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A STUDY FO CUS ON OPERATIONAL EFFICIENCY OF SELECTED OIL AND REFINERY COMPANIES IN INDIA – USING MOTAAL'S TEST

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ABSTRACT

Management of efficiency is essential for the success of any business organization. Operational efficiency is affects the liquidity and profitability of the business. An attempt to increase profitability would lead to decrease in liquidity and a high liquidity position would adversely affect the profitability. Therefore the business organization strives to maintain a trade off between the liquidity and profitability. The paper attempts to study the operational efficiency of selected oil and refinery companies in India. Motaal's test has been applied to assess the efficiency or liquidity position of the companies. Further an attempt has also been made to study the financial efficiency is measured in terms of various turnover ratios like the inventory turnover ratio, receivables or debtors' ratio, working capital turnover ratio, fixed assets turnover ratio and total assets turnover ratio. The study is based on secondary data collected from the published corporate annual reports of the company. The results of Motaal's test indicate that out of seven companies selected for the study, the liquidity position of the above selected units in the years 2022-23 and 2023-24 was best whereas the years 2021-22 and 2024-25 was rank last indicating a very low liquidity position.

Keywords: Oil and Refinery Companies, Operational Efficiency, Activity Ratios and Motaal's Comprehensive Test.

I. Introduction

The financial statements give important details about a company's position and performance. Making decisions requires knowledge from the financial statements. These statements cover the state of investment in the company, the outcomes achieved during the review period, and provide a report on advancement by the management. The operations results and financial situation of a company are disclosed in these statements, so performance may be assessed by analyzing and drawing conclusions from them. Financial statements are analyzed for this reason. The summaries of timely reports of financial and operational data compiled by an organization in its books of accounts are known as financial statements. These accounting

numbers are presented as financial statements by accounting methods. The financial statements, or the compilation of all accounting numbers, are obviously the end results of financial accounting. The accounting period, which is typically one year long, is the relevant period for financial statements, which are periodic statements.

II. Statement of the problem

The parameters that are involved to convince the public to invest the money in the concerned sector are enormous. The oil and refinery sector has huge potential to attract the capital from the public. The measurement of its performance plays a vital role in attracting funds from the share market. The scientific analysis of the performance of the oil and refinery sector has not been in the universal standard. The universal standard of performance analysis involving profitability and liquidity analysis and value addition is the need of the hour to assess the performance exhibited by the oil and refinery companies in India. The global demand hand have played vital role in the development of the oil and refinery sectors. The oil and refinery sector has its own resource of capital when it starts the scale of operation. The further expansion of the oil and refinery industries is largely based upon the public capital. The public capital has been dependent on the finance efficiency and reputation of the company. The acquirement of the public capital is possible only through the stock exchanges in the country. Since the oil and refinery industry is a demanding industry. So far no studies have been carried out in all the sectors of the oil and refinery industry. It is imperative to study the financial efficiency of oil and refinery companies.

III. Objectives of the study

The present study is designed to examine the operational efficiency of selected oil and refinery companies in India.

1. To analyze the operational efficiency such as inventory, receivables, fixed assets and total assts.
2. To measures the financial efficiency of selected oil and refinery companies in India.
3. To present summary of the study and to make suitable suggestion for improvement in the competitive business world.

IV. Research Methodology

In research, the methodology needs to be cautiously designed to capitulate results that are as objective as realistic. An able-bodied comprehensible modus operandi empowers the new-fangled research investigator re-examine the study milieu. Good methodology follows the standards of the established conventions. For the present study, a number of indispensable inimitabilities of the research methodology skirmishing the application magnitude and research rationalization of each one are defined here in this chapter.

1.4.1 Research design

It is not possible in practice for an individual research worker to approach all the bits and pieces in the universe. Researchers select only a small amount of bits pieces from the universe for the purpose of the study on the basis of stratified sampling. The sample so selected constitutes the sample design for the purpose. A research design is a definite plan for obtaining a sample from a given population. Research design means a sketch or a drawing of a research project's structure. It comprises a series of prior pronouncements that, taken together, provide a roadmap for carrying out a research project. The research design of the present study is outlined hereunder.

1.4.2 Selection of sample

Keeping in view the scope of the study, it is decided to include all the companies under oil and refinery companies working in the year 2015-16 to 2024-25. But, owing to several constraints such as non-

availability of financial statements or non-working of a company in a particular year etc., the researcher is compelled to restrict the number of sample companies to six. Therefore, this study is expost facto based on survey method making a survey of nine companies in oil and refinery companies in India.

The oil and refinery companies are purposively selected for the present study, considering its importance as the backbone of economic growth in any country. The database of CMIE has made compilation for nine oil and refinery companies of which only seven companies have financial data for a continuous period of 10 years namely from 2015-16 to 2024-25. Owing to several constraints such as non-availability of financial statements or non-working of a company in a particular year, etc. for the purpose of the present study only seven large oil and refinery companies have been selected. The criterion adopted for the selection of companies in the present study is the size of their total assets of fifty crore rupees and above, as it is the only characteristics for which information is available at the population level.

