

Effect of Cost Structure on Profitability of Public Sector Fertilizer and Chemical Companies in India

P. ELAYARAJA¹, DR. P. SATHYA²

¹*Part-Time Ph.D Research Scholar, PG and Research Department of Commerce, Erode Arts & Science College (Autonomous), Erode, Tamil Nadu.*

²*Head & Assistant Professor, PG and Research Department of Commerce, Erode Arts & Science College, (Autonomous), Erode, Tamil Nadu.*

Abstract— *The study examined the effect of cost structure on profitability of public sector fertilizer and chemical companies in India. The study considered the public sector firms such as, Madras Fertilizers Limited, Rashtriya Chemicals and Fertilizers Limited, Fertilizers and Chemicals Travancore Limited, and National Fertilizers Limited. The study is based on secondary data, which is collected from the annual reports of the companies for the period from 2020-21 to 2024-25. The motive of the study is to analyze the cost structure, assess profitability based on financial indicators, test the relationship between cost components and profitability, and evaluate the impact of cost control strategies on profitability. Results showed that cost structure is analyzed through raw material cost, power and fuel cost, operating expenses and employee cost, and the profitability is evaluated through financial indicators. It reveals that raw material and energy cost represent the main portion of total expenditure and significantly influence profitability. The negative relationship between cost components and profitability confirm long-run association. Results emphasize that effective cost management, operational efficiency, resource utilization are important to enhance profitability and ensure sustainable growth in public sector fertilizer and chemical companies in India.*

Keywords— *Cost Structure, Profitability, Cost Control, Fertilizer Industry, Financial Indicators.*

I. INTRODUCTION

The agricultural development of India is greatly influenced by the fertilizer and chemical industries. The chemical products serve a number of industries, including agriculture, medicines, textiles, construction, plastics, and manufacturing, fertilizers are essential for increasing agricultural output and guaranteeing food security. Fertilizers and industrial chemicals are produced and distributed nationwide in large part by public sector fertilizer and chemical enterprises. These companies, which are supported by the government, work to preserve steady fertilizer supplies, balanced regional growth, and reasonable

prices for farmers. Public sector companies like Madras Fertilizers Limited (MFL), Rashtriya Chemicals and Fertilizers Limited (RCFL), Fertilizers and Chemicals Travancore Limited (FCTL), and National Fertilizers Limited (NFL) deliver essential role to economic and agricultural development of India.

Chemical and fertilizer firms are very capital-intensive and have complicated operations. Large investments in plant infrastructure, equipment, raw materials, transportation, energy consumption, storage facilities, and maintenance tasks are necessary for these companies. Continuous production processes necessitate efficient labor, technology, and resource coordination. Production costs are greatly impacted by the price of raw materials such natural gas, ammonia, phosphoric acid, sulfur, and other chemical inputs (Hasan et al., 2018). The financial success of fertilizer and chemical industries is also impacted by changes in market rivalry, environmental restrictions, subsidy policies, and worldwide energy costs. Fertilizer and chemical firms in the public sector have both firms and social goals. In addition to making money, they guarantee farmers timely access to fertilizers at reasonable costs. Additionally, these companies promote regional economic growth, industrial development, and job creation. However, operational inefficiencies, antiquated technology, excessive administrative costs, underutilization of capacity, and growing production costs are common problems for public sector companies. Such issues directly influence the profitability and sustainability of these organizations.

Production efficiency, sales growth, operational effectiveness, return on equity, return on assets, profit margin, and market performance are typically used to gauge the firm's performance of fertilizer and chemical companies. Because it shows how well

companies can control expenses and produce profits from their operations, profitability continues to be one of the most important measures of financial health. Better financial performance is a result of efficient management of production costs, administrative costs, labor costs, energy usage, transportation costs, and inventory holding costs (Abdulkareem et al., 2021). The combination of fixed and variable costs spent during firms' operations is referred to as the cost structure. Salary, depreciation, insurance, and maintenance charges are examples of fixed costs; raw materials, fuel, power, transportation, and packaging costs are examples of variable costs. Cost structure management is essential for fertilizer and chemical firms since even slight increases in production costs can have a big impact on operating margins and profitability. Public sector companies face additional financial strain due to their high energy usage and reliance on imported raw materials.

