



Strategic Investments in Fixed Assets for Pollution Mitigation in NSE-Listed Indian Pharmaceutical Companies

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ABSTRACT:

The Pharmaceutical industry in India significantly contributes to the nation's growth and overall welfare. However, it is also confronted with environmental issues and sustainability concerns. In the face of global challenges such as climate change and the depletion of natural resources, there is a growing consensus that businesses must assume accountability for their environmental impacts. This research paper delves into the implementation of green accounting principles within Indian pharmaceutical sector as a means to tackle these issues and endorse sustainable practices. Green accounting involves an innovative approach that integrates environmental factors into conventional financial accounting systems. The pharmaceutical sector in India is under mounting pressure from regulatory authorities, consumers, and international stakeholders to curtail its environmental footprint and adopt ethical business practices. This research paper attempted to find the strategic investments in Fixed Assets for pollution mitigation in NSE listed Indian Pharmaceutical companies. The pharmaceutical industry in India is creating environmental issues like noise, air, water pollution. Researcher has collected the data from the published financial statements of selected pharmaceutical companies which are listed on National Stock Exchange for the financial year 2021-22 and 2022-23. Data was analyzed and conclusion has been drawn. On the basis of analysis researcher has made some suggestions.

1. Introduction

The Pharmaceutical Industry plays a vital role in the Indian economy. It is also associated with environmental pollution and challenges. Pharmaceutical Industries are taking efforts to mitigate pollution and promote sustainability, driven by regulatory measures, technological advancements and a growing awareness of the need for responsible industrial practices. It encompasses a wide range of activities, including the manufacturing of basic Pharmaceutical Products which include chemicals, medical components, tablets, capsules etc. Responses to most of the environmental reporting items suggest that respondents to the study had positive attitude towards environmental reporting.¹ The pharmaceutical industry in India has witnessed substantial growth over the years, driven by domestic and international demand. Environmental accounting is

in preliminary stage in India and whatever shows in the accounts in this regard is more or less compliance of relevant rules and regulation in the Act.²

Pharmaceutical manufacturing processes often release various volatile organic compounds pollutants into the air, including volatile organic compounds (VOCs), particulate matter, and greenhouse gasses. The presence of these pollutants can lead to air pollution, which has adverse effects on public health and the environment. Indian pharmaceutical companies are not doing enough to protect the environment. Pharmaceutical companies must take action to prevent pollution, climate change and global warming through green chemistry initiatives. This can be attributed to absence of enforcement of environment laws.³ Reporting the environmental progress and disclosure to the stakeholder is also important to have a control over pollution. More than



50 percent of the companies have disclosed their environmental policies in the 2013-14. Large majorities of these companies disclose these policies only to show their commitment towards environmental goals. But most of the times this information is given in a few lines only in the Directors report.⁴ If we take the nearby countries like Bangladesh the picture of environmental accounting is not different. Organizations should follow environmental rules and regulation in a consistent manner is the minimum lowest rank perception of the sample respondents of the concerned of the enterprises 54.1%. Similarly, 82% of respondents have opined that organization in Bangladesh need strengthen capacity for implementation and enforcement of environment-friendly working condition. Organizations maintaining integrated environmental consideration in Bangladesh have shown 59% perception of environmental accounting practice.⁵ It is necessary to find whether Indian Pharmaceutical companies strategic investments in fixed assets to mitigate the pollution in India.

2. Objectives

- To study the impact of the pharmaceutical companies on pollution in India.
- To Study the strategy of management to investment in fixed assets which helps to control the pollution.
- To Study the impact of investment in fixed assets to reduce environmental pollution and improve their overall environmental sustainability.

3. Review of Literature

² Revels that 2137 units which did not have requisite effluents treatment systems, 480 units have been closed down and 1457 units are about to be closed. 106 units have set up such systems and 94 units have been granted extension of time. During the year 1997-98 around 680 complaints regarding various types of pollution air, water, noise and soil have been received and attended to. The concern of the Ministry for protecting the environment in the coastal waters and the coastal belt has led to the imposition of a no-construction belt of 300 meters beyond the high water tidal limit on the Indian coast line. This has affected the beach hotels and coastal resorts.

