CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

Research refers to seek for knowledge. This process is consistent and continuous, comprising of innovative work undertaken in an organized way in order to increase knowledge. Research is a search of new familiarity and/or the use of past information in an innovative method so as to develop new concept, techniques and findings. This consists of investigation and examination of existing research to the level that it directs to innovative along with productive results. It is a systematic progression of gathering and analyzing financial data to increase ones knowledge.

3.2 Meaning of Research and Research Methodology

Clifford Woody has defined research. According to him, “the research comprises defining and redefining problems, formulating hypothesis or suggested solutions, organizing and evaluating data, making deductions and reaching conclusions, and at last carefully testing the conclusions to determine whether they fit the formulating hypothesis.”

According to Robert Ross, “Research is essentially an investigation, a recording and an analysis of evidence for the purpose of gaining knowledge.” While, research methodology is an appropriate process of solving problems. It is a science of revising how research is to be conceded. Basically, it is the procedure by which
researcher goes about their effort of identifying, explaining and evaluating phenomenon. It is defined as the learning of techniques by which acquaintance is expanded. Its main objective to give plan of action of research. (Rajasekar, 2013)

3.3 Review of Literature

Following review of literature have been studied for the present research:

Ajmera (2014) in his study on the financial performance appraisal of selected steel companies in India investigated the relationship between the leverage (financial leverage, operating leverage and combined leverage) and the earning per share and market price of the share. In addition, it has aimed to describe how the earning capacity of the firm has influenced by the fixed operating costs and the fixed financial charges. From the study, it has found that there is a significance relationship between DFL and EPS, DCL and EPS, DOL and EPS, DPS and EPS, MPS and EPS. Fixed operating expenses and the financing mix decisions of the firm are significantly influencing the earning capacity. The leverage effect is positive when the earning of the firm is higher than the fixed financial charges. The leverage is an important factor and having impact on Market Price of the Shares and the wealth of the shareholders can be maximizes by employ more debt fund.

Bagchi and Khamrui (2014) in their paper delves at evaluating the profitability and liquidity management and inter-firm comparison based on statistical models of two leading FMCG companies in India- HUL and ITC Limited over a period of ten years. For the purpose of analysis statistical tools like descriptive statistics and
linear multiple regression are used. Statistical results show that the HUL has performed better than ITC Limited both in terms of profitability and in terms of liquidity. Multiple regression results reveal that liquidity performance indicator have direct impact on profitability.

**Bhatt (2014)** in his study of profitability analysis with specific reference to Indian Petroleum Industry- An empirical study concluded that ONGC's (Oil and Natural Gas Company) profitability is highest among the other petroleum companies of India. It is followed by RIL (Reliance Industries Limited) and again almost equal for BPCL (Bharat Petroleum Corporation Limited) and HPCL (Hindustan Petroleum Corporation Limited).

**Lavanya and Reddy (2013)** analysed the financial performance of Iron and Steel Industry with the help of Market Value Added Approach and it is found that the performance of select Iron and Steel units in terms of profitability cannot be increased unless the interlinked problems like modernization, cost reduction, control, taxes etc. are solved.

**Muthusam and Gowri (2013)** examined the performance of Hindustan Petroleum Corporation Limited and its financial position with the help of selected accounting ratios. It has been found that firm are effectively utilizing of their capital. Over the years, financial leverage of the company has declined. Similarly, Operating leverage of the company also declining. It indicates that company is moving from high levered to low levered zone.
**Padmini and Reddy (2012)** assessed the liquidity enjoyed by the Indian Pharmaceutical Industry through the application of ratio analysis, trend analysis and statistical tests. The adequacy of liquidity and solvency has judged both from the point of view of technical and actual sense. Technical liquidity (Current ratio and Liquid Ratio) of Better Performing Companies (BPCs) was strong enough, whereas, Moderate Performing Companies (MPCs) was nearer to the Industry average. But, Low Performing Companies (LPCs) was below the industry average, as well as other two groups of the Indian Pharmaceutical Industry (IPI), indicating poor technical liquidity. The actual liquidity (net cash flow coverage to current liabilities) in BPCs and MPCs was encouraging, whereas, low in LPCs, which leads to lesser degree of liquidity and solvency.

