OPERATIONAL EFFICIENCY ANALYSIS OF SELECTED MANUFACTURING FIRMS IN INDIA

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ABSTRACT

Turnover ratio is also called performance ratio. Activity ratios highlight the operational efficiency of the business concern. The term operational efficiency refers to effective, profitable and rational use of resources available to the concern. In order to examine the judicious utilization of resources as well as the wisdom and farsightedness in observing the financial policies laid down in this regard, certain ratios are computed and they are collectively called turnover or activity or performance ratios. This paper determines the performance analysis of 32 selected manufacturing firms in India over the period of 2007 - 2008 to 2016 – 2017.The results revealed that the performance of manufacturing companies is satisfactory.

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***Keywords:** Performance, Activity, Turnover, Manufacturing, Firms, India.*

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Introduction

The manufacturing industry is important for the nation's growth, which is the symbol to measure a country's comprehensive strength and the degree of adoption modernization. Although the world is entering the information age, during the contemporary period most economically developed countries are still the most developed countries in the manufacturing industry. Since the reform and opening up, our booming manufacturing industry has become a major force that drives the economic development of the whole nation. In addition, global trade has become more and more common, as the share of exports accounted for a large proportion of the whole international trade. The Gross Domestic Product (GDP) contribution of the manufacturing firms in India gained after independence was not substantial. During 1950-51, the manufacturing sector in India contributed only 8.98% to the GDP. However, it had increased to 14.23%, during 1965-66, further during the year1980s, this figure further increased to 16.18% but it remained constant in that decade until 1990-91. This slight dip stems from the growth of the service sector and its increased contribution to the GDP of the country. During the fiscal year, 2018 - 19 the manufacturing sector contributed about 16% to the GDP.

Statement of the Problem

The present study is one of the few studies that explicitly evaluate the relationship between OE of the firm and future firm performance for emerging market firms. The importance of this study also lies in the use of financial ratios, a method which can be useful for financial analysis. The ratios used in this study can be applied in future research on performance measurement systems and the results can be used for teaching financial ratios and financial analysis. The paper provides insight for policy-makers as to the importance of OE in influencing shareholder wealth maximization in Indian Top 500 Firms. The findings reported in this study indicate the importance of OE in improving future firm performance. Thus, this study adds empirical substance to existing theory.

Review of Literature

Gangadhara M (2018) this paper focused on the profitability performance with special reference to profitability ratios of select automobile units in India. For the purpose of the study, the researcher has conveniently selected the top six companies having the highest sales and production in

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140

2018. Profitability is the ability to earn profit from all the activities of an enterprise. It indicates how well the management of an enterprise generates earnings by using the resources at its disposal. A business needs profits not only for its existence but also for expansion and diversification. Vertical integration, leverage, liquidity, inventory turnover and operating expenses to sales ratio are also the strongest determinants of the profitability of an enterprise. The automobile industry of India is one of the largest industries when compared to the world market. Every household now has a vehicle and India is to 40 million passenger vehicles are in existence proving that the automobile industry has been able to provide various preferences for the vehicle to suit this large population of India.

Dr. Ashvin R (2017) investigates the relationship between financial management and profitability of the domestically listed large petrochemical companies. The variables considered are Long Term Debt to Equity Ratio, Current Ratio, Inventory Ratio, Debtors Ratio and Profit after Tax to Sales Ratio. The data were analyzed using multiple regression techniques. The results obtained suggest that Long Term Debt to Equity Ratio appears to have a significant but negative relationship with profitability. This leads us to believe that enterprises having lower debt components tend to be more profitable. It further points out that Inventory and Debtors do not have a significant influence on profitability. This research may help the corporate managers and academicians to develop better insight for financial management in their attempt to optimize profitability.

NavleenKaur, Jasmindeep Kaur (2016) This study ascertains the determinants of profitability of automobile industry in India by taking Return on Assets ratio (ROA) as dependent variable to determine the nature and extent of relationship (if any) between profitability of automobile industry in India with other selected independent variables In order to study the determinants of profitability of Automobile Industry in India, data have been collected from CMIE PROWESS database. The study covers a period of eleven financial years from 2003-04 to 2013-14. In order to achieve the objectives of the study, firm-specific factors viz. financial leverage, size of firm, tangibility of assets, growth of firm, liquidity, inventory turnover ratio, debt-equity ratio, debtor's turnover ratio, total assets turnover ratio, average payment period, and cash liquidity of firm are regressed against return on assets ratio. Firstly, correlation analysis and multiple regression analysis are applied to identify the factors affecting the profitability of sample firms. Further, to find out the prominent factors that account for the variation in the profitability of sample firms, stepwise regression analysis has been carried out. It was found that the profitability of the automobile industry in India is significantly influenced by the liquidity position of the firm, growth of the firm, inventory turnover ratio, debt-equity ratio, and average payment period.

