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3.1 Introduction

It is very well said that in order to speak with confidence you need to have evidences and concrete reasons to support your say. In any serious work you need to take help of some expert and in the same way in order to provide some new knowledge to the world which is the basic objective of any Ph.D. degree we need to use some strong technical way to come to some conclusion.

To know the details and to come to some conclusions and provide some suggestion to the businesses this research work is a humble effort. This work which is basically done for the Ph.D. Degree is dealing with the Pharmaceutical Industry of India. The main parameter or measurement of any business activity is Profit and hence in order to assess the performance of this industry in the past decade we have made an analysis of profitability of the companies of the Pharmaceutical Industry of India.

In this study a comparison has been done in between different Pharmaceutical companies, selected for the study. Financial details for the period from 2003-04 to 2009-10 have been taken into consideration.
3.2 Period of the Study

The following research work is carried out on the 10 selected units of Pharmaceutical Industry of India for the period of 7 years from 2003-04 to 2009-10. The duration of the period is good enough to cover the short term fluctuations and is enough to provide insights into the performance of the different selected companies.

The new Patent protection would be operational from the year 2005, and hence the entire scenario of Indian Pharmaceutical Industry would change from then. In the light of this change how Indian Pharmaceutical Industry is poised to face the challenge; the study period is taken close to a decade just before the new patent protection comes into force in India.

The reintroduction of product patent would mean that companies would not be able to copy drugs patented after 1995. In other words, most Indian companies may face an acute decline in market opportunities after 2005. It is also pointed out that a shift to a product patent regime would demand that basic capabilities of indigenous research be developed. Big companies have started preparing themselves for improving their R&D standard as well as
R&D budget and also making tie-ups with the leaders for the R&D, but the real test is for the small units because they not only lack financial resources but also lack trained manpower and accessible testing facilities.

The passage of the Patents (Amendment) Act, in 1999 was the first important step in facilitating product patents in the country by accepting product patents applications since 1995 and providing for the grant of exclusive marketing rights (EMR) in India.

After decades of denial, in 1999 India became party to the Paris Convention and the Patent Cooperation Treaty. It has been argued that the IPR (Intellectual Property Rights) regime can significantly constrain access to technology by developing countries and increase dependence on imports. The local firms would, under such circumstances, be left with no option other than collaborating with the foreign firms or simply giving up business. Similarly, a stronger patent system can dissuade innovative activity by local firms whose R&D function, dependent on the spillover effects of other firms and important in itself, would be affected adversely by the restricted access to these spillovers.

Due to the process patent system domestic
manufacturers could produce inexpensive, generic versions of off-patent regimes. The product patent regime would disallow such production and trade. It is apprehended that the prices of newly patented drugs would increase substantially, thereby imposing tremendous social and economic costs on the poor on these countries. The argument that higher prices would induce greater innovative activity by the patent protected developed nations is highly flawed. Even if a large part of the expenditure by multinational firms on R&D is geared towards the many so-called ‘poor’ country diseases (viz., tuberculosis, malaria, cholera, HIV/AIDS, etc.), the developing country consumers would still find the cost of medicines prohibitive; consequently, through low sales, R&D investment would be reduced. In any case, prices of medicines for the ‘global’ ailments (viz., cancer, cardiac diseases, etc.) would also be high for new drugs in developing countries, irrespective of the patent regimes. The R&D activity shall, evidently, continue to derive strength from consumers in the developed nations. In fact, a recent UNDP report estimates that once TRIPs comes into force, it could induce a price hike ranging between 12 per cent and 68 per cent. It concludes: ‘To expect developing countries to accept such price spirals without adequately addressing their concerns of access to cheaper medicines to fight life threatening diseases, particularly in a public health emergency, seems unfair’.
Changes in India’s policy regime did not come about automatically with the signing of the WTO-TRIPs Agreement. However, the Indian pharmaceutical majors were both aware of and prepared for the implications of the new regime. But the shift in policy away from the established and much favoured process patent system involved a gradual reorientation of political and business mindsets. An important contributing factor was the initiation of India’s general programme of economic reforms in mid 1991. This process increased general understanding of market mechanisms, global business trends, and the role of international organisations, new perspectives on trade, the evolution of patent systems and other issues that have a bearing on public debates about economic policymaking.\(^5^8\)

3.3 Scope of the Study

As the current study is for the pharmaceutical industry of India all the companies of pharmaceutical industry of

India can be included in the study. But the companies with meager investments or very less market are excluded from the scope. Hence the selection was to be done from the public limited companies from the entire pharmaceutical industry.

