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Foreword

When we create, when we work for the new or push ourselves ahead in search of fulfilment and change, we do so in a collective progress. Then, we step into the unknown together, ready to shape what's coming.

Being completely satisfied, as soon as it happens to be recognized as being a duty and established as being a behaviour, opens doorways into unimaginable gardens thronged with grateful associates.

Innovators, change-agents, artists, creative thinkers and progressives are the culmination of so many influential and inspiring people who have come before and opened our eyes to other worlds of thought. We look to our mentors, teachers, and peers who continually build us into citizens of the planet.

We walk with their energy and then add our own. We, in turn, become mediums of what's possible.

It is well known that what is not measured cannot be improved. In this edition (the fourth) of our Commerce Window issue we have tried to make some contribution to its improvement, and in the hope that this issue will become a useful tool for analysing and interpreting the results of our actions.

The authors of these journals, in sharing the expression of their talents, experiences and the difference they have made within these pages, by describing who has influenced them and pushed them to be who they are, also tell us who we are.

Enthusiasm could be the internal voice that whispers, "I can do it!" when other folks shout, "No, you cannot."

And thus, they inspire in all of us the passion to take action, have impact, find responsibility, help others, and move forward in the mutual endeavour of shaping what's to come.

Neither believe nor reject anything, because any other person has rejected or believed it.

S. Shekhar
Conference Secretary

*This Volume contains a number of research papers commissioned by the Research and Development wing.
We are grateful to each of the authors for the extensive work involved and the quality of the work presented. The recommendations by the authors are their own and do not necessarily reflect the views of the Research and Development wing.

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MEASURING THE WORKING CAPITAL PERFORMANCE AND LIQUIDITY POSITION OF PETROLEUM INDUSTRY OF INDIA – WITH SPECIAL REFERENCE TO PUBLIC AND PRIVATE SECTOR

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Abstract

Liquidity is the most significant for both individuals and companies. Without cash coming in the door, companies can quickly get into trouble with their creditors. This paper deals with the working capital performance of Indian petroleum industry and the liquidity position of these companies. One way ANOVA (Robust test of equalities of means) has been used to test the variance and Welling's Index Model is used to examine the liquidity position of the companies through various liquidity ratios. Furthermore the liquidity position amongst public and private sector separately also been tested. The result indicates that the working capital performance is poor in the petroleum industry of India.

Keywords: Working Capital Performance, Petroleum Industry, Liquidity Position, ANOVA and Welling's Index Model.

INTRODUCTION

Liquidity for the petroleum companies is the ability to meet the short term obligations or the ability of the petroleum companies to convert its assets into cash which mostly deals with the short term obligations, i.e. within one accounting year. Managing liquidity is a daily process which requires petroleum companies to monitor and project cash flows to ensure adequate liquidity. To maintain a balance between short-term assets and short-term liabilities is very critical. Inability to meet short term obligations may affect company's operations and reputation adversely. Excess liquidity proves to be costly for petroleum companies. So, it is always needful to maintain adequate liquidity. However, there is no standard norm for maintaining liquidity in petroleum industry. That particularly depends on the nature of the business, scale of operations, location of the business.and many other factors that affect working capital requirement.

Total investment of a company can be divided into two parts, i.e. long-term and short-term. Long-term term investment includes long-term advances termed as "Fixed Investment". It is the advances made by the companies to earn profits during the life of the petroleum companies, where short-term advances are made to run the operations. (Agrawal, 1981) has mentioned "The funds required for financing the duration of operation cycle in a business are known as working capital funds." Hence Working capital management is concerned with making sure that business have adequate amount of money and lines of credit available to the business all the times.

(Kennedy & McMullen, 1968) perfectly mentioned "A Study of working Capital is of major importance to internal and external analysis because of its close relationship to current day-to-day operations of business. Inadequacy or mismanagement of working capital is one of leading cause of business failures." It is therefore very important to maintain the adequate working capital for smooth running of operations, proper liquidity and higher profitability in the petroleum companies. Working capital management refers to the administration of all aspects of current assets and current liabilities.

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REVIEW OF LITERATURE

(Sumathy & Seetha, 2015) analyzed the working capital structure and liquidity of oil and gas industry based on secondary data the statistical tools like Mean, Standard Deviation, Coefficient Of Variance and Analysis Of Variance (ANOVA) have been used to the study. The study revealed that the liquidity of this industry is not in satisfactory level.

(Vijaykumar & Gomathi, 2013) have studied the profitability of Indian Oil refineries and found using various ratios and statistical techniques that operating efficiency of selected oil refineries in India is satisfactory and the management generally succeeded in investing capital funds. Their result showed that Hindustan Petroleum Corporation Ltd, Bharat Petroleum Corporation Ltd, Mangalore Refinery and Petrochemicals, Essar Oil Ltd and Reliance Industries Ltd experienced a strong tendency in profitability to decline over the study period of 1994-95 to 2008-09.

