Does the Market Reward Corporate Environmentalism? Evidence from Indian IT Firms

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Abstract

Purpose : The information technology (IT) sector has been a prominent player in the Indian growth story by accelerating economic growth and advancing standards of living. The sector has reaped rich dividends during the pandemic, with the world transforming to digitalization at a frenzied pace. We cannot overlook the environmental effects of the IT sector, such as e-waste and excessive energy use, even in light of the general recognition of its contributions. Investigating how environmental management practices adoption impacts Indian IT companies' market valuation is the goal of this study.

Methodology : The impact of corporate environmentalism on firm performance is studied using three market valuation-based measures, namely Tobin's *q*, market-to-book value ratio, and excess valuation-to-sales ratio. Corporate environmentalism is measured using a count of environmental management practices (EMPs) along with firm-specific variables like age, advertising expenditure, research and development expenditure, firm size, sales growth, leverage, asset age, and multinational status. We built a unique dataset of 89 listed IT firms over 12 years, from 2008–2009 to 2021–2022. This study used both static and dynamic panel regression models as econometric tools to investigate how the adoption of EMP affects firm valuation.

Findings : The empirical findings demonstrated that two years after the deployment of EMPs, environmentally proactive enterprises saw increases in valuation, demonstrating that the market rewarded such firms. Additionally, we discovered that the firm's market valuation was significantly impacted by the size of the company and its advertising budget.

Practical Implications : The study has implications for management, regulators, and policymakers to promote environmental management as we find fresh evidence that "it pays to be green." The IT industry has a crucial position within our industrial ecosystem and possesses the potential to facilitate the integration of sustainable practices with sustainability-focused goods, bridging the gap between local and global contexts as well as connecting the present with the future.

Originality : This study focused on the IT industry in a developing country context by building a panel dataset of 89 Indian companies over a 12-year period. Unlike prior research, we built a comprehensive measure of environmental management and addressed endogeneity using static and dynamic panel regression.

Keywords : **environmental management, corporate environmentalism, firm valuation, information technology, India**

JEL Classification Codes : C33, Q51, Q56, L86

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The Indian economy opened up to the outside world 32 years ago when it allowed for globalization, privatization, and liberalization. India's remarkable tale of prosperity and resilience is characterized by

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strong growth rates, macroeconomic stability, and heightened consumer confidence. Despite global concerns about the emergence of new COVID variants, the Indian economy stands rock solid with a projected growth rate of 6.5% for FY 2024–2025, making it the fastest-growing economy in the world (International Monetary Fund, 2024). Nonetheless, this development has come at a price. Natural resources are becoming increasingly scarce due to the rapid population rise and extensive industrial expansion that has caused serious environmental damage. The Confederation of Indian Industry (2021) stated that the country's IT sector, which accounts for 9% of GDP, suffers a disproportionate amount from pollution-induced productivity loss, losing $1.3 billion, or 1%, of its sector value. Companies recognize that "business as usual" will be damaging and unsustainable in light of the escalating environmental issues.

As a result, environmental concerns have moved from being a side issue to a top priority on corporate agendas. Firms are evidently taking a large number of voluntary initiatives to align their economic and ecological interests (Kumar & Dua, 2022). Firms are adopting an increasing number of environmental management practices (EMPs) by setting formal environmental policies, strategies, objectives, and administrative procedures aimed at improving environmental responsiveness and reputation. Although optional in the Indian context, adopting EMPs involves financial considerations due to the limited resources available to businesses. The cost-benefit analysis of the environmental activities that they undertake is of special relevance to firms. Despite four decades of research on the financial impacts of corporate environmentalism, the results are competing and contradictory. This study concentrates on the relationship between financial performance and environmental management using data from the Indian IT sector. There are several reasons for this focus.