⁴ Researcher in this Research paper in which interpret to find out that Goan business firm are Acting according to

certain accepted Standard on environmental accounting and disclosure practices. where some identified standard were like General accepted accounting standard (GAAP), Greenhouse gas reporting rule 2009 (GHGRR), Then Indian Accounting standards (IAS), International financial reporting standard (IFRS), Company Act 2013(CO.ACT 2013) which has been newly constituted for all companies of India will be able to follow same paten of disclosure practices and International organization for standardization 14000. (ISO -14000)

⁶ The finding indicates that investigate the relationship between green accounting and energy efficiency and environmental performance in the context of Bangladeshi pharmaceutical and chemical companies. The study also explores the mediating role of energy efficiency in the relationship between green accounting and environmental performance. The results indicate that green accounting has a significant positive impact on both energy efficiency and environmental performance. Moreover, energy efficiency partially mediates the relationship between green accounting and environmental performance. The study also found that economic, environmental, and social practices of green accounting have a positive impact on both energy efficiency and environmental performance, with environmental practices having the highest impact. The findings of this study provide important insights for managers and policymakers of pharmaceutical and chemical companies in Bangladesh, highlighting the need for green accounting practices that promote environmental sustainability.

⁷ This research paper fount that the legal foundation of Chinese environmental accounting information disclosure is relatively weak, relevant laws and regulations are not perfect enough. In terms of environmental accounting information disclosure content, Fosun Pharmaceutical the overall degree of information is not high, less information disclosure. On the channels of information disclosure, Lack of unified environmental accounting information disclosure standards, Enterprise independent selectivity is relatively high.

⁸ It examines material flow cost accounting in the context of grounded theory, and conducts a case study on the companies which have implemented material



flow cost accounting. The purpose of this research is to identify the relationship between material flow cost accounting and green design, and to provide a reference for the production design of the enterprise. After analysis, material flow cost accounting can generate detailed waste data, and provide a green design reference in actual energy conservation. These two outcomes complement each other, and will support achievement of the goal of mutual financial and environmental protection.

⁹ Identified the effect of environmental accounting on the performance of pharmaceutical companies in Nigeria. The results of the study revealed that firm specific characteristics (such as size, age, profit after tax and leverage) were found to have significant influence on environmental accounting reports in manufacturing companies in Nigeria. There is no specific factors that determine environmental accounting in pharmaceutical companies in Nigeria should be rejected. The findings of the study also revealed that community development and employees' welfare were statistically significant on profitability pharmaceutical companies in Nigeria. Study stated that environmental accounting does have significant impact on profitability of pharmaceutical companies in Nigeria.

¹⁰ This research investigated the potential and obstacles associated with implementing green accounting in the Oil & Gas companies of Nigeria, drawing evidence from selected financial institutions in the South East region. The focus of the study was on assessing whether the adoption of green accounting contributes to economic growth. Additionally, it delved into the specific prospects and challenges related to the practice of green accounting in the Nigerian economy. The findings revealed a certain degree of economic growth attributable to the implementation of green accounting. The study concluded that while there are significant opportunities for the practice of green accounting in the

economy, there are still existing challenges that require attention. As a recommendation, the study suggested updating and simplifying the laws and principles governing green accounting for improved effectiveness.

¹¹ This paper seeks to explore the importance of incorporating environmental accounting into the curriculum of Indian universities. The study utilizes data obtained from primary and various secondary sources. It adopts a descriptive research approach. By comprehending accurate assessments of environmental harm, the associated costs of pollution throughout the production cycle, market-based recovery mechanisms (such as carbon credits), expenses related to management activities, research and development costs, expenditures for social programs, and the costs associated with addressing environmental damage, commerce educators can impart valuable knowledge to students. Additionally, the findings of this research may guide the government in the prospective implementation of environmental accounting in India.

4. Research Methodology

The population in this study was 20 pharmaceutical companies listed on the National Stock Exchange (NSE) for the 2021-2023 periods. This study took a sample of pharmaceutical companies listed on the National Stock Exchange(India) Random sampling was used, so a research sample of 5 companies was selected. The data analysis tool uses the simple percentage method. The currently drawn sample fulfills the required characteristics. In general, these characteristics are as follows: 1.The sample companies engaged in manufacturing pharmaceutical products that go public and are listed on the National Stock Exchange and publish financial reports (annual reports) in 2021- 2022 and 2022-23. The companies selected as samples were manufacturing companies that published the annual Report comprising corporate Governance Report.

