Chapter 2 - Literature Review

This Chapter deals with the studies done in different aspects of pharmaceutical firms. Then, importance of such study is discussed and why it is needed and how will be helpful to people in large. Based on above Research gap identification is done then objective of study is decided. Thus Hypothesis is formulated and data collection process is discussed. The research methodology is elaborated.

A number of studies have been published on different aspects pertaining to pharmaceutical firms. Some of the work done by authors throws lot of insights on pharmaceutical industry scenario in Indian context.

Table 2.1 Literature Review

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<tr>
<th>Author &amp; Year</th>
<th>Purpose of Study</th>
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<tr>
<td>Saranga and Phani (2004)</td>
<td>Used DEA to study the performance of 44 pharmaceutical companies in order to determine the best practices in the Indian Pharmaceutical industry.</td>
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<td>BISWAJIT DHAR &amp; K.M. GOPAKUMAR (2006)</td>
<td>&quot;Post-2005 TRIPS scenario in patent protection in the pharmaceutical sector: The case of the generic pharmaceutical industry in India&quot;</td>
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<td>H. Saranga (2007)</td>
<td>&quot;Multiple objective data envelopment analysis as applied to the Indian Pharmaceutical Industry&quot;</td>
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<td>Anita Kotwani, Margaret Ewen, Dalia Dey, Shobha Iyer, P.K. Lakshmi, Archana Patel, Kannamma Raman, G.L. Singhal, Vijay Thawani, Santanu Tripathi &amp; Richard Laing (Indian J Med Res 125, May 2007)</td>
<td>&quot;Prices &amp; availability of common medicines at six sites in India using a standard methodology&quot;. The price and availability of medicines are key components in determining access to effective treatment. Data on prices and availability of common medicines in public and private sector in different States of India are scarce. Hence, surveys were undertaken in different States of India to evaluate these metrics</td>
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<td>Man-Keun Kim, Thomas R. Harris and Slavica Vusovic (2009)</td>
<td>Efficiency Analysis of the US Biotechnology Industry: Clustering Enhances Productivity</td>
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<td>Dr. Amit Sengupta National Campaign Committee for Drug Policy, New Delhi, India (2010)</td>
<td>&quot;Study of National Health System in India with regards Access to Health Care and Medicines&quot;. To provide detail framework and policy pertaining to Indian pharmaceutical industry</td>
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<td>Mainak Mazumdar, Meenakshi Rajeev, &amp; Subhash C. Ray (2010).</td>
<td>&quot;Sources of heterogeneity in the efficiency of Indian pharmaceutical firms&quot; In order to maximize profit, a firm has to attain both input and output efficiencies. DEA efficiency score of a firm provides an assessment of its performance based on measurement of output and input efficiencies for Indian pharmaceutical firms.</td>
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<tr>
<td>H S Pannu, U Dinesh Kumar and Farooquie (2010)</td>
<td>To study &quot;Impact of Innovation on the Performance of Indian Pharmaceutical Industry using Data Envelopment Analysis&quot;</td>
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<tr>
<td>Dr. Rajesh Jain,2011</td>
<td>“Challenges and potentiality of survival and success of family owned businesses in pharmaceutical industry in India since 1980”</td>
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<tr>
<td>Ravi KIRAN &amp; Sunita MISHRA (2011)</td>
<td>&quot;Research and Development, Exports and Patenting in the Indian Pharmaceutical Industry: a Post TRIPS Analysis.&quot; This paper examines the Impact of TRIPS on Research and Development, Exports and Patenting activity of the Pharmaceutical Industry of India.</td>
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Kotwani et.al. (2007) studied on prices & availability of common medicines at six sites in India. Sengupta (2010) worked on National Health System in India with regards to access to Health Care and Medicines. His work provided detail framework and policy pertaining to Indian pharmaceutical industry.

Some of the papers published based on financial statement analysis of the firms. We are focusing mainly on those studies that use frontier analysis or DEA to gauge performance of pharmaceutical firms.

