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Connecting Sustainable Practices to Corporate Success: An Analysis of Nifty Pharma

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ABSTRACT

This study examines the financial performance of Nifty Pharma firms from 2022 to 2024 in relation to sustainable practices. Using partial least squares (PLS) estimation, the analysis incorporates profit margin as a mediating variable to evaluate the influence of environmental factors on corporate performance, with a particular focus on return on assets (ROA). Data sourced from the Bloomberg database underpins the analysis, guided by clearly defined research objectives and hypotheses. Preliminary tests, including correlation analysis, descriptive statistics, and variance inflation factor (VIF) evaluation, were conducted to ensure robustness. Path analysis revealed that renewable energy significantly and positively influenced both profit margin and ROA, whereas overall greenhouse gas (GHG) emissions demonstrated a negative but negligible impact. Other environmental factors showed mild effects, though their significance remained limited. These findings underscore important considerations for senior management, emphasizing the benefits of reducing GHG emissions, embracing renewable energy, and adopting sustainable practices to improve profit margins and optimize ROA.

Keywords - sustainable practices, renewable energy, return on assets, greenhouse gases, structural modelling.

INTRODUCTION

The pharmaceutical industry has a major financial impact, particularly when it comes to healthcare expenses, but it also plays a critical role in improving people's quality of life. Understanding how environmental disclosure affects a firm's performance and advancement toward sustainability goals is becoming more and more crucial as sustainability becomes a priority. Research, development, and marketing of goods including drugs, vaccines, and cures for common and uncommon ailments fall under the purview of the industry. Global aging, longer life expectancies, and improvements in healthcare are some of the factors driving demand for pharmaceutical businesses that offer a wide choice of goods and also adhere to sustainable development principles.

Consequently, the pharmaceutical sector has been more emphasized for its role on sustainability (Schneider et al., 2010). The residual effects of medicine in its life cycle as further discussed by Kümmerer (2010) are just some of the concerns that require further thinking on how the pharmaceutical industry alters the ways it manages the business operations. While, on the other hand, such calls awareness to these challenges, how do academics respond? What are the major subjects of concern? What contribution was made? What are the areas which need further investigation? This paper presents a brief of how ecological factors impact on organizational performance and discusses the subject of sustainable development in the context of the pharmaceutical industries. This work analyzed the NSE index of companies operating in

the Indian pharmaceutical sector focusing on Pharma index for the fiscal years from 2022 to 2024. Environmental sustainability (ES) is normally expressed by means of specific measurements including Green House Gas (GHG), use of renewable energy, water usage, and management of wastes, which are normally included in the annual report, though there are a lot of research studies that have explored the connection between EP and FP and has arrived at several conclusions. Therefore, the basic aim of this study is to check Environmental factors on Financial performance & what it means to give awareness for stake holders.

This study seeks to answer the following question, among others: are there strategies that pharmaceutical companies might employ to improve their environmental performance in order to increase their bottom line? Second, can greenhouse gas emissions really boost pharmaceutical companies' bottom lines? The third question is whether or not pharmaceutical companies can boost their profits by switching to renewable energy. Fourthly, is it conceivable that pharmaceutical companies' financial performance improves in relation to the quantity of overall waste? Fifthly, would the pharmaceutical corporations' bottom lines be impacted by their total water consumption? Despite the fact that the goals of the study are: So, this was the initial stage in figuring out how environmental performance affects pharmaceutical firms' bottom lines. Furthermore, we want to ascertain the impact of greenhouse gas production on the profitability and return on investment trends of pharmaceutical enterprises. Furthermore, does the pharmaceutical industry's total competence and, by extension, profit, improve when renewable energy sources are used? thirdly, does the overall waste impact the financial health of pharmaceutical companies? Is there a correlation between the pharmaceutical companies' performance and the amount of water they use? But here are what we want to achieve with this research: We must first determine whether there is a correlation between pharmaceutical companies' financial success and their environmental performance. The second objective is to calculate how much of an impact greenhouse gas emissions have on the bottom lines of pharmaceutical companies.