Selim Reza (2016) explored the profitability and productivity of sugarcane producers, profit function and linear regression analysis are used. The result has shown that farmers gain profit from sugarcane production and the profit margin increases if the farmers grow inter-crop with sugarcane. Fertilizer, seed, and pesticides significantly affect the sugarcane production where the use of fertilizer and pesticides are positively and seed is negatively related to sugarcane production. In the case of sugarcane production with inter-crop, tilling and pesticides are positively and significantly and human labor is significantly but negatively related to sugarcane production. As it is shown from the study, to increase production and profit levels of sugarcane, the government, as well as agricultural organizations, should encourage farmers for inter-cropping.

Methodology

The universe of the study is considered for companies listed in the Bombay Stock Exchange (BSE), which is the largest stock exchange in India. All the listed company's mandatory requirements and follow the norms set by the Securities Exchange Board of India (SEBI) for disclosing the financial reports.

Sampling Frame

The sampling frame is considered for the study, companies belong to the category of manufacturing firms. The companies are included the broad categories of companies belongs to automobiles, Cement, Infrastructure and Paints, Coal, Oil, Petroleum and Gas, Energy and Power, Personal Products, Pharmaceutical, Steel and Aluminium.

Sampling Methods

The sample companies are selected by using a stratified sampling technique.

Period of the Study

The study confined the period of 10 years from 2007-2008 to 2016-2017

Tools Used

Ratio analysis, Descriptive statistics, Skewness, Kurtosis, Annual Growth Rate, Compound Annual Growth Rate, and ANOVA.

Data Analysis and Interpretations

- **Debtors Turnover Ratio**

This ratio exhibits the speed of the collection process of the firm in collecting the over dues amount from the debtors and against bills receivables. The speediness is being computed through the debtor's velocity from the ratio of Debtors Turnover Ratio. Debtor's Velocity indicates the number of times the receivables are turned over in business during a particular period. In other words, it represents how quickly the debtors are converted into cash. It is used to measure the liquidity position of a concern. This ratio establishes the relationship between receivables and sales. It is to be noted that opening and closing receivable and credit sales are not available, the ratio may be computed as:

$$Debtor'sTurnoverRatio = \frac{TotalSales}{AvergaeReceivables}$$

This ratio indicates the efficiency of a firm's credit collection and efficiency of credit policy. Higher the ratio is better the position of the firm in collecting the overdue means the effectiveness of the collection department and vice versa. It points out the liquidity of trade debtors, i.e., higher turnover ratio and shorter debt collection period indicate prompt payment by debtors. Similarly, a low turnover ratio and higher collection period imply that payment by trade debtors is delayed.

Table 1: Debtors Turnover Ratio

Year	Automobiles	Cement, Infrastructure, and Paint	Coal, Oil, Petroleum, and Gas	Energy and Power	Personal Products	Pharmaceutical	Steel and Aluminium	Average
2007-08	48.73	6.99	17.07	7.95	13.95	2.85	17.16	18.32
2008-09	31.36	8.17	19.74	8.99	19.53	3.24	21.65	17.13
2009-10	37.89	7.75	18.14	11.82	21.54	3.08	27.23	18.84
2010-11	54.77	12.04	25.48	15.05	32.28	3.58	42.44	27.28
2011-12	46.57	12.42	24.41	9.37	40.12	3.63	27.35	25.32
2012-13	46.46	10.21	28.09	11.56	46.41	3.60	31.40	27.20
2013-14	41.44	9.54	29.48	13.69	49.64	3.33	36.69	27.46
2014-15	67.34	10.46	42.54	12.09	48.39	3.75	49.37	35.82
2015-16	43.50	9.73	37.51	9.98	48.98	3.64	24.72	28.47
2016-17	45.13	9.31	28.18	11.75	53.52	3.31	21.21	27.28
Average	**46.32**	**9.66**	**27.06**	**11.22**	**37.44**	**3.40**	**29.92**	**25.31**
SD	9.70	1.74	8.16	2.18	14.53	0.29	10.17	5.72
CV	20.95	18.05	30.16	19.45	38.81	8.48	33.99	22.58
Max	67.34	12.42	42.54	15.05	53.52	3.75	49.37	35.82
Min	31.36	6.99	17.07	7.95	13.95	2.85	17.16	17.13
Skew.	0.89	0.15	0.70	0.23	-0.60	-0.70	0.81	0.05
Kurt.	1.97	-0.57	0.02	-0.45	-1.40	-0.38	-0.11	-0.05
AGR (%)	-7.39	33.32	65.03	47.71	283.54	15.99	23.65	48.95
CGR (%)	-0.76	2.92	5.14	3.98	14.39	1.49	2.15	4.06