(Das R. C., 2013) analyzed financial performance of Indian Petroleum Industry covering the financial performance of twelve selected companies from the petroleum industry on three broad financial parameters i.e. liquidity, capital structre and profitability for ten years. Fiancial performance has be analysed using various accounting ratios, Pearson's simple, Spearman's rank corelation, multiple regrassion technique have been applied and co-efficient has been tested. Stastical test like t- test and F- test are used to analyse the data. But there are still other techniques like comparative statement analysis, common size statement analysis, trend analysis, fund flow analysis, cash flow analysis, cost-volume-profit analysis, economic value added, market value addition etc. which have not been used in this study, which could make the study more relavent.

(Kumar, Gupta, & Goyal, 2013) analyzed the financial performance of Indian oil corporation limited focusing on profitability, liquidity, solvency, overall performance, operational efficiency and effectiveness, credit policies and externally the potential investment as well as credit worthiness of borrowers etc. using one of the most important and powerful tool i.e. ratio analysis. It can be concluded that the profitability position of the company cannot be said satisfactory.

(Raheman, Qayyum, & Afza, 2011) have analyzes working capital management performance of manufacturing sectors by using different working capital management measures. It also compares the ranking of sectors/industries based on working capital management performance in order to identify the prominent and laggard sectors.

USEFULNESS OF THE RESEARCH

This research will be used in many ways like it will add some light on the existing position of liquidity of the petroleum industry of India, the management can take authentic decision to have adequate liquidity. Finally the current economic situation is not in a healthy position. The findings of our research can be used not only by petroleum companies only but also by other organizations to improve their financial performance and financial crisis of the country.

OBJECTIVES

The main objectives of the research paper has been mentioned bellow,

1. To examine the working capital performance of the selected company.
2. To study the liquidity position of the public sector and private sector and over all petroleum companies of India precisely by applying Welling Index.
3. To give suggestion for the better liquidity

HYPOTHESES

H_0 = There is no significance difference in the working capital performance of the selected petroleum companies of India

H_1 = There is significance difference in the working capital performance of the selected petroleum companies of India

RESEARCH METHODOLOGY

(Singh, 2006) has quoted, "Research methodology involves such general activities as identifying problems, review of the literature, formulating hypotheses, procedure for testing hypotheses, measurement, data collection analysis of data, interpreting results and drawing conclusions" (p. 79). The following research methodology has been framed to study the liquidity position of the public sector and private sector petroleum companies of India.

Sources of data collection

Secondary data have been used in this research, which have been collected from the annual reports of the selected petroleum companies of India. Various journals, Government publication, reports of petroleum and natural gas ministry, Government of India, various publications of Petroleum Federation of India (PFI), National Petrochemicals and Refiners Association (NPRA), National Petroleum Council (NPC) have also been used.

Period of Study

The present study is made for ten years from 2005-06 to 2014-15. This is a very long period to give a concrete conclusion.

Sample Design

Total 22 petroleum companies are selected which are engaged in oil drilling, exploration, production, refining, marketing and distribution of petroleum products like oil, gas and lubricants of Indian Petroleum Industry, excluding joint venture, co-operative sector, companies engaged allied business, unlisted in stock exchange of India. There are total 11 companies in public sector and 11 companies in private sector, they are as under,

1. Aban Offshore Ltd. (AOL) (Private)
2. Bharat Petroleum Corporation Ltd. (BPCL) (Public)
3. Castrol India (CI) (Private)
4. Chennai Petroleum Corporation (CPCL) (Public)
5. Deep Industries Ltd. (DIL) (Private)
6. Essar Oil Ltd.(EOL) (Private)
7. Gas Authority of India Ltd. (GAIL) (Public)
8. GP Petroleums (Sah PetroleumsLtd.) (GPP) (Private)
9. Gujarat State Petronet Ltd. (GSPL) (Public)
10. Hindustan Oil Exploration Co Ltd. (HOEC) (Private)
11. Hindustan Petroleum Corporation Ltd. (HPCL) (Public)
12. Indian Oil Corporation Ltd. (IOCL) (Public)
13. Indraprastha Gas Ltd. (IGL) (Public)
14. Jindal Drilling & Industries Ltd. (JDIL) (Private)
15. Mangalore Refinery and Petrochemicals Ltd. (MRPL) (Public)
16. Oil and Natural Gas Corporation Ltd. (ONGC) (Public)
17. Oil India Ltd. (OIL) (Public)
18. Petronet LNG Ltd (PLL) (Public)

19. Reliance Industries Ltd (RIL) (Private)
20. Selan Exploration Technology Limited (SETL) (Private)
21. Shiv Vani Oil & Gas Exploration Services (SVOGL)(Private)
22. Tide Water Oil Company India Ltd (TWOCL) (Private)

Tools and Techniques used

For clear understanding of the data collected and the pattern over the years descriptive statistics, like minimum, maximum, mean are used. One way ANOVA and Welling Index has been used to study the difference in means liquidity position of the selected petroleum companies of India. In order to analyze the collected data for our variables, the IBM SPSS Statistics 19 is used.