Table: 1 Random Sampling

No	Description	Total
1	Total Number of Pharmaceutical companies listed on NSE India	20
2	Companies not selected for Study	15
	Random Sample Selected 25% of Population	05



5. Data analysis and interpretation

Table: 2 Total Energy Consumption (In Joules Or Multiples) And Energy Intensity

Company	Financial Year	Total electricity consumption (A)	Total fuel consumption (B)	Energy consumption through other sources (C)	Total energy consumption (A+B+C)	Energy intensity per rupee of turnover
Dr. Reddys	2022-23	13,47,746	26,92,267	NA	40,40,013	16.40
	2021-22	12,59,881	32,35,123	NA	44,95,004	21.00
Zydus	2022-23	886,994	1,081,836	NA	1,968,831	22.55
	2021-22	837,676	1,123,280	NA	1,960,956	24.57
Sun Pharma	2022-23	1,489,233	1,019,551	698,069	3,206,853	15.70
	2021-22	1,464,919	1,040,498	771,969	3,277,386	21.10
Glenmark	2022-23	348,992	147,026	NA	496,018	60.33
	2021-22	325,011	165,694	NA	490,705	60.27
Lupin	2022-23	1,267,950	878,847	NA	2,651,957	24.01
	2021-22	1,289,682	844,764	NA	3,123,218	26.53

From Table 2 it is observe that company's total energy consumption has reduced in the financial year 2022-23 reduced. All the selected company compliance the government regulation by installing the equipment which help to reduce the overall consumption of energy. Installation of solar panel system also supports green

environment and sustainable devolvement of the companies. If we compare the Table 2 and Table 5 it is observed that company have increased the capital expenditure which results in the reduction in consumption of total energy.

Table: 3 Consumption of Water

	Financial Year	Total volume of water withdrawal (in kiloliters)	Total volume of water consumption (in kiloliters)	Water intensity per rupee of turnover	Change in Water Intensity Per Rupee of Turnover
Dr. Reddys	2022-23	18,84,363	15,85,558	8	0
	2021-22	18,38,019	17,04,281	8	
Zydus	2022-23	1,532,370	1,532,370	18	-1
	2021-22	1,544,450	1,544,450	19	
Sun Pharma	2022-23	2,151,878	2,032,731	10	-4
	2021-22	2,299,489	2,209,014	14	



Glenmark	2022-23	485,064	485,464	59	0
	2021-22	480,940	481,340	59	
Lupin	2022-23	1,567,890	2,240,995	20	0
	2021-22	1,661,168	2,369,480	20	

This analysis shows that some companies, like Zydus and Sun pharma, have improved their water efficiency (reduced water intensity) compared to the previous year, while others, like Lupin and Glenmark, have become less water-efficient. Monitoring water usage and intensity is crucial for sustainable practices and

resource management in the pharmaceutical industry. Companies with reduced water intensity may be implementing more efficient water management strategies, while those with higher water intensity may need to focus on reducing water consumption to achieve sustainability goals.

Table: 4 Details Of Air Emissions (Other Than GHG Emissions)

	Financial Years	NO _x	SO _x	Particulate matter (PM)	Change in NO _x Emission	Change in SO _x Emission	Change in Particulate Emission
Dr. Reddys	2022-23	111	263	104	7	16	25
	2021-22	104	247	79			
Zydus	2022-23	16	23	24	-5	-8	-8
	2021-22	21	31	32			
Sun Pharma	2022-23	126	121	142	-40	-29	-72
	2021-22	166	150	214			
Glenmark	2022-23	103	31	69	18	-7	-49
	2021-22	85	38	118			
Lupin	2022-23	3	3		0	0	0
	2021-22	3	3				

NO_x = nitrogen oxide

SO_x = sulfur oxides

Analysis of Table 4 reveals the changes in air emissions for these pharmaceutical companies. Companies such as Zydus, Sun Pharma and Glenmark have managed to reduce their emissions significantly, while others like Dr. Reddys and Lupin have experienced some fluctuations in emissions, including both increases and

decreases. Monitoring and controlling these emissions are vital for environmental sustainability and compliance with regulatory standards in the pharmaceutical industry. Companies with emission reductions may have implemented cleaner technologies or improved processes, while those with increased emissions may need to review their environmental practices and consider emission reduction strategies.

**Table: 5 R&D And Capital Expenditure (Capex) Investments In Specific Technologies**

	Financial Years	% R&D	% Capex	Difference in R & D	Difference in Capex
Dr. Reddys	2022-23	100	3	0	2
	2021-22	100	1		
Zydus	2022-23	44	7	7	3
	2021-22	37	4		
Sun Pharma	2022-23	100	16	0	9
	2021-22	100	7		
Glenmark	2022-23	100	3	0	-7
	2021-22	100	10		
Lupin	2022-23	NA	3	0	-1
	2021-22	NA	4		

R&D = Research and Development

Capex = Capital Expenditure

Table 5 analysis shows variations in the allocation of investments for R&D and Capex among the pharmaceutical companies. Companies like Zydus and Sun Pharma have increased their investments in both R&D and Capex, while Dr. Reddys have shifted more

towards Capex. This suggests strategic adjustments in resource allocation to meet specific business goals and priorities in the pharmaceutical industry.