1. LITERATURE REVIEW

❖ Financial Performance

FP is a way to see how well a company has set up its assets and generated revenue. Indicators such as net income, cash flow, and overall financial soundness can be used to evaluate it (Otekunrin et al., 2019). Its primary usage is in long-term financial analysis and shareholder value maximisation (Jayeola, O., 2015). The primary indicators of financial performance that are utilised to assess FP are ROA, ROE, ROCE, EPS, and ROI. A financial metric known as return on asset (ROA) measures how profitable a business is relative to the total resources it controls (Otekunrin et al., 2019). To get this number, divide the company's net income by its total assets. A greater return on assets (ROA) indicates that a company is making good use of its financial resources, which in turn increases profitability. Return on Assets (ROA) is a metric that businesses use to measure their operational efficiency and their ability to generate returns from their assets.

❖ Profit Margin :-

Profitability is the degree to which a company is able to turn a profit from its sales. Keep in mind that low performance levels indicate a failing company, whereas high performance levels always indicate a successful one. It is feasible for companies to maximise their use of resources in order to increase their profits. Research has shown that environmental performance may increase a company's profitability (Asjuwita, M.et al., 2020; Putri et al., 2019). The working hypothesis of the study is based on the theoretical frameworks and empirical investigations of several scholars, and it is

H2:- There is a relationship between Profit Margin on ROA is significant.

❖ Environmental Performance:

Environmental performance metrics include ecosystems and all of its components, including land, air, and water, and are utilised to assess an organization's influence on the environment. These indicators are frequently included in sustainability reports. According to Ucheagwu et al. (2019), this process include managing resources like water, energy, and materials while decreasing waste, emissions, and effluents. We must protect the ecosystem and provide a sustainable future for generations to come (Morelli et al., 2011).Companies are now urged to include information about their environmental sustainability (ES) practices—including their usage of renewable energy, water consumption, waste management, and carbon emissions—in their annual reports so that stakeholders may benefit from them (Sammut Bartolo et al., 2021; Shin et al., 2016).According to Hao et al. (2021), EP is all about new and inventive ways of doing things that mess with the status quo of products, procedures, and company operations.Henceforth, these subjects will constitute the crux of our investigation.

GHG disclosure: -ROA metrics seen for financial performance to check the pharmaceutical businesses that demonstrate excellent environmental performance, including a reduction in GHG emissions. This is due to the fact that adopting sustainable practices may result in lower costs, less legal concerns, and improved business reputation.Investors are rewarding pharmaceutical businesses more and more for reporting on sustainability measures, such as greenhouse gas emissions, and this has a beneficial effect on financial performance, including return on assets (ROA) (Pechancová, V et al. (2019).Pharmaceutical firms that release a lot of greenhouse gases must pay increasing amounts for regulatory compliance, which might hurt their return on assets (ROA). Businesses that cut emissions on a proactive basis can lessen these risks and improve their bottom line. Reducing greenhouse gas emissions in pharmaceutical firms frequently results in increased energy savings and other operational efficiency, which in turn enhance asset utilisation and boost return on assets.

H1: There is a relationship between GHG on Profit Margin is significant
H1A: There is relationship between GHG on ROA is significant