Pannu et.al. (2010) studied on aspect of Innovation on performance of Indian Pharmaceutical Industry. Malhotra & Malhotra (2008) used DEA where it employs relative efficiency, a concept enabling comparison of companies with a pool of known efficient companies. The inputs considered are “days of sales outstanding, days cost of goods, sold in inventory, total debt/equity. The outputs considered are “cash flow per share, return on equity, return on assets, return on invested capital, inventory turnover, interest rate coverage, quick ratio”. Saranga (2007), Saranga and Phani (2004) used DEA to study the performance of pharmaceutical companies in order to determine the best practices in the Indian Pharmaceutical industry. Mazumdar et.al. (2010) used DEA efficiency score of a firm which provides an assessment of its performance based on measurement of output and input efficiencies for Indian pharmaceutical firms.

2.1 Importance of Study

This study is important and provides a different and realistic approach which has not been considered earlier with a holistic approach. The study talks in details of relevant diseases and drugs pertaining to it. In depth understanding has been provided on the drug regulatory pricing and laws practices followed internationally. The pharmaceutical industry scenario has been dealt with relevance to companies with innovator drugs and manufacturer of generic drugs. The various diversified aspects of pharmaceutical industry and challenges have been studied. The select companies manufacturing these
drugs are taken into consideration and DEA is used to analyse the performance of pharmaceutical firms. The challenges from drug manufacturing firms are to make a requisite margin so that company can thrive well. Whereas from societal point of view the drug prices should be provided at affordable prices for larger public. For this there are Government regulatory bodies which fix the prices for essential drugs. 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 drug at an affordable prices as well as make descent margin to thrive it’s 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 firms performance have been simplistic in statistical analysis. The tools used have their own limitations. 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.

2.2 Research gap identification

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

(a) A holistic approach needs to be considered from Diseases to Drugs and Firms making it. This is required because there is lot of diversity and factors which needs to be considered keeping requirement of consumers in a developing country like India. There also needs to be a win – win situation for the companies making these drugs, so that they grow in the competitive and regulated market. Previous studies are in isolation, and needs to be connected and come out with solutions which will be beneficial for the pharmaceutical industry as well as the larger public or consumers.
(b) Assessment of these firms spends and critical inputs, particularly on R&D, raw material, power and fuel, are needed which eventually increases the cost of medicine. Thus, also analyze if efficient firms are cost efficient. As cost efficient firm can provide drugs at affordable price. There needs to be suggested recommendations for the firms so that they can reallocate their resources and come up with improved efficiency. There remains a need to lower the price without reducing the margins of the companies, which is being addressed by the authors through this study.

(c) Drugs manufactured by pharmaceutical firms including multinational corporations are expensive and beyond reach of average Indian consumer. Pricing to meet wants of consumer, without any compromise on quality needs to be re-looked. Previous studies do not address the practical solutions which can be applied to such areas like finding out which firms are consumer friendly. By this study, authors have come up with analysing efficiency of firms and also developed a new approach which can be applied to find out these consumer-conducive firms considering inputs and outputs. Thus, considering the pricing strategies of such firms might lead to reduction in Consumer Paying Price (CPP).

(d) Last but not the least, DEA being a robust tool was not used in previous studies in pragmatic way to come up with realistic solutions to apply to most of these areas of gaps.

2.3 Objective of Study

There exists a lot of diversity in Indian pharmaceutical environment in various aspects. The drugs manufactured by pharmaceutical companies including multinational corporations (MNCs) are costly drugs and these are ordinarily beyond reach of average Indian consumer. In 2010 the Planning Commission (a central government body), instituted a high level expert group to propose an overall framework for establishing universal health coverage (UHC) in India. The UHC will primarily grow generics market, with low prices moderating financial impact of increased volume, thereby eroding the margin for MNC generic players competing with low-cost locals. This will
lead to a tough competitive market. Keeping larger public good in mind, it will be in the best interest of even these companies to tailor down their costs to meet needs of consumer, without any compromise on quality. Through this study, we get to understand clear picture of comparative assessment of the market place economics of drugs and of different firms at large to help consumers and also the Pharmaceutical companies including MNCs. Like with improved cost efficiency might lead to scope of reduction of price without reduction on margin. We are trying to provide a holistic picture and approach to the problem from arriving at the diseases for the study to the drugs manufactured by the firms and then assessment of these firms through differentiated tool like DEA which enables us to assess the firm’s technical and cost efficiency. We will apply Delphi Technique to arrive at specific prevalent diseases in India and identify pharmaceutical firms making drugs for these diseases. We will be using data envelopment analysis (DEA) approach to find out the Cost efficiency of firms.