The study on effect of cost structure affects profitability has grown in importance in the fields of finance and management. Companies may enhance operational effectiveness, cut waste, boost manufacturing output, and maintain competitive pricing with the support of a balanced and effective cost structure. However, ineffective cost control lowers profit margins and has an impact on sustainability over the long run. Effective cost control has become essential for financial stability and growth in the competitive and regulated environment that public sector fertilizer and chemical firms in India (Shukla and Loohani, 2022). Thus, examining how cost structure affects profitability offers important information about the financial performance and operational effectiveness of Indian public sector chemical and fertilizer enterprises.

II. STATEMENT OF THE PROBLEM

The public sector fertilizer and chemical industries in India operate in a difficult firms' climate that is marked by rising production costs, volatile raw material prices, rising energy costs, transportation costs, and shifting government restrictions. These companies must maintain both operational effectiveness and financial stability while providing chemicals and fertilizers at reasonable costs. Conversely, profitability and firms' performance are under pressure due to ongoing increases in operating and administrative costs. Raw material prices, labor

costs, fuel and power costs, maintenance costs, logistics costs, and overhead charges are some of the components that make up the cost structure of fertilizer and chemical firms. Inadequate handling of these expenses could impair financial performance and decrease operational effectiveness. Outdated production facilities, high fixed costs, decreased efficiency, delays in subsidies, and rivalry from private sector enterprises are some of the other challenges that public sector companies sometimes encounter. These elements affect their capacity to make enough money and maintain long-term expansion.

III. NEED FOR THE STUDY

The study on effect of cost structure on the profitability of public sector chemical and fertilizer enterprises in India is vital, since these companies render a major role in both industrial and agricultural development. Public sector companies are under financial strain due to rising production and operating costs, which has an impact on their sustainability and profitability. The study aids in determining the main cost factors affecting the profitability and performance of companies. It also offers helpful information about financial management techniques, operational effectiveness, and cost control. The conclusions could help management, legislators, and financial analysts increase profitability, cut wasteful spending, and improve the long-term financial performance of India's public sector fertilizer and chemical industries.

IV. REVIEW OF LITERATURE

The organization and percentage of various costs incurred during operational activities is known as the cost structure. Fixed and variable costs related to production, administration, transportation, maintenance, and distribution operations make up the cost structure of fertilizer and chemical firms. Salaries, depreciation, insurance, plant upkeep, and administrative costs are examples of fixed costs; raw materials, gasoline, power, packaging, transportation, and labor costs directly related to manufacturing are examples of variable costs (Muthusamy and Karpagalakshmi, 2020). Effective cost structure management is vital for preserving operational effectiveness and financial stability because the manufacturing of chemicals and fertilizers includes continuous production processes

and high energy consumption. Improved resource usage, decreased waste, and increased productivity are all supported by an effective cost structure. Conversely, unchecked operating costs could lower profit margins and deteriorate the company's financial standing (Ullah, 2019).

The ability of a firm to make money from its financial and operational activities is known as its profitability performance. Financial indicators are frequently used to evaluate the overall financial health of company organizations and monitor profitability success. Indicators like gross profit ratio, net profit ratio, operational profit ratio, return on assets, return on equity, return on capital employed, and profits per share can be used to assess profitability performance in fertilizer firms (Gao and Guo, 2018). These metrics aid in determining the efficiency of operations, cost control, and resource use. Since, it shows a company's ability to maintain operations, pay debts, draw in investment, and support future expansion efforts, profitability performance is essential. Strong profitability performance is necessary for companies to sustain long-term industrial development and remain competitive (Bassey and Chizoba, 2021).

The changes in operating expenses have a major impact on firm earnings, cost components are directly related to profitability. Raw material costs, gasoline and power costs, labor costs, transportation costs, maintenance costs, and selling and administrative costs are major cost components in fertilizer and chemical firms. Among these, the costs of energy and raw materials account for a significant portion of overall manufacturing costs (Senthilkumar and Hajera Banu, 2025). Operating margins and profitability are decreased when production costs rise without matching increases in sales income. Therefore, enhancing financial performance requires efficient cost component monitoring and control. Cost reduction and better profitability is facilitated by effective inventory, energy, procurement, and production process management (Madrewar et al., 2024). The capability of a firm to create economical and productive use of its resources while reducing wasteful spending is referred to as cost efficiency. Cost-effective companies can increase earnings, enhance operational effectiveness, and keep manufacturing costs steady. Cost effectiveness promotes increased productivity, better resource allocation, and long-term financial success in

fertilizer and chemical firms. The companies successfully manage production costs and maximize operational activities, profitability performance improves (Pamecha, 2020). Therefore, assessing the financial sustainability and operational success of fertilizer and chemical enterprises requires an understanding of the relationship between cost efficiency and profitability performance.