**Padmini and Reddy (2012)** in their study on "Capital structure (Debt-Equity) of Indian Pharmaceutical Industry" to this end it is found that Better Performing Companies (BPCs) and Moderate Performing Companies (MPCs) of Indian Pharmaceutical Industry (IPI) depended on equity financing, whereas, Low Performing Companies (LPCs) were on debt financing. The degree of financial leverage did not alter the earning of the shareholders favorably in IPI. The interest coverage has been sufficient in BPCs and MPCs and therefore, justification for the use of debt is valid. But a reserve situation has observed in LPCs.

**Pandya (2012)** analysed the financial performance of Tata Steel Ltd. using the framework of ratio analysis. The study reveals that Tata Steel performed well in terms of return available to all the investors measured as return on average capital employed. It also revealed that during the study period Tata Steel offered a
higher return to equity shareholders measured in terms of return on equity and earning per share. However, declining return on average net worth on year basis is a cause of concern for TSL.

Rahaja and Bhardwaj (2012) in their study it has examined the impact of different component of working capital on profitability (ROI) of Tata Motors. The results show that there is no significant relation between liquidity and profitability. Out of seven components of working capital, only two factors have negative impact on profitability namely working capital turnover ratio and cash turnover ratio. It implies that there is a positive correlation between working capital components and profitability (ROI) of Tata Motors during the study period.

Shukla (2011) investigated the impact of efficient working capital management over the performance of any firm in Indian economy and the investigation shows that yes, there is significant impact. The study supports some of the other studies as well. It has further recommended to the organization that profitability can be enhanced with liquidity if working capital has managed effectively.

Singh and Tandon (2011) made the comparative analysis of the capital structure of banking industry with special reference to SBI and ICICI bank. It is found that both the bank has the policy of using trading on equity. ICICI bank has more dependence on owned fund and SBI on debt fund.

Sharma (2011) in his analytical study indicates that Tata Steel Limited is enjoying the benefit of the accepted leverage theorem. Leverage theorem is a general rule. The dividend policy of the company is conservative. The company has been
maintaining a decreasing trend in its dividend pay-out. The company was enabling to maximize the EPS by the reverse operation of financial leverage. The company successfully pulled down the degree of financial leverage to reap the EPS advantage. Besides that, it has also found that there is a correlation between DFL and EPS, DFL and DPS & EPS DPS.

Kumar and Sharma (2010) found that Coromandel Fertilizers Ltd. has abundant internal resources. It is following a stable debt equity ratio. It has been maintaining an increased trend in its dividend payout. Operating leverage of the company has more ups and down. But, the financial leverage is more or less stable. The fluctuations in the market price of the share has related to the capital structure decisions and dividend decisions to some extent.

Sofat (2010) studied the relationship between liquidity and profitability and between profitability and risk of the selected cement companies in India. It has found that profitability position of all the companies has been showing improvement over the years. It has been possible due to a considerable increase in sales revenue of all the companies over the period under consideration. The correlation between liquidity and profitability was the highest in case of the Indian Cement Ltd. In addition, it was having a high degree of positive correlation between current ratio and ROI as well as quick ratio and ROI and the values of correlation in both the cases have found significant at 5% level. Moreover, correlation between profitability and risk has found to be highest in case of Madras Cement Ltd. It also established that with increase of operating risk company's profitability is increasing.
**Jackline and Deo (2009)** have studied the liquidity management of Indian banks of the Selected liquidity ratios calculated and statistical tools like Edward Spearman's Rank Correlation, Student "t" test and Mann Whitney "U" test has been employed to test the liquidity position of Indian Bank. From the study, it has found that the sample firm has been bringing up the effort in improving the overall state of liquidity to have a favorable impact on its probability.

**Kaur et al. (2009)** studied the determinants of the capital structure in the wake of liberalization and globalization of economic policies of the world and its effect on Indian corporate sector in automobile and cement industry. The study reveals a significant variation in the capital structure practices of the firms between two industries over a period of five years. Multiple regression results shows that business risk, profitability and WACC are important determinants of capital structure.

**Sing and Chekol (2009)** in their study found that there is a positive relationship of working capital aggressive investment policy and profitability. The study also found negative relationship of working capital aggressive financing policy and profitability. Therefore, this study revealed a contrary finding on working capital investment and financing policy of firms.