ANALYSIS AND DISCUSSION

Accounting Analysis

Following ratios are taken into considerations for the analysis of liquidity of the petroleum companies selected, namely, current ratio (CR), quick ratio (QR), Absolute Liquid Ratio (ALR), Cash Debt Coverage Ratio (CDCR), Cash to Current Asset Ratio (CTOCAR), Current Assets to Total Assets Ratio (CATOTAR), Current Liabilities to Total Assets Ratio (CLTOTLR), Working Capital Turnover Ratio (WCTR), Inventory Turnover Ratio (ITR), Debtors Turnover Ratio (DTR), Cash Turnover Ratio (CTR).

Table 1 Working capital ratios of selected companies of petroleum industry of India

Name Of Company	Average WCTR (in time)	Average ITR (in time)	Average DTR (in days)	Average CTR (in time)
Consolidated	**-6.62**	**09.82**	**13**	**21.43**
AOL	-9.54	11.01	90	18.65
BPCL	33.82	12.72	6	320.57
CI	7.36	09.14	29	10.50
CPCL	18.35	07.75	19	1648.74
DIL	4.58	13.72	104	9.61
EOL	3.26	09.53	88	21.12
GAIL	45.28	32.38	19	17.68
GPP	6.00	05.46	103	16.46
GSPL	1.64	11.15	43	2.77
HOEC	-11.75	03.47	57	4.01
HPCL	-89.17	10.93	7	2613.40
IOCL	21.79	08.24	10	802.12
IGL	-8.96	56.19	16	36.06
JDIL	5.29	69.18	91	1497.95
MRPL	98.62	11.57	20	523.98
ONGC	6.87	15.46	29	7.03
OIL	1.20	14.62	36	1.16
PLL	-141.06	40.47	19	36.47
RIL	26.49	8.73	16	21.43
SETL	1.91	22.17	83	1.21
SVOGL	1.18	09.73	366	9.54
TWOCL	3.84	05.00	41	23.41

Source : Published Annual Reports of Selected Companies

Name of the companies marked Bold indicates Public Company

Working capital turnover ratio of the individual petroleum company selected has been presented in table 1 along with the consolidated position. It can be analyzed from the table that the average working capital turnover ratio was marked at -6.62 times and the highest in MRPL with 98.62 times and PLL with -141.06 is lowest amongst all. (Table no.1)

Inventory turnover ratio was marked average at 9.82 times and the highest in JDIL with 69.18 times and HOEC with 3.47 is the least that means HOEC invest too much in inventories. (Table no.1)

Debtors' turnover ratio is the highest in SVOGL with 366 days, which indicates that it takes 366 days for SVOGL to collect its receivables and BPCL with 6 days which shows quick collection policies. (Table no.1)

Cash turnover ratio was marked average at 21.43 times and the highest in HPCL with 2613.40 times which indicates that it is very efficient in using its cash for the generating good amount of sale and OIL with 1.16, which indicates that it is very poor in utilizing its cash. (Table no.1)

Statistical Analysis

Test of Homogeneity of Variance

H_0: The variances are equal.

H_1: The variances are not equal.

Table 2 Test of Homogeneity of Variance for selected 22 companies of petroleum industry of India

Ratio	Levene Statistic	df1	df2	Sig.	Result H_0
Working Capital Turnover Ratio	4.121	21	198	.000	Rejected
Inventory Turnover Ratio	17.217	21	198	.000	Rejected
Debtors' Turnover Ratio	10.938	21	198	.000	Rejected
Cash Turnover Ratio	10.504	21	198	.000	Rejected
0.05 significant level					

The output of the test of homogeneity of variances for selected 22 companies of petroleum industry of India has been shown in table no. 2. All working capital ratios' significant value is less than 0.05, which indicates the H_0 is rejected and the variances are not equal. (Field, 2009) has mentioned in his book Robust test of equality of means is applicable as pa pert of One Way ANOVA test when variances are not equal. Here homogeneity of variances is violent so in this case robust tests of Equality of Means will be used.

One Way ANOVA Test

Table 3 One Way ANOVA Test for selected 22 companies of petroleum industry of India

Robust Tests of Equality of Means					
		Statistic[a]	df1	df2	Sig.
Working Capital Turnover Ratio	Welch	12.275	21	70.728	.000
Inventory Turnover Ratio	Welch	33.101	21	71.858	.000
Debtors' Turnover Ratio	Welch	53.989	21	71.518	.000
Cash Turnover Ratio	Welch	11.175	21	70.420	.000
a. Asymptotically F distributed.					

From the above table no. 3, it can be seen that in the case of Welch test and for ANOVA associated significant value is less than 0.05. This indicates that null hypotheses is rejected which means there is a significant difference in the working capital performance of the selected of petroleum companies of India.

