for market integration (Nepal et al., 2011)

In Europe, 96/92 directives made the compulsion to all European Union countries to do change in regulations for restructuring and privatization. Directives were issued because the reforms in the countries were slow. The directives outlined provide clear rules to introduce competition in a phased manner. Creation of Electricity regulator was mandated for a European Union Nation.

Power of European regulator was increased and directions to open up the market for all customers have been issued (Ferraria et al., 2005). Dutch policy of the restructuring and its' effects are on an average ahead of European Union Electricity Directives. Netherland met the second European Union Electricity Directives deadline and it was one amongst the two countries (another country was Slovakia) which did the same. For meeting the deadline, the country got the appreciation from the European Union. Deregulation law there did the legal unbundling of networks along with unbundling of tariffs in electricity usage charges and network charges. Law also required the gradual and phased deregulation in the demand-side market (Damme, 2005).

Cost of service regulations is being followed in distribution segment and simultaneously Performance-based ratemaking (PBR) regulations are being evolved to be followed in distribution companies from the earlier Cost of service regulations. The new regulation does the price capping and hence has control over the service tariff. Utilities may earn higher amount of revenue by cutting cost and enhancing the efficiency (Gomez et al., 2000). According to Borenstein (2003), When the power suppliers have the ability to charge the electricity price according to the variation in cost, such environment gives the feel of a standard economic model for an effective competitive market. At present, no liberalized power market charges the customer with real-time pricing, means the price which varies on the wholesale cost index. However, if we charge the customer for Real-Time Pricing then the same may enhance the efficiency but may not necessary to reduce the capacity investment.

The particulars in a market are driven by the market power. When the market price is moved above the competition level for a defined time period to make a profit by a market participant then it is known as market power. Market Monitoring Process may be a most effective approach to identify and mitigate the risky exercise of market power. India has a hybrid model of energy market where power pooling and trade through bilateral contract is being done. (Bajpai, 2009). Despite the need for deregulation and frequent talk about it, many market mechanisms have been enforced in the market which created a significant effect on emerging retail and wholesale electricity markets. Price capping, administrative and non - market pricing protocols are such market mechanisms. Joskow derives an optimal program for power prices, investments, and outputs under which consumers who are not priced sensitive, needs to be controlled under few categories. It has been

found that price deiced by wholesale electricity markets, reflects the particulars of social opportunity cost (Joskow, 2004). Wholesale market structure in India is also studied. It is found that market power may be one of the reasons contributing in increment of electricity price (Shukla, 2011). Cross-subsidy consumers who consume the power higher when wholesale price become higher – have a loss in relation to real-time pricing. If their loss is significant then they come in the situation to oppose the real-time pricing. Borenstein suggested that there can be a supplemental program to make adoption of real-time pricing, easier by an industry. Consumers who have high demand profiles are the cause of losses and these losses can be reduced via consumer price responsiveness. If offsetting efforts are done then they may be insufficient to achieve the loss effect produced by subsidies (Borenstein, 2005).

Literature also discusses the consequences of restructuring on Environment. Restructuring has a significant impact on the environment and this impact is affected mainly by four factors: 1) Variation in electricity demand 2) Substitution of fuel for power generation 3) Improvement in efficiency and competition 4) Interaction of market structure and firm's behavior with environmental regulations (Burtraw et al., 2000). Environmental shortcomings may be offset by the competition. Root causes of environmental deficiencies may be identified through while competition is being introduced. Environmental deficiencies pertaining to the cost of service regulations can be managed by Integrated Resource Planning. State and Central agencies need to take actions for coal power plants so that the production from these plants can be limited. If the same is not followed then it will have a negative impact on quality of air and simultaneously more amount of NOx, $CO_2$ will be released (Lee et al., 1996).

Singh (2009) discusses the foreseen role of National Action Plan on Climate Change in Indian Market of Hawkers. As per 2001, only 43.50% rural and 87.60% urban people have access to the power. In India, hawkers are lacking with access to power and run their business till late hours. They use candlelight, petromax lanterns, electric emergency light etc. for the illumination. To provide the electricity access to such hawkers, supply through local grid has been made. Further options to generate power from renewable energy sources especially from solar may help to illuminate the hawkers. National Solar Mission in line with National Action Plan on Climate Change may help the overall scenario of increased power generation from solar.

Energy builds the blocks to develop an economy. A causal relationship exists there between the power consumption and economic growth of a nation (Sajal, 2002). An econometric relationship exists between power consumption and variables like income, the reliability of power, fuel (used at captive power plants), the income of customers etc. (Bose et al., 1999). The relationship between the income and energy consumption is debatable. If the causality in relationship flows from the side of energy consumption to income then it is taken as the energy-dependent economy and in this type of economy, the shortage of energy may adversely affect the income. However, if we have a reverse chain of casual relationship from income to energy then it denotes null effect or very little effect on income will be there in case energy conservation policies are implemented in less energy dependent economies. We can also say that energy conservation policies do not deteriorate the economy over there (Lee, 2005).

India is the largest democracy in the world. GDP of India has been growing at good pace and it has been forecasted to grow at the same pace in coming decades. To support the growth in GDP, it is necessary to support the growth of electricity and for the same, proper planning needs to be done to meet the demand (Grover et al., 2006). In India, the economy grows at 4.5% per annum[14] while the generation increases at the ratio of 10%. On the other hand, the demand for electricity is growing with 8% of Compound annual growth rate (Ghosh, 2002). India consists five major power consumer categories which are; large industries, small and medium enterprises, agriculture consumers, residential consumers and commercial consumers. Income and price elasticity of power consumption is computed at the national level. Results show that industrial and commercial consumers pursue the highest elasticity while the power shortage affects the commercial sector most (Bose, 1999).