**Diwan and Patra (2008)** found that the oil sector in India were very much supportive of national economic policy reforms. Reforms in oil sector have moved hand in hand with national economic reforms. Oil sector purposefully engaged in keeping the nation's wheel running on the path of reforms. It of course has before it the uphill task of providing adequate fuel at affordable prices for a
growing economy within the framework of sustainable development. Therefore, the industry has to continually find new and innovative paths to operate in an increasingly global and a growing economy.

### 3.4 Research Gap

From the above literature, it is clear that few studies have been made on operational efficiency in different industries. Moreover, few studies have been made in Indian Petroleum Industry on different issues. However, there is hardly any study made on financial performance of public sector oil and gas industry. Therefore, there is a need to go for a study of operational efficiency of petroleum industry in India to it improves further.

### 3.5 Research Problem

The Indian Oil and Gas sector is one of the major sectors in India. This sector performs a principally essential role in influencing decisions in the economy of the country. This sector is of strategic importance and has an incredible growth potential in India. It is a well managed industry. In India, this industry adds over 15% to the nation’s GDP. This sector is the largest contributor to central and state treasuries. However, in order to fulfil the rising demand of petroleum products India has to import on 70% crude oil from other countries. In order to reduce reliance and dependence on foreign oil sources, the Union Govt. is committed to developing increased E&P activity and improve the operational performance and efficiency of the these companies. So, the topic of the research has been design to
find out the operational efficiency of Indian oil and gas sector. The key intention of the research is to study the present circumstances of oil & petroleum industry and to find volume of operational efficiency of the selected companies for study. In present era, various financial inconveniences are managed by the oil and gas sector for valuable and remedial resolution of crises, some systematic revision of the operational efficiency must be done. Thus, the topic of research is:

“Operational Efficiency in Petroleum Industry (A Comparative Study of Selected Public Sector Oil & Gas Companies in India)”

The study of operational efficiency is very important and valuable for the finance managers of such companies, to study different financial phases. This sector uses several measures for managing its economic and operational performance. This study defines the true financial picture of the selected companies. It also measures the competence with the funds commend to the administration have been used in an effective way. This provides appropriate information to its different users for their financial decisions. This comparative analysis helps in determining the strength and weakness of the industry. The analysis of operational efficiency can indicates financial strength, weakness, short comings, problems and limitations of the selected companies. These inferences may used by higher officials to recover recital and to predicate future consequences. This analysis can be used in taking various strategic decisions related to trade of a division, chief promotional program or increasing a plant.
3.6 Scope of The Study

The scope is as categorised as under:

In this study, top 3 public sector oil and gas companies named Indian Oil Corporation Limited (IOCL), Hindustan Petroleum Corporation Limited (HPCL) and Bharat Petroleum Corporation Limited (BPCL) which are working and producing crude oil & petroleum production in India. Thus, entire India has been used as geographical area for this research study. The present study involves the analysis data of previous ten years of selected public sector oil & gas companies. The period of ten years is an adequate time period for investigate the data of research. Thus, the period has been taken as 10 years from 2004-05 to 2014-15.

3.7 Objectives of The Study

Followings are the main objectives of the research:

1. To study operational efficiency of the Petroleum Industry.
2. To evaluate profitability of Petroleum Industry.
3. To analyze the financial strength of Petroleum Industry.
4. To study the liquidity of Petroleum Industry.
5. To compare the overall operational efficiency of Public sector Petroleum Sector in India.
6. To provide suitable suggestions based on research findings to improve the performance and efficiency of Indian Petroleum industries.
3.8 Hypothesis Of The Study

Followings are the main hypothesis:

H₀: There is no significant difference among operational efficiency of selected oil and gas companies of India.

H₁: There is a significant difference among operational efficiency of selected oil and gas companies of India.

3.9 Significance of The Study

The significance of the study is as follows:

1. India is fast rising country for petroleum products in the world. The decisive obligation for achieving advanced expansion rates to increase the production and contribute adequate resources. However, not only India will continue to linger scarce in energy, but the gap between demand and domestic production is expected to grow considerably in the near future, Thus, this study will help in measure to improve the operational efficiency of oil and gas companies.