Table: 6 Reusing, Recycling And Disposing At The End Of Life

	Financial Years	(a) Plastics (including packaging)	(b) E-waste	(c) Hazardous waste	(d) Other waste
Dr. Reddys	2022-23	NA	NA	NA	NA
	2021-22	NA	NA	NA	NA
Zydus	2022-23	162	NA	273.00	NA
	2021-22	158	NA	201.00	NA
Sun Pharma	2022-23	2,012	NA	NA	NA
	2021-22	531	NA	NA	NA
Glenmark	2022-23	1,989	4	230.00	1,415.00
	2021-22	2,163	5	246.00	1,479.00
Lupin	2022-23	NA	NA	NA	NA
	2021-22	NA	NA	NA	NA

The analysis shows that different pharmaceutical companies have varying levels of data available for

waste management, and the types of waste managed also differ. For example, Glenmark has detailed data for



various waste types in both years, while Zydus and Sun Pharma mainly focus on plastics and hazardous waste. The "NA" entries indicate that Lupin and Dr. Reddys did not provide data for waste management in both financial years.

Effective waste management is crucial for environmental sustainability and regulatory compliance.

Companies with comprehensive waste management data are likely taking steps to responsibly manage their waste streams, which is an important aspect of corporate social responsibility and environmental stewardship.

Table: 7 Installation of Equipment's

	Financial Years	SP	ETP (ZLD)	STP	EV	WHRS	PPA
Dr. Reddys	2022-23	Yes	Yes	No	No	Yes	Yes
	2021-22	Yes	Yes	Yes	No	Yes	Yes
Zydus	2022-23	Yes	Yes	No	No	No	Yes
	2021-22	Yes	Yes	No	No	No	Yes
Sun Pharma	2022-23	Yes	Yes	Yes	No	Yes	Yes
	2021-22	Yes	Yes	Yes	No	Yes	No
Glenmark	2022-23	Yes	Yes	Yes	No	Yes	Yes
	2021-22	Yes	Yes	No	No	Yes	Yes
Lupin	2022-23	Yes	Yes	No	No	Yes	Yes
	2021-22	Yes	Yes	No	No	Yes	Yes

SP = Solar Panel ,

ETP = Effluent Treatment Plant

STP = Sewage Treatment Plant

EV = Electric Vehicle

WHRS = Waste Heat Recovery System

PPA = Pharmaceutical Process Automation

The analysis shows the installation status of various equipment and systems related to waste management, emission control, and energy utilization. The data indicates that pharmaceutical companies have implemented different environmental and energy management systems based on their specific needs and environmental policies. These installations can contribute to more efficient and environmentally friendly operations, including waste reduction, energy savings, and emissions control.

6. Findings and Conclusion

The analysis of the correlation between "% Capex" and "Total energy consumption (A+B+C)" for the given dataset reveals a weak negative correlation. This suggests that, to some extent, there is a tendency for a decrease in total energy consumption as the percentage of capital expenditure increases. However, the

relationship is not very strong, indicating that other factors might influence total energy consumption as well.

7. Suggestions:

Diversify Energy: Saving Investments: Companies should explore various energy-saving investments and initiatives to reduce energy consumption. While there is a weak negative correlation with capital expenditure, this should not be the sole focus for energy efficiency improvements.

Energy Efficiency Audits: Conduct regular energy efficiency audits to identify areas where energy consumption can be optimized. Focus on technologies and practices that can yield significant energy savings.

Sustainability Programs: Implement comprehensive sustainability programs that incorporate both capital



expenditure and energy consumption reduction strategies. These programs can target reductions in energy usage through more efficient processes, renewable energy adoption, and waste heat recovery.

Data Monitoring: Continuously monitor and collect data on energy consumption, and correlate it with various factors, including capital expenditure, to identify specific patterns and opportunities for improvement.

Invest in Renewable Energy: Consider investing in renewable energy sources, which not only reduce energy costs but also have a positive environmental impact. This can help in achieving long-term sustainability goals.

Employee Awareness and Training: Educate employees on energy-efficient practices and the importance of energy conservation. Encourage a company-wide culture of energy-consciousness.

Regulatory Compliance: Ensure compliance with energy efficiency regulations and standards in the pharmaceutical industry, as this may impact both energy consumption and capital expenditure decisions.

Periodic Review: Regularly review and update energy and capital expenditure strategies to adapt to changing market conditions, technologies, and environmental goals.

Overall, while there is a weak negative correlation, it is important to consider multiple factors and strategies to effectively reduce energy consumption and promote sustainability in the pharmaceutical industry. Energy management should be an integral part of the company's overall sustainability and efficiency initiatives.

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