1.4.3 Source of data

The data used for the present study is secondary data. The major source of data analyzed and interpreted in this study related to all those data which was collected from "PROWESS" database, which is the most reliable on the empowered corporate database of Centre for Monitoring Indian Economy (CMIE). The database provides financial statements, ratio analysis, fund flows, product profiles, returns and risk on the stock market. The Reserve bank of India Bulletin, Business newspapers, Annual survey of industry, CMIE publications, Libraries of various research institutions through internet etc. have also been used as a data source.

1.4.5 Data analysis

In the course of analysis in this study, use of various accounting and statistical techniques have been made. Accounting technique includes ratio analysis, while among statistical techniques the Arithmetic Mean (X), Co-Efficient of Variation (CV), Standard Deviation (SD), Compound Annual Growth Rates (CAGR) and Motaal's Comprehensive Test have been applied through EXCEL and SPSS statistical software.

V. Limitations of the study

There are some limitations are as follows, the most important among them are:

1. The study is based on secondary data obtained from the published annual reports and as such its finding depends entirely on the accuracy of such data.
2. Statistical test used in the study to interpret the analyzed data to generalize the findings of the study for the entire population has got their own limitations and result in the analysis is subject to some constraints as are applicable to statistical tools.
3. The financial statement does not keep pace with the changing price level.

VI. REVIEW OF LITERATURE

The chapter is an attempt to evaluate the research on various Operational Efficiency of Selected Oil and Refinery Companies in India that are either directly or indirectly linked with the present study.

Khawar Naeem, Abdul Salam Khan, Razaullah Khan and Catalin Iulian Pruncu (2020)[1] this study briefed that methodology for the oil and gas businesses to maintain their production plant productive with a bare minimal investment in carrying maintenance, repair, and operating inventory planning. The MRO inventory is the most exorbitant asset and it demands significant investment. It facilitates the oil and gas production plant to be productive by performing planned and unplanned maintenance activities. The purpose of this research is to boost the service level from ninety per cent with a drop in the average inventory investment. It is intended to provide a satisfactory service level to the company with a least average inventory investment than the company's adopted policy.

Men Thi Bui, Hieu Minh Nguyen (2020)[2] this study attempts to identify the association between different variables affecting profitability of the firms in the oil and gas sector in Vietnam. The efficiency of this industry is based on manifold factors; result in the determination of the key contributing factors. The profitability of the firms is the primary factor. The totals of two hundred and three samples were collected from twenty nine companies listed on Vietnam Stock Market from 2012 to 2018. The study results imply that there are four factors that have an influence on ROA, namely, leverage, government ownership, dividend, and exchange rate. However, when leverage and exchange rate have negative influence on ROA, government ownership and dividend payment seem to have a positive effect. The findings of this study advice that high debt ratio in capital structure and the negative effect of exchange rate on their companies' efficiency can adversely affect the profit of enterprises.

Adegbie Folajimi Festus and Adesanmi Timilehin (2020)[3] addressed that Profitability, asset growth, and investor expectations for economic value added are all dependent on how well a company manages its available resources, particularly its liquidity management, which was previously believed to be insufficient. As a result, the study examined how liquidity management affected the corporate sustainability of Nigerian oil and gas enterprises. An ex-post facto research design was examined. Thirteen oil and gas businesses were listed on the Nigerian Stock Exchange in 2017 representing the whole population. Utilizing a purposive sample method, ten oil and gas businesses were selected. The legitimacy and reliability of the data were assumed based on the examination and certification by external auditors, and the information was collected from the sampled companies' public financial statements. For the data analysis, descriptive and inferential statistics were employed. The study recommended that investors, managers, policymakers, financial regulators, and market players be aware of how companies manage their liquidity and how long it takes for receivables to be collected as these factors are crucial to the long-term viability of such businesses.

Jatinsankar (2020)[4] has explored secondary data for nine Indian companies operating in oil and gas sector, to understand the impact of working capital management on the profitability. The secondary data were gathered from CMIE- prowess database. The cash conversion cycle is computed by adding a day's inventory outstanding and a day's sales outstanding, and then subtracted from day's payables outstanding. Return on Assets of the companies is considered as dependent variable in the study. The finding of the study reveals cash conversion cycle and debt ratio are having indirect relationship to return on assets. The researcher has recommended minimizing the cash conversion cycle to improve return on assets.

In Pakistan's banking industry, Vijay Kumar and Abdur Rahman Aleemi (2020)[5] analyze the implications of financial leverage on enterprises' investment decisions. Making decisions in three interrelated areas—investment, finance, and dividend—will help you achieve your goal of wealth maximization. For listed banks from 2006 to 2013, panel data approaches were combined with common effects, fixed effects, and random effects. Finding the ideal financing arrangement that will maximize shareholder wealth is the basic idea. This analysis does not support the studies that claim financial leverage negatively affects a firm's investment decision. By the way, the idea that financing decisions and investment decisions are mutually exclusive is disproved. Instead, financing decisions have a significant influence on investment choices, which can lead to either over- or under-investment depending on the presence of variables like transaction costs, asymmetric information, and agency issues.

Mohammed et al. (2020)[6] This study evaluates the impact of leverage and liquidity on the profitability of the listed O&G firms based in Malaysia. Data were received from the audited financial statements of twenty two listed O&G firms for a period of ten years (2008 – 2017). The collected data were analyzed using a quantitative data methodology. The findings of the study pointed out that leverage in terms of debt-equity ratio has a significant negative association on a firm's profitability. However, liquidity ratios happened to be insignificantly related to the profitability of the O&G industry in Malaysia. This study intends to spread awareness among the top management of firms, the analysts, and the investors in monitoring and predicting the firm's profitability and the value of the firms, thus contributing to the better investment decision making.