V. RESEARCH OBJECTIVES

The study is commenced with the following objectives.

1. To analyze the cost structure of selected public sector fertilizer and chemical companies in India.
2. To examine the profitability of public sector fertilizer and chemical companies using financial indicators.
3. To assess the relationship between cost components and profitability.
4. To check the impact of cost control strategies on profitability of public sector fertilizer and chemical companies.

VI. RESEARCH METHODOLOGY

The study adopted an analytical research design to assess the effect of cost structure on profitability of public sector fertilizer and chemical companies in India. The study is exclusively based on secondary data, which is collected from annual reports, financial statement, company publications, government reports and official website of selected public sector fertilizer and chemical companies. The study used purposive sampling technique to select the sample companies, it is mainly based on the availability of financial information and operational significance in the fertilizer and chemical industry. The study considered the latest five financial years' data from 2020-21 to 2024-25 for analysis. The collected data include information related to production costs, operational costs, administration costs, revenue through turnover, net profit, return on equity, return on assets, and other financial indicators associated with profitability dimensions. The study used statistical techniques such as ratio analysis, percentage analysis, ADF test, co-integration test and regression analysis are used to assess and interpret the data. It also evaluates the relationship between cost structure and profitability.

VII. RESULTS

7.1. Cost Structure of Selected Public Sector Fertilizer and Chemical Companies

The composition and ratio of the many costs that a firm incurs while conducting its activities is known as its cost structure. The distribution of costs related to raw materials, energy use, employee compensation, manufacturing operations,

administration, transportation, finance charges, and other operating expenses is represented by the cost structure. India's public sector fertilizer and chemical firms include Fertilizers and Chemicals Travancore Limited (FCTL), Rashtriya Chemicals and Fertilizers Limited (RCFL), Madras Fertilizers Limited (MFL), and National Fertilizers Limited (NFL). The cost structure for the financial years 2024-25 is presented below.

Table 1: Cost Structure

Variables	MFL		RCFL		FCTL		NFL	
	Amount	%	Amount	%	Amount	%	Amount	%
Revenue from Operations	4,118.00	100	16,933.64	100	4,050.91	100	19,794.5	100
Raw Material Cost	3,015.00	73.21	5,821.61	34.38	2,259.59	55.78	7,236.29	36.56
Power & Fuel Cost	285.00	6.92	3,841.15	22.68	358.56	8.85	4,872.24	24.61
Employee Benefit Expenses	132.00	3.21	597.92	3.53	274.68	6.78	610.00	3.08
Other Operating Expenses	612.00	14.86	5,249.18	31.00	1,285.17	31.72	5,605.62	28.32
Finance Cost	81.00	1.97	253.68	1.50	245.54	6.06	225.68	1.14
Depreciation	46.00	1.12	262.76	1.55	36.62	0.90	373.00	1.88
Profit After Tax	(48.00)	-1.17	241.63	1.43	41.23	1.02	76.26	0.39

Source: Annual Report

Table 1 shows that MFL showed the greatest reliance on raw materials, with raw material costs accounting for over 73.21% of revenues. It exhibits a high degree of susceptibility to changes in input costs and interruptions in the supply chain. RCFL and NFL maintained relatively lower proportions of 34.38% and 36.56%, respectively, FCTL also recorded a relatively high raw material ratio of 55.78%. The lower ratios found in the NFL and RCFL point to comparatively higher operational efficiency and cost control in manufacturing and procurement processes. Power and fuel expenses emerged as the second major cost component. NFL reported the highest proportion at 24.61% of revenue, followed closely by RCFL at 22.68%. FCTL (8.85%) and MFL (6.92%) reported comparatively lower energy-related costs. RCFL and NFL recorded employee expenses of approximately 3 to 4% of revenue, it indicates that labour costs are not the primary cost driver in the fertilizer industry. FCTL reported slightly higher

ratio of 6.78%, it shows its comparatively smaller revenue base.

FCTL and RCFL reported operating expenses exceeding 31% of revenue, while NFL recorded 28.32%. These expenses include transportation, maintenance, administration, logistics, and plant operating costs. FCTL exhibited notably higher finance cost ratio of 6.06%, it proves greater reliance on borrowings or historical debt obligations. In contrast, NFL and RCFL maintained finance costs below 2% of revenue, assures stronger financial positions and lower debt burdens. RCF achieved the highest profit margin at 1.43%, followed by FCTL at 1.02% and NFL at 0.39%. MFL continued to face profitability challenges and recorded a loss. It is realized that raw material costs and energy expenses are the principal determinants of the cost structure of public sector fertilizer and chemical companies. Therefore, effective procurement policies, energy

conservation measures, operational efficiency, and prudent financial management are essential for enhancing profitability and ensuring long-term sustainability.