Renewable energy: - Government-sponsored initiatives, such as tax breaks and subsidies, have increased the adoption of renewable energy in recent years by reducing energy generation costs and enhancing cost competitiveness. Renewable energy derives from natural resources that are replenished at a rate exceeding their consumption, such as solar and wind energy. It is regarded as a clean and sustainable alternative to conventional energy sources, applicable in transportation, heating and cooling systems, and power generation, among other uses. It is gaining increased recognition as a viable alternative due to the global emphasis on reducing CO2 emissions. Governments have implemented programs and incentives, such as tax breaks and subsidies, to promote the growth of renewable energy projects. This has resulted in cost competitiveness and the emergence of manufacturers and installers of renewable energy technology (Reddy et al., 2020).Solar and wind energy are the most prevalent and accessible renewable energy sources, offering clean and greenhouse gas-free alternatives (Zhou et al., 2009).Pharmaceutical companies may integrate sustainable energy sources into their operations, particularly solar and wind energy. This may involve utilising solar power plants for building energy needs, implementing motion sensors to promote energy conservation, and adopting energy-efficient lighting fixtures. The relationship between REW and Profit Margin is significant.

H3A: A significant relationship exists between GHG and ROA.

Waste Management Disclosure: - Materials that are discarded and no longer serve their intended purpose are classified as waste. It may arise from obsolete commercial products or as a byproduct of manufacturing processes, existing in solid, liquid, or gaseous states (Mubaslat, 2021). The management of waste encompasses diverse methods and processes for identifying, regulating, and processing different types of refuse, spanning from generation to recycling.Waste management aims to create a framework referred to as the 3Rs (Reduce, Reuse, Recycle) to enhance environmental conservation and foster healthy communities. Waste reduction aims to minimise material costs and waste output, while reusing and recycling wasted resources for new or alternative applications is a key objective of this process (Polycarp, S. U. (2019).Effective waste management can enhance operational efficiency and reduce input costs, thereby positively influencing a company's profitability. Lean production techniques seek to minimise waste in all forms, thereby lowering costs and enhancing overallperformance.

The relationship between Total Waste and Profit Margin is significant.
The relationship between Total Waste and ROA is significant.

Water utilization disclosure: - Water consumption refers to the amount of water that is used and subsequently extracted from its original source. It is recognised as a significant threat, and sustainable standards emphasising efficient water management have been established (Ali et al., 2022). Ali et al. (2022) reported that the financial impact of water hazards in 2020 was significant, while the costs associated with mitigation were considerably lower than the potential financial

repercussions. Consequently, investors are increasingly focused on the disclosures companies make regarding the risks associated with water usage (Trausch et al., 2011). Effective water management can lead to improved asset utilisation, reduced operating costs, and enhanced risk management. This may positively influence financial metrics such as ROA. Businesses operating in regions with constrained water resources face increased operational risks, potentially adversely affecting their profitability and asset utilisation. Effective water risk management in businesses is associated with higher return on assets (ROA).Pharmaceutical companies committed to water sustainability disseminate information regarding their water management strategies and encourage both employees and clients to utilise water more efficiently.This study aims to assess the correlation between the financial performance of listed corporations and their disclosure of water sustainability practices.
The relationship between total water use and profit margin is significant.
The relationship between Total Water and ROA is significant.

2. RESEARCH METHODOLOGY

This research examines the impact of environmental performance determinants on the corporate financial performance of companies listed on the NSE pharma index for the period 2022 to 2024. The target population in this study was accessed using a purposive sampling technique. Nifty Pharma includes the following companies: Alkem Ltd., Aurobindo Pharma, Biocon, Cipla, Dr. Reddy's Labs, Lupin, Sun Pharma, Torrent Pharma, Zydus Life, and Divis Labs. The data collection will focus on pharmaceutical manufacturing companies in India that are listed on the NSE Pharma Index, which includes a total of 198 companies. From this group, 10 companies will be selected based on a measurement period of three years. The independent variables in this study include total greenhouse gases, total waste generated, total water consumption, and total renewable energy. The establishment of company profitability serves as the intervening variable. Return on assets, representing financial performance, is treated as a dependent variable in this study for analysing the company's performance. This study employed SEM-PLS for data analysis. This study employs the SEM approach, specifically for Path Analysis and Model Framing.

