# Chapter - 4

## Research Methodology

<table>
<thead>
<tr>
<th>No.</th>
<th>Sub No.</th>
<th>Particulars</th>
<th>Page No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0</td>
<td></td>
<td>Introduction</td>
<td>78</td>
</tr>
<tr>
<td>4.1</td>
<td></td>
<td>Title of the Present Research</td>
<td>78</td>
</tr>
<tr>
<td>4.2</td>
<td></td>
<td>Period of the Study</td>
<td>79</td>
</tr>
<tr>
<td>4.3</td>
<td></td>
<td>Scope of the Present Study</td>
<td>79</td>
</tr>
<tr>
<td>4.4</td>
<td></td>
<td>Population and Sample of the Study</td>
<td>79</td>
</tr>
<tr>
<td>4.5</td>
<td></td>
<td>Type of the Study</td>
<td>80</td>
</tr>
<tr>
<td>4.6</td>
<td></td>
<td>Method of Data Collection</td>
<td>80</td>
</tr>
<tr>
<td>4.7</td>
<td></td>
<td>Objective of the Study</td>
<td>81</td>
</tr>
<tr>
<td>4.8</td>
<td></td>
<td>Hypotheses of the Study</td>
<td>82</td>
</tr>
<tr>
<td>4.9</td>
<td></td>
<td>Tools and Techniques of Analysis</td>
<td>83</td>
</tr>
<tr>
<td>4.9.1</td>
<td></td>
<td>Accounting Technique</td>
<td>83</td>
</tr>
<tr>
<td>4.9.2</td>
<td></td>
<td>Statistical Technique</td>
<td>84</td>
</tr>
<tr>
<td>4.10</td>
<td></td>
<td>Chapter Plan</td>
<td>87</td>
</tr>
<tr>
<td>4.11</td>
<td></td>
<td>Limitations of Present Research</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reference</td>
<td>89</td>
</tr>
</tbody>
</table>
Chapter - 4

Research Methodology

4.0 Introduction:

‘Research’ is an art of scientific investigation and innovation. The term research refers to the search of knowledge and pertinent information on a specific topic. Research is an original contribution to the existing knowledge making for its advancement and development. In the literary meaning, every letter of the term ‘RESEARCH’ has a special and dignified meaning, mentioned as follows:

<table>
<thead>
<tr>
<th>R</th>
<th>Rational Way of Thinking</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Expert and Exhaustive Treatment</td>
</tr>
<tr>
<td>S</td>
<td>Search for Solution</td>
</tr>
<tr>
<td>E</td>
<td>Exactness</td>
</tr>
<tr>
<td>A</td>
<td>Analytical Analysis of Adequate Data</td>
</tr>
<tr>
<td>R</td>
<td>Relationship of Fact</td>
</tr>
<tr>
<td>C</td>
<td>Careful Recording</td>
</tr>
<tr>
<td>C</td>
<td>Critical Observation</td>
</tr>
<tr>
<td>C</td>
<td>Constructive Attitude</td>
</tr>
<tr>
<td>C</td>
<td>Condensed Generalization</td>
</tr>
<tr>
<td>H</td>
<td>Honesty</td>
</tr>
<tr>
<td>H</td>
<td>Hard Work</td>
</tr>
</tbody>
</table>

For the solution of any problem a systematically established method is required. Same as in case of scientific and logical solution of the research problem, a systematic method is required which is known Research Methodology. The research methodology adopted by the researcher for the present research study follows in these dimensions:

4.1 Title of the Present Research:

To conduct present research, the researcher has analysed different ideas and dimensions of research the problems and finalized the title of the present research. The title of the present research study is mentioned as below:

“Analysis of Profitability of Pharmaceutical Industries”

(2008-09 to 2012-13)

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4.2 Period of the Study:

The present research is focused on analysis of profitability of various pharmaceutical companies for the period of 5 years from 2008-09 to 2012-13. There is no special reason to consider this period as the period of study. But to derive perfect conclusion of the study and to cover all aspects of changes in profit and profitability, this period seems to be quite fit. So, to make the present study fruitful, the researcher has selected the above mentioned period.