First, developed countries have conducted numerous studies on this premise (Konar & Cohen, 2001), exclusively focusing on the manufacturing sector (Hofmann et al., 2012; Zhu et al., 2013). Developing countries suffer from a lack of clear environmental regulations, poor follow-up mechanisms, underdeveloped capital markets, and a lack of data on environmental performance (Sarkar & Sarkar, 2012). This restricts the applicability of earlier studies to developing countries, particularly India. Second, although services do not directly affect the environment like manufacturing businesses do, their supply chain does indirectly affect the environment through energy use, carbon emissions, and waste production. In fact, India is the third-largest producer of e-waste in the world, with a recycling rate of only 1% (Ruiz, 2024). These facts justify additional research on the environmental effects of the IT sector.

Third, given the voluntary nature of corporate environmentalism in India, we do not use a single standard practice, like ISO 14001, to gauge a company's environmental performance. Instead, we provide a complete measure of environmental management through composite variables. Fourth, very few studies have considered the problem of endogeneity in analyzing the relationship between environmental management and firm performance (Endo, 2019). This paper presents a comprehensive study where we perform a static analysis and a dynamic panel data analysis. We use an extensive dataset of 89 listed IT companies. The time period under study spans 12 years, from 2009–2010 to 2020–2021. We use dynamic panel analysis to look at the relationship between environmental performance and financial performance using three market value-based measures: Tobin q[1], market-to-book value ratio[2], and excess valuation to sales ratio. We also look at the possibility of reverse causality.

[1] Lindenberg's and Ross (1981) introduced the concept of Tobin's q. They describe it as the ratio of a firm's market worth against the replacement cost of its physical assets. However, most literature citing 'Tobin's q' vary from this initial definition. The cited reason is the intangibility of assessing replacement costs (Gregory & Whittaker, 2013).

[2] In financial terms, market to book value (MBVR) equates to the product of equity shares with the closing share price at year end against equity book value plus reserves. Excess valuation to sales (EV/S) denotes excess market value over asset book value normalized by sales, unlike Tobin's Q MBVR or EV/S usage in emerging economies such as India remains uncomplicated since no adjustments are necessary.

Although EMPs might not show immediate financial benefits, results from static and dynamic panel estimates suggest that two years after adoption and implementation, they might boost firm valuation. Environmental pro-activeness can lead to reduced regulatory penalties, higher operational efficiency, a stronger competitive position, and enhanced goodwill for the firm. Even though the short-term effects of implementing EMPs on a company's valuation are relatively insignificant, the market rewards environmentally responsible businesses with higher valuations in the long run. The importance of encouraging environmental management practices is highlighted by the study's findings, which have important ramifications for management, regulators, and legislators. The assumption that environmental activities have a favorable impact on business valuation is supported by new evidence presented in this study. Moreover, the study identifies the IT sector as a potential "green champion," showcasing its capacity to lead by example in prioritizing sustainability. This sector's unique position enables it to drive environmental initiatives and serve as a catalyst for a more sustainable future.

Related Literature

A rising number of people are becoming interested in corporate environmentalism in recent years. Public awareness has increased as a result of growing environmental concerns, diminishing water supplies, and rising pollution levels (Tara & Singh, 2014). Furthermore, the presence of diverse workforces, heightened international trade, rapid technological advancements, and shifts in organizational structures have propelled environmental concerns to the forefront of the corporate agenda (Chakraborty & Biswas, 2020). Companies are typically reluctant to participate in environmental projects because of worries about the expenses and potential effects on financial performance, even though it is well-accepted how important it is to behave responsibly.

The vast literature on the linkage between environmental pro-activeness and firm performance presents a mixed bag of results. Friedman (1970) proposed that businesses should care only about making as much money as possible, and investment in environmental activities is a waste of the already limited resources at a firm's disposal (Jaggi & Freedman, 1992; Santhi et al., 2024; Wagner et al., 2002). Allet and Hudon (2015) and Forcella and Hudon (2016) conducted research that suggested no association between a firm's environmental performance and its financial performance. The main contention is that organizations that can sustain their financial viability are the only ones that can afford to dedicate substantial resources to environmental priorities. Some green management solutions, such as the provision of non-financial environmental services and green microcredit, have greater upfront costs.