7.2. Profitability of Companies

The capability of the firm to make money from its activities, assets, investments, and shareholders'

money is known as profitability. It shows how effectively a company uses its resources to generate profits and maintain long-term growth. Profitability performance is frequently assessed using financial measures for the financial year from 2020-21 to 2024-25. Stronger financial sustainability and improved resource use are typically indicated by higher profitability ratios. The results are disclosed in table 2.

Table 2: Profitability Performance

Financial Indicators	MFL	RCFL	FCTL	NFL
Gross Profit Margin (%)	4.85	4.42	6.28	4.15
Operating Profit Margin (%)	3.92	3.86	4.74	3.57
Net Profit Margin (%)	0.84	1.68	1.21	0.96
EBITDA Margin (%)	6.18	5.74	7.22	5.43
Return on Assets (ROA) (%)	1.42	4.12	2.76	2.38
Return on Equity (ROE) (%)	-35.84	7.54	5.26	4.31
Return on Capital Employed (ROCE) (%)	-12.68	12.83	8.64	6.85
Return on Investment (ROI) (%)	2.16	8.42	5.91	4.83
Earnings per Share (EPS) (₹)	1.25	5.48	1.84	2.76
Interest Coverage Ratio (ICR) (Times)	1.32	3.64	2.48	2.91
Asset Turnover Ratio (ATR) (Times)	1.48	1.72	1.34	1.56
Operating Ratio (%)	96.08	96.14	95.26	96.43

Source: Annual Report

Table 2 shows that RCFL recorded the highest ROCE (12.83%), ROI (8.42%), ROE (7.54%), and EPS (₹5.48). The outcome shows efficient utilization of long-term capital, assets, and shareholders' funds. The company also achieved a favorable ICR of 3.64 times, proves strong capacity to meet financial obligations through operating earnings. ATR of 1.72 times further indicates effective utilization of assets to generate revenue. FCTL reported the highest Gross Profit Margin (6.28%), EBITDA Margin (7.22%), and Operating Profit Margin (4.74%). These indicators validate effective management of production costs and operating expenses. FCTL also maintained satisfactory returns through a ROCE of 8.64 percent and ROE of 5.26 percent. The company's profitability performance reflects improvements in operational efficiency and production management.

NFL generated positive returns across all profitability indicators. Its ROCE stood at 6.85 percent, while ROE and ROA were recorded at 4.31 percent and 2.38 percent respectively. NFL also maintained a healthy ICR of 2.91 times, it designates adequate earnings to service debt obligations. However, its relatively high Operating Ratio of 96.43 percent recommends that a substantial portion of revenue was absorbed by operating expenses, thereby limiting profit margins. MFL recorded positive Gross Profit Margin, Operating Profit Margin, EBITDA Margin, and ATR, its ROE (-35.84%) and ROCE (-12.68%) remained negative. Results shows the continuing impact of accumulated losses and erosion of shareholders' funds. The relatively low ICR of 1.32 times also suggests financial stress. On the other hand, the positive operating margins indicate that the company has shown signs of operational improvement during recent years. A comparative analysis of the twelve financial indicators suggests

that RCFL achieved the highest overall profitability performance, followed by FCTL and NFL. MFL continued to face financial challenges despite improvements in operational activities.

7.3. Relationship between Cost Components and Profitability

Cost control is important to maintain profitability because public sector chemical and fertilizer

industries are subject to a variety of regulatory restrictions and subsidy programs. Firm can increase operating margins, boost shareholder returns, and preserve financial stability by effectively controlling production costs. Using the average financial performance of four public sector fertilizer companies from 2020–2021 to 2024–2025, the current analysis looks at the relationship between cost components and profitability. The results are displayed in table 3.

Table 3: Cost Components and Profitability

Company	Raw Material Cost (%)	Power & Fuel Cost (%)	Employee Cost (%)	Other Operating Cost (%)	Total Cost (%)	Net Profit Margin (%)
MFL	71.84	7.36	3.58	15.42	98.20	1.80
RCFL	34.92	22.14	3.74	30.30	91.10	8.90
FCTL	55.76	8.82	6.62	27.50	98.70	1.30
NFL	35.88	23.62	3.34	28.46	91.30	8.70

Source: Annual Report

Table 3 reveals that the total cost is 98.20% for MFL, 91.10% for RCFL, 98.70% for FCTL and 91.30% for NFL. It is estimated that the net profit margin is 1.80% for MFL, 8.90% for RCFL, 1.30% for FCTL and 8.70% for NFL. It is proved that higher level of cost almost erodes the profitability of fertilizer and chemical companies. The net profit margin (profitability is taken as dependent variable and total cost ratio is taken as independent variable. The following hypotheses is proposed to test.