Ghosh (2002) analyzed that consumption of electricity is increased in recent years due to increment in the average income of nationals. To provide the economy no damaging impact, challenges of electricity sector like tariff structure, efficiency improvement, demand supply gap, high losses etc. needs to be addressed. Energy is an essential to boost the productivity of a country. In earlier studies, energy income output relationship has been investigated by anyone amongst two sides – Energy demand function, aggregate production function. The demand-side model uses three variables: Energy, Energy Price, and GDP. The production side model uses the following

[14] On long term basis

variables: Energy, GDP, Labour and Capital stock. Most of the literature, however, focused on the production side (Lee et al., 2008). It is recommended to increase the share of power generation from nuclear sources from present share of 3% to at least 25%. The harnessing of the full potential of renewable energy sources is also necessary. These steps can reduce the dependency of India on other countries for fuel import (Grover et al., 2006).

Payne (2008) does the empirical study about the relationship between energy consumption and economic growth. Hypothesis outlined for this purpose is about: feedback, neutrality, conservation and growth. The study focuses on empirical results, methodological issues, econometric approaches, country coverage, the specification of models and selected variables. Analyzation of the energy consumption is important to study the impact it on economic growth. Further, this is necessary in order to draft effective energy policies and regulations. The relationship between energy consumption and growth in the economy is further examined by Ozturk et al., (2010) for 51 countries using panel data analysis. The relationship between the energy consumption and growth of the economy has been studied in different kinds of literature but the empirical outcome varies. An energy dependent country has cautious energy regulations and policy because negative shock on the particulars of energy supply may have a negative effect on economic growth. While in such countries where the energy consumption is driven by the growth in the economy, energy conservation and related policies have less effect on the economy.

To deal with the global warming, compliance of the targets set in Kyoto Protocol demonstrated the level of seriousness of worlds' leaders to deal with the greenhouse gas emissions and its' impacts. However, countries are working in such manner to follow the Kyoto protocol which does not harm the economic growth. Energy is a necessary input and works like an engine to grow the economy. The relationship between energy growth and GDP growth variates continuously as the structure of economies is changing continuously (Lee, 2007). Previous results generated by the literature about the direction of causality are conflicting in nature. The relationship between real GDP, Energy Consumption, and Capital Formation is examined by the Narayan et al. (2008). It has been found through the long run structural estimation; Granger causality, panel cointegration, and panel unit root that these variables are co-integrated. The study suggests that if a country does not have feasible alternatives to increase the production of energy from renewable sources than cutting down the $CO_2$ emission may have a negative impact on the economy of that country.

The outcome of the discussion on reviewed literature on Competition in Global Power Markets:

1. It is suggested that economical, technological and cultural changes are required to enable the transition of power markets from monopoly to full competition but little attention is paid to detail such changes. Literatures further identify different reasons for inefficiencies and reforms in global electricity market though country wise reasons are not covered.
2. The overall focus of literature roams around successful global competitive markets. Emergence and status of competition are nicely covered for the countries of European Union (emphasis on United Kingdom), New Zealand, USA and Nordic Countries. Comparison of Indian power market may also be covered by future studies.
3. Environmental end Economical Relationships with Power Markets are covered nicely. Though price fall in power markets with the effect of competition, and its positive effect on the economy could also be covered.

The above discussion highlights under mentioned research gaps on third research theme 'Competition in Global Power Markets'. Research Gaps are as follows:

1) The literature on the reforms identify the reasons for the inefficiencies. Most of these studies are on comparative analysis of five markets namely European Union (emphasis on United Kingdom), New Zealand, USA, Australia and Nordic Countries. There is a dearth of study focusing on emerging markets like India.

2) The literature on the reforms identifies the impact of recent trends in the global electricity market in terms of availability of electricity to consumers at a low price. The literature is concentrated with experiences from the European Union (emphasis on United Kingdom), New Zealand, USA, Australia and Nordic Countries. There is a scarcity of study focusing on developing framework for the emerging markets like India.

**THEME 4: GLOBAL EXPERIENCE IN RETAIL COMPETITION**

In order to allow more competition in electricity, alternative organizational structures of electricity markets are receiving a lot of attention (Joskow, 1983). Monopoly days of generation segment are gone and the sector is now considered as a competitive segment. However, transmission and

distribution sector are still considered as natural monopolies. For allowing competition in the whole system, competitors may have access to transmission and distribution network. An essential facility through transmission and distribution network may be created to allow open access (Brunekreeft, 1997). In the new regime of, Generation, Transmission, Distribution, and Retail (sales and billing) are considered as the four stages electricity industry structure. Opening up of power market for fourth stage i.e. retail has become a common tool for policymakers for further liberalizing and realizing efficiency gains in their market. Retail is characterized by full competition hence it leads to lower prices (Yadack et al., 2016).