On the contrary, Porter's "win-win" thesis asserts that improved environmental performance results in greater economic benefits through decreased costs and increased profits (Porter, 1991; Porter & Van der Linde, 1995). Fujii et al. (2013) investigated the correlation between environmental performance and economic performance in Japan's industrial sector. The results show that a company's financial results are positively impacted by its environmental performance, as measured by its CO2 emissions. Other investigators (Konar & Cohen, 2001) have reported similar findings. Fraj et al. (2015) contended that adopting environmental consciousness can yield competitive advantages in terms of cost. This can be achieved by reducing emissions, improving resource productivity and creativity, and enhancing social legitimacy and brand value. Adoption of responsible environmental behavior not only allows organizations to address their social corporate responsibility but also provides them with advantages in terms of competitive advantage, market performance, and financial performance (Bıçakcıoğlu, 2018; Liu et al., 2015). Charumathi and Ramesh (2017) studied the market valuation implications of corporate social and environmental reporting trends among non-financial companies in India. The research indicates that the introduction of business responsibility reporting has led to a significant rise in the quantity of social and environmental data provided, which has enhanced market valuation.

Furthermore, some studies have failed to gather any significant linkage between environmental and financial

performance. Under static panel analysis, Endo (2019) found that corporate environmental performance had a positive impact on firm performance in the Japanese manufacturing sector. However, when using dynamic panel data models, this relationship becomes insignificant, leading to the observation that using static panel models might lead to premature conclusions in this domain. Other empirical studies (Böhringer et al., 2012; Duque-Grisales et al., 2020; Iraldo et al., 2009) have reported similar results.

Despite the widely held belief that a company benefits from improved environmental practices, existing research presents conflicting and competing findings. This study aims to revisit the relationship between environmental and financial performance, focusing on the immediate and long-term impacts of EMPs to provide new insights into corporate environmentalism. Our study focuses on a significant service industry in a developing country environment, which may increase the applicability of our findings to other developing countries. This contrasts with most previous research, which concentrates on the manufacturing sector in rich countries. Furthermore, recognizing firms' flexibility in choosing environmental practices, we construct a comprehensive measure of environmental management using composite variables rather than a single standard practice like ISO 14001 (Kumar & Dua, 2022). Previous empirical studies on the link between environmental and financial performance have yielded contradictory results, often due to model misspecification and/or limited data availability (Elsayed & Paton, 2005; Lin et al., 2019). We employ a dynamic panel data model to address endogeneity in the environmental-financial link and longitudinal data to account for firm variations in order to address these issues (Elsayed & Paton, 2005; Endo, 2019). In the environmental-financial link, a dynamic panel data analysis successfully regulates endogeneity and reverses causation. The generalized method of moments (GMM) is utilized in this study to account for endogeneity in the financial and environmental linkages of the organization.

Conceptual Framework

This research seeks to examine the impact of environmental management on the extended profitability of IT companies in India. Current studies use accounting-based performance indicators. These indicators, including return on assets[3] (ROA) and return on equity (ROE), are commonly known as ROE. Accounting-based measures, while useful in assessing how managerial actions impact firm performance, lack the ability to predict future profits. Historical asset costs are used in accounting measurements, which are based on the company's past performance.

Moreover, they do not account for inflation or the value of intangible assets. Because of this, their ability to forecast the future is relatively limited (Cochran & Wood, 1984). Performance metrics derived from market value, on the other hand, provide an outlook and reveal information about a company's long-term profitability. Market-based measurements take into account both market and non-market information, providing a more complete picture of a company's success than accounting measures, which only take into account previous data (Lubatkin & Shrieves, 1986).

Consequently, we hypothesize that businesses that use environmental management techniques boost market valuation by sending out good signals to the marketplace. Accordingly, we propose:

↳ **H1 :** Adoption of EMPs has a positive impact on the market valuation of a firm.

Tobin's *q*, market-to-book value ratio (MBVR), and excess valuation-to-sales (EVS) ratio are the three market-value-based indicators that we use to evaluate a company's overall financial performance.

[3] Return on assets is defined as the ratio of net income to total assets and the ratio of net income to shareholders' equity is known as return on equity.