Welling's Index Model for analyzing the liquidity position of selected companies

Table 4 shows 1 to 22 various rank obtained by selected petroleum companies in various Liquidity ratios. This table clearly indicates that each company is having different number in different ratio. So, it is very difficult to say which petroleum company stands first in the context of Liquidity. So, to find out the most liquid company, Welling's Index model has been applied, which is as under. Table 5 shows the rank for liquidity Ratios based on Welling's Index Model for 22 selected companies. The higher ratio is given rank 1 except debtors turnover ratio. Lowest Debtors' turnover ratio is given rank 1 and so on, as it shows quick collection from debtors. From the table 5, it has been found that OIL (wij = 3.243) is the most liquid company from the selected companies. Followed by CI (wij = 3.143), SETL (wij = 3.036), SVOGL (wij = 2.814), IGL (wij = 2.481), JDIL (wij = 2.360), MRPL (wij = 2.263), BPCL (wij = 2.216), HPCL (wij = 2.104), GSPL (wij = 1.735), CPCL (wij = 1.613), GAIL (wij = 1.594), GPP (wij = 1.469), TWOCL (wij = 1.415), PLL (wij = 1.384), ONGC (wij = 1.345), IOCL (wij = 1.322), RIL (wij = 1.301), AOL (wij = 1.038), DIL (wij = 0.970), HOEC (wij = 0.934) and EOL (wij = 0.820).It can be seen that the EOL is in the liquidity crisis.

Table 6 shows 1 to 11 various rank obtained by selected public sector petroleum companies in various Liquidity ratios. This table clearly indicates that each company is having different number in different ratio. Table 7 shows the rank for liquidity Ratios based on Welling's Index Model for 11 public sector petroleum companies. From the table, it has been observed that OIL (wij = 4.783) is at the rank 1 being most liquid company from public sector of petroleum industry of India. Followed by MRPL (wij = 3.594), IGL (wij = 3.590), GSPL (wij = 3.174), CPCL (wij = 3.123), BPCL (wij = 2.908), HPCL (wij = 2.606), ONGC (wij = 2.539), GAIL (wij = 2.462), PLL (wij = 2.432) and IOCL (wij = 2.008) at last position.

Table 8 shows 1 to 11 various rank obtained by selected private sector petroleum companies in various Liquidity ratios. This table clearly indicates that each company is having different number in different ratio. Table 9 shows the rank for liquidity Ratios based on Welling's Index Model for 11 private sector petroleum companies. From the table, it has been observed that SETL (wij = 5.333) is at the rank 1 being most liquid company from private sector of petroleum industry of India. Followed by SETL (wij = 5.333), CI (wij = 4.554), JDIL (wij = 3.957), RIL (wij = 3.710), SVOGL (wij = 3.525), TWOCL (wij = 2.627), GPP (wij = 2.103), AOL (wij = 2.037), DIL (wij = 1.849), EOL (wij = 1.795) and HOEC (wij = 1.730).

SUMMARY OF FINDINGS

1. The working capital ratio in MRPL, GAIL, BPCL, RIL and IOCL have extremely high ratio and they don't have enough capital to support its sales growth. CPCL, CI, ONGC, GPP, JDIL, DIL, TWOCL, EOL, SETL, GSPL, OIL and SVOGL are highly capable in using the short-term assets and liabilities to support sales. They have more smooth operations and they have limited need for the additional funding. AOL, HOEC, HPCL and PLL are investing in too many accounts receivable and inventory assets to support its sales and as a result they face liquidity crisis.
2. The inventory turnover ratio in JDIL, IGL, PLL, GAIL, SETL, ONGC, OIL, DIL, BPCL, MRPL, GSPL, AOL and HPCL have strong sales and have better liquidity. SVOGL, EOL, CI, RIL, IOCL, CPCL, GPP, TWOCL and HOEC are inefficient in buying and too much of its capital tied up in inventory that it will take a long time to sell or make profit on. These companies have poor liquidity.
3. The debtors' turnover ratio in SVOGL with 366 days, which is very high comparing to industry average 13 days. The debtors turnover ratio found high in DIL, GPP, JDIL, AOL, EOL, SETL, HOEC, GSPL, TWOCL, OIL, ONGC and CI too. These companies face liquidity problem due to high ratio and their credit lending policies are too stringent. MRPL, PLL, GAIL, CPCL, IGL and RIL have adequate ratio, while IOCL, HPCL and BPCL have better account receivable policy and well operational performance.
4. HPCL, CPCL, IOCL, MRPL and BPCL have very high cash turnover ratio because they are very low in cash. Though JDIL has very high ratio, it is efficient in using cash towards better use for sales. PLL, IGL and TWOCL companies' management proves that they are very efficient in using its cash for fruitful purpose. The cash turnover ratio of OIL was the lowest amongst all. The management of EOL, GPP,

SVOGL and HOEC is not efficient in using its cash but on the same side management of RIL, AOL, GAIL, CI, DIL, ONGC, GSPL, SETL and OIL is much efficient to generate high revenue by using its cash.

