International Journal of Trade and Commerce-IIARTC
July-December 2021, Volume 10, No. 2 pp. 295-301
ISSN-2277-5811 (Print), 2278-9065 (Online)

COSMOS (Germany) JIF: 5.135; ISRA JIF: 7.249; ISI JIF: 3.721

An Empirical Study of Profitability & Liquidity Behaviour in Bharat Petroleum Corpon Ltd. & Hindustan Petroleum Corporation Ltd.

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Abstract
An endeavor to measure the overall operating efficiency through Profitability and Liquidity taking BPCL & HPCL has been made in this paper for ten years from 2011-12 to 2020-21to establish an empirical relationship amongst Variables based on statistical techniques. Empirical workings have been done with the help of Multiple R, R^2, Multiple Regression, T Test, and F Ratio.
Key Words: *BPCL, HPCL, Petroleum products, Operating efficiency, Return on capital employed.*

PAPER/ARTICLE INFO
RECEIVED ON: 02/08/2021
ACCEPTED ON: 05/09/2021

Reference to this paper should be made as follows:

Kumar, Akshya & Varshney, Monika (2021), "An Empirical Study of Profitability & Liquidity Behaviour in Bharat Petroleum Corpon Ltd. & Hindustan Petroleum Corporation Ltd.", *Int. J. of Trade and Commerce-IIARTC*, Vol. 10, No. 2, pp: 295-301

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DOI: 10.46333/ijtc/10/2/7

1. Introduction

Profits are considered essential for survival, expansion, and diversification. Liquidity indicates that the company pays its Short-term debts obligations when it becomes due. Overall control of overall Profitability and Liquidity ensures a smooth running of its business wheel. Therefore, a proper balance between these two variables should be maintained for efficient functioning. Without Profit, a company may be considered sick, but one with no Liquidity may soon meet its downfall and ultimately come to an end.

2. Profile of BPCL & HPCL

BPCL being an integrated oil company in the downstream sector engaged in refining crude oil and marketing petroleum products[1] achieved the status of "Maharatna" on 12th September 2017. BPCL has two refineries; one in Mumbai with 12.00million metric Ton per annum and the other in Kochi with 15.50 million metric Ton per annum. As regards HPCL being a government of India[2] enterprise with a "Maharatna" status on 24th October 2019 and the second-largest integrated oil company in India has two refineries, one in Mumbai with the capacity of 7.50 million metric Ton per annum and the other in Visakhapatnam with the capacity of 8.30[3]million metric Ton per annum.

3. Return on Capital Employed

Measuring overall operating efficiency is Sine-qua-non because of the owner's interest; It can be better served with the help of Return on Capital Employed, which helps measure overall operational efficiency in using funds entrusted to management. Indeed, it is the product of two ratios: (i) Investment Turnover, i.e., Ratio of Sales to Capital Employed, and (ii) Profit Margin on Sales, i.e., Percentage Profit on Sales. The Ratio is computed as follows:

$$\text{Return on Capital Employed}d^4 = \frac{\text{Sales}}{\text{Capital Employed}} \times \frac{\text{Profit (Before Tax)}}{\text{Sales}} \times 100$$

Alternatively,

$$\frac{\text{Profit (Before Tax)}}{\text{Capital Employed}} \times 100$$

Where, Profits stands for Net Profit before Tax whereas,

Capital Employed consists of Equity Share Capital + All Reserve & Surpluses – Fictitious Assets.

Table 1shows the Return on Capital Employed of BPCL & HPCL, respectively.

Cause and Effect analysis has been made with the help of Multiple R, R^2, Multiple Regression, and 't-tests taking Y as dependent variable and X_1 and X_2 as independent variables.

Table 1: Net Profit (Before Tax) (X_1), Capital Employed (X_2) and Return on Capital Employed (Y) of BPCL & HPCL