Source: Compiled from the annual report of the respective companies

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Years	1800.09	9.00	200.01	4.24	0.001	2.06
Between Sectors	15149.65	6.00	2524.94	53.49	0.001	2.27
Residual	2549.03	54.00	47.20			
Total	19498.77	69.00				

The Debtors Turnover Ratio of selected manufacturing industries over the period of ten years from 2007-08 to 2016-17 is represented in Table 4.14. It indicates that the industry average of the Debtors Turnover Ratio is 25.31 percent, which is, fluctuated between the maximum of 46.32 percent in Automobiles and a minimum of 3.40 percent in Pharmaceutical. The average Debtors Turnover Ratio was estimated above the industry average in the case of Automobiles 46.31 followed by Personal Products 37.44, Steel and Aluminium 29.92, Coal, oil, Petroleum Gas 27.06 and the remaining sectors were found that below the industry average.

It is also inferred that the standard deviation of manufacturing industries in India was 5.72 percent, which is evident that low fluctuation during the study period. The standard deviation of the Debtors Turnover Ratio was registered above the industry average in the case of Personal Products 14.53, followed by steel and aluminum 10.17, Automobiles 9.70, Coal, oil, Petroleum and Gas 8.16, Energy and power 2.18 Cement, Infrastructure and paint 1.74, and Pharmaceutical 0.29 which implies that these companies have been considered a significant variation in the Current Asset to Fixed Asset Ratio. The coefficient of variation of Debtors Turnover Ratio is 38.81 percent that is found a high fluctuation during the study period.

The computation of skewness of Debtors Turnover Ratio was 0.05 percent and it was recorded a maximum of 0.89 percent obtained by Automobiles and a minimum of -0.70 percent disclosed by Personal products. The Debtors Turnover Ratio is skewed to left as skewness values are negative value, hence meaning that most of the companies in the sample nearest to the average value. The kurtosis of this ratio was showed -0.05 percent and it was a maximum of 1.97percent obtained by Automobiles and a minimum of -1.40 percent revealed by the Personal Products. The kurtosis values of manufacturing industries are indicated and relatively higher as compared to the industry average, which explains that the distribution is more peaked (less dispersed).

The industry average of AGR was 48.95 percent during the period of the study and among the selected companies it was a maximum of 283.54 percent gained by Personal products and its minimum of -7.39 percent obtained by Automobiles. The mean value of the CGR of Debtors Turnover Ratio was 4.06 percent during the period of the study and among the selected companies it was a maximum of 14.39 percent gained by Personal Products and its minimum of –0.76 percent obtained by Automobiles. The growth rate of Debtors Turnover Ratio has been registered a negative growth of the selected manufacturing industries in India.

In order to test the hypothesis, stated that "There is no significant difference in debtor's turnover ratio between sectors and between years". For this purpose, two-way ANOVA has been applied and shown Since the calculated value of 'F' between years (4.24) is more than the table of 'F' (2.06) at a 5 percent level of significance. It is concluded that there is a significant difference in the debtor's turnover ratio between years. However, there is a significant difference in this ratio between selected sectors, since, calculated value 'F' (53.49) is more than the table value of 'F' (2.27) at a 5 percent level of significance.

Working Capital Turnover Ratio

This ratio highlights the effective utilization of working capital with regard to sales. These ratios also represent the firm's liquidity position. It establishes the relationship between the cost of sales and networking capital. This ratio is calculated as follows:

$$Working Capital Turnover Ratio = \frac{Net Sales}{Working Capital}$$

It is an index to know whether the working capital has been effectively utilized or not in making sales. A higher working capital turnover ratio indicates efficient utilization of working capital, i.e., a firm can repay its fixed liabilities out of its working capital. Also, a lower working capital turnover ratio shows that the firm has to face the shortage of working capital to meet its day-to-day business activities unsatisfactorily. This may also imply overtrading, as there may be the inadequacy of working capital to support the increasing volume of sales. This may be a risky proposition to the firm. The ratio is to be compared with the trend of the other firms in the industry for different periods to understand the right working capital ratio, without resulting overtrading.