5. By applying Welling's Index to selected 22 petroleum companies of India it has been found that OIL is the most liquid company in the industry. It can enjoy its liquidity in utilization of effective sales and profit earning with the help of highest proportion of cash in hands in current assets and good liquidity, while EOL is at the last rank in liquidity and faces liquidity crisis. It has also been found that EOL is very bad in cash on hand and in bank, it has very low proportion of working capital in its operations and poor in collection policies.
6. While comparing 11 public sector companies it has been found that OIL is the most liquid company in the public sector because it has the highest absolute liquid ratio that makes it the most liquid company among all, but it is poor in collection from debtors comparing to other's collection period, while IOCL is at the last position in liquidity of the public sector, as it is very poor with its cash and very low inventory turnover ratio that makes its too much investment in the inventory which has zero rate of return and high cash debt coverage ratio.
7. It has been found by comparing 11 private companies that, SETL is the most liquid company in private sector as it is best at current, quick and absolute liquid ratio and HOEC is at the last position. It is very poor with its cash and very low inventory turnover ratio that makes its too much investment in the inventory which has zero rate of return.

CONCLUSION

From the above discussion it can be conclude that as per one way Anova, there is significance difference in the working capital turnover ratios of selected petroleum companies of India. The working capital performance of the selected companies is very poor on an average. They need to have proper working capital management for the efficient use of resources and effective decision making. By applying Welling's Index it can be conclude that SETL and OIL are the most liquid companies in private sector and public sector respectively, while HOEC and IOCL are very poor in liquidity.

DELIMITATIONS

1. This study is based on secondary data. Therefore, the quality of study depends purely upon the accuracy, reliability and quality of the secondary data source.
2. The liquidity is also affected by other factors like inflation, market change etc. have not been covered by this study.
3. There are different methods to measure liquidity.
4. Different tools used to analyze the data, have own limitation that applies to this study also.

SCOPE FOR FURTHER RESEARCH

The performance of working capital can be analyzed by measuring the relationship between the return on equity, return on investment, and return on sales and WC components.

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APPENDIX **Table 4 Showing Various Liquidity Ratios Rank of All Selected Petroleum Companies of India**

Company Name	CR		QR		ALR		CDCR		CTOCAR		CATOTAR		CLTOTLR		WCTR		ITR		DTR		CTR	
	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij
AOL	2.46	6	2.28	4	0.24	13	0.09	9	10.63	16	24.96	20	12.80	22	-9.54	19	11.01	12	89.64	18	18.65	12
BPCL	1.19	18	0.58	18	0.04	19	0.07	13	3.37	19	47.65	9	40.69	5	33.82	3	12.72	9	6.23	1	320.57	6
CI	1.55	10	1.11	10	0.56	4	0.07	14	35.76	4	117.82	1	76.23	1	7.36	7	9.14	16	28.72	10	10.50	15
CPCL	1.47	12	0.53	21	0.01	22	0.05	18	0.42	22	62.38	5	43.34	4	18.35	6	7.75	19	18.53	6	1648.74	2
DIL	1.64	9	1.48	6	0.30	9	0.07	12	15.26	13	22.36	21	14.51	21	4.58	11	13.72	8	103.50	21	9.61	16
EOL	0.96	22	0.58	19	0.17	17	0.04	19	17.67	12	38.15	15	40.16	6	3.26	13	9.53	15	87.89	17	21.12	11
GAIL	1.15	19	1.06	12	0.29	10	0.08	11	24.08	7	39.45	14	33.97	12	45.28	2	32.38	4	19.37	7	17.68	13
GPP	1.54	11	1.06	11	0.17	16	0.01	20	9.18	17	76.16	3	51.82	2	6.00	9	5.46	20	102.89	20	16.46	14
GSPL	3.67	2	0.91	14	0.49	5	0.13	4	46.57	3	19.11	22	19.70	18	1.64	15	11.15	11	43.10	14	2.77	20
HOEC	1.35	13	1.17	9	0.45	6	0.05	17	29.08	5	25.74	19	19.60	19	-11.75	20	3.47	22	57.20	15	4.01	19
HPCL	1.12	20	0.47	22	0.01	21	0.07	16	0.90	21	42.94	12	38.75	7	-89.17	21	10.93	13	7.41	2	2613.40	1
IOCL	1.23	16	0.57	20	0.02	20	-0.01	22	1.36	20	46.87	10	38.40	8	21.79	5	8.24	18	9.64	3	802.12	4
IGL	2.86	5	0.69	16	0.19	15	0.19	1	22.89	8	27.67	18	34.92	11	-8.96	18	56.19	2	15.80	5	36.06	8
JDIL	2.30	7	2.22	5	0.07	18	0.11	5	3.53	18	57.42	7	28.32	13	5.29	10	69.18	1	91.01	19	1497.95	3
MRPL	1.12	21	0.68	17	0.21	14	0.10	8	20.63	11	56.63	8	51.40	3	98.62	1	11.57	10	19.51	9	523.98	5
ONGC	1.29	15	1.21	8	0.27	11	0.13	3	20.72	10	46.12	11	35.32	10	6.87	8	15.46	6	29.06	11	7.03	18
OIL	2.90	4	2.74	3	1.97	1	0.09	10	67.39	1	60.98	6	21.54	17	1.20	16	14.62	7	36.43	12	1.16	22
PLL	1.22	17	0.99	13	0.35	7	0.11	6	27.25	6	29.99	17	25.44	15	-141.06	22	40.47	3	19.46	8	36.47	7
RIL	1.33	14	0.87	15	0.32	8	0.10	7	22.55	9	30.89	16	23.11	16	26.49	4	8.73	17	15.51	4	21.43	10
SETL	2.92	3	2.82	2	1.34	2	0.17	2	48.14	2	70.19	4	25.90	14	1.91	14	22.17	5	83.41	16	1.21	21
SVOGL	3.78	1	3.53	1	1.12	3	-0.01	21	14.09	14	42.16	13	16.15	20	1.18	17	9.73	14	366.11	22	9.54	17
TWOCL	2.25	8	1.28	7	0.27	12	0.07	15	11.58	15	81.23	2	36.70	9	3.84	12	5.00	21	41.38	13	23.41	9