Mahdi Nuhair Rahi, Ali Jweid Jaeel and Abdulaziz Jafar Abbas (2021)[7] The purpose of the paper is substantial detrimental effects of the Iraqi refinery effluent pollution. The research explained the wastewater management in refineries. This study reveals that the emission from Iraqi refineries includes environmental toxins such as Couscous Pollutants, Liquid Pollutants and Strong Pollutants in the Southern Refineries. Along with this the standards in which refining waste in Iraq is studied. The government is not compromising on regulations and companies struggle to meet those regulations. As a result, it is obvious that the area's oil and refineries, specifically refineries, have important repercussions for livelihoods and agriculture. The paper establishes the detrimental impact on the field, fishermen and village livelihoods of the oil and gas refining sector, both legal and illegal refineries.

Gowri and Devika (2021)[8] The investigation of the selective steel industry's profitability and liquidity condition in India is the focus of the current study. For any business, profitability and liquidity are the two key considerations. They should be accounted for by each organization's management as their top responsibilities. A commercial firm's ability to meet its short-term obligations is demonstrated by the idea of liquidity, which is essential to its efficient operation. Both internal and external analysts must conduct a study of liquidity due to its direct connection to a company's everyday activities. Avoiding a weak liquidity position is important since it puts a company's solvency and profitability at risk and renders it risky and unsound for further investment. A company's profitability is determined by how much its revenues exceed its necessary expenses. Potential investors concentrate on the profitability ratios while keeping an eye out for dividends and increases in stock prices. Managers, on the other hand, try to gauge operational success in terms of profitability. As a result, a low profit margin would indicate poor management, which would cause investors to hesitate.

Appah Ebimobowei, Onowu Joseph Uche and Tonye Young-Arney (2021)[9] This empirical study shows how profitability and liquidity ratios affect the increase of profit at Nigerian listed oil and gas companies. The data for the study were taken from the annual reports of sample companies for the years 2014 through 2019 and were gathered using an ex-post facto and correlation design. With the help of descriptive statistics, a correlation matrix, and multiple regressions, the sample firms' published financial statements' secondary data was analyzed. According to the multivariate analysis's findings, the growth of profits at listed oil and gas companies in Nigeria has been significantly and positively impacted by the current ratio, acid test ratio, gross profit ratio, net profit ratio, net working capital, return on assets, return on equity, and return on capital employed. Based on the investigation, the study concluded that liquidity and profitability ratios have an impact on a company's potential to grow.

Umar Heru Setiadi and Wawan Dhewanto (2022)[10] In a growing nation in Asia, the energy sector is transitioning from fossil fuels like oil and gas to clean energy sources like electricity. According to publicly available government data, rising electrification and other energy diversification will cause the share of oil and gas to drop from 32 per cent to 20 per cent in 2050. The study found that in order for the firm to produce better profits and increase its competitiveness in the future, it needs an appropriate business strategy to handle any type of business difficulty. The internal business environment of the corporation is identified in this study using VRIO analysis and the Business Model Canvas. The external business environment of the corporation is also determined using PESTLE and Porter's Five Forces. The quantitative strategic planning matrix's last recommendation is market development, which was selected as the company's top priority strategy and includes steps including boosting crude processing capacity and flexibility and modernizing refinery technology.

VII. ANALYSIS AND INTERPRETATION - ANALYSIS OF OPERATING EFFICIENCY AND MOTAAL'S COMPREHENSIVE TEST

7.1 Analysis of Operating Efficiency

The effectiveness of using the firm's resources or assets is measured by the turnover ratios. To secure sales and profits, money is invested in a variety of assets. The efficiency with which assets are managed

directly affects how much is sold. The number of sales and profits increases with improved asset management. This ratio indicates whether the total amount of each sort of asset is appropriate, excessive, or inappropriate in light of current and anticipated sales levels. A company's capital costs will soar if it has a lot of assets, which will result in lower profits. On the other hand, if assets are undervalued, profitable sales will be lost.

7.1.1 Inventory Turnover Ratio

The Inventory turnover ratio, also considered stock velocity, is ordinarily estimated as the sales-to-inventory ratio. It is to signify whether or not stock has been properly utilized. The intention is to keep inventory at a minimum. Inventory turnover ratio discusses the number of times the stock has been debated during the period and estimates the efficiency with which a firm manages its inventory. In other words, it is the ratio between inventory stocked and goods sold. A stock turnover of eight times per year is considered ideal. If it is eight times, or more, it means that more sales are affected, i.e., the business is expanding, and so there is effective inventory management. On the other hand, a stock turnover of less than eight times means that the sales are lower and, hence, the concern has accumulated unsalable goods, i.e., the business is not prosperous. A high inventory turnover indicates inventory efficacy because the more frequently stocks are sold, the less money is required for the inventory. Ineffective inventory management, poor operations, low-quality products, stock builds-ups, accumulations of out-of-date and slow-moving commodities, and low profit relative to total investment are all signs of low inventory turnover ratios. High inventory turnover rates are not always indicative of favourable circumstances.

