Summary

There exists a lot of diversity in Indian pharmaceutical environment in various aspects. Whether it is on disparity of pricing, regulated pricing, regulatory bodies involved, or change of patent act and evolvement of operating style due to switch of the regimes, patent act or types of drugs in market i.e innovator and generic, big molecule or small molecules, combinations of drugs, essential drugs etc. Furthermore, implications of implementations of TRIPS in developing countries including India, are leading to strengthening of IPRs regime and may further limit the access of technology. local enterprises may be under pressure to close down or form alliances with larger firms, resulting in a concentration of the industry and dependence on imports may go up and drug prices are probably going up upon introduction of product patents.

Though, there have been studies on pharmaceutical industry by various authors on these different aspects affecting the industry there are missing links. This study has provided a complete picture starting from diseases, its treatment, drugs and firms making it and their analysis to provide meaningful insights and coming out with new and original recommendations to the challenges faced by drug manufacturings firms as well as to help the consumers and society in large. The study funnels down to the challenges faced by these pharmaceutical firms as well as consumers. The prime necessities of pharmaceutical firms in current Indian context are to provide drugs at affordable prices as well as to make descent margins to thrive well in the market. This study is important from few stand point considering the diversity and complexities of the industry. Effectiveness of functioning of pharmaceutical companies and effective deployment of the available resources are vital issues, as the company has a responsibility to provide the drugs at affordable prices as well as make descent margin to thrive its business. This is a reason why examining and measuring the success of pharmaceutical firms using efficiency evaluation and benchmarking is an important exercise. Also in areas of research methodology, previous studies related to pharmaceutical firm’s performance have been simplistic in statistical analysis. The tools used have their own limitations. DEA is used to analyze the performance of pharmaceutical firms. This study provides
framework that can improvise the performance of pharmaceutical firms. Moreover, such studies also suggest the firm to re allocate their resources in such a way so that to be cost efficient. This may help them to maintain same margin and pass on the benefits to the market by reducing the prices to the same extent of a drug. Such kind of study will also help Government bodies to also assess firms that are price conducive.

It was found out that earlier authors though have worked on various aspect to pharmaceutical industry, but there still exists gaps as follows:-

(a) A holistic approach
(b) Assessment of these firms based on critical inputs, particularly on R&D, raw material, power and fuel, are needed which eventually increases the cost of medicine.
(c) Pricing to meet wants of consumer as well as firm

Thus, objectives of the research are:
1. To identify specific prevalent diseases in India.
2. Evaluate efficiency of select pharmaceutical firms,
3. To identify the parameters required to evaluate cost efficiency and others (like technical and allocative efficiency)
4. To discover the possible input excesses and output shortfalls

The above leads to formulating hypothesis as follows:-

H1: Combinations of inputs does change efficiency of firm
H2: The excess investments on R&D do not result in increase of sales.
H3: An efficient Pharmaceutical firm is cost efficient
H4: All firms are not consumer conducive.

Then the data was collected from various secondary and primary sources and through different methods as elaborated in the study. Data envelopment analysis and other tools like Tobit regression were done to assess the performance of these pharmaceutical firms. The assessments are done through 3 setup. Through set up (I), it finds out that how combinations of multiple inputs change the Efficiency. Applying DEA we found out that most of the DMU those are pertaining to respective firms are spending more on R&D. Relook into this area can lead to improved efficiency of the firms. It was found that all companies are above 70% BCC efficient. It can be inferred that even though the spend
on R&D is more but it is not yielding enough. The analysis helped to find out the peers of Decision making units (DMUs) that is the pharmaceutical firms. Tobit regression analysis, highlights that the efficiency of pharmaceutical firms is mainly impacted either by output variables namely profit and export or by input variables i.e. R&D. Through, Setup-II, it was found out that even if a firm is technical efficient i.e 1, it need not be cost efficient. Though 16 of the firms are technical efficient only 8 firms are cost efficient. It can be inferred that with correct allocation of resources the firm can become cost efficient. A cost efficient firm can help society in large to produce drugs at affordable prices as well as maintain a decent margin to thrive in the market.

Setup III, deals in suggesting consumer conducive firms. The “Consumer Paying Price (CPP)” is the maximum retail price (MRP) most of the time, which is very much different from the sales revenue generated by the firms itself. Most likely intermediary channels enjoy this big chunk. Probably, (1) this leverage is provided by the firm to push their products into market by making it lucrative to the channel partners (distributor, wholesaler, retailer etc.) or (2) The Brand itself has such a strong pull that customer pays that price yet the firms knowingly or unknowingly do not reduce the MRP and let the channel partner enjoy this chunk.

We find that some decision making units (DMU), the BCC efficiency and CCR efficiency increases considerably when CCP is considered. When CPP is not considered there values are less than when CPP are considered. This shows that these firms are consumer conducive firms or these firms pricing are favorable to consumers. Based on such analysis, Government can also take initiative to encourage those firms that are conducive to consumers. Cost efficient firms can yet pass on the benefits to consumers still make same margins for itself and without cutting down on the intermediaries’ portion with right input mix and reallocating resources as suggestive of the model. This will help society in large by production of drugs at affordable prices as well as lead to business growth.

**Organization of study**
The thesis is organized into six major chapters. Chapter one provides an Introduction to the diversified aspects and provides a scenario in details pertaining to Pharmaceutical
Industry. It also provides details of the Patent laws before and Post TRIPS scenario for better understanding of the readers. It also cites the emerging trends and strategies of the pharmaceutical firms in Indian context. It talks about the drug policies and changes relating to India over a period of time, which affects the industry. This chapter has also touched upon the different kind of molecules relating to drugs and also drug development process to provide a holistic view to the readers.

In Chapter Two, Literature review, Importance of study, research gap identification, objectives, devicing hypothesis, collection of data and Research methodology adopted has been discussed.

Chapter three, deals with identification of diseases found globally and in particular prevalent in India. This chapter talks about Delphi Technique which was used among subject matter experts and eminent medical professionals to arrive at the prevalent disease to be considered for the study. This chapter also provides details of the diseases, therapies, drugs and drug manufacturing companies pertaining to it. It also provide in detail the author work at arriving at select firms for the study.

Chapter four provides an overview of the conceptual foundation of the advanced technique Data Envelopment Analysis which is used in this study for evaluation. It also throws light on Charnes Cooper and Rhodes (1978) and Banker Charnes and Cooper (1984) models in detail. DEA is used and firms assessment are done by using the models which has been elaborated in details to provide meaningful inference about the pharmaceuticals firm under study. Through this chapter benchmarking of firm are done and suggestive slack are determined for respective firms.

Chapter five elaborates on cost efficiency and possibilities of reallocation of resources by the firms. Chapter five deals to find out Cost efficient firms. It also deals with an unique approach to find out consumer conducive firms. This analysis has come out as unique and original revelation.

Chapter six provides the Conclusions, recommendations and future research work. It provides direction and highlights on the future scope of the study. It states, how the approach can be replicated and DEA be applied to such real life situation and used for the benefit of society. This chapter is followed by References and Appendices.