4.3 Scope of the Present Study:

As the present research study is focused on the profitability of the ‘Pharmaceutical Industries’, so the scope of present study is extended to all the companies dealing in the pharmaceutical sector. The broad classification of companies engaged in the pharmaceutical sector includes three different types of industries viz. Bulk Drugs, Formulations and Bulk Drugs and Formulations. In order to understand the pulse of the pharmaceutical industries working in India, it is essential to consider the major/main players of the industry. Hence the selection of the companies has been done from the Bulk Drugs and Formulations category considering their market share and terms of volume.

4.4 Population and Sample of the Study:

As the title of the present research is based on analysis of Pharmaceutical Industries, the entire pharmaceutical industry of India is wide universe of the present study. As per the record available from the website there are 1,355 total number of pharmaceutical companies registered in India. The further classification of these 1,355 companies comprises of 3 different category viz. private sector 1,334, public sector 15 and Government sector 6. The company-entity wise classification of pharmaceutical companies reveals that there are 144 companies covered under public ltd. companies (listed), 257 companies covered under the category of unlisted public limited companies, 707 private limited companies and 247 other forms of organization working in pharmaceutical field.

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2 Source: Fundoodata.com
For the purpose of present research, the researcher has selected 10 different pharmaceutical companies, using lottery method, working at large scale and listed with recognized stock exchanges of India; of them a few companies from the selected sample are also included in top 500 companies in India. The companies selected by the researcher for the present study are Aurbindo, Cadila, Cipla, Dr. Reddy’s, Ipca, Jubilant, Lupin, Sun, Torrent and Glenmark.

4.5 Type of the Study:

The present research is empirical in nature. It provides basis for external validation. The empirical study is based on observation or experience alone; it is also known as data based research. It is capable of being verified by observation or experiment. The researcher has made an attempt to answer the questions raised in quantitative investigation. So, the present research may be defined as quantitative and analytical research. It is a functional study by nature and it focuses on the different aspects of profitability of selected pharmaceutical companies.

4.6 Method of Data Collection

The present research is mainly based on secondary source of data. To justify the research title and to achieve the objectives of the study, it is necessary to collect the required data/information at par. The present research is mainly based on secondary sources of data as to analyze the profitability of pharmaceutical industry financial information and profitability figures are required.

The researcher has collected the required information from the published annual reports of the selected sample units over the period of time and used different websites viz. moneycontrol.com, adityabirlamoney.com, fundoodata.com, etc. As the financial reports of public limited companies are public documents, it is very easy for the researcher to collect the accurate data from the above mentioned sources.
4.7 Objective of the Study:

No work is started without any objective. The present research work has also some objectives. The present research work has been undertaken keeping in view certain objectives. The researcher has applied all sincere efforts to satisfy the broader objectives listed below:

- To understand the basic nature and composition of Pharmaceutical Industries in India.
- To understand the different ways to measure the profitability according to accounting aspects and analyze the profitability of selected pharmaceutical companies covered under the sample of the present research, during the period of study.
- To compare the profitability of selected pharmaceutical companies during the period of study.
- To identify and measure the relationship between different profitability ratios of all selected samples covered under the study.
- To define the performance and to provide rank to selected sample units for the performance of different profitability ratios.
- To provide suggestions to the pharmaceutical industries for maintaining and improvement of profit and performance.
4.8 Hypotheses of the Study:

To justify the title of the present research study and broad objectives defined by the researcher, the researcher has made a few hypotheses. The hypotheses made by the researcher are mentioned in the table, as given below:

Table – 4.1
A Table Showing Hypothesis of the Present Study

<table>
<thead>
<tr>
<th>No.</th>
<th>Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Null-Hypothesis-H₀: There is no significant difference in Gross Profit Ratio among selected pharmaceutical companies during the period of study.</td>
</tr>
<tr>
<td>02</td>
<td>Null-Hypothesis-H₀: There is no significant difference in Operating Profit Margin among selected pharmaceutical companies during the period of study.</td>
</tr>
<tr>
<td>03</td>
<td>Null-Hypothesis-H₀: There is no significant difference in Net Profit Ratio among selected pharmaceutical companies during the period of study.</td>
</tr>
<tr>
<td>04</td>
<td>Null-Hypothesis-H₀: There is no significant difference in Net Profit after Tax Ratio among selected pharmaceutical companies during the period of study.</td>
</tr>
<tr>
<td>05</td>
<td>Null-Hypothesis-H₀: There is no significant difference in Return on Assets among selected pharmaceutical companies during the period of study.</td>
</tr>
<tr>
<td>06</td>
<td>Null-Hypothesis-H₀: There is no significant difference in Adjusted Return on Net Worth Ratio among selected pharmaceutical companies during the period of study.</td>
</tr>
<tr>
<td>07</td>
<td>Null-Hypothesis-H₀: There is no significant difference in Return on Capital Employed Ratio among selected pharmaceutical companies during the period of study.</td>
</tr>
<tr>
<td>08</td>
<td>Null-Hypothesis-H₀: There is no significant difference in Return on Long Term Fund Ratio among selected pharmaceutical companies during the period of study.</td>
</tr>
<tr>
<td>09</td>
<td>Null-Hypothesis-H₀: There is no significant difference in Earning Per Share Ratio among selected pharmaceutical companies during the period of study.</td>
</tr>
<tr>
<td>10</td>
<td>Null-Hypothesis-H₀: There is no significant difference in Dividend Per Share Ratio among selected pharmaceutical companies during the period of study.</td>
</tr>
<tr>
<td>11</td>
<td>Null-Hypothesis-H₀: There is no significant difference in Dividend Payout Ratio (Cash Profit) among selected pharmaceutical companies during the period of study.</td>
</tr>
</tbody>
</table>
4.9 Tools and Techniques of Analysis:

For the systematic analysis of the data collected by the researcher, from the various sources, scientific tools and techniques are applicable. Application of proper tools and techniques leads the research to fruitful analysis and it will add the worth in the research. The detailed discussion on the tools and techniques, used in this research, are mentioned here under:

4.9.1 Accounting Technique:

Accounting Ratio

The broad area of the present research is based on the concept of profitability, to calculate the profitability different accounting ratios are required to analyze the data collected for the companies covered under the sample. Therefore ratio analysis has been used as accounting technique.

Ratio analysis means the process of computing, determining and presenting relationship of items and group of items in the financial appraisal. Ratio expresses the numerical relationship between two figures. Accounting ratios are used to describe significant relationship, which exist between figures shown on a balance sheet, in a profit and loss account, in a budgetary control system or in any other part of the accounting organization. To justify the present study, and to arrive at fruitful conclusion, the researcher has used eleven different ratios representing profitability of a company. The accounting ratios used in present research are listed as below:

- Gross Profit Ratio
- Operating Profit Margin
- Net Profit Ratio
- Net Profit After Tax Ratio
- Return on Assets
- Adjusted Return on Net-Worth Ratio
- Return on Capital Employed
- Return on Long Term Fund

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– Earnings Per Share
– Dividend Per Share
– Dividend Pay Out Ratio (Cash Profit)

4.9.2 Statistical Technique:
Use of statistical techniques has become a normal phenomenon in any type of analysis;

Arithmetic Mean

One of the most important objectives of statistical analysis is to get one single value that describes the characteristic of the entire mass of unwieldy data. Such a value is called the central value or an average or the expected value of the variable. The most popular and widely used measure of representing the entire data by one value is what most laymen call an ‘average’ and what the statisticians call the arithmetic mean. Its value is obtained by adding together all the items and dividing this total by number of items.

Standard Deviation (σ)

Standard deviation is that, unlike variance, it is expressed in the same units as the data. The formula of standard deviation is as under:

\[ \sigma = \frac{\sqrt{\sum(X - \bar{X})^2}}{n - 1} \]

Co –Efficient of Variance

In probability theory and statistics, the coefficient of variance (CV) is a normalized measure of dispersion of a probability distribution. It is defined as the ratio of the standard deviation to the mean. This is only defined for non-zero mean, and is most useful for variables that are always positive. It is also known as unitized risk. The coefficient of variation should only be computed for data measured on a ratio scale. It does not have any meaning for data on an interval scale. The formula of coefficient of variance is as under.

\[ CV = \frac{\sigma}{\bar{X}} \]