The details regarding the above ratio have been listed in Table 1. It implies that the industry average of inventory turnover ratio has documented an oscillating and rising trend. The industry average of this ratio is 34.35 in 2015-16 and then a little bit of fluctuating and decreasing trend on each year and after that it began to rise in trend to reach the value of 35.22 in the year 2020-21; further it declined to reach 25.45 in 2024-25. The average value of inventory turnover ratio of industry average is 31.77 during the period of the study. The mean value of this ratio in Oil and Natural Gas Corporation Limited (57.18), Oil India Limited (52.93) and Gail India Limited (52.93) has been more than that of industry average position during the period under study. Whereas, among the selected oil and refinery companies like Chennai Petroleum Corporation Limited (22.32), Bharat Petroleum Corporation Limited (16.75), Hindustan Petroleum Corporation Limited (15.57) and Indian Oil Corporation Limited (14.11) had been below the industry mean value during period under study. The SD of the above ratio of industry average value is 2.67 and it registered the highest of 8.42 achieved by Gail India Limited and its lowest of 2.18 is gained by Hindustan Petroleum Corporation Limited. The CV value of this ratio exhibited moderate fluctuations among the selected oil and refinery companies during the study period. The compound annual growth rate is found to be negative in all the chosen companies except Hindustan Petroleum Corporation Limited.

7.1.2 Debtors Turnover Ratio (DTR)

The ratio of debtors to credit sales or debtors turnover ratio determines how frequently debts are collected annually. Debtors and receivables are crucial components of current assets. The firm's liquidity is significantly influenced by the quality of its debtors. The ratio of outstanding to unpaid accounts helps determine the caliber of the borrowers. The real credit collection period is contrasted to the credit that the debtors have approved. Credit collection is ineffective if the first period of credit allowed exceeds the standard duration of credit, which is thirty days. In contrast, it is understood that credit collection is successful if the actual duration of credit permitted is shorter than the typical period of credit.

A dynamic trend in the receivables turnover ratio of the selected public sector oil and refinery companies is observed from Table 1. It mentions that the industry average of debtors' turnover ratio has registered an uptrend for first six years i.e., 2015-16 to 2020-21. The industry average of this ratio is (31.80) reducing in the year 2021-22 and then immediately started to rise to 35.41 in 2022-23 finally it reached 31.30 in 2024-25. The

mean of industry average of this ratio is 32.18 during the considered study period and among the seven oil and refinery companies it has the maximum of 58.19 achieved by Bharat Petroleum Corporation Limited and its minimum of 8.80 attained by Oil India Limited. The SD of this ratio of industry is 2.81 under the study period. Out of the selected companies, the maximum of 16.96 registered by Chennai Petroleum Corporation Limited and its minimum of 2.23 is marked by Oil India Limited. The computation of CV of debtors turnover ratio all over the period of the study is 8.73 and then it is highest at 47.77 obtained by Chennai Petroleum Corporation Limited and lowest of 8.13 gained by Hindustan Petroleum Corporation Limited. The compound annual growth rate of this ratio is negative for almost all the companies under study.

7.1.3 Working Capital Turnover Ratio (WTR)

The working capital turnover ratio evaluates how effectively an organization uses its available working capital. This ratio shows how working capital and turnover are related. Not all businesses operate with a standard working capital turnover ratio. The working capital turnover ratio indicates efficiency if it is higher and management inefficiency in the use of working capital if it is lower. But it should be noted that extremely high ratio values indicate overtrading, and extremely low ratio values indicate under trading, both of which are bad for the business. Therefore, the working capital turnover ratio should be in the middle. The information concerning working capital turnover ratio has been detailed in Table 1. It ensures that the industry average of WTR has set a highly fluctuating pattern. It is maximum (9.13) at the year 2022-23 and minimum (4.99) at the year 2024-25.

The industry average mean of working capital turnover ratio is 7.63 all through the study period. Amongst the selected companies the highest mean value of this ratio is 14.99 registered by Chennai Petroleum Corporation Limited, the following firms are Bharat Petroleum Corporation Limited with 13.67, Hindustan Petroleum Corporation Limited with 9.63, Indian Oil Corporation Limited with 6.45, Gail India Limited with 5.19, Oil and Natural Gas Corporation Limited with 1.97 and Oil India Limited with 0.30. The derivation of SD of working capital turnover ratio of industry average is 1.19 and it ranges from 3.43 marked by Chennai Petroleum Corporation Limited to 0.10 recorded by Oil India Limited. The CVof mean value of industry average is 15.92 during the period of entire study and it is least at 14.90 scored by Indian Oil Corporation Limited and its maximum of 34.03 obtained by Oil and Natural Gas Corporation Limited. The compound annual growth rate is adverse in three companies out of seven in all the selected oil and refinery companies.

7.1.4 Fixed Assets Turnover Ratio

This ratio indicates the degree of contribution of the fixed assets of an enterprise to sales. The average fixed asset turnover ratio has been calculated to be five times. So, if a fixed asset turnover ratio is five times or greater, it indicates proper fixed asset utilization. Whereas, if the fixed asset turnover ratio is lower than five, it indicates underutilization of fixed assets. The data pertaining to the fixed asset turnover ratio of oil and refinery companies has been detailed in Table 1. It discusses that the industry average for this ratio has set down a fluctuating trend all through the study timeframe. Furthermore, the above ratio's industry average is 7.03 in 2017-18 and 3.22 in 2024-25, indicating a downward trend throughout the study period.