To assess the H1 using Tobin's *q*, we use the following regression model in accordance with Konar and Cohen (2001). Equation 1 measures the impact of various factors on the intangible asset value of the firm.

$$\text{Tobin's } q = \beta_0 + \beta_1 EMP_{it} + \beta_2 FV_{it} + \varepsilon_i \qquad (1)$$

where, EMP_{it} is the sum of environmental practices in period *i* in firm *t* and *FV* represents firm-specific non-environmental variables in period *i* in firm *t*.

Determining the value of a company through Tobin's *q* poses challenges in developing countries like India, where capital markets are underdeveloped and data on the market value of debt and asset replacement costs is not available (Sarkar & Sarkar, 2012). Additionally, this statistic is also susceptible to omitted variable bias. Consequently, we employ MBVR as a substitute for firm valuation. Based on the Ohlson (1995) model, we assess the market value of equity by taking into account the stock's book value, financial performance, and environmental performance (Gregory & Whittaker, 2013; Kumar & Shetty, 2018). Unlike Tobin *q*, when using MBVR, no computational adjustments are required. The appropriate regression equation is as follows:

$$\frac{MV}{BV} = \beta_0 + \beta_1 \frac{1}{BV} + \beta_2 \frac{NI}{BV} \beta_3 EMP_{it} + \beta_4 FV_{it} + \varepsilon_{it} \qquad (2)$$

MV stands for market value of equity. *BV* signifies book value. *NI* represents net income. EMP_{it} is the sum of environmental practices within a certain period in a specific firm. FV denotes non-environmental variables in the same time frame for the same firm.

The excess valuation to sales (EV/S) ratio, the third method employed in our research for valuing companies, serves as a gauge of a company's potential for long-term wealth generation. This ratio is useful for determining the premium or discount that the market assigns to a company based on its future prospects. Moreover, the EV/S ratio takes into consideration differences in size and leverage among countries (Galbraith & Stiles, 2008; Thomadakis, 1977).

The appropriate regression model is as follows:

$$\frac{EVS}{S} = \beta_0 + \beta_1 EMP_{it} + \beta_2 FV_{it} + \varepsilon_i \qquad (3)$$

where, EMP_{it} is the sum of environmental practices in period *i* in firm *t* and *FV* represents firm-specific non-environmental variables in period *i* in firm *t*.

Data and Methodology

Sample

The study investigates corporate environmentalism in IT firms in India. To investigate the effect of EMPs on market valuation, we collected data from 89 publicly traded IT companies. We limited our analysis to a subset of businesses whose group membership did not change over time. Businesses that merged or closed their doors during this period were excluded.

Time Period

In order to trace the impact of environmental management on firm valuation, we constructed a panel database

covering a 12-year period from 2008–2009 to 2021–2022. We considered this period as business models and processes have seen a major transformation post-prime crisis. We gathered information primarily from secondary sources.

Sources of Data

In this analysis, we used secondary data to look at how adoption impacts a company's performance. For details on environmental initiatives at the corporate level, we combed through sustainability reports and corporate responsibility reports of businesses. Data used for the independent variables came from the CMIE Prowess database, corporate social responsibility reports, and audited annual reports from businesses.

Variables

The dependent variable in our study is firm valuation, which is determined using three market-based measures (Tobin's *q*, MBVR, and EVS ratio). Corporate environmentalism is measured by the number of EMPs adopted by a firm. It is a useful measure for exploring the varying degrees to which different businesses have adopted environmental management strategies (Singh et al., 2015). Table 1 provides a description of the environmental practices.

Several control variables are incorporated to limit the possibility of model distortion and to account for probable factors that may influence the relationship between financial performance and environmental factors at the entity level. Firm-specific variables used in the study are firm size, R and D intensity, advertising intensity, asset age, multinational status, sales growth, and firm age.

The environmental relationship is influenced by firm size, which is particularly significant because of the potential for economies of scale in greener initiatives. The degree of social responsibility displayed by smaller businesses might not match that of larger ones (Waddock & Graves, 1997). Larger companies also face greater scrutiny from the public, which may incentivize them to enhance their environmental performance (Behal & Uppal, 2023; Fombrun & Shanley, 1990). The sales-to-assets ratio serves as a fundamental parameter for assessing firm size.