Measurement	Factor	Variable	Data Source
Firm Performance	Return on Assets(ROA)	Endogenous	Bloomberg Lab
Firm Performance	Profit Margin(PM)	Mediator	Bloomberg Lab
Environmental Factors	GHG	Independent (exogenous)	Bloomberg Lab
Environmental Factors	Renewable Energy(REW)	Independent (exogenous)	Bloomberg Lab
Environmental Factors	Total Waste(TW)	Independent (exogenous)	Bloomberg Lab
Environmental Factors	Total water Use (TWU)	Independent (exogenous)	Bloomberg Lab

❖ Measures

This study utilises Path Analysis to examine the interactions among GHG, REW, TWU, TW, PM, and ROA. Econometric models, also known as structural equation models, were developed early to account for economic measures. Endogenous variables derive their variability from sources internal to the model or from interactions with other variables within the model. This approach was chosen due to its capacity to manage non-normal data, address formative constructs, and test for mediation effects. Profit margin is calculated as “PM,” while adjusting for the exogenous factors TW, TWU, GHG, and REW, which subsequently influence the endogenous factor, ROA. Return on Assets (ROA) is influenced by Profit Margin (PM) variables, which mediate the relationship between environmental factors and ROA.The proposed SEM-PLS method demonstrates superiority over earlier studies that utilised linear regression, multiple regression, or multivariate regression analysis (Wasara et al., 2019).The former can illustrate intricate causal relationships involving mediation effects, thereby enhancing comprehension of the underlying processes. PLS-SEM offers a significant advantage by enabling the estimation of models with numerous indicators while effectively addressing issues associated with multicollinearity and non-normal data, commonly found in financial and environmental analyses. The present study employs a distinct approach by estimating mediation within the framework of SEM-PLS, contrasting with earlier studies that utilised F-tests, Hausman tests, or non-parametric techniques (Fang et al., 2019). This study examines the internal and external factors influencing environmentalism and resource mobilisation, as well as financial performance dynamics within the Indian cement industry. The findings contribute to both academic understanding and practical applications.

❖ PLS-SEM Analysis

The application of the PLS-SEM approach is concluded to be highly effective in the context of the presented data analysis in our research due to several significant features. Initially, it is important to outline that (Hair, Hult, Ringle, & Sarstedt, 2017; Henseler, Ringle, & Sinkovics, 2009).PLS-SEM is particularly appropriate for evaluating complex research models and for conducting causal-predictive research. This study presents a comprehensive research model comprising four components, from which six hypotheses are derived. This PLS-SEM analysis investigates the roles of environmental and financial factors in the Indian cement industry, employing the 'soft-modeling' approach (Wold et al., 1984; Richter, Sinkovics, Ringle, & Schlägel, 2016).