The average value of fixed assets turnover ratio of industry average is 5.18 during the study period. In this, ratios of Bharat Petroleum Corporation Limited (9.63), Chennai Petroleum Corporation Limited (9.35), Hindustan Petroleum Corporation Limited (7.25) and Indian Oil Corporation Limited (5.63) are better than that of industry average position during the study period. On the other hand, remaining companies like Gail India Limited (2.13), Oil Indian Limited (1.42) and Oil and Natural Gas Corporation Limited (0.86) have lower value than the industry mean value during the period under study. Among all the selected companies, highest mean value of this ratio is 9.63 achieved by Bharat Petroleum Corporation Limited and its minimum of 0.86 obtained by Oil and Natural Gas Corporation Limited. The result of standard deviation mentions that the industry average is 1.41 which ranges from 3.82 by Bharat Petroleum Corporation Limited to 0.18 by Oil and

Natural Gas Corporation Limited. The estimation of CV of fixed assets turnover ratio is listed as 27.30 all through the time span of study. It ranges from 39.64 attained by Bharat Petroleum Corporation Limited to 18.38 gained by Gail India Limited. The compound annual growth rate is adverse in all the selected public sector oil and refinery companies in India.

7.1.5 Total Assets Turnover Ratio

The total asset turnover ratio represents the relationship between total assets and sales. This ratio measures the proficiency of asset utilization, which in turn measures the total performance of the business. The typical total asset turnover ratio mentions that the sales should be at least double the value of the assets. A total asset turnover ratio of double or higher implies that the assets of an enterprise have been utilized effectively. If the total asset turnover ratio is less than two, the company's assets are underutilized. It is observed that a very high total asset turnover ratio indicates overtrading. The content relating to the total asset turnover ratio has been detailed in Table 1. It shows that the industry average of the aforementioned ratio has had a markedly oscillating trend throughout the period under study. It ranged between the top of this ratio of 2.08 in 2018-19and the least of 1.34 in 2024-25.

The average point of total assets turnover ratio of industry average is 1.75 over the period under study. Here the ratios of Chennai Petroleum Corporation Limited (3.28), Bharat Petroleum Corporation Limited (2.98), Hindustan Petroleum Corporation Limited (2.74) and Indian Oil Corporation Limited (1.75) are better than that of industry average position during the period under study. However, among the selected oil and refinery sector companies like Gail India Limited (0.93), Oil and Natural Gas Corporation Limited (0.33) and Oil India Limited (0.27) had been weaker than the industry mean value during the period under study. Amongst the selected companies it has maximum of 3.28 marked by Chennai Petroleum Corporation Limited and its minimum 0.27 secured by Oil India Limited. The result of standard deviation mentions that industry average is 0.22 and the maximum of this ratio is 0.55 obtained by Bharat Petroleum Corporation Limited and its minimum 0.05 got by Oil and Natural Gas Corporation Limited. The calculation of CV of total assets turnover ratio is 12.46 during the period under study. It ranges between 29.23 registered by Oil India Limited and 11.16 scored by Hindustan Petroleum Corporation Limited. The compound yearly growth rate of this ratio is negative in all the selected oil and refinery companies in India.

7.2 Motaal's Comprehensive Test

Motaal's Comprehensive Test has been developed in order to assess the overall operational efficacy of public sector oil and refinery concerns over the study period, and the results are reported in Table 2. To demonstrate a more understandable analysis of operating efficiency, a ranking technique has been used in this test. Four turnover ratios like inventory turnover, debtor turnover, working capital turnover, fixed asset turnover, and total asset turnover ratio have been calculated and combined into a points score. The ratios are named as such because a higher turnover ratio signifies a higher level of operational efficiency. The final ranking was conducted on the premise that a firm's efficiency is more desirable and vice versa depending on the sum of its component scores. Table 2 shows that the chosen public sector oil and refinery companies saw good operating efficiency positions in the years 2017 - 18 and 2022 - 23, which were followed by the years 2018 - 19, 2016 - 17, 2015 - 16, 2023 - 24, 2019 - 20, 2020 - 21, 2021 - 22 and 2024 - 25.

VIII. RECOMMENDATIONS

Considering the above observations and findings of the study the following points are advised to improve the financial performance of the selected oil and refinery companies in India.

1. The inventory turnover ratio of IOCL reveals unhealthy performance of inventory management. The company should apply ideal inventory control technique to improve the inventory management.