Table 2: Working Capital Turnover Ratio

Year	Automobiles	Cement, Infrastructure, and Paint	Coal, Oil, Petroleum, and Gas	Energy and Power	Personal Products	Pharmaceutical	Steel and Aluminium	Average
2007-08	0.35	0.26	24.62	0.50	0.18	0.07	0.51	5.61
2008-09	0.44	0.47	2.35	0.71	0.27	0.11	0.69	0.83
2009-10	0.66	0.57	-20.69	0.96	0.29	0.11	0.72	-4.12
2010-11	-24.23	4.05	38.58	-2.09	8.69	3.36	4.85	6.41
2011-12	23.68	5.50	36.93	-0.66	1.36	2.92	-2.08	13.76
2012-13	15.99	6.87	87.58	0.42	-48.04	2.42	-2.48	15.91
2013-14	11.57	5.11	-40.76	0.57	18.54	2.49	-1.29	-2.77
2014-15	-2.34	-1.14	-19.93	2.27	12.59	1.42	-2.52	-2.78
2015-16	-3.34	-1.57	43.72	-7.37	16.01	1.24	-1.82	10.54
2016-17	-11.44	3.85	-11.25	-4.26	24.54	1.33	-6.24	-0.79
Average	1.13	2.40	14.12	-0.90	3.44	1.55	-0.97	4.26
SD	13.63	3.01	38.97	2.92	20.08	1.21	2.91	7.29
CV	1203.05	125.70	276.05	-325.63	583.25	78.64	-301.36	171.07
Max	23.68	6.87	87.58	2.27	24.54	3.36	4.85	15.91
Min	-24.23	-1.57	-40.76	-7.37	-48.04	0.07	-6.24	-4.12
Skew.	-0.14	0.09	0.44	-1.46	-2.07	0.07	0.30	0.45
Kurt.	0.45	-1.67	-0.28	1.75	5.48	-1.44	1.60	-1.34
AGR (%)	-3354.35	1379.22	-145.68	-958.77	13874.55	1711.03	-1328.01	-114.15
CGR (%)	0.42	30.92	-0.08	0.24	63.88	33.60	0.28	-0.18
Source: Compiled from the annual report of the respective companies								

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Years	1235.21	9.00	137.25	0.41	0.92	2.06
Between Sectors	1606.22	6.00	267.70	0.80	0.57	2.27
Residual	17979.26	54.00	332.95			
Total	20820.69	69.00				

The Working Capital Turnover Ratio of selected manufacturing industries over the period of ten years from 2007-08 to 2016-17 is represented in Table 4.15 It indicates that the industry average of the Working Turnover Ratio is 4.26 percent, which is, fluctuated between the maximum of 14.12 percent in Coal, Oil, Petroleum and the minimum of -0.97 percent in Steel and Aluminium. The average Working Capital Turnover Ratio was estimated above the industry average in the case of Coal, Oil, Petroleum 14.12 followed by Personal Products 3.44, Cement, Infrastructure 2.40, Coal, oil, Pharmaceutical 1.55 and the remaining sectors were found that below the industry average.

It is also inferred that the standard deviation of manufacturing industries in India was 7.29 percent, which is evident that low fluctuation during the study period. The standard deviation of the Working capital Turnover Ratio was registered above the industry average in the case of Coal, oil, Petroleum and Gas 38.97, followed by Personal Products 20.08, Automobiles 13.63, which implies that these companies have been considered a significant variation in the Working Capital Turnover Ratio. The coefficient of variation of Working Capital Turnover Ratio is 171.07 percent that is found a high fluctuation during the study period.

The computation of skewness of Working Capital Turnover Ratio was 0.446 percent and it was recorded a maximum of 0.30 percent obtained by Steel and Aliminium and a minimum of -2.07 percent disclosed by Personal products. The Working Capital Turnover Ratio is skewed to left as skewness values are negative value, hence meaning that most of the companies in the sample nearest to the average value. The kurtosis of this ratio was showed -1.34 percent and it was a maximum of 5.48 percent obtained by Personal Products and a minimum of -1.67 percent revealed by the Cement Infrastructure. The kurtosis values of manufacturing industries are indicated and relatively higher as compared to the industry average, which explains that the distribution is more peaked (less dispersed).

The industry average of AGR was -114.15 percent during the period of the study and among the selected companies it was a maximum of 1711.03 percent gained by Pharmaceutical and its minimum of -3354.34 percent obtained by Automobiles. The mean value of CGR of Working Capital Turnover Ratio was -0.18 percent during the period of the study and among the selected companies it was a maximum of 63.88 percent gained by Personal Products and its minimum of –0.07 percent obtained by Coal, Oil, Petroleum. The growth rate of Working Capital Turnover Ratio has been registered a negative growth of the selected manufacturing industries in India. In order to test the hypothesis, it stated that "There is no significant difference in working capital turnover ratio between sectors and between years". For this purpose, two-way ANOVA has been applied and shown Since the calculated value of 'F' between years (0.41) is less than the table of 'F' (2.06) at a 5 percent level of significance. It is concluded that there is no significant difference in the working capital turnover ratio between years. However, there is no significant difference in this ratio between selected sectors, since, calculated value 'F' (0.80) is less than the table value of 'F' (2.27) at a 5 percent level of significance.