Retail competition has been practiced majorly in developed countries. In Asian developing countries, the establishment of wholesale market is in practice. The retail competition was firstly tested in Norway followed by Britain, New Zealand, Australia, USA and other countries of European Union. Retail competition removes price control to enable market price formation. It also enables supplier switching and removes the barrier to entry (Nagayama, 2007). The United Kingdom was the first country that introduced retail competition (Woolf, 1994). The country introduced supplier choice in the phased manner. Increase in competition and high consumer switching led to several social benefits for the stakeholders (Littlechild, 2010). New Zealand introduced retail competition in 1998 just after the two years of wholesale introduction (Abbott, 2014). The country mandated the forced ownership unbundling of carriage and content and thus completed the separation activity successfully before the deadline given to the industry (Gunn et al, 1999). However, retail restructuring did not receive significant attention in USA. Most of the retail markets in USA remains relatively inactive especially for residential consumers (Rose, 2004). Though open access is allowed in most of the states of USA. States who have not implemented the open access are moving in the direction to implement it (Goett et al, 2000). In Australia, the retail model has been implemented by the states of Victoria and South Australia. Both of the states gives choice to end consumer for switching the supplier (Simshauser et al., 2013.). Nordic countries (Norway, Sweden, and Finland, Denmark) opened up their market for retail competition around 1998. The retail market is developed well in there. The proportion of consumer switching in Nordic countries is lower than United Kingdom but it is higher than other countries. (Littlechild, 2006)

In the retail electricity markets, most public and private firms compete with each other. Private firms are proved to be more efficient than public ones (Kumbhakar et al., 1998). The retail model gives choice to the consumer for choosing the supplier hence consumer can sign a contract with any supply company authorized in that area. (Kristinaek et al., 2008). Supplier switching is an important indicator of the success of retail markets (Yang, 2014). Globally, after the introduction of retail competition, a large number of commercial power consumers changed their power suppliers immediate, however residential consumers were not that large. However, this trend has been changed now and major residential consumers have switched their power supplier (Nakajima et al, 2010)

The Republic of India is also looking to introduce retail competition by further liberalizing their market. Though electricity act 2003 has the provision of parallel distribution licensees in an area, there is an imperative need to amend the act for separating distribution function from supply function. (Das, 2010; Singh, 2010). Separation of distribution (Carriage) and supply (content) function is necessary as per the market structure suggested for retail model. Separation shall remove the conflict of interest and will give an opportunity to introduce more than one supplier in the market. Presence of more than one supplier shall be able to remove monopoly and the industry structure will become competitive. (Agrawal et al, 2017). Introduction of retail introduction eliminates price controls, increases consumer choice, lessens barriers to entry, encourage research and innovations and hence the prices fall in the market. However, expected results of retail competition may not necessarily be the same which everyone thinks. They may vary country to country. All the stakeholders need to be active in the market to gain the right advantage of retail competition (Defeuilley, 2009).

In the retail electricity markets, most public and private firms compete with each other. Private firms are proved to be more efficient than public ones (Kumbhakar et al., 1998). The retail model gives choice to the consumer for choosing the supplier hence consumer can sign a contract with any supply company authorized in that area. (Kristinaek et al., 2008). Supplier switching is an important indicator of the success of retail markets (Yang, 2014). Globally, after the introduction of retail competition, a large number of commercial power consumers changed their power suppliers immediate, however residential consumers were not that large. However, this trend has

been changed now and major residential consumers have switched their power supplier (Nakajima et al, 2010)

Retail prices in power markets of various countries are a smooth representation of the underlying wholesale cost (Borenstein et al., 2003). Since 1985, real electricity price in developed countries (except New Zealand) is falling. Support of retail competition is there in such countries. However, In the countries of Asia, Eastern Europe, Latin America, Russia – the real electricity price is increasing steadily (Nagayama, 2007).

Despite the success of the retail competition, it is not necessary that end consumer shall always react to real-time electricity prices. There may be three reasons: 1) Absence of incentives for adjusting consumption with real-time price 2) Transaction cost associated with real-time monitoring 3) consumers are not able to adjust their consumption freely (Tirole et al, 2004). Some non-market mechanisms have been imposed on retail electricity markets. These mechanisms are justified by imperfections of retail electricity markets, particularly with the inability of retail consumers to see and react with real-time power prices and imperfections in mechanisms which are adapted to mitigate the market power problems (Joskow et al, 2004)

The outcome of the discussion on reviewed literature on Global Experience in Retail Competition:

1) Retail competition introduces full competition in supply market. Separation of carriage and content businesses from distribution business is a pre-requisite to introduce retail competition. Literatures gives the global evidence of such separation although the manner and degree of separation are not covered.
2) Evidence of retail introduction is covered mainly from UK, New Zealand, Australia, USA and Nordic Countries. Literatures covers country wise experiences with retail competition, however, a study could not be found that compares the various electricity markets on same parameters.
3) Most of the literature suggests that retail competition is the last and final of the reform process. However, to reach this last stage, steps, activities, and actions required could not be found explicitly.

The above review on the fourth research theme "Global Experience in Retail Competition" highlights following research gap:

Synthesizing the literature on a comparison of retail power markets generated good insight on global electricity markets through comparative metrics. However, not much literature is found on Indian electricity market. Moreover, activities which may enable retail competition through the bifurcation of carriage and content in Indian scenario are not addressed much in reviewed literature.

## 4.3 LITERATURE REVIEW ON THEORY OF MIXED OLIGOPOLY

The mixed oligopolistic market contains at least one public and one private firm (Net, 1999). Across many countries in the world, both private and public firms are there to serve in some sectors of the market. Transportation, energy, telecommunication, education, banking, and healthcare sectors are one of them [(Bennett et al (2012), Donder et al (2009), Matsumura et al (2005)].