Year	BPCL			HPCL		
	Net Profit (Before Tax) (Rs. in Cr.) X_1	**Capital Employed** (Rs. in Cr)	**Return on Capital Employed** (In Percent) Y	**Net Profit (Before Tax)** (Rs. in Cr.) X_1	**Capital Employed** (Rs. in Cr) X_2	**Return on Capital Employed** (In Percent) Y
2011-12	1884.17	14913.9	12.63	1219.24	13122.5	9.29
2012-13	4035.69	16634	24.26	1474.56	13726.4	10.74
2013-14	5948.98	19458.8	30.57	2615.51	15012.2	17.42
2014-15	7415.51	22467.5	33.01	4154.12	16022.1	25.93
2015-16	10651.2	27158.7	39.22	5738.07	18356.1	31.26
2016-17	11042.8	29668.4	37.22	9020.84	20347.4	44.33
2017-18	11198	34152	32.79	9201.93	23948.2	38.42
2018-19	10439.6	36737.7	28.42	9338.66	28174.8	33.15
2019-20	2671.04	33214.4	8.04	1572.59	28962.4	5.43
2020-21	22617.6	54544.6	41.47	14246.8	36186.1	39.37

BPCL Results						
Multi. R	0.9377	R^2	0.8792			
ANOVA	*Degree of freedom*	*Sum of Squares*	*Mean Square*	*(F) Ratio*	*Level of Significance F*	
Reg.	2	958.351939	479.175969	25.485049	0.000612	
Residual	7	131.615671	18.802239			
Total	9	1089.96761				
	Coefficients	*S.E.*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	28.824099	4.186653	6.884759	.000235	18.924238	38.723961
X_1	.002942	.000459	6.414326	.000362	.001858	.004027
X_2	-.000897	.000235	-3.823418	.006513	-.001452	-.000342
HPCL Results						
Multi. R	0.9569	R^2	0.9156			
ANOVA	*Degree of freedom*	*Sum of Squares*	*Mean Square*	*(F) Ratio*	*Level of Significance F*	
Reg.	2	1606.431404	803.215702	37.982942	0.000174	

Residual	7	148.027236	21.146748			
Total	9	1754.458640				
	Coefficients	*S.E.*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	21.670753	4.742512	4.569467	.002576	10.456494	32.885011
X_1	.003960	.000503	7.875384	.000101	.002771	.005149
X_2	-.000904	.000288	-3.135167	.016490	-.001586	-.000222

(Source: Calculated with the help of statistics published by BPCL & HPCL in Annual Reports; Various Issues)

Table 1 reveals that the mean of y in the case of BPCL is 28.76, whereas it is of HPCL25.53, which indicates that BPCL operates better than HPCL.
Multiple R indicates a high degree of positive coefficient of correlation among the variables for BPCL & HPCL. The regression coefficient for independent variable 'X_1' reflects a positive relationship with its dependent variable 'Y.' It indicates an increase of ₹ 0.002942 in the Rate of Return of BPCL keeping constant 'X_2', whereas a rise in ₹ 0.00396 addition of the Rate of Return. R^2 indicates 88% change in 'Y' of BPCL occurs due to 'X_1', whereas it appears to be 91.60% in the case of HPCL.
The computed 'T' value is greater than that of tabulated values, reflecting a linear relationship in both companies. The 'F' ratio is more significant at a given significance level, indicating that the Null Hypothesis of Regression is insignificant, so it cannot be accepted.

Quick Ratio
It measures a relationship between Quick Assets & Current Liabilities. Quick Assets represent cash or cash equivalents convertible into cash within a brief period. Alternatively, total current assets minus stock and prepaid expenses make Quick Assets. The standard Ratio is 1:1. The Ratio is computed as follows:

$$\text{Quick Ratio}^5 = \frac{\text{Quick Assets}}{\text{Current Liabilities}}$$

Table 2 shows the Quick Ratio of BPCL & HPCL, respectively.

Cause & Effect analysis has been made with the help of Multiple R, R^2, Multiple Regression, and 't' test-taking Y as the dependent variable and X_1 and X_2 as independent variables.

Table 2: Showing Quick Assets (X_1), Current Liabilities (X_2) and Quick Ratio (Y) of BPCL & HPCL

Year	BPCL			HPCL		
	Quick Assets (Rs. in Cr.) X_1	**Current Liabilities** (Rs. in Cr.) X_2	**Quick Ratio** (In times) Y	**Quick Assets** (Rs. in Cr.) X_1	**Current Liabilities** (Rs. in Cr.) X_2	**Quick Ratio** (In times) Y
2011-12	23497.3	46667.6	0.5	17196.7	42700.4	0.4