3. RESULTS AND DISCUSSION: -

❖ **Path Analysis :-**

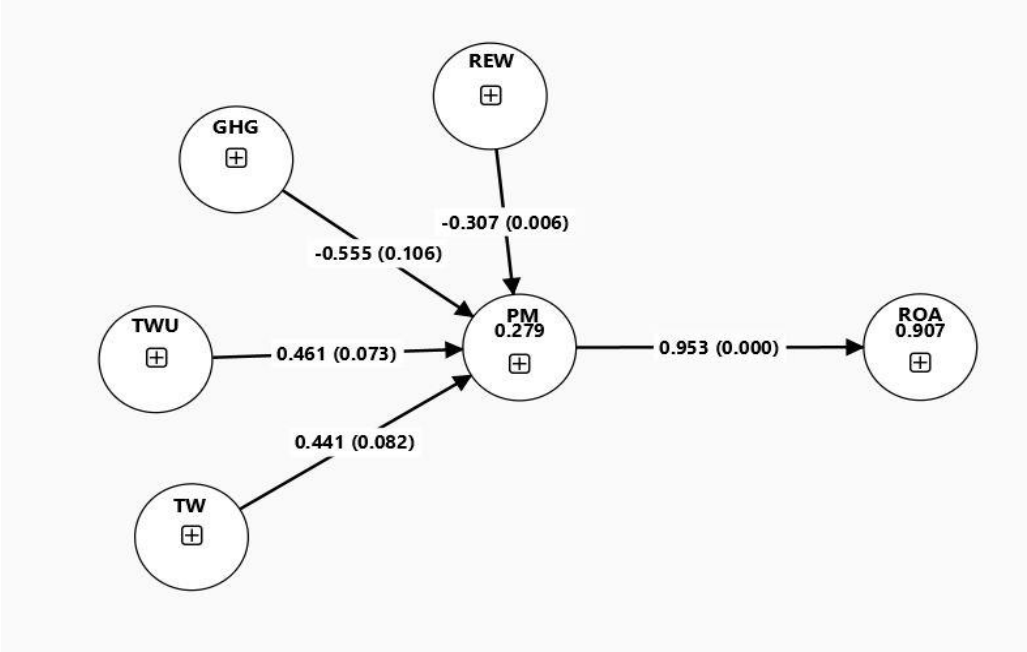

Table:2 Model Fit Indices: -

	Saturated model	Estimated model
SRMR	0.000	0.033
d_ULS	0.000	0.023
d_G	0.000	0.041
Chi-square	-0.000	6.367
NFI	1.000	0.964

Table 2 shows that the discrepancy measures for each developed model were lower compared to the corresponding estimated and saturated models derived from the reference distribution. This outcome supports the acceptance of all hypotheses, with none of the models being rejected at the 5% or 1% significance levels. Furthermore, a comprehensive bootstrapping analysis with 5,000 resamples yielded an SRMR value of 0.000. Since this value is well below the recommended threshold of 0.080, it indicates that the model exhibits a strong fit to the data.

Table 3: - VIF inner model

	GHG	PM	REW	ROA	TW	TWU
GHG		5.42				
PM				1.000		
REW		1.055				
ROA						
TW		3.597				
TWU		3.745				

Table 3 highlights the importance of identifying and addressing multicollinearity among all predictor constructs in the structural equation model to maintain the validity and reliability of the SEM outcomes. The Variance Inflation Factor (VIF) is a valuable tool for assessing collinearity. A VIF within the range of 3 to 5 suggests no collinearity concerns, while a VIF exceeding 10 indicates significant issues. In this study, no multicollinearity problems were observed.

Table 4: - Correlation Matrix

	GHG	TWU	REW	LTW	PM	ROA
GHG	1					
TWU	0.851583	1				
REW	-0.20238	-0.1178	1			
TWU	0.846813	0.757298	-0.17573	1		
PM	0.272523	0.357936	-0.32669	0.373408	1	
ROA	0.192071	0.264708	-0.23831	0.270855	0.95252	1

GHG and TWU: There is a substantial positive connection (0.8516), indicating that as As GHG increases, TWU also grows. The negative correlation between GHG and REW (-0.2024) suggests that higher GHG levels are associated with a decline in REW. TWU and PM share a moderate positive correlation (0.3579), indicating that they tend to rise together, albeit less strongly than the GHG-TWU relationship. PM and ROA, on the other hand, have a very strong positive correlation (0.9525), demonstrating a near one-to-one association where an increase in PM is closely mirrored by a rise in ROA. REW shows negative correlations with most other variables, such as -0.2383 with ROA and -0.3267 with PM, indicating an inverse relationship with these factors.

Table 5 :- R square Value

	R-square	R-square adjusted
PM	0.279	0.176
ROA	0.907	0.904

The findings in Table 3 reveal that the endogenous latent variables, Profit Margin (27.9%) and Return on Assets (90.7%), demonstrate moderate to strong predictive power within the sample.