In the mixed oligopoly, Private firms behave like profit maximizers and also have symmetric objectives among them while public firm always try to maximize the social welfare [(Kato et al. (2007), NET (1999)] It has been observed that if a public firm gets privatized then the objective of private and public firm becomes common and all firms uses same production technology. There is no consequence present where privatization of public firm was being done in order to ensure the first best allocation of subsidies (Kato et al., 2007). Although a uniform assumption for public firm's behavior does not exist. One prominent assumption is there in the literature that the public firm always tries to maximize the social welfare. In case if the market is duopoly then noncooperative behavior of firms is observed. Better allocation of resources has been made in the market if a public firm is present to compete with a private firm (NET, 1999). In public firms, budget constraints are negligible to increase the social welfare. A public firm tries to maximize its output based on the breakeven constraint. If mixed oligopoly is replaced by the public monopoly then it generates higher social welfare (Bennett et al., 2012). If mixed oligopoly markets are investigated, then public firms emerged out as the maximizer of social welfare. The public firm competes with the profit maximizer private firm. The private firm follows the cost reduction activity hence the production cost of a private firm is lower than the public firm. Locations are efficient in a mixed duopoly in comparison to private duopoly (Matsumura et al., 2004)

Comparison of classical oligopoly models - Cournot and Bertrand are revisited under the Mixed Oligopoly. In a mixed duopoly wherein a state-owned firm competes with a private firm, price (Bertrand) competition yields higher profits for the private firm. Yielding of higher profits implies that price based (Bertrand) competition is weaker than quantity based (Cournot) competition. In the normal market condition of mixed oligopoly (not duopoly), price competition yields higher social welfare regardless the number of firms present in the market. However, if number of privates firms is five or greater than five, quantity based competition may yield higher profits for individual private firm (Haraguchi et al., 2015)

If the number of firms is exogenous then the welfare maximizing behavior of public firm becomes suboptimal. In such market, entry of private firm is allowed and if the number of firms is fixed, the same welfare maximizing behavior of public firm becomes optimal. It has been found that mixed market conditions are better only if public firms do not earn nonnegative profits (Matsumura et al., 2005). If the government gives subsidies before and after the privatization – then the degree of welfare remains same. If subsidies are offered before privatization only, then the welfare gets lower down after privatization. It is also true that particulars of overall efficiency are contributed by subsidies in a mixed oligopoly because cost distribution effects occur there. Through the results found out in analysis – a new direction of study i.e. production subsidy has been added in the theory of mixed oligopoly (White, 1996). A mixed oligopoly can be taken as the cooperative approach rather than the competitive approach because interests of public and private owned companies are quite similar and they do not oppose to each other's interests (Kalashnikov et al., 2011). Further Donder et al. (2009) studies vertically differentiated market structure where two firms consider both quality and price factors in their competitive decisions if consumers are ready to use the average quality product. Although conditions differ for the different objectives of firm i.e. for the firm which maximizes profit and for the firm which maximizes revenue.

On the basis of above review of the literature on underpinning theory, '**Mixed Oligopoly**' there is following **theoretical research gap**: 'There is a dearth of scholarly literature addressing the approach of restructuring in a transition scenario from monopoly to mixed oligopoly.'

## 4.4 CONSOLIDATION OF RESEARCH GAPS

Four research themes identified on review of the keywords, point out following research gaps from the structured literature review:

### Research Gaps under Research Theme 1 (T1): Performance Indicators of Indian Power Sector

1. Less attention is paid to the best international practices to reduce distribution losses.
2. Less clarity on the extent of restructuring and its impact on reducing distribution losses.
3. Lack of scholarly attention on assessment of the relation between DISCOMs financial health and distribution losses.

### Research Gaps under Research Theme 2 (T2): Regulatory Framework and Reforms in Power Sector

1. The review of the literature on the amendments on regulations in global power market highlights need for more studies in this area.
2. Although various studies regarding the impact of reforms are available in the literature studies showing the importance of global experience on ownership unbundling are rare.
3. There is a lack of scholarly attention on regulations required for the separation of carriage and content from existing distribution companies.

### Research Gaps under Research Theme 3 (T3): Competition in Global Power Markets

1. The literature on the reforms identify the reasons for the inefficiencies. Most of these studies are on comparative analysis of five markets namely European Union (emphasis on United Kingdom), New Zealand, USA, Australia and Nordic Countries. There is a dearth of study focusing on emerging markets like India.
2. The literature on the reforms identifies the impact of recent trends in the global electricity market in terms of availability of electricity to consumers at a low price. The literature is concentrated with experiences from the European Union (emphasis on United Kingdom),

New Zealand, USA, Australia and Nordic Countries. There is a scarcity of study focusing on developing framework for the emerging markets like India.

**Research Gaps under Research Theme 4 (T4): Global Experience in Retail Competition**

1. Retail competition introduces full competition in supply market. Separation of carriage and content businesses from distribution business is a pre-requisite to introduce retail competition. Literatures gives the global evidence of such separation although the manner and degree of separation are not covered.
2. Evidence of retail introduction is covered mainly from UK, New Zealand, Australia, USA and Nordic Countries. Literatures covers country wise experiences with retail competition, however, a study could not be found that compares the various electricity markets on same parameters.
3. Most of the literature suggests that retail competition is the last and final of the reform process. However, to reach this last stage, steps, activities, and actions required could not be found explicitly.

