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Company Specific Determinants of Adopting Internal Carbon Pricing As Carbon Management Strategy

R. Desai[a], A. Raval[b], N. Baser[c], D. Saraf[d]
[a, c] Pandit Deendayal Energy University, Gandhinagar, Gujarat, India;
[b, d] Nirma University, Ahmedabad, Gujarat, India

ABSTRACT

Environmental sustainability and climate change have been considered as two of the burning issues across the globe and require an inclusive approach to manage the same. Regulators and policymakers are constantly pressurizing business corporations to adopt emission management practices to control their carbon footprint. To respond to this, corporate houses have progressively institutionalized internal carbon pricing (ICP) as a climate management strategy to control carbon footprints in operations and business models. The **purpose** of the study is to examine the firm-specific determinants of adopting ICP among companies operating in an emerging economy context. Current research takes a three-dimensional look at the reasons behind the use of ICP by combining factors related to finances, corporate governance, and the environment. Using panel data from 107 firms for 10 years (2013–2022), the study employs binary logistic regression analysis. Further, the study also uses the generalized method of moments (GMM) to control for potential endogeneity. Findings indicate that profitability, firm size, leverage, board size, and environmental sensitivity are the significant factors affecting the adoption of ICP among the sample firms. Further, the results also depict that even though the number of firms using ICP has increased, the current mean adoption rate is only 23%. The present study contributes to the scarce literature on carbon management practices in emerging contexts and describes several important implications for managers and policymakers.

Keywords: internal carbon pricing; sustainability; determinants; carbon management

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ОРИГИНАЛЬНАЯ СТАТЬЯ

Детерминанты принятия внутреннего углеродного ценообразования в качестве стратегии управления выбросами углерода, зависящие от конкретной компании

Р. Десаи[a], А. Равал[b], Н. Басер[c], Д. Сараф[d]
[a, c] Энергетический университет имени Пандита Диндаяла, Гандхинагар, Гуджарат, Индия;
[b, d] Университет Нирма, Ахмадабад, Гуджарат, Индия

АННОТАЦИЯ

Экологическая устойчивость и изменение климата считаются одной из актуальных проблем во всем мире и требуют комплексного подхода к их решению. Регуляторы и политики постоянно оказывают давление на бизнес-корпорации, требуя от них внедрения методов управления выбросами для контроля за углеродным следом. В ответ на это корпорации постепенно институционализируют внутреннее углеродное ценообразование (ICP) в качестве стратегии управления климатом для контроля углеродного следа в операциях и бизнес-моделях. **Цель** исследования — изучить специфические для каждой компании факторы, определяющие принятие ICP среди компаний, работающих в условиях развивающейся экономики. В настоящем исследовании применяется трехмерный подход, объединяющий финансовые факторы, факторы корпоративного управления и факторы, связанные с окружающей средой, которые объясняют принятие ICP. Используя панельные данные 107 фирм за 10 лет (2013–2022 гг.), в исследовании применяется бинарный логистический регрессионный анализ. Кроме того, используется обобщенный метод моментов (GMM)

для контроля потенциальной эндогенности. Результаты показывают, что прибыльность, размер компании, леверидж, размер совета директоров и чувствительность к окружающей среде являются значимыми факторами, влияющими на принятие ICP среди компаний выборки. Кроме того, результаты свидетельствуют о том, что, несмотря на увеличение числа фирм, использующих ICP, средний уровень внедрения составляет всего 23%. Настоящее исследование вносит вклад в скудную литературу по практике управления выбросами углерода в развивающихся странах и описывает ряд важных последствий для менеджеров и политиков.

Ключевые слова: внутреннее углеродное ценообразование; устойчивость; детерминанты; управление выбросами углерода

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INTRODUCTION

Climate change and its effects are posing an alarming situation for regulators, international bodies, and the whole of humankind to address this issue with utmost urgency. The emission of greenhouse gases such as carbon dioxide (CO_2) is connected to hazardous anthropogenic interference with the climate system (UNFCCC, 1992). One of the prominent causes for such deteriorating environmental conditions is the emission of CO_2 by economic entities.[1] Provided this, the regulators and policymakers are forcing firms to examine business operations from the environmental and social perspective rather than focusing on only the financial viewpoint [1]. Further, stakeholders (including investors) are also pressurizing corporate houses to consider the environmental effects of present economic activities as well as prospects to better gauge the liability arising from substandard environmental performance. To respond to this, business firms across the globe are switching to low-carbon technologies and green business practices. However, such a paradigm shift requires huge financial outlay in research and development of new technology as well as in the implementation of the same. Further, the intention to adopt a carbon reduction strategy also depends upon the regulatory setting in which the company is operating [2]. In developing countries like India, the regulatory framework to control CO_2 emissions is impaled with gaps and contradictions [3]. In such a situation, economic considerations such as cost-benefit analysis [4] and shareholders' pressure are the important factors shaping the carbon management strategy of firms [5]. Among various emission management approaches like lowering process emissions, reducing emission combustion, and emission trading [6], internal carbon pricing (ICP) has gained larger acceptance among business organizations [7]. Carbon pricing has been adopted as a market-driven instrument in several countries and regions for slicing down CO_2 emissions and coping with climate change [8]. Adoption of ICP can be operationalized and reported using three varied approaches: (i) a shadow price; (ii) an implicit price; and (iii) an internal carbon fee [9]. A shadow price represents the theoretical value assigned to CO_2 emission which assists in selecting low emitting projects [10], whereas the implicit price method considers the financial resources deployed by firms to mitigate the regulatory obligation of reducing CO_2 emission and/or complying with the same.[2] Further, internal carbon fees measure every ton of CO_2 emission in monetary terms by assigning a specific value to it and consider the same in the project evaluation [11].