As control variables, we then include R and D intensity (research and development expenses as a percentage of sales) and advertising intensity (advertising spend divided by sales). Due to the fact that advertising and research and development expenditures can encourage the inclusion of environmentally friendly features in products and inform consumers about the advantages of eco-friendly goods, these variables can be used as a stand-in for business innovation. Additionally, they can help companies differentiate themselves from competitors in the

Table 1. ***Descriptive Statistics of Environmental Practices***

Variables	Measurement (YES = 1 NO = 0)	Mean	*SD*
GRI	The organization publishes sustainability reports certified by GRI.	0.132	0.338
ISO 14001	The organization is ISO 14001 certified.	0.537	0.499
Green Buildings	The organization uses green buildings, which are BEE/LEED certified.	0.103	0.304
CDM	The firm is running CDM projects.	0.110	0.314
CDP	The firm is part of CDP.	0.285	0.452
Envt. exp.	The firm is incurring environmental expenditure.	0.107	0.309

Note. *GRI :* Global Reporting Initiative ; *CDM :* Clean Development Mechanism ; *CDP :* Carbon Disclosure Project ; *Envt. exp :* Environmental expenditure.

Table 2. ***Control Variables Used in the Study***

Variables	Meaning	Measurement
ADV	Advertising intensity	Ratio of advertising expenditure to sales.
RD	R and D intensity	The ratio of research and development expenditure to sales.
GS	Growth of sales	$Sales_t - Sales_{t-1} / Sales_{t-1} * 100$.
LEV	Leverage	Long-term debt to total assets ratio.
MNC	Multinational status	Value of 1 in the case of an MNC; else, 0.
Assetage	Age of a firm's assets	Net fixed assets/Total assets.
Sales/Asset	Sales asset ratio	Net sales/Total assets.
AGE	Age of firm	Number of years since incorporation.

Table 3. ***Correlation Matrix***

	EMP	*RD*	*LEV*	*Salesasset*	*Assetage*	*SG*	*ADV*	*AGE*	*MNC*	*1/BV*	*NI/BV*
EMP	1										
RD	0.115***	1									
LEV	–0.0931**	–0.125***	1								
Salesasset	0.0452	–0.00256	0.191***	1							
Assetage	0.158***	–0.00921	0.217***	0.141***	1						
SG	–0.0298	–0.0127	–0.0139	–0.0259	–0.0453	1					
ADV	0.0276	–0.00951	0.122***	0.178***	0.0679*	–0.0130	1				
AGE	0.119***	0.0809*	0.0375	0.0512	0.0671*	–0.0433	0.311***	1			
MNC	0.343***	0.335***	0.128***	0.0728*	0.00209	–0.0281	0.149***	0.0315	1		
1/BV	–0.00927	–0.0137	–0.0163	0.00172	–0.0133	–0.00131	–0.0178	0.0465	–0.0300	1	
NI/BV	0.0952**	0.0445	–0.0286	0.129***	0.00175	–0.00195	0.134***	0.0103	0.152***	0.0238	1

*$p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Note. *EMP* = Total environmental management practices adopted by firm, *RD* = RandD intensity, *Lev* = Leverage, *Assetage* = Ratio of net fixed assets to total assets, *SG* = Sales growth, *ADV* = Advertising intensity, *Age* = Number of years since firm's inception, *MNC* = Multinational corporation, *1/BV* = 1/Book value, *NI/BV* = Net income/ Book value.

market (McWilliams & Siegel, 2000). To assess a company's vulnerability, we consider the debt-equity ratio (Waddock & Graves, 1997). Companies with a high debt-equity ratio are expected to have a lower market value (Kumar & Shetty, 2018). The ratio of net fixed assets to total assets, or asset age, is another metric we assess. Companies relying on outdated machinery and software may face a competitive disadvantage (Konar & Cohen, 2001; Russo & Fouts, 1997). Firm age, or the number of years a company has been in operation, serves as another control variable. The age of a company, or its stage in its lifecycle, can influence its profitability (Hanks et al., 1993). Multinational corporation (MNC) status is associated with access to better technology and finances and is assumed to lead to better financial performance (Kumar & Shetty, 2018). Finally, we consider sales growth (SG) as a predictor of future growth prospects, which positively influences a company's value (Konar & Cohen, 2001). Table 2 presents a summary of all control variables, while Table 3 provides the correlation matrix.