2. The receivable turnover ratio of OIL exhibits poor performance of receivable management. The company should employ suitable receivable control technique to improve the receivable management.
3. The total assets turnover ratio of OIL indicates atypical utility of the total assets as compared to other selected oil and refinery companies. OIL should update plant and construct additional capacity to improve productivity.
4. The fixed assets turnover ratio of ONGC exhibits irregular utility of the total assets when compared with other selected oil and refinery companies. ONGC should renovate plant and built additional capacity to improve productivity.
5. The management of oil and refinery sector should take necessary actions to circumvent excess investment in current assets because inert investment earns nothing.
6. The management should take effective steps to progress its solvency position for both short-term and long-term.
7. The main issue before the oil and refinery sector is the accumulating trend of cost. All the components of costs are gradually increasing which affects the financial performance of the sector.
8. Therefore, it is the utmost necessity that the oil and refinery sector should exhibit better performance by minimizing the operating cost. In order to control the cost in sector, standard costing system should be initiated to improve their performance.
9. The study has illustrated that the long term financial strength of the oil and refinery sector is average. The commercial operation and financial strength have persisted to be weak.
10. To advance the financial position of the oil and refinery sector it is advised that the capital of the companies should be reframed by a part of the loan capital into equity capital. This conversion will have the benefit in lessening the burden of interest payment as well as repayment of loans to creditors.
11. Thus, the share capital will facilitate the companies to earn a surplus. This will improve the financial performance, thereby allowing them to raise enough internal sources to finance their expansion programmes. Hence the above aforementioned factors should be highly focused by the respective oil and refinery companies to increase or decrease the profitability position.

VI. CONCLUSION

The operational efficiency of the oil and refinery companies improved during the last five years mostly because of higher production. Since the demand for the fuel products elevated during the study period, the companies are able to meet the demand with its potential capacity. Due to this mass production and mass purchase, the costs of production also have reduced and the sectors are able to show good profitability ratio during the study period.

This result in growth of oil and refinery sector's contribution to the GDP, some analysts actually anticipate that the Indian oil and refinery sector would grow at a rapid rate than the expected rise in GDP. Since the Indian oil and refinery sector has tremendous growth potential and the per capita consumption is obligated to grow at a much faster rate, parallel capacity instalments in relation with domestic demand will be needed. Thus, the dreams of our planners to expedite the economic growth in the country by effecting improved fuel production at reasonable cost are still viable to be translated into reality.

India now has one of the largest oil and refinery sectors in the world. This is an excellent measure of economic development in a developing country with an agro-based economy like India. Major international investors in the oil and refinery industries are attracted to our country because of its rapidly improving infrastructure, sizable domestic market, improved purchasing power, established financial market, and good corporate governance framework. The availability of cutting-edge and effective technology and methods will provide Indian athletes a competitive edge. In the future, industry will primarily produce high-quality fuel products, ensuring cost competitiveness and raising labour productivity. Due to a coordinated effort throughout sectors

and excellent government policies, India's oil and refinery sectors will become the preferred location for international investors to generate high-quality products.

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Table 1

Operating Efficiency of Selected Oil and Refinery Companies in India

Values in Times

Year / Company	Inventory Turnover Ratio								Receivable (or) Debtors Turnover Ratio							
	IOCL	ONGC	BPCL	HPCL	GIL	OIL	CPCL	Industry Average	IOCL	ONGC	BPCL	HPCL	GIL	OIL	CPCL	Industry Average
2015-16	16.98	56.56	19.22	14.17	51.46	61.60	20.48	**34.35**	44.40	14.34	47.73	54.77	17.24	9.23	16.77	**29.21**
2016-17	16.80	59.80	19.45	16.15	42.89	47.32	19.25	**31.67**	44.51	11.25	46.80	49.58	15.12	9.65	15.67	**27.51**
2017-18	16.92	72.32	18.20	17.37	39.12	46.24	21.94	**33.16**	44.45	10.38	62.62	43.90	14.91	13.55	22.61	**30.35**
2018-19	17.18	66.22	18.01	17.73	34.08	44.32	24.99	**31.79**	52.31	7.79	70.06	46.80	11.29	6.80	23.64	**31.24**
2019-20	14.47	53.93	16.75	16.43	41.96	49.51	20.75	**30.54**	54.92	8.29	82.54	52.02	9.81	5.23	26.99	**34.26**
2020-21	11.23	59.22	14.64	13.77	46.29	58.84	23.79	**32.54**	55.76	13.09	64.40	52.95	10.70	7.97	45.06	**35.70**
2021-22	11.33	53.09	14.51	14.48	50.48	46.04	24.76	**30.67**	53.48	11.86	53.63	49.59	11.63	8.55	33.83	**31.80**
2022-23	14.55	52.48	18.00	17.73	58.58	59.54	25.67	**35.22**	47.75	13.47	55.59	51.98	14.30	9.78	55.03	**35.41**
2023-24	13.03	55.05	16.78	16.84	39.68	56.48	28.14	**32.29**	40.47	14.49	53.69	58.40	11.85	9.83	56.39	**35.02**
2024-25	8.63	43.09	11.93	10.99	30.65	59.42	13.43	**25.45**	38.80	10.83	44.82	48.32	9.89	7.42	59.03	**31.30**
Mean	**14.11**	**57.18**	**16.75**	**15.57**	**43.52**	**52.93**	**22.32**	**31.77**	**47.69**	**11.58**	**58.19**	**50.83**	**12.67**	**8.80**	**35.50**	**32.18**
S.D	**2.99**	**7.99**	**2.39**	**2.18**	**8.42**	**6.82**	**4.15**	**2.67**	**6.10**	**2.34**	**11.82**	**4.13**	**2.54**	**2.23**	**16.96**	**2.81**
C.V (%)	**21.17**	**13.98**	**14.26**	**13.98**	**19.34**	**12.88**	**18.58**	**8.40**	**12.79**	**20.22**	**20.32**	**8.13**	**20.03**	**25.38**	**47.77**	**8.73**
CAGR (%)	**-6.54**	**-2.48**	**-4.66**	**2.51**	**-5.05**	**-0.36**	**-4.13**	**-2.95**	**-1.34**	**-2.77**	**-0.63**	**-1.25**	**-5.41**	**-2.15**	**13.41**	**0.69**