n = Number of Selected Petroleum Companies (22); m= number of Liquidity ratios calculated (11);
ui = the number of petroleum company which have calculated ith ratio (22);
vj = the number of Liquidity ratios in which jth company (11)

$$Wj = \sum \frac{1}{nm} \times \frac{uivj}{rij}$$

Table 5 Showing Various Liquidity Ratios Rank of All Selected Petroleum Companies of India

Company Name	CR	QR	ALR	CDCR	C TO CAR	CA TO TAR	CL TO TLR	WCTR	ITR	DTR	CTR	WELLING INDEX	RANK
	Wj	Wj	Wj	Wj	Wj	Wj	Wj	Wj	Wj	Wj	Wj	∑ Wj	
OIL	0.250	0.333	1.000	0.100	1.000	0.167	0.059	0.063	0.143	0.083	0.045	3.243	1
CI	0.100	0.100	0.250	0.071	0.250	1.000	1.000	0.143	0.063	0.100	0.067	3.143	2
SETL	0.333	0.500	0.500	0.500	0.500	0.250	0.071	0.071	0.200	0.063	0.048	3.036	3
SVOGL	1.000	1.000	0.333	0.048	0.071	0.077	0.050	0.059	0.071	0.045	0.059	2.814	4
IGL	0.200	0.063	0.067	1.000	0.125	0.056	0.091	0.056	0.500	0.200	0.125	2.481	5
JDIL	0.143	0.200	0.056	0.200	0.056	0.143	0.077	0.100	1.000	0.053	0.333	2.360	6
MRPL	0.048	0.059	0.071	0.125	0.091	0.125	0.333	1.000	0.100	0.111	0.200	2.263	7
BPCL	0.056	0.056	0.053	0.077	0.053	0.111	0.200	0.333	0.111	1.000	0.167	2.216	8
HPCL	0.050	0.045	0.048	0.063	0.048	0.083	0.143	0.048	0.077	0.500	1.000	2.104	9
GSPL	0.500	0.071	0.200	0.250	0.333	0.045	0.056	0.067	0.091	0.071	0.050	1.735	10
CPCL	0.083	0.048	0.045	0.056	0.045	0.200	0.250	0.167	0.053	0.167	0.500	1.613	11
GAIL	0.053	0.083	0.100	0.091	0.143	0.071	0.083	0.500	0.250	0.143	0.077	1.594	12
GPP	0.091	0.091	0.063	0.050	0.059	0.333	0.500	0.111	0.050	0.050	0.071	1.469	13
TWOCL	0.125	0.143	0.083	0.067	0.067	0.500	0.111	0.083	0.048	0.077	0.111	1.415	14
PLL	0.059	0.077	0.143	0.167	0.167	0.059	0.067	0.045	0.333	0.125	0.143	1.384	15
ONGC	0.067	0.125	0.091	0.333	0.100	0.091	0.100	0.125	0.167	0.091	0.056	1.345	16
IOCL	0.063	0.050	0.050	0.045	0.050	0.100	0.125	0.200	0.056	0.333	0.250	1.322	17
RIL	0.071	0.067	0.125	0.143	0.111	0.063	0.063	0.250	0.059	0.250	0.100	1.301	18
AOL	0.167	0.250	0.077	0.111	0.063	0.050	0.045	0.053	0.083	0.056	0.083	1.038	19
DIL	0.111	0.167	0.111	0.083	0.077	0.048	0.048	0.091	0.125	0.048	0.063	0.970	20
HOEC	0.077	0.111	0.167	0.059	0.200	0.053	0.053	0.050	0.045	0.067	0.053	0.934	21
EOL	0.045	0.053	0.059	0.053	0.083	0.067	0.167	0.077	0.067	0.059	0.091	0.820	22