Econometric Estimation

This paper applies two econometric measures to understand EMPs adoption's influence on firm valuation. To

prove hypothesis 1, the first step involves using a static regression model. Static models are beneficial because they help manage the unobserved heterogeneity that is specific to firms or particular periods. Next, potential biases associated with endogeneity are controlled through a dynamic regression model. We run both models in STATA 16. Both the random effects model and the fixed effects model are calculated using the static panel least squares estimation method. The Hausman test is used for testing the consistency of random effects, vis-à-vis the fixed effect model (Wooldridge, 2010). The Hausman test statistics reject the null hypothesis, and the fixed effect model is chosen in Table 4.

Table 4. ***Impact of EMPs on Market Valuation (Dependent Variable : Tobin's q, EV/S, and MBVR)***

	Tobin's *q*		***EV/S***		***MBVR***	
	Fixed Effects	**Dynamic Effects**	**Fixed Effects**	**Dynamic Effects**	**Fixed Effects**	**Dynamic Effects**
L1.DV	-----	0.146	------	0.456	------	0.212*
		(0.241)		(0.100)		(0.713)
L2.DV	------	0.159	------	–0.0224	------	0.205*
		(0.231)		(0.0288)		(0.260)
1/BV	-----	-----	-----	-----	6.528*	3.59*
					(4.404)	(2.273)
NI/BV	------	------	------	------	4.396*	1.283*
					(6.690)	(3.266)
EMP	0.0625	0.0191	0.171	0.0580	0.1686	0.432
	(0.221)	(0.0475)	(0.313)	(0.198)	(1.978)	(0.593)
L1.EMP	0.0264	0.0589	–0.100	0.0184	–0.282	0.00475
	(0.0848)	(0.0825)	(0.0759)	(0.193)	(0.288)	(0.352)
L2.EMP	0.391**	0.251***	0.361*	1.75***	1.178**	1.551*
	(0.202)	(0.270)	(0.176)	(0.478)	(0.501)	(0.861)
RD	0.0231	0.0982	0.622	0.384	–0.0336	0.0555
	(0.0548)	(0.111)	(0.785)	(0.196)	(0.0547)	(0.129)
ADV	1.547*	1.688**	1.329**	1.4379*	1.250***	1.313*
	(15.67)	(11.27)	(22.10)	(27.83)	(39.22)	(25.17)
LEV	–0.00956	–0.0125	–0.216	–0.206*	0.204	0.0499
	(0.0217)	(0.0171)	(0.267)	(0.122)	(0.272)	(0.119)
Sales/asset	0.260**	0.392**	0.224*	0.0247*	1.403**	2.306**
	(0.337)	(0.307)	(0.262)	(1.185)	(3.263)	(1.960)
Assetage	–0.702	–0.1067	–0.4608	–0.3272	–0.2202	–0.3706*
	(1.217)	(0.815)	(3.454)	(3.372)	(3.448)	(2.151)
SG	–0.000263	0.0013	–0.000120	0.001	–0.00356	0.0011
	(0.000919)	(0.0214)	(0.000614)	(0.0200)	(0.00309)	(0.0201)
MNC	–0.295	–0.0438	–0.269	–0.0556	–0.2704	–0.465
	(0.322)	(0.166)	(0.320)	(0.663)	(1.962)	(0.412)
AGE	–0.00724	–0.0108	–0.00892	0.00208	–0.0305	0.0117*
	(0.724)	(0.00721)	(0.0119)	(0.00721)	(0.0190)	(0.00689)