The study will lead to recommendations of firms about their peer with whom they can benchmark. They can find the areas where they need to optimize their inputs and outputs, to be more efficient. Due to pressure to provide drugs to consumers at affordable price the approach will also lead to recommendations where the firms can bring in efficiency thereby producing drugs in more optimized way and service to market at lesser price without reducing the margin.

The study might also provide an approach to regulatory or Government authority to recommend pharmaceutical firms to price their maximum retail price (MRP) which will also be conducive for consumer or patients and also retain the profit they were making earlier. Based on such analysis, Government can also take initiative to encourage those firms that are conducive to consumers and also thriving in the market by making descent profit. This will help society in large by production of drugs at affordable prices as well as lead to business growth for the firms.

The objectives of the research are to find out the followings:-

1. To identify specific prevalent diseases in India.
2. How meaningful is usage of DEA or frontier analysis to evaluate efficiency of select pharmaceutical firms, based on multiple inputs and outputs.

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 and to do projections for various firms accordingly for efficient utilization of resources.

2.4 Hypothesis

H₁: Combinations of inputs does change efficiency of firm

H₂: The 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.

2.5 Collection of Data

The specific prevalent diseases in India were identified through Delphi technique with a panel of seven judges, working at a distance, with all communication by email through a moderator. This constituted expert opinion of Medical professionals.

The secondary data was collected from Annual report of companies particularly for Revenue, R&D spent, Fuel cost, RM cost etc. Data on the drugs manufactured by firms pertaining to specific diseases was taken from Drug Today, Vol-I and Vol –II, 2012. The important data like stock keeping units (SKUs), brands, therapy, company name, strength of drugs, pack size, maximum retail price (MRP) and number of units sold was collected from data of All India organization of chemist and druggists. The financial data was also gathered from Bloomberg, Mar, 2012.

Primary observatory research was conducted at 35 privately owned medical / pharmacy/ retail outlets each at 4 cities i.e Delhi, Bangalore, Chennai and Mumbai to find out the price at which the customer buys medicine.
2.6 Research Methodology

- Delphi technique was applied among experts of Medical profession to arrive at specific prevalent diseases in India.
- Applying Pareto’s law, 24 pharmaceutical firms was identified among all firms making drugs for select diseases.
- Data envelopment analysis (DEA) or Frontier analysis was used to find out efficiency of firms. The Charnes, Cooper, Rhodes (CCR) and Banker, Charnes, Cooper (BCC) models was used for the analysis.
- Mathematical computation to reliable collected secondary data was carried out to find percentage increase from firm’s selling value (i.e Actual Revenue made by firm) compared to Consumer paying price CPP.
- Primary observatory research carried out to understand the CPP. It was observed in 4 cities i.e Bangalore, Chennai, Delhi and Mumbai at 35 pharmacy outlets in each city.
- The work of analysis to test the Hypothesis and points led in the objectives are done by 3 setups (I, II, III). Set up I used BCC technical efficiency of the firms and come out with the benchmarking of firms. It suggests the firms peer to eachother. The analysis also recommends the inputs which need to be increased or decreased to have improved efficiency. In Setup II, cost efficiency has been found out. Here it is found out that even the firms are technical efficient there lies the scope to reallocate the resources and be cost efficient. In Setup III, a unique reverse way approach used to find out the efficiency by consideration of both aspects. One is by taking CPP, which is mostly maximum retail price (MRP) and other one by not taking into consideration of CPP.