Table 6 Showing Various Liquidity Ratios Rank of All Selected Public sector Petroleum Companies of India

Company Name	CR		QR		ALR		CDCR		CTOCAR		CATOTAR		CLTOTLR		WCTR		ITR		DTR		CTR	
	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij	Avg. Ratio	Rank rij
BPCL	1.19	8	0.58	8	0.04	8	0.07	8	3.37	8	47.65	4	40.69	3	33.82	3	12.72	6	6.23	1	320.57	5
CPCL	1.47	4	0.53	10	0.01	11	0.05	10	0.42	11	62.38	1	43.34	2	18.35	5	7.75	11	18.53	5	1648.74	2
GAIL	1.15	9	1.06	3	0.29	4	0.08	7	24.08	4	39.45	8	33.97	8	45.28	2	32.38	3	19.37	6	17.68	8
GSPL	3.67	1	0.91	5	0.49	2	0.13	3	46.57	2	19.11	11	19.70	11	1.64	7	11.15	8	43.10	11	2.77	10
HPCL	1.12	10	0.47	11	0.01	10	0.07	9	0.90	10	42.94	7	38.75	4	-89.17	10	10.93	9	7.41	2	2613.40	1
IOCL	1.23	6	0.57	9	0.02	9	-0.01	11	1.36	9	46.87	5	38.40	5	21.79	4	8.24	10	9.64	3	802.12	3
IGL	2.86	3	0.69	6	0.19	7	0.19	1	22.89	5	27.67	10	34.92	7	-8.96	9	56.19	1	15.80	4	36.06	7
MRPL	1.12	11	0.68	7	0.21	6	0.10	5	20.63	7	56.63	3	51.40	1	98.62	1	11.57	7	19.51	8	523.98	4
ONGC	1.29	5	1.21	2	0.27	5	0.13	2	20.72	6	46.12	6	35.32	6	6.87	6	15.46	4	29.06	9	7.03	9
OIL	2.90	2	2.74	1	1.97	1	0.09	6	67.39	1	60.98	2	21.54	10	1.20	8	14.62	5	36.43	10	1.16	11
PLL	1.22	7	0.99	4	0.35	3	0.11	4	27.25	3	29.99	9	25.44	9	-141.06	11	40.47	2	19.46	7	36.47	6

n = Number of Selected Petroleum Companies (11); m= number of Liquidity ratios calculated (11);
ui = the number of petroleum company which have calculated ith ratio (11);
vj = the number of Liquidity ratios in which jth company (11)

$$Wj = \sum \frac{1}{nm} \times \frac{uivj}{rij}$$

Table 7 Showing Various Liquidity Ratios Rank of All Selected Public sector Petroleum Companies of India

Company Name	CR	QR	ALR	CDCR	C TO CAR	CA TO TAR	CL TO TLR	WCTR	ITR	DTR	CTR	WELLING INDEX	RANK
	Wj	Wj	Wj	Wj	Wj	Wj	Wj	Wj	Wj	Wj	Wj	∑ Wj	
OIL	0.500	1.000	1.000	0.167	1.000	0.500	0.100	0.125	0.200	0.100	0.091	4.783	1
MRPL	0.091	0.143	0.167	0.200	0.143	0.333	1.000	1.000	0.143	0.125	0.250	3.594	2
IGL	0.333	0.167	0.143	1.000	0.200	0.100	0.143	0.111	1.000	0.250	0.143	3.590	3
GSPL	1.000	0.200	0.500	0.333	0.500	0.091	0.091	0.143	0.125	0.091	0.100	3.174	4
CPCL	0.250	0.100	0.091	0.100	0.091	1.000	0.500	0.200	0.091	0.200	0.500	3.123	5
BPCL	0.125	0.125	0.125	0.125	0.125	0.250	0.333	0.333	0.167	1.000	0.200	2.908	6
HPCL	0.100	0.091	0.100	0.111	0.100	0.143	0.250	0.100	0.111	0.500	1.000	2.606	7
ONGC	0.200	0.500	0.200	0.500	0.167	0.167	0.167	0.167	0.250	0.111	0.111	2.539	8
GAIL	0.111	0.333	0.250	0.143	0.250	0.125	0.125	0.500	0.333	0.167	0.125	2.462	9
PLL	0.143	0.250	0.333	0.250	0.333	0.111	0.111	0.091	0.500	0.143	0.167	2.432	10
IOCL	0.167	0.111	0.111	0.091	0.111	0.200	0.200	0.250	0.100	0.333	0.333	2.008	11