Inventory Turnover Ratio

This ratio is used to measure whether the investment in stock in trade is effectively utilized or not. It reveals the relationship between sales and cost of goods sold or average inventory at cost price or average inventory at selling price. The ratio expresses the speed of converting the stock into sales. In other words, how fast the stock is being converted into sales in a year. The greater the ratio of conversion leads to lesser the number of days/weeks/months required to convert the stock into sales. While using this ratio, care must be taken regarding season and condition, price trend, supply condition, etc. In order to compute this ratio, the following formulae are used:

$$InventoryTurnoverRatio = \frac{CostofGoodsSold}{AverageInventoryatCost}$$

This ratio indicates whether an investment in stock in trade is efficiently used or not. Higher the ratio is better the firm in converting the stock into sales and vice versa. This ratio is widely used as a measure of investment in stock is within the proper limits or not. This ratio highlights the operational efficiency of the business concern. This ratio is helpful in evaluating stock utilization. It measures the relationship between the sales and the stock in trade. This ratio indicates the number of times the inventories have been turned over in business during a particular period.

Table 3 : Inventory Turnover Ratio

Year	Automobiles	Cement, Infrastructure, and Paint	Coal, Oil, Petroleum, and Gas	Energy and Power	Personal Products	Pharmaceutical	Steel and Aluminium	Average
2007-08	3.72	2.09	25.25	2.79	1.94	0.73	4.35	7.48
2008-09	3.86	2.73	30.37	3.52	2.48	0.89	4.84	8.92
2009-10	4.82	2.70	29.63	3.89	2.49	0.87	5.01	8.98
2010-11	19.41	12.78	11.93	9.29	5.54	3.82	4.28	10.73
2011-12	20.33	12.82	10.93	9.77	6.02	3.78	4.41	10.81
2012-13	22.16	11.45	12.07	8.42	6.41	3.52	4.85	11.12
2013-14	21.35	11.83	11.50	8.27	6.87	4.01	4.63	11.01
2014-15	18.73	10.34	13.20	8.17	7.22	4.06	4.32	10.69
2015-16	21.43	13.53	12.97	9.18	6.76	4.38	4.80	11.73
2016-17	22.15	12.04	10.64	9.47	7.12	4.34	4.16	11.16
Average	15.79	9.23	16.85	7.28	5.28	3.04	4.56	10.26
SD	8.13	4.72	8.13	2.74	2.12	1.55	0.30	1.34
CV	51.45	51.16	48.23	37.66	40.16	50.83	6.50	13.06
Max	22.16	13.53	30.37	9.77	7.22	4.38	5.01	11.73
Min	3.72	2.09	10.64	2.79	1.94	0.73	4.16	7.48
Skew.	-0.97	-0.92	1.09	-0.93	-0.86	-0.94	0.15	-1.20
Kurt.	-1.24	-1.26	-0.83	-1.11	-1.26	-1.26	-1.64	0.58
AGR (%)	495.25	475.97	-57.85	240.07	266.87	491.68	-4.42	49.36
CGR (%)	19.53	19.14	-8.28	13.02	13.88	19.46	-0.45	4.09
Source: Compiled from the annual report of the respective companies								

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Years	162.11	9.00	18.01	0.72	0.69	2.06
Between Sectors	1796.30	6.00	299.38	11.91	0.001	2.27
Residual	1357.65	54.00	25.14			
Total	3316.06	69.00				

The Inventory Turnover Ratio of selected manufacturing industries over the period of ten years from 2007-08 to 2016-17 is represented in Table 4.16. It indicates that the industry average of the Inventory Turnover Ratio is 10.26 percent, which is, fluctuated between the maximum of 16.85 percent in Coal, oil, Petroleum Gas and a minimum of 3.04 percent in Pharmaceutical. The average Inventory Turnover Ratio was estimated above the industry average in the case of Coal, oil, Petroleum and Gas 16.85 followed by Automobiles 15.79 and the remaining sectors were found that below the industry average.