Hausman test statistics	75.46***	------	17.13**	------	13.72***	-----
Industry effects	Y	Y	Y	Y	Y	Y
Constant	1.796***	0.716	4.125***	0.0430	1.582	1.284
	(0.613)	(0.804)	(1.029)	(2.229)	(3.116)	(3.264)
Sargan test statistics	-----	15.88	------	17.40	------	25.20
AR(1)	-----	1.493	------	0.8279	------	1.221
AR(2)	-----	0.8501	------	0.7794	------	0.678
Observations	430	318	422	318	430	318
Number of companies	120	117	120	117	120	117

Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Note. *DV* = dependent variable, *EMP* = total environmental management practices adopted by firm, *RD* = RandD intensity, *Lev* = Leverage, *Assetage* = ratio of net fixed assets to total assets, *SG* = Sales growth, *ADV* = Advertising intensity, *Age* = number of years since firm's inception, *MNC* = Multinational Corporation, *1/BV* = 1/Book value, *NI/BV* = Net income/ Book value.

The endogeneity of explanatory variables in the regression model can affect our statistical estimate in addition to heterogeneity. The most efficient way to control for endogeneity is to use a dynamic panel regression. Following Arellano and Bond (1991), we control for the potential endogeneity of all explanatory variables using GMM estimation. This methodology demonstrates efficacy when applied within short periods of time, comprising significant individual units. The Arellano–Bond estimator controls for potential endogeneity by setting up a GMM estimation to deploy additional instruments obtained by orthogonality conditions existing between the lagged value of the dependent variable and differenced disturbances (Baum et al., 2003). The GMM estimation technique's efficacy is determined by the effectiveness of the instruments used and the absence of correlation between the error components. As such, we employ the Arellano–Bond test to verify first- and second-order autocorrelation in the first differenced errors and the Sargan test, which is based on the entire Arellano and Bond (1991) instrument set, to test the over-identifying conditions. The Sargan test results provide an indication of the suitability of the instruments employed in our dynamic regression model. The values of AR(1) and AR(2) indicate that there is no serial correlation among the errors, as shown in Table 4.

The outcomes of the dynamic panel regression and the static fixed effects support hypothesis H1. They demonstrate how implementing EMPs increases a company's worth in a way that is both statistically and positively significant. Specifically, after two years of EMP adoption, there has been a notable increase in firm valuation metrics (Table 4). The firm's Tobin *q* increases by 0.39 units in the static model and by 0.25 units in the dynamic model with each additional EMP it adopts in time period *t*. Therefore, hypothesis H1 is accepted. These findings align with prior research that has demonstrated the positive impact of environmental activism on firm valuation metrics (Dua & Kumar, 2023). With the additional EMP the company deployed, static EV/S increased by 0.36 units and dynamic EV/S by 1.75 units. The statistically significant and positive correlation between EMP and EV/S indicates that investors are attracted to environmentally conscious enterprises because they offer above-average profits and the potential for long-term wealth development (Cochran & Wood, 1984; Khanna & Damon, 1999). Furthermore, both static and dynamic MBVR increase by 1.178 and 1.551 units, respectively, after two years of EMP implementation. This indicates that companies adopting a wider array of environmentally sound policies are perceived to have lower volatility compared to their competitors, making them a more attractive

investment option (Gregory & Whittaker, 2013; Gupta et al., 2022; Kumar & Shetty, 2018).

Our research reveals that it takes approximately two years for the market to begin reflecting the benefits of EMPs. Implementing new environmental strategies often requires significant organizational reorganization and restructuring, leading to a delay in realizing the benefits of environmental management (Hart & Ahuja, 1996). Companies with surplus funds tend to utilize them to enhance profits and stock prices by capitalizing on market investment opportunities (Waddock & Graves, 1997; Wagner, 2010). An increase in advertising intensity has a beneficial effect on a firm's financial success, according to both static and dynamic panel assessments. In static analysis, a one-unit increase in advertising intensity results in a corresponding increase of 1.547 Tobin's *q* units, 1.329 EV/S units, and 1.250 MBVR units. Similarly, in dynamic analysis, the corresponding increase is 1.688 Tobin's *q* units, 1.437 EV/S units, and 1.313 MBVR units. Businesses that care about the environment convey to the market that there is good growth potential in the industry through their advertising campaigns. A significant number of consumers have expressed a preference for engaging with companies that exhibit environmental leadership (Konar & Cohen, 2001; McWilliams & Siegel, 2001). Additionally, our research underscores that previous performance positively impacts current market valuation, as supported by the MBVR. Investors frequently use historical data to shape their evaluation of a company's future worth.