Sources: Compiled from Annual Reports of the Respective Units

Table 1 *Contd……*

Operating Efficiency of Selected Oil and Refinery Companies in India

Values in Times

Year / Company	Working Capital Turnover Ratio								Fixed Assets Turnover Ratio							
	IOCL	ONGC	BPCL	HPCL	GIL	OIL	CPCL	Industry Average	IOCL	ONGC	BPCL	HPCL	GIL	OIL	CPCL	Industry Average
2015-16	6.63	1.12	12.86	7.90	6.24	0.52	10.38	**6.52**	7.13	1.17	13.39	9.09	2.58	2.19	12.21	**6.82**
2016-17	6.35	1.79	14.32	9.38	6.12	0.40	11.39	**7.11**	7.85	1.08	15.02	9.63	2.44	1.99	10.26	**6.90**
2017-18	6.72	1.84	15.06	8.99	7.88	0.32	13.50	**7.76**	8.00	0.92	14.24	9.03	2.71	1.75	12.57	**7.03**
2018-19	7.52	1.62	17.50	9.33	6.08	0.29	16.52	**8.41**	7.16	0.88	12.47	7.53	2.07	1.52	11.75	**6.20**
2019-20	7.26	2.06	14.21	10.50	4.20	0.31	16.85	**7.91**	4.38	0.85	9.32	6.03	1.83	1.37	8.49	**4.61**
2020-21	6.40	2.16	11.12	9.97	4.30	0.27	15.30	**7.07**	4.20	0.76	7.70	5.97	1.71	1.10	10.46	**4.56**
2021-22	5.90	1.90	11.21	9.82	4.48	0.27	15.86	**7.06**	4.41	0.73	6.44	6.49	1.87	1.04	7.47	**4.06**
2022-23	7.22	3.56	16.45	12.93	4.90	0.25	18.59	**9.13**	5.19	0.92	7.26	7.31	2.42	1.36	7.48	**4.56**
2023-24	6.36	2.35	15.57	10.80	4.20	0.24	20.71	**8.60**	4.32	0.77	5.75	6.00	2.14	1.12	6.94	**3.86**
2024-25	4.11	1.32	8.37	6.67	3.48	0.16	10.84	**4.99**	3.65	0.53	4.72	5.46	1.55	0.76	5.87	**3.22**
Mean	**6.45**	**1.97**	**13.67**	**9.63**	**5.19**	**0.30**	**14.99**	**7.46**	**5.63**	**0.86**	**9.63**	**7.25**	**2.13**	**1.42**	**9.35**	**5.18**
S.D	**0.96**	**0.67**	**2.79**	**1.68**	**1.34**	**0.10**	**3.43**	**1.19**	**1.70**	**0.18**	**3.82**	**1.52**	**0.39**	**0.45**	**2.40**	**1.41**
C.V (%)	**14.90**	**34.03**	**20.40**	**17.47**	**25.91**	**32.11**	**22.89**	**15.92**	**30.23**	**21.02**	**39.64**	**20.94**	**18.38**	**31.68**	**25.72**	**27.30**
CAGR (%)	**-4.67**	**1.66**	**-4.20**	**-1.68**	**-5.67**	**11.12**	**0.43**	**-2.64**	**-6.48**	**-7.61**	**-9.90**	**-4.97**	**-4.97**	**-10.04**	**-7.06**	**-7.23**

Sources: Compiled from Annual Reports of the Respective Units

Table 1 *Contd……*

Operating Efficiency of Selected Oil and Refinery Companies in India

Values in Times

Year / Company	Total Assets Turnover Ratio							
	IOCL	ONGC	BPCL	HPCL	GIL	OIL	CPCL	Industry Average
2015-16	1.96	0.38	3.34	2.63	0.98	0.42	2.92	**1.80**
2016-17	2.02	0.39	3.69	2.82	0.94	0.38	3.32	**1.94**
2017-18	1.93	0.37	3.68	2.97	1.02	0.27	3.87	**2.01**
2018-19	2.05	0.36	3.56	3.20	1.01	0.26	4.09	**2.08**
2019-20	1.57	0.31	2.81	2.82	0.91	0.24	3.14	**1.69**
2020-21	1.48	0.31	2.57	2.71	0.82	0.20	3.22	**1.62**
2021-22	1.53	0.29	2.71	2.81	0.87	0.23	2.82	**1.61**
2022-23	1.79	0.36	2.86	2.86	1.09	0.26	3.33	**1.79**
2023-24	1.71	0.31	2.53	2.52	0.99	0.26	3.36	**1.67**
2024-25	1.43	0.21	2.11	2.05	0.73	0.16	2.72	**1.34**
Mean	**1.75**	**0.33**	**2.98**	**2.74**	**0.93**	**0.27**	**3.28**	**1.75**
S.D	**0.23**	**0.05**	**0.55**	**0.31**	**0.11**	**0.08**	**0.43**	**0.22**
C.V (%)	**13.44**	**16.24**	**18.37**	**11.16**	**11.25**	**29.23**	**13.19**	**12.46**
CAGR (%)	**-3.1**	**-5.76**	**-4.49**	**-2.46**	**-2.90**	**-9.20**	**-0.71**	**-2.91**