It is also inferred that the standard deviation of manufacturing industries in India was 1.34 percent, which is evident that low fluctuation during the study period. The standard deviation of the Inventory Turnover Ratio was registered above the industry average in the case of Automobiles and Coal, oil, Petroleum Gas 8.13, followed by Cement, Infrastructure and Paint 4.72, steel and aluminum 2.79, Energy and power 2.74, and Personal Products 2.12 which implies that these companies have been considered a significant variation in the Current Asset to Fixed Asset Ratio. The coefficient of variation of Inventory Turnover Ratio is 51.45 percent that is found a high fluctuation during the study period.

The computation of skewness of the Inventory Turnover Ratio was -1.20 percent and it was recorded a maximum of 1.09 percent obtained by Coal, oil, Petroleum Gas and a minimum of -0.97 percent disclosed by Automobiles. The Inventory Turnover Ratio is skewed to left as skewness values are negative value, hence meaning that most of the companies in the sample nearest to the average value. The kurtosis of this ratio was showed 0.58 percent and it was a maximum of -0.83 percent obtained by Coal, oil, Petroleum Gas and minimum of -1.64 percent revealed by the Steel and Aluminium. The kurtosis values of manufacturing industries are indicated and relatively higher as compared to the industry average, which explains that the distribution is more peaked (less dispersed).

The industry average of AGR was 49.36 percent during the period of the study and among the selected companies it was a maximum of 495.25 percent gained by Automobiles and its minimum of -57.85 percent obtained by Coal, oil, Petroleum, and Gas. The mean value of the CGR of Inventory Turnover Ratio was 4.09 percent during the period of the study and among the selected companies it was a maximum of 19.53 percent gained by Automobiles and its minimum of -8.28 percent obtained by Coal, oil, Petroleum, and Gas. The growth rate of Inventory Turnover Ratio has been registered a negative growth of the selected manufacturing industries in India.

In order to test the hypothesis, it stated that "There is no significant difference in inventory turnover ratio between sectors and between years". For this purpose, two-way ANOVA has been applied and shown Since the calculated value of 'F' between years (0.72) is less than the table of 'F' (2.06) at a 5 percent level of significance. It is concluded that there is no significant difference in the inventory turnover ratio between years. However, there is a significant difference in this ratio between selected sectors, since, calculated value 'F' (11.91) is more than the table value of 'F' (2.27) at a 5 percent level of significance.

Fixed Assets Turnover Ratio

The fixed assets turnover ratio indicates how efficiently a company is utilized its fixed assets to generate sales revenue. This ratio indicates the efficiency of assets management. Fixed Assets Turnover Ratio is used to measure the utilization of fixed assets. This ratio establishes the relationship between the cost of goods sold and total fixed assets. The fixed asset turnover can be used to evaluate the appropriateness of the level of a company's property, plant, and equipment. The ratio may also be calculated as:

$$FixedAssetsTurnoverRatio = \frac{CostofGoodsSold}{TotalFixedAssets}$$

The fixed assets turnover ratio is interpreted as the number of times in sales generated by each rupee of fixed assets. A higher ratio highlights have efficiently utilized the fixed assets for the conversion of sales. If the ratio is depressed, it indicates the under-utilization of fixed assets.

Table 4: Fixed Asset Turnover Ratio

Year	Automobiles	Cement, Infrastructure, and Paint	Coal, Oil, Petroleum, and Gas	Energy and Power	Personal Products	Pharmaceutical	Steel and Aluminium	Average
2007-08	7.76	4.77	9.61	3.52	7.33	3.30	2.69	6.36
2008-09	7.17	4.01	11.60	4.18	8.76	3.38	2.47	6.85
2009-10	7.10	4.37	10.34	3.98	8.75	3.05	2.43	6.55
2010-11	7.16	3.68	11.31	3.99	8.96	2.87	3.02	6.71
2011-12	7.40	4.35	17.71	2.90	9.30	2.91	3.63	8.26
2012-13	7.61	3.23	21.60	0.93	8.88	2.91	2.83	8.67
2013-14	7.24	3.43	29.05	0.84	8.23	3.19	1.79	10.12
2014-15	7.05	3.53	27.01	0.89	8.39	3.35	1.63	9.70
2015-16	7.07	3.52	10.75	0.69	7.78	3.11	1.00	5.96
2016-17	7.08	3.91	9.76	0.71	7.60	2.71	0.94	5.72
Average	**7.26**	**3.88**	**15.88**	**2.26**	**8.40**	**3.08**	**2.24**	**7.49**
SD	0.25	0.49	7.50	1.57	0.65	0.23	0.88	1.58
CV	3.40	12.71	47.26	69.38	7.72	7.35	39.31	21.08
Max	7.76	4.77	29.05	4.18	9.30	3.38	3.63	10.12
Min	7.05	3.23	9.61	0.69	7.33	2.71	0.94	5.72
Skew.	1.26	0.55	0.96	0.14	-0.43	-0.11	-0.20	0.67
Kurt.	0.41	-0.69	-0.76	-2.31	-1.03	-1.15	-0.83	-1.10
AGR (%)	-8.75	-18.05	1.58	-79.96	3.69	-17.87	-65.01	-9.96
CGR (%)	-0.91	-1.97	0.16	-14.85	0.36	-1.95	-9.97	-1.04
Source: Compiled from the annual report of the respective companies								