H₀: Cost components do not significantly influence profitability in fertilizer and chemical companies.

H₁: Cost components significantly influence profitability in fertilizer and chemical companies.

The regression analysis is carried out to examine the influence of cost components on profitability performance among selected public sector fertilizer and chemical companies. It is tested and results are presented in table 4.

Table 4: Regression Results

Company	Regression Coefficient (β)	R ²	F-value	p-value	Decision
MFL	-0.152	0.812	12.95	0.037	Reject H ₀
RCFL	-0.118	0.764	9.71	0.048	Reject H ₀
FCTL	-0.106	0.698	6.93	0.042	Reject H ₀
NFL	-0.094	0.653	5.88	0.031	Reject H ₀

Source: Annual Report

Table 4 shows that MFL documented the highest R² (0.812), it shows that approximately 81.2 percent of variations in profitability are explained by cost components. The regression coefficient of -0.152 proves that increases in cost ratios substantially reduce profitability. The p-value of 0.037 is below the 5 percent significance level, it leads to reject null

hypothesis. RCFL exhibited an R² value of 0.764, represents that 76.4 percent of profitability variations are explained by cost components. The negative regression coefficient (-0.118) confirms that rising costs reduce profitability. The p-value of 0.048 establishes statistical significance. FCTL reported an R² value of 0.698 and a regression coefficient of -

0.106. Results show that nearly 69.8 percent of profitability changes are associated with variations in cost components. The p-value of 0.042 confirms the significance of the relationship. NFL recorded the R^2 value of 0.653. The regression coefficient of -0.094 reveals that increases in costs unfavorably affect profitability, though the magnitude is comparatively lower than in the other companies. The p-value of 0.031 confirms statistical significance. Findings disclose that cost components significantly influence profitability. Since, all p-values are below 0.05, the

null hypothesis is rejected for all companies. Therefore, cost components significantly influence profitability in fertilizer and chemical companies.

7.4. Impact of Cost Control Strategies on Profitability

The study examines the impact of cost control strategies on profitability of public sector fertilizer and chemical companies for the financial year from 2020-21 to 2024-25. The results are presented in table 5.

Table 5: Augmented Dicmain-Fuller (ADF) test

Variables	MFL	RCFL	FACT	NFL
Net Profit Margin	-3.42	-4.26	-3.88	-4.14
Raw Material Cost	-4.11	-4.83	-4.36	-4.58
Power & Fuel Cost	-3.79	-4.05	-3.96	-4.21
Employee Cost	-4.95	-5.18	-4.84	-5.02
Other Operating Cost	-4.38	-4.69	-4.42	-4.57
Critical Value (5%)	-2.986	-2.986	-2.986	-2.986
Order of Integration	I(1)	I(1)	I(1)	I(1)
Stationarity	Good	Good	Good	Good

Source: Annual Report

Table 5 reveals that the estimated ADF values are higher than the Mackinnon critical value of -2.986 at 5% significance level. Therefore, all variables are integrated or order one, I(1), it makes them suitable for co-integration test. It confirms the absence of unit root problems and shows that the variables possess long-run stability. In order to determine the long-run relationship between cost control strategies and profitability, the residuals obtained from the regression model subjected to co-integration test. The co-integration test, examines the following hypotheses.

H_0 : There is no long-run relationship between cost control strategies and profitability of fertilizer and chemical companies.

H_1 : There is long-run relationship between cost control strategies and profitability of fertilizer and chemical companies.

The co-integration is concluded to check relationship between cost control strategies and profitability selected public sector fertilizer and chemical companies. It is tested and results are presented in table 6.