2. A large amount of investment in the upstream and downstream sectors is likely to flow through existing and new domestic and international companies. The research study also includes the performance of the selected companies. The fiscal investigation will be beneficial to the Government in taking appropriate judgment to spend their resources in this segment.
3. The Indian oil and gas sector plays a major position in effecting the decisions in all levels of the economy. If the present annual expansion is worthy than it will speed up the potential results which encourages the expansion and growth. This has made essential require for a larger strengthen search for new fields, developing improved methods of removal, refining and distribution.

4. The present study also useful for the researchers which are keen interested in oil and gas sector.

3.10 Research Design

A research design is a rational arrangement prepared for guiding the research. It defines the goals, methodology and techniques of the study which is to be adopted for attaining the research goals. It includes the blue print for collection, measurement and analysis of data. It provides a systematic sketch of procedure for the researcher to follow.

For the analysis, of each unit first of all different elements of operating cost, operating income, working capital and profitability of these companies are determined. Various cost ratios, operating profit ratios, income ratios, working capital ratios and profitability ratios has been studied for selected oil and gas companies.

Various statistical tests have been applied to the calculated ratios. The statistical test is a procedure to test the goodness of fit. This test identifies the significance of association between two attributes and tests the homogeneity or the significance of population variance.
After testing every unit of ratio further, the null hypothesis has been verified for the calculated ratios that whether there is significant difference in the ratio trend for the period of study for the selected public sector companies. If the hypothesis is established there is no significant difference in the ratio of units and if it is rejected there is a significant relation among the variables. In the following research, chi-square test and Anova has been applied to test the hypothesis.

### 3.11 Parameters

Followings are the main parameters of the present study:

1. Raw material Cost
2. Power and fuel cost
3. Employee cost
4. Manufacturing and selling cost
5. Miscellaneous cost
6. Various sources of income
7. Working capital
8. Profit performance

### 3.12 Sample Design

For the purpose of the study, researcher has selected three top performing oil and gas companies of India. The selected companies are as follows:

1. Indian Oil Corporation Limited (IOCL)
2. Hindustan Petroleum Corporation Limited (HPCL)
3. Bharat Petroleum Corporation Limited (BPCL)
3.13 Data Collection

In the present study mainly secondary data has been used which was collected from the financial statements of the selected companies and their websites. Besides, the collected data has been arranged inappropriate tables and analyze as per the prerequisite. This research study is restricted to selected oil and gas Industries which are working in India, so, researcher has selected 3 top oil and gas companies of India. The data related to selected oil and gas companies have been attained and collected from the financial reports of these companies and related websites.

3.14 Statistical Technique

The main base of this study is to analyze operational efficiency of selected oil and gas companies of India. For tools have been used for analysis and testing of these hypotheses:

1. Measures of central tendency
2. Measures of dispersion
3. Index number
4. Chi-square test, and
5. F test
The detailed study of the above tools is as under:

**Chi-Square Test**

The chi-square test is a statistical technique to evaluate the consequence of association between factors. It is essential that the experimental and normal frequencies must be categorised in the similar approach and the theoretical distribution must be familiar to present similar frequency in case of observed distribution. Following formula is used to determine this test:

\[ \sum \frac{(f_0 - fe)^2}{fe} \]

Where,

- \( f_0 \) = Observed frequency
- \( fe \) = Expected frequency

**ANOVA (Analysis of Variances)**

It is a test of variance. This test defines whether two independent approximate of population variation differ significantly or not. Following formula is used to calculate F ratio:

\[ F = \frac{\text{Larger estimates of variance}}{\text{Smaller estimates of variance}} \]

This test is an extension of t and z test. It was developed by Ronald Fisher. Thus, this test is also called Fisher analysis of variance.
References


2. **Bagchi and Khamrui (2014)**, *Evaluating the Profitability and Liquidity Management And Inter-Firm Comparison Based on Statistical Models of Two Leading Fmcg Companies In India*, International Journal of Management and Business Studies, ISSN: 2231-2463, pp. 68-75.


5. **Jackline and Deo (2009)**, *The Liquidity Management Of Indian Bank*, International Journal of Accounting and Management, ISSN: 2945-1169, pp. 158-168