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Years	66.58	9.00	7.40	0.84	0.58	2.06
Between Sectors	1458.48	6.00	243.08	27.57	0.001	2.27
Residual	476.09	54.00	8.82			
Total	2001.15	69.00				

The Fixed Asset Turnover Ratio of selected manufacturing industries over the period of ten years from 2007-08 to 2016-17 is represented in Table 4.17 It indicates that the industry average of the Fixed Asset Turnover Ratio is 7.49 percent, which is, fluctuated between the maximum of 15.88 percent in Coal, oil, Petroleum Gas and the minimum of 2.24 percent in Steel and aluminum. The average Fixed Asset Turnover Ratio was estimated above the industry average in the case of Coal, oil, Petroleum and Gas 15.88 followed by Personal Products 8.40, Automobiles 7.26 and the remaining sectors were found that below the industry average.

It is also inferred that the standard deviation of manufacturing industries in India was 1.58 percent, which is evident that low fluctuation during the study period. The standard deviation of the Fixed Asset Turnover Ratio was registered above the industry average in the case of Coal, oil, Petroleum and Gas 7.50, followed by Energy and power 1.57, steel and aluminum 0.88, Personal products 0.65, Cement, Infrastructure and paint 0.49, and Automobiles 0.25 which implies that these companies have been considered a significant variation in the Current Asset to Fixed Asset Ratio. The coefficient of variation of Fixed Asset Turnover Ratio is 69.38 percent that is found a high fluctuation during the study period.

The computation of skewness of Fixed Asset Turnover Ratio was 0.67 percent and it was recorded a maximum of 1.26 percent obtained by Automobiles and a minimum of -0.43 percent disclosed by Personal products. The Fixed Asset Turnover Ratio is skewed to left as skewness values are negative value, hence meaning that most of the companies in the sample nearest to the average value. The kurtosis of this ratio was showed -1.10 percent and it was a maximum of 0.41 percent obtained by

Automobiles and a minimum of -2.30 percent revealed by Energy and power. The kurtosis values of manufacturing industries are indicated and relatively higher as compared to the industry average, which explains that the distribution is more peaked (less dispersed).

The industry average of AGR was -9.96 percent during the period of the study and among the selected companies it was a maximum of 3.69 percent gained by Personal products and its minimum of -79.96 percent obtained by Energy and power. The mean value of CGR of Fixed Asset Turnover Ratio was -1.04 percent during the period of the study and among the selected companies it was a maximum of 0.36 percent gained by Personal Products and its minimum of -14.85 percent obtained by Energy and power. The growth rate of Fixed Asset Turnover Ratio has been registered a negative growth of the selected manufacturing industries in India.

In order to test the hypothesis, stated that "There is no significant difference in fixed asset turnover ratio between sectors and between years". For this purpose, two-way ANOVA has been applied and shown Since the calculated value of 'F' between years (0.84) is less than the table of 'F' (2.06) at a 5 percent level of significance. It is concluded that there is no significant difference in the fixed asset turnover ratio between years. However, there is a significant difference in this ratio between selected sectors, since, calculated value 'F' (27.57) is more than the table value of 'F' (2.27) at a 5 percent level of significance.