These research gaps mentioned above were further reviewed in the light of available literature. They were further refined in the light of available literature. The refined gaps are as follows:

1. Various research has deliberated various technical initiatives to reduce distribution losses. There is lack of scholarly attention suggesting a suitable competitive retail model for power distribution sector in India. Moreover, there is a dearth of literature on regulatory reforms and their impact leading to a framework for retail introduction in Indian Power Sector.
2. Less scholarly attention on the mapping of the activities enabling the bifurcation of content and carriage for the introduction of retail in India.

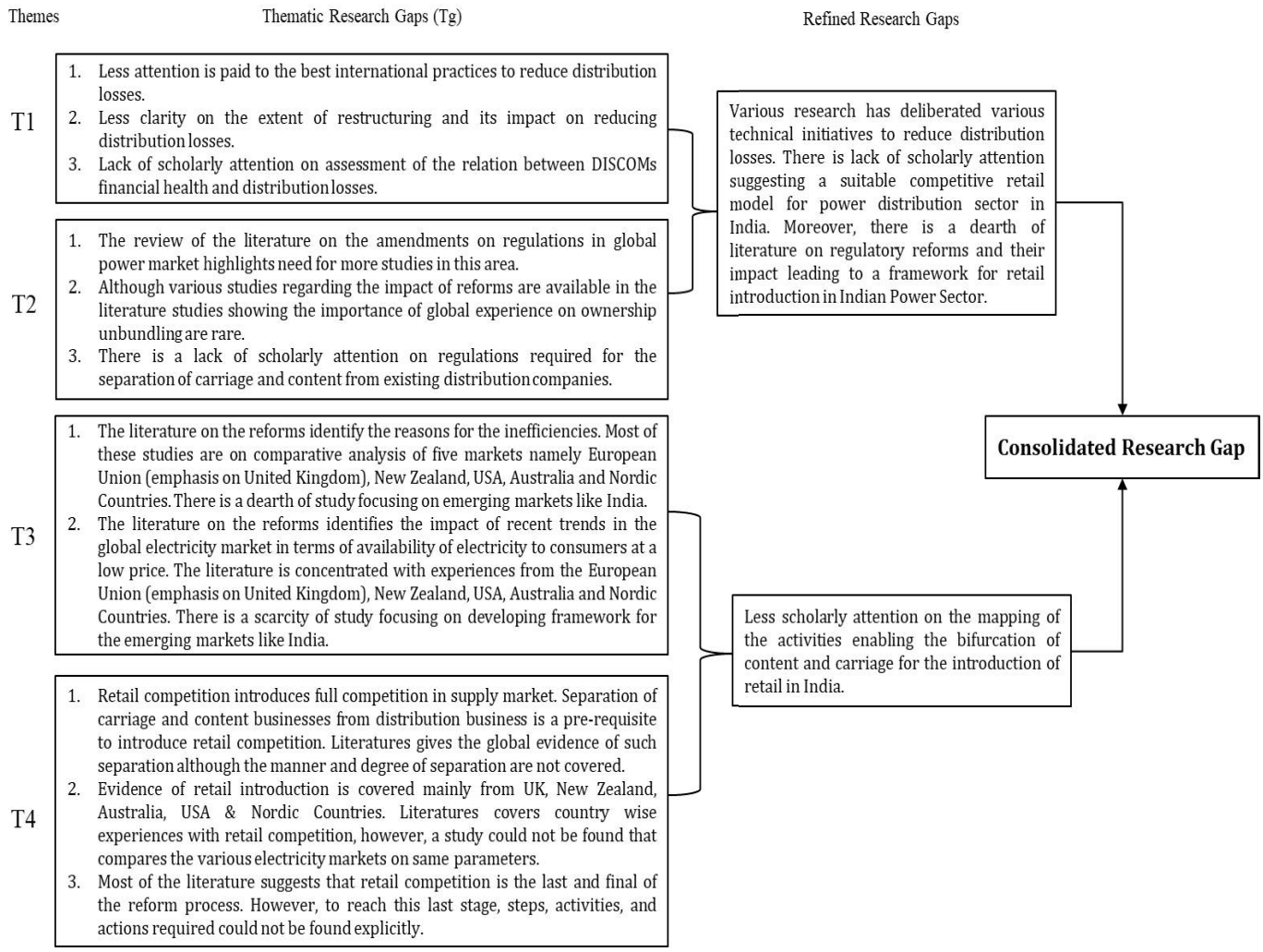


Figure 4.1: Refining of Research Gaps

### 4.4.1 RESEARCH GAP

The literature reviewed for this particular study derives two research gaps. These research gaps are further reduced in accordance with the funnel approach suggested by "Creswell (1994)" and as adopted and expanded by Miller in 2009 for developing a framework for the Analysis of Politics in Enterprise Transformations". The funnel approach to derive the consolidated research gap is shown as below in Figure 4.2.