There are further classifications in the public limited companies as those who are into business of:

1. Bulk Drugs
2. Formulations
3. Bulk Drugs & Formulations

Hence the selection of the companies has been done from the last type of companies in the pharmaceutical industry of India. In order to understand the pulse of Indian Pharmaceutical Industry it was essential to select the major players of the Industry and as still the industry was driven by volumes it was imperative on the part of the researcher to select those companies which are having the highest market share in terms of volumes.

The annual sales figures for the year ended on 2009-10 were ranging from Rs. 10,525 crores to Rs. 73,294 crores, hence the selection was done for the top 10 companies. All the selected companies have annual sale figures of more than Rs. 10,500 crores.
The selected 10 companies are as under:

1. Ranbaxy Ltd.
2. Dr. Reddy’s Laboratories Ltd.
3. Cipla Ltd.
4. Sun Pharmaceuticals Industries Ltd.
5. Lupin Ltd.
6. Aurobindo Pharmaceuticals Ltd.
7. Glaxo Smithkline Ltd.
8. Cadila Healthcare Ltd.
9. Aventis Ltd.
10. IPCA Laboratories Ltd.

3.4 Objectives of the Study

(1) To understand the basic nature and composition of Pharmaceutical Industry.

(2) To understand the various ways to measure the profitability and thereby the financial performance.

(3) To calculate different measures of profit for different companies under study for the study period [From 01-04-2003 to 31-03-2010].

(4) To identify any relationship in-between companies in the various measures of profit.

(5) To identify any relationship in-between different years for the trend of various measures of profit. In other words to identify any
trend in the profit in the study period.

(6) To derive conclusions about the performance of the companies with regard to several criteria.

(7) To provide some suggestion to the companies under study.

3.5 Data Collection

All data which are necessary for the research have been collected from the annual reports of different companies under study. Additional information required was collected by from various websites and also from various Journals, Magazines and other publications. This research is based on secondary data.

Companies selected for the research are on the basis of sales figures of the year 2009-10 from the various financial magazine like “Capital Market” and “Fortune India”.

3.6 Research Methodology for the Interpretation of the Data

The research work is based on data taken from the annual reports of the selected companies for the period of study. Various other publications for the Pharmaceutical Industry have also
been taken into consideration. The data obtained have been duly classified, edited and tabulated under various groups and sub-groups, as per requirement of the study.

Statistical measures like Arithmetic Mean, Index Numbers, F-test and various ratios are used as per requirement.

3.7 Hypothesis

**Hypothesis for different Companies for the Study Period**

In order to observe some concrete conclusions by comparing the annual results between the selected Pharmaceutical companies under study following hypothesis are made.

1. “The individual cost to total cost ratio is same among different Companies during the period of study.”

2. “The profit margin ratio is same among different companies during The period of study.”

3. “The assets turnover ratio is same among different companies during The period of study.”

4. “The return on investment ratio is same among different companies During the period of study.”

**Hypothesis for each (individual) Pharmaceutical Company among different years.**

By comparing annual financial results of each
(individual) Pharmaceutical company for all consecutive years of the study period, following hypothesis are made in order to derive conclusions.

1. “The individual cost to total cost ratio of each individual company is same during all the years of the study period.”

2. “The profit margin ratio of each individual company is same during all the years of the study period.”

3. “The asset turnover ratio of each individual company is same during all the years of the study period.”

4. “The return on investment ratio of each individual company is same during all the years of the study period.”

3.8 Tools for Analysis

(a) Ratio Analysis

Ratio analysis is a widely used tool of financial analysis. It is defined as the systematic use of ratio to interpret the financial statements so that the strengths and weaknesses of a firm as well as its historical performance and current financial condition can be determined. The term ratio refers to the numerical or quantitative relationship between two items/variables.  

Most ratios can be calculated from information provided by the financial statements. Financial ratios can be used to

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analyze trends and to compare the firm's financials to those of other firms. In some cases, ratio analysis can predict future bankruptcy.