Table 8 Showing Various Liquidity Ratios Rank of All Selected Private sector Petroleum Companies of India

Company Name	CR		QR		ALR		CDCR		CTOCAR		CATOTAR		CLTOTLR		WCTR		ITR		DTR		CTR	
	Avg.	Rank	Avg.	Rank	Avg.	Rank	Avg.	Rank	Avg.	Rank	Avg.	Rank	Avg.	Rank	Avg.	Rank	Avg.	Rank	Avg.	Rank	Avg.	Rank
	Ratio	rij	Ratio	rij	Ratio	rij	Ratio	rij	Ratio	rij	Ratio	rij	Ratio	rij	Ratio	rij	Ratio	rij	Ratio	rij	Ratio	rij
AOL	2.46	3	2.28	3	0.24	8	0.09	4	10.63	9	24.96	10	12.80	11	-9.54	10	11.01	4	89.64	7	18.65	5
CI	1.55	7	1.11	8	0.56	3	0.07	6	35.76	2	117.82	1	76.23	1	7.36	2	9.14	7	28.72	2	10.50	7
DIL	1.64	6	1.48	5	0.30	6	0.07	5	15.26	6	22.36	11	14.51	10	4.58	5	13.72	3	103.50	10	9.61	8
EOL	0.96	11	0.58	11	0.17	10	0.04	9	17.67	5	38.15	7	40.16	3	3.26	7	9.53	6	87.89	6	21.12	4
GPP	1.54	8	1.06	9	0.17	9	0.01	10	9.18	10	76.16	3	51.82	2	6.00	3	5.46	9	102.89	9	16.46	6
HOEC	1.35	9	1.17	7	0.45	4	0.05	8	29.08	3	25.74	9	19.60	8	-11.75	11	3.47	11	57.20	4	4.01	10
JDIL	2.30	4	2.22	4	0.07	11	0.11	2	3.53	11	57.42	5	28.32	5	5.29	4	69.18	1	91.01	8	1497.95	1
RIL	1.33	10	0.87	10	0.32	5	0.10	3	22.55	4	30.89	8	23.11	7	26.49	1	8.73	8	15.51	1	21.43	3
SETL	2.92	2	2.82	2	1.34	1	0.17	1	48.14	1	70.19	4	25.90	6	1.91	8	22.17	2	83.41	5	1.21	11
SVOGL	3.78	1	3.53	1	1.12	2	-0.01	11	14.09	7	42.16	6	16.15	9	1.18	9	9.73	5	366.11	11	9.54	9
TWOCL	2.25	5	1.28	6	0.27	7	0.07	7	11.58	8	81.23	2	36.70	4	3.84	6	5.00	10	41.38	3	23.41	2

n = Number of Selected Petroleum Companies (11); m= number of Liquidity ratios calculated (11);
ui = the number of petroleum company which have calculated ith ratio (11);
vj = the number of Liquidity ratios in which jth company (11)

$$Wj = \sum \frac{1}{nm} \times \frac{uivj}{rij}$$

Table 9 Showing Various Liquidity Ratios Rank of All Selected Private sector Petroleum Companies of India

Company Name	CR	QR	ALR	CDCR	C TO CAR	CA TO TAR	CL TO TLR	WCTR	ITR	DTR	CTR	WELLING INDEX	RANK
	Wj	Wj	Wj	Wj	Wj	Wj	Wj	Wj	Wj	Wj	Wj	∑ Wj	
SETL	0.500	0.500	1.000	1.000	1.000	0.250	0.167	0.125	0.500	0.200	0.091	5.333	1
CI	0.143	0.125	0.333	0.167	0.500	1.000	1.000	0.500	0.143	0.500	0.143	4.554	2
JDIL	0.250	0.250	0.091	0.500	0.091	0.200	0.200	0.250	1.000	0.125	1.000	3.957	3
RIL	0.100	0.100	0.200	0.333	0.250	0.125	0.143	1.000	0.125	1.000	0.333	3.710	4
SVOGL	1.000	1.000	0.500	0.091	0.143	0.167	0.111	0.111	0.200	0.091	0.111	3.525	5
TWOCL	0.200	0.167	0.143	0.143	0.125	0.500	0.250	0.167	0.100	0.333	0.500	2.627	6
GPP	0.125	0.111	0.111	0.100	0.100	0.333	0.500	0.333	0.111	0.111	0.167	2.103	7
AOL	0.333	0.333	0.125	0.250	0.111	0.100	0.091	0.100	0.250	0.143	0.200	2.037	8
DIL	0.167	0.200	0.167	0.200	0.167	0.091	0.100	0.200	0.333	0.100	0.125	1.849	9
EOL	0.091	0.091	0.100	0.111	0.200	0.143	0.333	0.143	0.167	0.167	0.250	1.795	10
HOEC	0.111	0.143	0.250	0.125	0.333	0.111	0.125	0.091	0.091	0.250	0.100	1.730	11