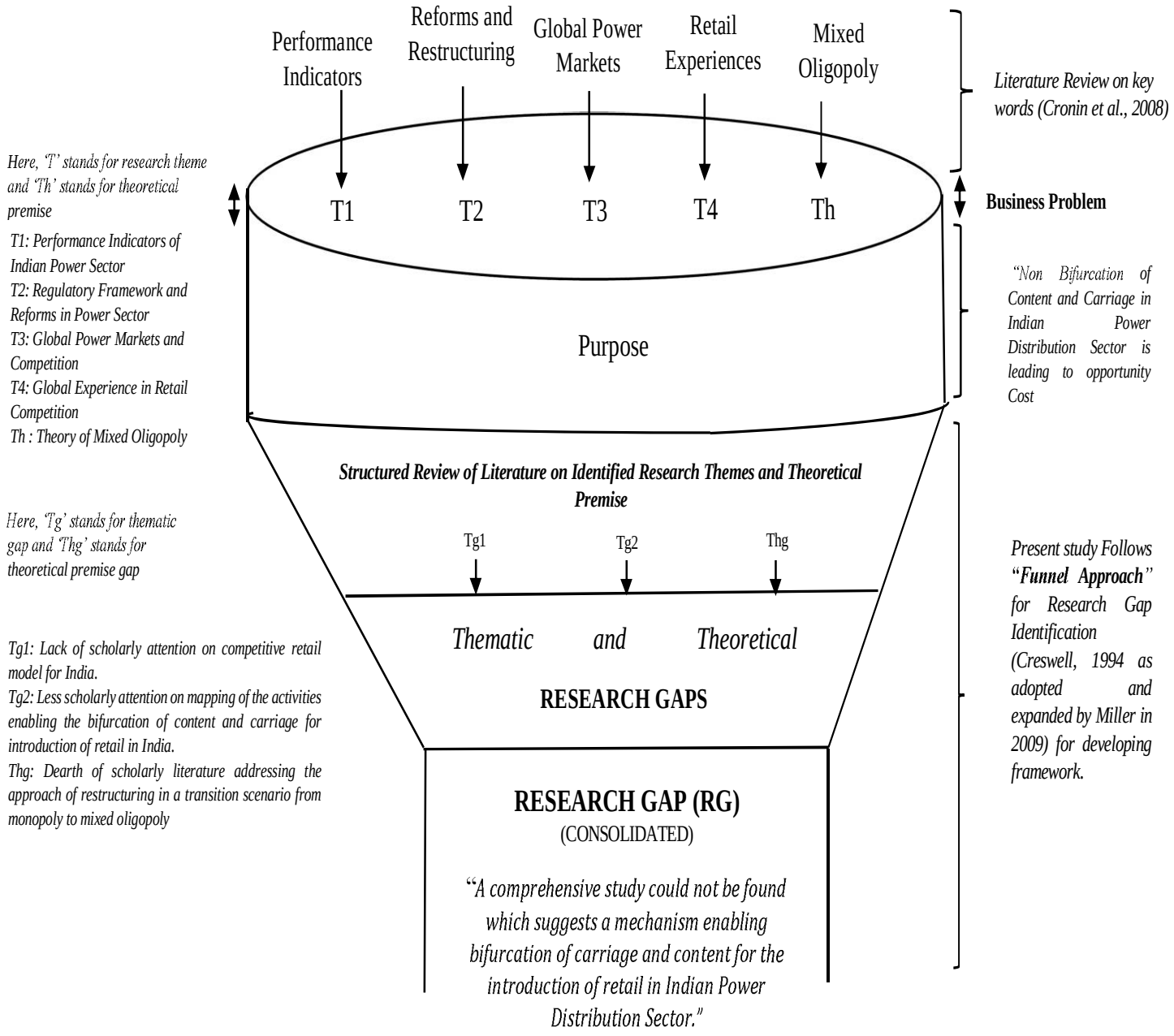


Figure 4.2: Funnel Approach for Consolidation of Research Gap

The consolidated research gap for the present study is: "**A comprehensive study could not be found which suggests a mechanism enabling bifurcation of carriage and content for the introduction of retail in Indian Power Distribution Sector**".

### 4.4.2 CRITICAL ANALYSIS OF RESEARCH GAP

Literature review assesses the performance indicators of Indian power sector and founds: though Indian power sector has been growing with good pace since last few decades, the rising scale of inefficient operations are endlessly plaguing the sector. Technical and commercial losses, negative profits, high debt, high pricing, consumer dissatisfaction are growing continuously in Indian Power Distribution Sector and thus negatively affecting the entire value chain. Though the Indian Government tried to address these issue through Electricity Act 2003, significant success could not be attained. Since Indian power distribution sector has a monopoly, there is a need to eliminate this monopoly by bringing competition through next-generation reforms. Introduction of retail competition through separation of carriage and content business is the most favorable approach globally to remove monopoly in distribution segment in order to make the sector efficient. The government of India may also opt retail competition for Indian power sector. Though the policymakers are looking in this direction through Electricity Amendment Bill 2014, they could not form a definite comprehensive study which can suggest a framework enabling bifurcation of carriage and content to introduce retail competition as per ground conditions. Hence the study signifies a need to design a framework which can suggest a mechanism to introduce retail competition in India through the separation of carriage and content from existing distribution business.

## 4.5 RESEARCH PROBLEM

A research problem is a clear expression or definite statement which reflects an area of concern, a difficulty to be removed, a situation to be improved upon, a disconcerting question that exists in scholarly literature or in theory or within present practices – that indicates a need for significant understanding and deliberate investigation (Britton, 1975). Research problem does not illustrate how to do something. Research Problem offers a broad or vague proposition. It presents a value question (McClelland et al, 1953). In our case, the research problem for the present study is:

**"What approach should be adopted by policymakers to enable restructuring in a transition scenario from monopoly to mixed oligopoly."**

## 4.6 RESEARCH QUESTION

A research question is a fundamental core of review of the literature, study, research project or thesis (Johnson and Onwuegbuzie, 2004). Research question gives focus on the study, regulates the methodology and guides in all stages of reporting, analysis, and inquiry. The research question for the present study is:

**"What should be a framework for bifurcation of carriage and content to introduce retail in Indian power sector?"**

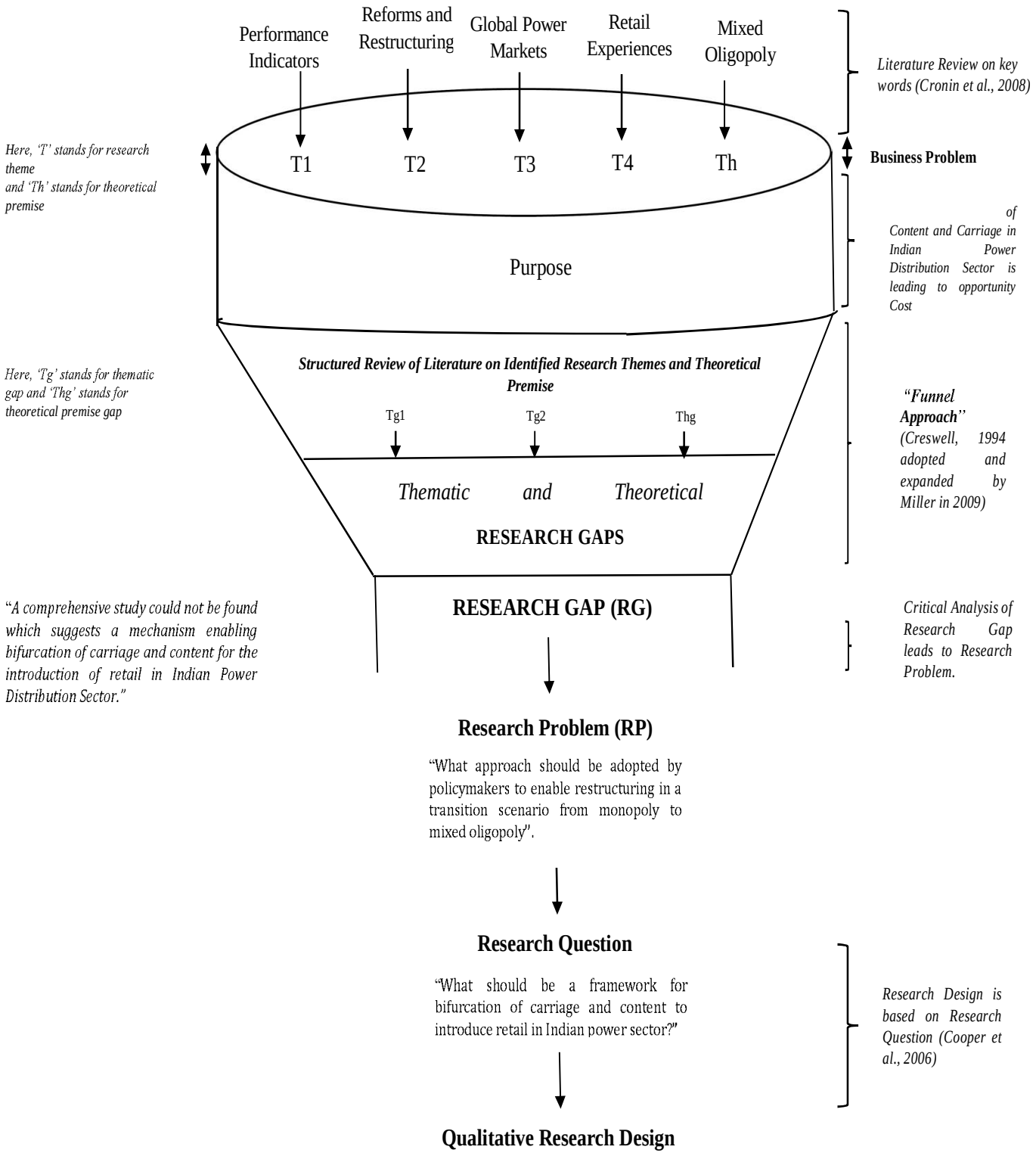


Figure 4.3: Research Question Leading to Qualitative Research Design

Figure 4.3 shows the alignment of research question with research design. The research design answers the question set out by the literature review. The relation between the research question and research design is fundamental to whole research process because an inappropriate research design may affect the quality of answer (Closs and Cheater, 1999). Hence it is important to match the research design with a particular research question. The 'association' between the research question and research design strengthens the entire foundation of research (Draper, 2004). Therefore the research question of the present study highlights the need for Qualitative Research Design.

## 4.7 RESEARCH OBJECTIVE

The research objective provides an accurate narration of the specified actions which are necessary to be carried out to fulfills the purpose of present study (Isaac and Michael, 1995). The research objective should be in the single sentence. To identify a research objective, research question needs to be defined (Mays and Pope, 1995). The research objective of the present study is:

**"To formulate a framework for bifurcation of carriage and content to introduce retail in Indian power sector."**

Figure 4.4 shows how the research objective for present study set lines for familiarisation in Qualitative Research Design to develop conceptual lens (conceptualization).