4 Kothari, C.R. ()
F- Test

F- Test is based on F- distribution and is used to compare the variance of the two independent samples. This test is also used in the context of analysis of variance (ANOVA) for judging the significance of more than two sample means at one and the same time. It is also used for judging the significance of multiple correlations coefficients. Test statistic, F, is calculated and compared with its Probable value (to be seen in the F- ratio tables for different degree of freedom for greater and smaller variances at specified level of significance) for accepting or rejecting the null hypothesis. When we use the F – Test, we presume that:

1. The population are normal
2. Sample have been drawn randomly
3. Observations are independent
4. There is no measurement error

Analysis of Variance (ANOVA)

The first object of the analysis of variance is to obtain a measure of the total variation within the series and the second object is to find a measure of variation between or among the components. Then the significance of difference between the variations in two series or more may be measured. In other words, with the help of the techniques of analysis of variance we can test the hypothesis that the means of all the components constituting a population are equal to the mean of the population or that the sample has come from the population. The technique of analysis of variance is referred to as ANOVA. A table showing the source of variation, the sum of squares, degree of freedom, mean square (variance) and the formula for the F-ratio is known as ANOVA table.

The actual analysis of variance is carried out on the basis of ratio between the variances. The variance ratio is obtained by dividing the variance between the samples by the variance within the samples. This ratio forms the test statistic known as F-Statistic, i.e.

\[
CV = \frac{\sigma}{\mu} \times 100
\]

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5 Kothari, C.R. (2006), Research Methodology, New Age International Publishers, New Delhi, pp.311
\[ F - \text{Statistic} = \frac{\text{Variance Between the Samples}}{\text{Variance Within the Samples}} \]

**Tukey’s HSD (Honestly Significant Difference) Test**

Tukey's test, also known as the Tukey range test, Tukey's HSD (Honestly Significant Difference) test, or the Tukey–Kramer method, is a single-step multiple comparison procedure and statistical test generally used in conjunction with an ANOVA to find which means are significantly different from one another. This test is named after John W. Tukey,\(^6\) it compares all possible pairs of means, and is based on a studentized range distribution \(q\) (this distribution is similar to the distribution of \(t\) from the \(t\)-test).

The test compares the means of every treatment to the means of every other treatment; that is, it applies simultaneously to the set of all pairwise comparisons and identifies where the difference between two means is greater than the standard error would be expected to allow. The confidence coefficient for the set, when all sample sizes are equal, is exactly \(1 - \alpha\). On the basis HSD Tukey, the researcher has given the ranks to the selected sampled pharmaceutical companies on the basis of their performance in terms of profitability ratios.

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\(^6\) Reference to the source or further explanation of the context of John W. Tukey's work is necessary for a complete understanding.
4.10 Chapter Plan

The present research study is divided into 7 different chapters, such are mentioned as below:

Chapter – 1  Introduction to Pharmaceutical Sector
Chapter – 2  Profitability Analysis- An Overview
Chapter – 3  Review of Related Literature
Chapter – 4  Research Methodology
Chapter – 5  Analysis & Interpretations
Chapter – 6  Interrelationships between Various Profitability Ratios
Chapter – 7  Summaries, Findings and Suggestions

4.11 Limitations of Present Research:

The researcher is aware of the limitations of the present research study, as it includes limited number of pharmaceutical companies (10) and based on secondary sources of information and data. The major limitations associated with present research are listed below:

1. There are many companies working in Pharmaceutical sector of India, belong to different segments. But the present study is related to only 10 Pharmaceutical companies of India. As the study is limited to the extent of the sample of 10 units, limitations of sampling are automatically associated with this study.

2. The present study is based on analysis of profitability of some selected pharmaceutical companies only; any generalization for universal application cannot be expected.

3. View of experts may be different for the purpose of the study, so it may create some difference in understanding the topic of the study.

4. This study is in the nature of exploratory and empirical research. It is not being proposed to enter in the normative aspect and offer suggestion for improvement in the condition of profitability. However, the researcher may suggest a few valuable suggestions to the pharmaceutical companies to improve the profitability.
5. This study is based on secondary data collected from the annual reports of the company and various websites, so the quality of research may be affected by the quality of data.

6. This study focuses on only the public limited (listed) companies. It does not consider the other forms of business organization.
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