Sources: Compiled from Annual Reports of the Respective Units

Table 2

Statement of Ranking in order of Activity Ratios - Motaal's Comprehensive Test

Year	Indian Oil Corporation Limited					Ultimate Rank	Rank	Oil and Natural Gas Corporation Limited					Ultimate Rank	Rank	Bharat Petroleum Corporation Limited					Ultimate Rank	Rank
	ITR	DTR	WCTR	FATR	TATR			ITR	DTR	WCTR	FATR	TATR			ITR	DTR	WCTR	FATR	TATR		
2015-16	2	8	5	4	3	**22**	**7**	5	2	10	1	2	**20**	**8**	2	8	7	3	4	**24**	**6**
2016-17	4	6	8	2	2	**22**	**7**	3	6	7	2	1	**19**	**10**	1	9	5	1	1	**17**	**8**
2017-18	3	7	4	1	4	**19**	**9**	1	8	6	3	3	**21**	**7**	3	4	4	2	2	**15**	**9**
2018-19	1	4	1	3	1	**10**	**10**	2	10	8	5	4	**29**	**4**	4	2	1	4	3	**14**	**10**
2019-20	6	2	2	7	7	**24**	**5**	7	9	4	6	6	**32**	**3**	7	1	6	5	6	**25**	**5**
2020-21	9	1	6	9	9	**34**	**3**	4	4	3	8	6	**25**	**5**	8	3	9	6	8	**34**	**3**
2021-22	8	3	9	6	8	**34**	**3**	8	5	5	9	9	**36**	**2**	9	7	8	8	7	**39**	**2**
2022-23	5	5	3	5	5	**23**	**6**	9	3	1	3	4	**20**	**8**	5	5	2	7	5	**24**	**6**
2023-24	7	9	7	8	6	**37**	**2**	6	1	2	7	6	**22**	**6**	6	6	3	9	9	**33**	**4**
2024-25	10	10	10	10	10	**50**	**1**	10	7	9	10	10	**46**	**1**	10	10	10	10	10	**50**	**1**

Sources: Computed

Contd…….

Table 2

Statement of Ranking in order of Activity Ratios - Motaal's Comprehensive Test

Year	Hindustan Petroleum Corporation Limited					Ultimate Rank	Rank	Gail India Limited					Ultimate Rank	Rank	Oil India Limited					Ultimate Rank	Rank
	ITR	DTR	WCTR	FATR	TATR			ITR	DTR	WCTR	FATR	TATR			ITR	DTR	WCTR	FATR	TATR		
2015-16	8	2	9	2	8	**29**	**4**	2	1	2	2	5	**12**	**10**	1	5	1	1	1	**9**	**10**
2016-17	6	7	6	1	4	**24**	**6**	5	2	3	3	6	**19**	**7**	7	4	2	2	2	**17**	**9**
2017-18	3	10	8	3	2	**26**	**5**	8	3	1	1	2	**15**	**8**	8	1	3	3	3	**18**	**8**
2018-19	1	9	7	4	1	**22**	**9**	9	7	4	6	3	**29**	**5**	10	9	5	4	5	**33**	**4**
2019-20	5	4	3	7	4	**23**	**8**	6	10	8	8	7	**39**	**2**	6	10	4	5	7	**32**	**5**
2020-21	9	3	4	9	7	**32**	**2**	4	8	7	9	9	**37**	**3**	4	7	6	8	9	**34**	**3**
2021-22	7	6	5	6	6	**30**	**3**	3	6	6	7	8	**30**	**4**	9	6	6	9	8	**38**	**2**
2022-23	1	5	1	5	3	**15**	**10**	1	4	5	4	1	**15**	**8**	2	3	8	6	5	**24**	**7**
2023-24	4	1	2	8	9	**24**	**6**	7	5	8	5	4	**29**	**5**	5	2	9	7	5	**28**	**6**
2024-25	10	8	10	10	10	**48**	**1**	10	9	10	10	10	**49**	**1**	3	8	10	10	10	**41**	**1**

Sources: Computed

Contd…….

Table 2

Statement of Ranking in order of Activity Ratios - Motaal's Comprehensive Test

Year	Chennai Petroleum Corporation Limited					Ultimate Rank	Rank	Overall Ultimate Rank	Overall Rank
	ITR	DTR	WCTR	FATR	TATR				
2015-16	8	9	10	2	8	**37**	**2**	**47**	**5**
2016-17	9	10	8	5	5	**37**	**2**	**49**	**4**
2017-18	6	8	7	1	2	**24**	**7**	**53**	**1**
2018-19	3	7	4	3	1	**18**	**8**	**50**	**3**
2019-20	7	6	3	6	7	**29**	**5**	**33**	**7**
2020-21	5	4	6	4	6	**25**	**6**	**25**	**8**
2021-22	4	5	5	8	9	**31**	**4**	**20**	**9**
2022-23	2	3	2	7	4	**18**	**8**	**53**	**1**
2023-24	1	2	1	9	3	**16**	**10**	**39**	**6**
2024-25	10	1	9	10	10	**40**	**1**	**7**	**10**

Sources: Computed