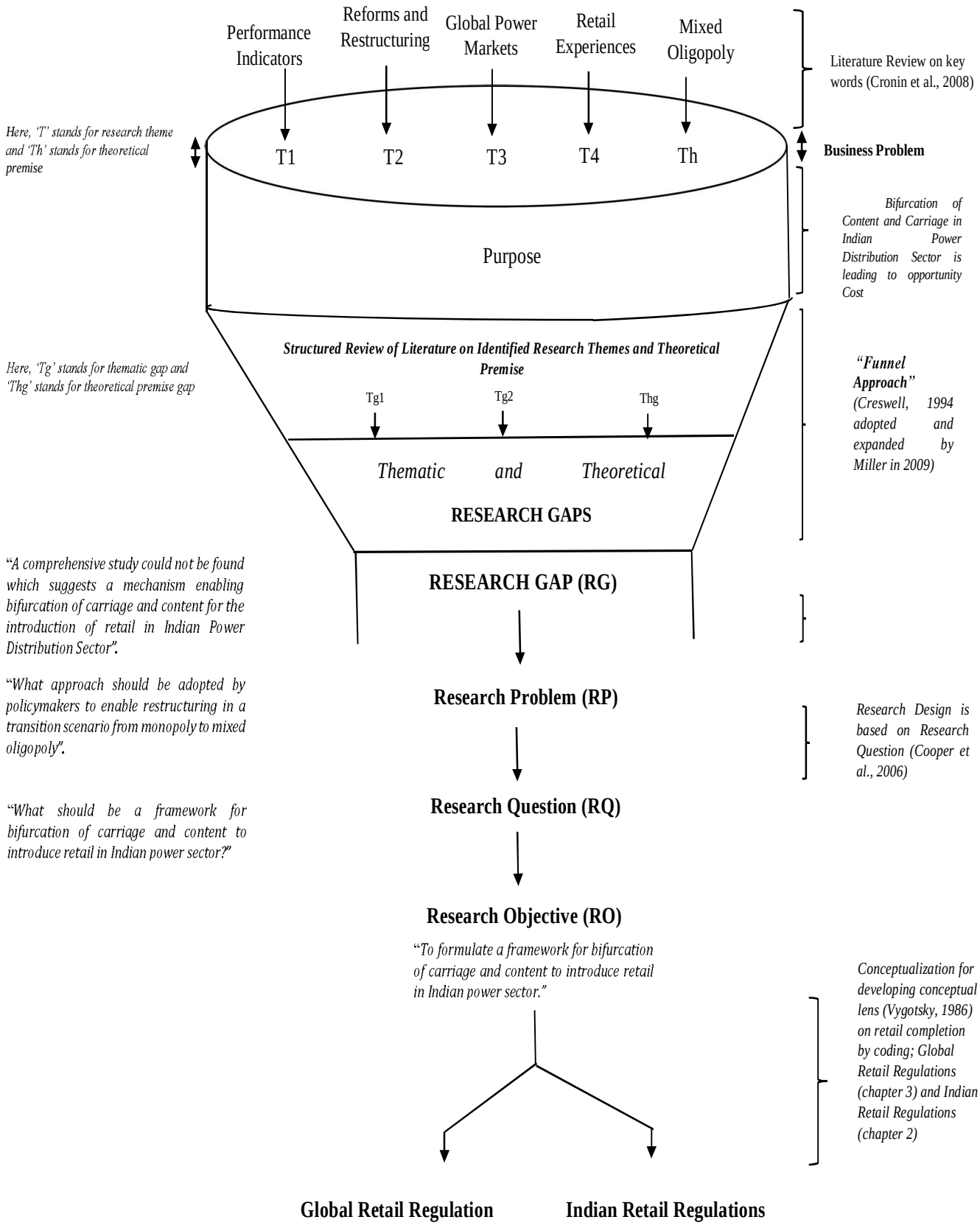


Figure 4.4 Research Objective Outlining Methodology for Familiarization

The research objective suggests that the Indian and Global retail regulations should be analyzed for familiarization under qualitative research design. The familiarization of the global and Indian retail regulations will result in the conceptual lens for this the process is also known as conceptualization (Vygotsky, 1986)

## 4.8 SUMMARY

1. Review of literature landscape is made on four research themes and underpinning theory 1) Performance Indicators of Indian Power Sector 2) Regulatory Framework and Reforms in Power Sector 3) Global Power Markets and Competition 4) Global Experience in Retail Competition 5) Theory of Mixed Oligopoly
2. Consolidation of research gap is done by refining research gap identified from research themes. For this, funnel approach adopted by from Miller, 2009 is followed. Initially, four research gaps were identified from four research themes which were then refined to two research gaps leading to a consolidated research gap. Thus the filtered consolidated gap derived using funnel approach is as follows: 'A comprehensive study could not be found which suggests a mechanism enabling bifurcation of carriage and content for the introduction of retail in Indian Power Distribution Sector'.
3. Theoretical premise gap for the present study is, 'There is a dearth of scholarly literature addressing the approach of restructuring in a transition scenario from monopoly to mixed oligopoly'.
4. The consolidated 'Research Gap' and 'Theoretical Premise Gap' led to the formulation of 'Research Problem', 'Research Question' and 'Research Objective'.
5. The derived Research Problem for the study is, 'What approach should be adopted by policymakers to enable restructuring in a transition scenario from monopoly to mixed oligopoly'.
6. The critical analysis of theme based Research Gap and purpose for present study frames following as Research Question, 'What should be a framework for bifurcation of carriage and content to introduce retail in Indian power sector?'

7. The Research Objective corresponding to Research Question is: 'To formulate a framework for bifurcation of carriage and content to introduce retail in Indian power sector'.
8. The Research Question highlights the need for Qualitative Research Design.
9. The next chapter elaborates the Qualitative Research Design and research methodology for the present study.