Table 6:- Descriptives :-

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
GHG -> PM	-0.555	-0.528	0.445	1.247	0.106
GHG -> ROA	-0.529	-0.504	0.425	1.246	0.106
PM -> ROA	0.953	0.949	0.020	46.754	0.000
REW -> PM	-0.307	-0.294	0.122	2.512	0.006
REW -> ROA	-0.293	-0.279	0.117	2.511	0.006
TW -> PM	0.441	0.420	0.317	1.389	0.082
TW -> ROA	0.420	0.398	0.300	1.397	0.081
TWU -> PM	0.461	0.460	0.318	1.451	0.073
TWU -> ROA	0.439	0.440	0.304	1.443	0.074

Table 6 presents the statistical analysis results for various relationships among the variables (GHG, PM, ROA, REW, TW, and TWU). Each row outlines the relationship between two variables, with key indicators including the original sample (O), sample mean (M), standard deviation (STDEV), T-statistics, and P-values.

- **GHG to PM (-0.555, p = 0.106):** The relationship between GHG and PM is moderately negative (-0.555), but the p-value (0.106) suggests it is not statistically significant at the typical thresholds ($p < 0.05$ or 0.01).
- **GHG to ROA (-0.529, p = 0.106):** Similarly, GHG negatively impacts ROA, but this effect is also not statistically significant ($p = 0.106$).
- **PM to ROA (0.953, p = 0.000):** PM has a strong positive association with ROA (0.953), which is highly significant ($p < 0.001$), indicating that increases in PM are strongly linked to higher ROA.

- **PM to REW (-0.307, p = 0.006):** A significant negative relationship exists between PM and REW (p = 0.006), suggesting that increases in rewards (REW) are associated with a decrease in PM.
- **REW to ROA (-0.293, p = 0.006):** There is a significant inverse relationship between REW and ROA, indicating that higher incentives might negatively affect returns on assets.
- **TW to PM (0.441, p = 0.082):** TW shows a moderately positive correlation with PM (0.441), but this relationship is not statistically significant (p = 0.082).
- **TW to ROA (0.420, p = 0.081):** TW positively influences ROA, but the relationship is not statistically significant (p = 0.081).
- **TWU to PM (0.461, p = 0.073):** There is a positive association between TWU and PM, but it is not statistically significant (p = 0.073), potentially reflecting an underlying collaboration metric.
- **TWU to ROA (0.439, p = 0.074):** TWU also shows a positive relationship with ROA, but this effect is not statistically significant (p = 0.074).

Table 7: - Synopsis of Evidence Supporting the Study's Hypothesis

Hypothesis	Explanation	Relationship
H1	There is a relationship between GHG on Profit Margin	Yes
H1A	There is relationship between GHG on ROA is significant	Yes
H2	There is relationship between profit Margin on ROA is significant	No
H3	There is relationship between REW on Profit Margin is significant	No
H3A	There is relationship between REW on ROA is not significant	No
H4	There is relationship between Total Waste on Profit Margin is significant	Yes
H4A	There is relationship between Total waste on return on assets is significant	Yes
H5	There is relationship between Total water use on Profit Margin is significant	Yes
H5A	There is relationship between Total water use on ROA is significant	Yes

V. CONCLUSION

Environmental factors can significantly impact financial outcomes, such as return on assets (ROA), by influencing operational dynamics. While adopting renewable energy (REW) offers a pathway to improved sustainability, it may negatively affect business performance and profitability due to high upfront costs or inefficiencies in early-stage production. On the other hand, although the statistical significance of the findings remains limited, initiatives aimed at reducing waste and greenhouse gas emissions appear to have the potential to boost financial performance. This suggests a possible positive link between adopting environmentally friendly practices and achieving greater profitability, though definitive evidence is lacking.

To better understand how specific environmental factors influence long-term business performance, companies should develop strategic policies that align financial goals with environmental commitments. Further research in this area is crucial. For organizations to achieve positive impacts on profitability and overall success, they must implement comprehensive strategies that address both environmental sustainability and operational effectiveness. Designing such initiatives should focus on balancing environmental objectives with financial performance to ensure mutual reinforcement.

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