Financial ratios can be classified according to the information they provide. The following types of ratios frequently are used:

Liquidity ratios
Asset turnover ratios
Financial leverage ratios
Profitability ratios
Dividend policy ratios

(b) Arithmetic Mean

Mean, also known as arithmetic average, is the most common measure of central tendency and may be defined as the value which we get by dividing the total of the values of various given items in a series by the total number of items.

Mean is the simplest measurement of central tendency and is a widely used measure. Its chief use consists in summarizing the essential features of a series and in enabling data to be compared.60

(c) Index Numbers

An index number measures the amount of change in a variable over time. The variable could be prices of different commodities, agricultural production, industrial production, imports and exports etc. In general, an index number is computed by taking the ratio of the value of the variable in the current period to the value in a base period. The resulting value is multiplied by 100 to finally express the index as a percentage.

Index numbers are indicators of economic behavior and hence are also called ‘economic barometers’ or ‘barometers of economic activity’. They are very useful to management or government organizations in policy making decisions.61

(d) F-Test

Analysis of variance (ANOVA) is an advance and popular statistical tool. ANOVA and regression analysis are most commonly used decision techniques. ANOVA is a statistical method to determine if there exists any difference among several population means. The technique analyses different forms of variances (Mean Squared Errors) associated with the random samples of population.62


The key statistic in ANOVA is the F-test of difference of group means, testing if the means of the groups formed by values of the independent variable (or combinations of values for multiple independent variables) are different enough not to have occurred by chance. If the group means do not differ significantly then it is inferred that the independent variable(s) did not have an effect on the dependent variable. If the F test shows that overall the independent variable(s) is (are) related to the dependent variable, then multiple comparison tests of significance are used to explore just which values of the independent(s) have the most to do with the relationship.

If the data involve repeated measures of the same variable, as in before-after or matched pairs tests, the F-test is computed differently from the usual between-groups design, but the inference logic is the same. There are also a large variety of other ANOVA designs for special purposes, all with the same general logic. Note that analysis of variance tests the null hypotheses that group means do not differ.

It is not a test of differences in variances, but rather assumes relative homogeneity of variances. Thus some key ANOVA assumptions are that the groups formed by the independent variable(s) are relatively equal in size and have similar variances on the dependent variable ("homogeneity of variances"). Like regression, ANOVA is a parametric procedure
which assumes multivariate normality (the dependent has a normal distribution for each value category of the independent.63

F-test, also called the F-ratio. The F-test is an overall test of the null hypothesis that group means on the dependent variable do not differ. It is used to test the significance of each main and interaction effect (the residual effect is not tested directly). A "Sig." or "p" probability value of .05 or less on the F test conventionally leads the researcher to conclude the effect is real and not due to chance of sampling. For most ANOVA designs, F is between-groups mean square variance divided by within-groups mean square variance. (Between-groups variance is the variance of the set of group means from the overall mean of all observations. Within-groups variance is a function of the variances of the observations in each group weighted for group size.) If the computed F score is greater than 1, then there is more variation between groups than within groups, from which we infer that the grouping variable does make a difference. If the F score is enough above 1, it will be found to be significant in a table of F values, using d.f.= k-1 and d.f. = N-k-1, where N is sample size and k is the number of groups formed by the factor(s). That is, the logic of the F-test is that the larger the ratio of between-groups variance (a measure of effect) to within-groups variance (a measure of

noise), the less likely that the null hypothesis is true.

If the computed F value is around 1.0, differences in group means are only random variations. If the computed F score is significantly greater than 1, then there is more variation between groups than within groups, from which we infer that the grouping variable does make a difference. Note that the significant difference may be very small for large samples. The researcher should report not only significance, but also strength of association.

3.9 Limitations of the Study

The present study is based on data taken from the annual reports of the company and all the conclusions and suggestions are given from the statistical analysis of the several ratios calculated.

The basic inherent limitations of figures, calculations, statistical analysis and human error are the limitations of the study. Much care and diligence have been exercised in making all the calculations, calculating various ratios for various companies for various years, statistical analysis and deriving conclusions from it but then also there can be some human error, which will make the study weaker to that extent.
The study is carried out for limited number of companies only. But it is difficult to draw conclusions from sample. Although much care has been taken to have a nice representation of population in the sample but then also a sample survey is not as good as a population survey. Hence the limitations of sample survey apply to this research also.

The study is carried out for a period of 7 years to derive conclusions about the performance of the companies and industry as a whole. But this number of years is not enough for a thorough understanding of business movements and their reactions to the changes of the economy.