Conclusion

Adopting sustainable business models is critical, and the IT industry—which includes hardware, software, and services—is in a unique position to lead this effort. With its innovative technologies and widespread influence, the IT sector can play a pivotal role in driving sustainable practices and addressing environmental challenges. This research aims to provide new insights into the subject of "whether it pays to be green" from the standpoint of a developing country. The empirical findings indicate that after two years of implementing EMPs, IT companies are more highly valued by the market, proving that the market rewards environmentally proactive firms. Furthermore, the findings of this research have significant theoretical, managerial, and policy implications.

Implications

Theoretical Implications

This study makes a significant contribution to the existing literature by offering new insights into the relationship between environmental factors and financial performance, especially within the context of a developing country. Implementing environmental management practices necessitates a comprehensive evaluation of how a company's products, procedures, and other activities may impact the environment. Environmental proactiveness improves a company's reputation and goodwill in the market, which raises the company's valuation. It also ensures regulatory compliance and reduces expenses, waste, and pollution, all of which improve operational efficiency. The long-term advantages of environmental management, according to our research, exceed the initial expenditures, even if they may be substantial. The study expands on our knowledge of the long-term effects of EMPs on firm valuation by utilizing dynamic panel data analysis and taking into account many control variables. Additionally, it clarifies how different businesses handle the environment, offering insightful information about corporate environmentalism.

Policy and Managerial Implications

Policymakers and management should both take note of the study's conclusions. Regulators can use this data to support laws that encourage and simplify corporate environmental management. Our policymakers must recognize that solely relying on a "command and control" approach and subsidies may not suffice unless businesses grasp the "costs" and "benefits" of green investments. Policymakers can promote sustainability and environmental responsibility by encouraging increased adoption of green practices across businesses through the establishment of supportive regulatory frameworks. Policymakers must provide businesses with strong incentives to emphasize voluntary environmentalism in light of India's weak institutional capability, absence of environmental data, and historical difficulties with regulatory enforcement. We should prioritize and incentivize strengthening mechanisms for enforcing existing environmental laws and encouraging voluntary reporting on compliance status. Incentives such as tax breaks, grants, or recognition programs can motivate businesses to proactively engage in environmental compliance and reporting, leading to improved environmental outcomes and greater accountability within the business community.

On the managerial front, fostering an environment conducive to innovation and research is essential for facilitating a smooth transition to environmental management. Managers should strive to create an innovative and research-friendly atmosphere within their organizations. By harnessing and leveraging "green capabilities," firms can gain a sustainable competitive advantage over their competitors. Corporate managers must recognize the potential of green investment. Despite short-term costs, such investments contribute to long-term market resilience and standing, as indicated by our results.

Limitations of the Study and Scope for Further Research

Despite its usefulness, this research has some limitations. First, there is a lack of comprehensive environmental performance statistics, which makes it challenging to evaluate the efficiency of current environmental practices. Second, the dataset only includes publicly traded Indian IT companies, which may limit the applicability of our results to smaller and privately held businesses. To provide a more comprehensive understanding, future studies could investigate corporate environmentalism in these firms. Additionally, conducting cross-country comparisons could offer deeper insights into the nature and variation of environmental practices adopted by global IT firms.

Authors' Contribution

Dr. Pritika Dua and Dr. Neha Nainwal collaborated closely on this research project. Dr. Pritika Dua took the lead on conceptualizing the study, designing both qualitative and quantitative aspects, as well as conducting numerical computations using Stata 16. Dr. Neha Nainwal played a significant role in gathering relevant research papers, conducting the literature review, and assisting with dataset preparation. Additionally, both authors worked together on writing the manuscript, with Dr. Pritika Dua taking the lead and Dr. Neha Nainwal providing consultation and support as the second author.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest, or non-financial interest in the subject matter or materials discussed in this manuscript.

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