2012-13	21689.2	42020.6	0.52	21765.7	43262.7	0.5
2013-14	20580.8	38581.3	0.53	20935.5	35307.3	0.59
2014-15	15843.2	32653.1	0.49	14598.7	23701	0.62
2015-16	14379.3	31698.6	0.45	14715.6	26789	0.55
2016-17	14170.1	43489.3	0.33	14212	45758.3	0.31
2017-18	15712.7	44792.1	0.35	18292.9	47377.4	0.39
2018-19	24863.2	47241.7	0.53	22634.1	56914.6	0.4
2019-20	20157.2	59004.8	0.34	17831.9	57007.4	0.31
2020-21	24184.1	54745.1	0.44	14727.4	62049.7	0.24

BPCL Results						
Multi. R	0.9918	R^2	0.9836			
ANOVA	*Degree of freedom*	*Sum of Squares*	*Mean Square*	*(F) Ratio*	*Significance F*	
Regression	2	.057402	.028701	209.654014	.000001	
Residual	7	.000958	.000137			
Total	9	.058360				
	Coefficient	*S.E.*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	.443743	.021982	20.186788	.000000	.391764	.495722
X_1	.000021	.000001	18.877213	.000000	.000019	.000024
X_2	-.000009	.000001	17.196008	.000001	-.000011	-.000008
HPCL Results						
Multi. R	0.9756	R^2	0.9518			
ANOVA	*Degree of freedom*	*Sum of Squares*	*Mean Square*	*(F) Ratio*	*Significance F*	
Regression	2	.142100	.071050	69.167793	.000025	
Residual	7	.007190	.001027			
Total	9	.149290				
	Coefficient	*S.E.*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	.566343	.064332	8.803484	.000049	.414223	.718463
X_1	.000017	.000003	4.994955	.001574	.000009	.000025
X_2	-.000010	.000001	-11.559312	.000008	-.000012	-.000008

(Source: Calculated with the help of statistics published by BPCL & HPCL in Annual Reports; Various Issues)

Table 2 reveals that the mean of y in the case of BPCL is 0.45, whereas it is of HPCL 0.43, which indicates that BPCL operates better than HPCL.

Multiple R indicates a very high degree of positive coefficient of correlation among the variables for BPCL & HPCL. The regression coefficient for independent variable 'X_1' reflects a positive relationship with its dependent variable 'Y..' It indicates an increase of ₹ 0.000021 in the Rate of Return of BPCL keeping constant 'X_2', whereas a rise in ₹ 0.000017 addition of the Rate of Return. R^2 indicates 98.36% change in 'Y' of BPCL occurs due to 'X_1', whereas it happens to be 95.18% in the case of HPCL.

Computed 'T' value being more significant than tabulated values reflects a linear relationship in both companies. THE 'F' ratio is more significant at a given level of significance indicates that the Null Hypothesis of Regression is not substantial, so it cannot be accepted.

4. Conclusion

Multiple R indicates a high degree of positive coefficient of correlation among the variables for BPCL & HPCL. The regression coefficient for independent variable 'X_1' reflects a positive relationship with its dependent variable 'Y.' It indicates an increase of ₹ 0.002942 in the Rate of Return of BPCL keeping constant 'X_2', whereas a rise in ₹ 0.00396 addition of the Rate of Return. R^2 indicates 88% change in 'Y' of BPCL occurs due to 'X_1', whereas it appears to be 91.60% in the case of HPCL.

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On the whole, it can be very safely concluded that BPCL is better than HPCL because of Profitability and Liquidity. Efforts should be made to reduce the cost of production through capacity expansion to enhance Profitability. Management of Liquid Assets should also be resorted further to improve liquidity, especially in the case of HPCL. Because of confidence intervals that indicate taking preventive measures that will accelerate the pace of Profitability and smoothen the liquidity, steps should also be taken.

Based on statistics inferences, main conclusions emerge as follows:

Rate of Return:

Predictor (BPCL) $Y = 28.824099 + 0.002942\ X_1 - 0.000897X_2$

Predictor (HPCL) $Y = 21.670753 + 0.003960\ X_1 - 0.000904\ X_2$

Liquidity Ratio:

Predictor BPCL Y = 0.443743+ 0.000021X_1 - 0.000009 X_2

Predictor HPCL Y = 0.566343+ 0.000017 X_1 - 0.000010 X_2

These predictors signify that timely action can undoubtedly bring about enhanced Profitability and better Liquidity. Efforts should be made because confidence intervals indicate taking preventive measures that will accelerate the pace of Profitability and smoothen the liquidity.

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