Net Profit to Total Asset Ratio

Table 5: Net Profit to Total Asset Ratio

Year	Automobiles	Cement, Infrastructure, and Paint	Coal, Oil, Petroleum, and Gas	Energy and Power	Personal Products	Pharmaceutical	Steel and Aluminium	Average
2007-08	11.49	11.18	7.12	14.07	21.90	13.25	8.86	12.41
2008-09	8.94	10.00	4.65	13.36	20.75	12.46	6.84	10.73
2009-10	13.53	13.99	5.50	9.17	20.89	12.44	5.67	11.96
2010-11	15.20	11.39	5.35	11.41	20.57	13.05	6.07	12.09
2011-12	14.41	11.27	4.64	6.32	19.21	12.67	5.47	11.00
2012-13	12.93	10.72	4.43	3.81	19.45	11.17	3.73	10.09
2013-14	13.53	9.47	4.77	3.34	18.32	7.10	3.80	9.36
2014-15	12.62	8.31	4.56	3.41	19.52	8.40	3.33	9.29
2015-16	16.18	8.80	4.94	0.45	15.34	8.43	0.76	9.03
2016-17	13.67	8.94	5.79	4.68	16.01	7.93	2.32	9.30
Average	**13.25**	**10.41**	**5.17**	**7.00**	**19.20**	**10.69**	**4.69**	**10.53**
SD	2.01	1.68	0.82	4.71	2.12	2.43	2.36	1.30
CV	15.15	16.16	15.82	67.30	11.04	22.76	50.38	12.32
Max	16.18	13.99	7.12	14.07	21.90	13.25	8.86	12.41
Min	8.94	8.31	4.43	0.45	15.34	7.10	0.76	9.03
Skew.	-0.89	0.90	1.69	0.38	-0.87	-0.41	0.10	0.31
Kurt.	1.65	1.08	3.08	-1.30	-0.06	-1.94	-0.09	-1.69
AGR (%)	18.97	-20.06	-18.79	-66.72	-26.90	-40.16	-73.87	-25.05
CGR (%)	1.75	-2.21	-2.06	-10.42	-3.08	-5.00	-12.56	-2.84
Source: Compiled from the annual report of the respective companies								

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Years	174.89	9.00	19.43	4.44	0.001	2.06
Between Sectors	1562.75	6.00	260.46	59.48	0.001	2.27
Residual	236.45	54.00	4.38			
Total	1974.09	69.00				

The Net Profit to Total Asset Ratio of selected manufacturing industries over the period of ten years from 2007-08 to 2016-17 is represented in Table 4.18. It indicates that the industry average of the

Net Profit to Total Asset Ratio is 10.53 percent, which is, fluctuated between the maximum of 19.20 percent in Personal Products and the minimum of 4.69 percent in Steel and aluminum. The average Net Profit to Total Asset Ratio was estimated above the industry average in the case of Personal Products 19.20 followed by automobiles 13.25, Pharmaceutical 10.69, Cement, Infrastructure and paint 10.41, and the remaining sectors were found that below the industry average.

It is also inferred that the standard deviation of manufacturing industries in India was 1.30 percent, which is evident that low fluctuation during the study period. The standard deviation of the Net Profit to Total Asset Ratio was registered above the industry average in the case of Energy and power 4.71, followed by Pharmaceutical 2.43, Steel and aluminum 2.36, Personal products 2.12, Automobiles 2.01, and Cement, Infrastructure and Paint 1.68 which implies that these companies have been considered a significant variation in the Current Asset to Fixed Asset Ratio. The coefficient of variation of Net Profit to Total Asset Ratio is 67.30 percent that is found a high fluctuation during the study period.

The computation of skewness of Net Profit to Total Asset Ratio was 0.31 percent and it was recorded a maximum of 1.69 percent obtained by Coal, oil, Petroleum Gas and minimum of 0.89 percent disclosed by Automobiles. The Net Profit to Total Asset Ratio is skewed to left as skewness values are negative value, hence meaning that most of the companies in the sample nearest to the average value. The kurtosis of this ratio was showed -1.69 percent and it was a maximum of 1.65 percent obtained by Automobiles and a minimum of -1.94 percent revealed by the Pharmaceutical. The kurtosis values of manufacturing industries are indicated and relatively higher as compared to the industry average, which explains that the distribution is more peaked (less dispersed).

The industry average of AGR was -25.05 percent during the period of the study and among the selected companies it was a maximum of 18.97 percent gained by Automobiles and its minimum of -73.87 percent obtained by Steel and Aluminium. The mean value of CGR of Net Profit to Total Asset Ratio was -2.84 percent during the period of the study and among the selected companies it was a maximum of 1.75 percent gained by Automobiles and its minimum of -12.56 percent obtained by Steel and aluminum. The growth rate of Net Profit to Total Asset Ratio has been registered a negative growth of the selected manufacturing industries in India.

In order to test the hypothesis, stated that "There is no significant difference in net profit to total asset ratio between sectors and between years". For this purpose, two-way ANOVA has been applied and shown. Since the calculated value of 'F' between years (4.44) is more than the table of 'F' (2.06) at a 5 percent level of significance. It is concluded that there is a significant difference in net profit to total asset ratio between years. However, there is a significant difference in this ratio between selected sectors, since, calculated value 'F' (59.48) is more than the table value of 'F' (2.27) at a 5 percent level of significance.

Conclusion

The conclusion of the study is that operational efficiency analysis of selected manufacturing firms in India are highly correlated to each other and based on the results of the study; recommendations for improving the operational efficiency in this industry are suggested.

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