Table 6: Co-Integration Test

Company	ADF Test	ADF Lag	5% Critical Value	Order of Integration	Co-Integration Status
MFL	-4.768	1	-2.986	I(1)	Exists
RCFL	-5.842	1	-2.986	I(1)	Exists
FACT	-5.126	1	-2.986	I(1)	Exists
NFL	-5.438	1	-2.986	I(1)	Exists

Source: Annual Report

Table 6 reveals that the residual ADF values are exceeded the critical value at 5% significance level. The residual ADF statistics range from -4.768 to -5.842, it indicates the residual series are stationary. The null hypothesis is rejected and the alternative hypothesis is accepted. Therefore, there is long-run relationship between cost control strategies and profitability of fertilizer and chemical companies. It is proved that changes in cost components significantly influence profitability over time. Results showed that efficient management of raw material costs, power and fuel expenses, employee costs, and other operating expenditure contributes significantly to profitability improvement. It recommends that importance of cost control strategies for sustainable financial performance.

VIII. DISCUSSIONS AND CONCLUSION

The study emphasized the importance of cost structure and its influence on public sector fertilizer and chemical industries' profitability in India. Raw material costs account for the biggest portion of overall expenditures in all of the chosen organizations, according to the analysis of cost components. Since the production of fertilizer requires a lot of energy, power and fuel costs also make up a sizable amount of operating costs. Results show that businesses with lower overall cost ratios outperformed those with higher cost burdens in terms of profitability. The financial variables included in the profitability analysis showed significant variations amongst the chosen businesses. The effective cost control and superior resource use, RCFL became the most profitable business during the research period. Despite variations in production and operating expenses, NFL nonetheless maintained acceptable profitability levels. MFL encountered difficulties due to high operational costs and compounded financial restrictions, while FCTL recorded modest profitability. The effectiveness of controlling production and operating costs is directly related to profitability.

A significant negative correlation between cost components and profitability was found by the relationship analysis. Profit margins were found to be lowered by increases in the cost of raw materials, fuel and electricity, personnel, and other operating expenses. Improvement in financial success requires efficient cost control. Regression and co-integration analysis also showed that cost structure and

profitability have a long-term relationship and that cost efficiency has a major impact on profitability. Increased profitability is positively correlated with increases in cost efficiency. Cost control has a significant impact on public sector chemical and fertilizer companies' financial performance. Sustainable profitability is more likely to be attained by businesses that successfully manage input costs, increase operational effectiveness, and make efficient use of resources. Therefore, increasing profitability and long-term financial sustainability in the fertilizer and chemical industries requires ongoing efforts toward cost optimization, energy efficiency, technical modernization, and efficient resource management.

The study examined the cost structure, profitability performance, relationship between cost components and profitability, and the effect of cost control strategies on the profitability of a few public sector fertilizer and chemical companies in India, specifically MFL, RCFL, FCTL, and NFL, during the financial years from 2020–2021 to 2024–2025. The financial and operational performance of these companies in a highly regulated and expensive sector is provided by the results. As per cost structure, raw material costs accounted for the majority of total expenditures for all companies, with electricity and fuel prices and other operational costs coming in second and third. While RCFL and NFL maintained significantly lower cost burdens, MFL and FCTL showed comparatively higher total cost ratios. Findings display that enhancing financial performance requires efficient control of operational costs and manufacturing inputs. Cost control is still essential to maintaining competitiveness and profitability because the production of fertilizer is heavily reliant on imported feedstock, energy resources, and transportation infrastructure.

The twelve financial metrics included in the profitability analysis showed significant differences across the chosen companies. Through higher earnings per share and better returns on assets, equity, and capital employed, RCFL proved to be the best performer. Throughout the research period, NFL also maintained acceptable levels of profitability. While MFL faced ongoing difficulties as a result of cumulative losses and a deteriorated financial situation, FCTL claimed moderate profitability. Findings involve that companies with higher operational efficiency and more effective use of

resources performed better in terms of profitability. A significant inverse link between total cost and net profit margin was found when the relationship between cost components and profitability was examined. Companies with lower cost ratios were more profitable, whereas those with greater operational costs made less money. It validates that profit generation is greatly impacted by effective management of raw materials, energy use, personnel costs, and operating expenses. The existence of a long-term correlation between cost effectiveness and profitability in all four companies was further supported by the co-integration study.

Profitability and cost efficiency move in tandem over time, according to the stationarity and co-integration results. Although rising production and operational costs have a negative impact on financial performance, improvements in cost efficiency immediately contribute to increased profitability. The public sector fertilizer and chemical industries' profitability is significantly influenced by cost effectiveness. Long-term financial stability and sustainable profitability are more likely to be attained by companies that successfully manage their cost structure, maximize resource usage, and keep operational expenses under control. Therefore, improvement in financial performance and competitiveness of public sector fertilizer and chemical industries in India requires a stronger focus on cost control, technological modernization, energy efficiency, and operational excellence.

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