The united commitment of policy makers, stakeholders, and corporate firms towards the climate impact of business operations has grabbed the attention of academicians and scholars. In the recent past, scientific research output focusing on CO_2 emission and business perspectives has grown exponentially. Extant literature has primarily examined the linkage of CO_2 emission with firm performance [12, 13] and cost of capital [14, 15], investor reaction to CO_2 related announcements [16], and disclosure of CO_2 emission [17, 18]. However, very few studies have explored the concept of carbon management practices, especially through ICP [19–21]. As mentioned above, companies operating in emerging economies do not have any direct regulatory pressure to reduce CO_2 emission or to strategize their carbon management. Hence, it is important to study the determinants that motivate the firms to voluntarily adopt ICP as carbon management policy. Further, climate change regulations differ across various nations and therefore, more country-specific studies can provide better insights to managers to plan their emission reduction strategies [22]. Present research aims to fill these gaps by analysing the firm-specific determinants

[1] CDP India Annual Report. Climate and Business — Partnership of the Future, 2020; CDP India, New Delhi (accessed on 15.10.2023).

[2] CDP: The Carbon Majors Database: CDP Carbon Majors Report 2017, Carbon Disclosure Project, July, https://www.cdp.net (accessed on 22.10.2023).

of ICP adoption in the context of one of the largest developing economies, India. The study purports to provide comprehensive verdicts by integrating a group of factors from financial, corporate governance, and environmental perspective.

The remaining structure the article as follows. Section 2 presents the review of extant literature and derives the conceptual model of ICP adoption. Section 3 presents the research methodology followed by section 4 which comprises of data analysis. Section 5 describes the implications of research and section 6 covers the conclusion along with future scope.

REVIEW OF LITERATURE AND HYPOTHESIS DEVELOPMENT

The adoption of ICP and other carbon management practices is a function of firm-specific characteristics in terms of finance, governance, and industry related factors. However, the extant literature on the specific adoption of ICP is scant; hence, the present study comprehends the literature on the firms' decision to adopt carbon management in general and disclosure of CO_2 emissions.

Financial Factors and Adoption of ICP

Adoption of environmental practices requires investment in low-polluting technologies, which necessitates the availability of funds to business firms [23]. Hence, profitable firms are expected to have positive relation with adoption of carbon management strategy as they have enough funds to deploy for investments [24]. A past study has supported the positive impact of ROA on firms' adoption of ICP by considering data from 2013 to 2017 across Europe, North America and Aisa [21]. Besides, the asset size of the firm is another important factor affecting the adoption of emission management policy [25]. According to the study from [26], investors and regulators closely inspect large firms due to high stakes involved, which forces such companies to be more responsive. The study conducts event study and find significant stock response. Hence, firms with large asset base are expected to be more proactive in responding the needs of various stakeholders [27]. Therefore, asset size is expected to have a positive impact on adoption of the ICP strategy. Leverage, represented by debt ratio, is yet another important factor affecting the disclosure and management of carbon emissions [8, 9]. Banks are gradually considering climate risk as an important factor in evaluation of firm for lending decision and concentrate investments in projects with low-polluting results [28]. Hence, firm with high leverage may adopt ICP more intensively than low levered companies.

H_1: Profitability has a significant positive impact on the adoption of ICP.

H_2: Firm size has a significant positive impact on the adoption of ICP.

H_3: Debt financing positively affect the adoption of ICP.

Corporate Governance Factors and Adoption of ICP

Governance variables in terms of board composition and independence can affect the propensity to disclose and subsequent adoption of carbon management policy. A past study indicated positive relationship between corporate governance and environmental management strategies [29]. Another research work from [30] has also emphasized that governance factors such as board size, board composition, and ownership structure affect adoption and implementation of the ICP. The study considered two data sets of nonfinancial firms incorporated in the FTSE ALL-Share index over the period 2005-2011. A high proportion of outside (independent) members on board positively affects the adoption of emission management strategies [31]. Further, separating the role of CEO and chairman also improves the odds of ICP adoption, as distinct functions enables CEO to better concentrate on specific tasks [32]. Past research from [7] concludes a significant positive relationship between internal carbon price and CEO Duality among global companies reporting to the Carbon Disclosure Project between 2015 and 2017. Further, board size (indicated by the number of directors) also affects the choice of ICP adoption as larger board members bring varied and holistic perspectives to decision making. Past studies have also confirmed positive effect of board size on adoption of carbon management practices [13, 33].

H_4: Larger board size positively influences the adoption of ICP.

H_5: Greater proportion of independent directors lead to the adoption of ICP.

H_6: CEO duality has significant positive impact on the adoption of ICP.

Environmental Factors and Adoption of ICP

Apart from financial and governance factors, the adoption of environmental management practice depends on the current emission level and the operating industry of the firm. ICP adoption and CO_2 emissions reduction relation examined samples using 45 countries across 43 industries from 2015 to 2018 [34]. Their study concluded that firms implementing carbon-pricing mechanisms have a tendency to reduce emissions faster than non-carbon pricing

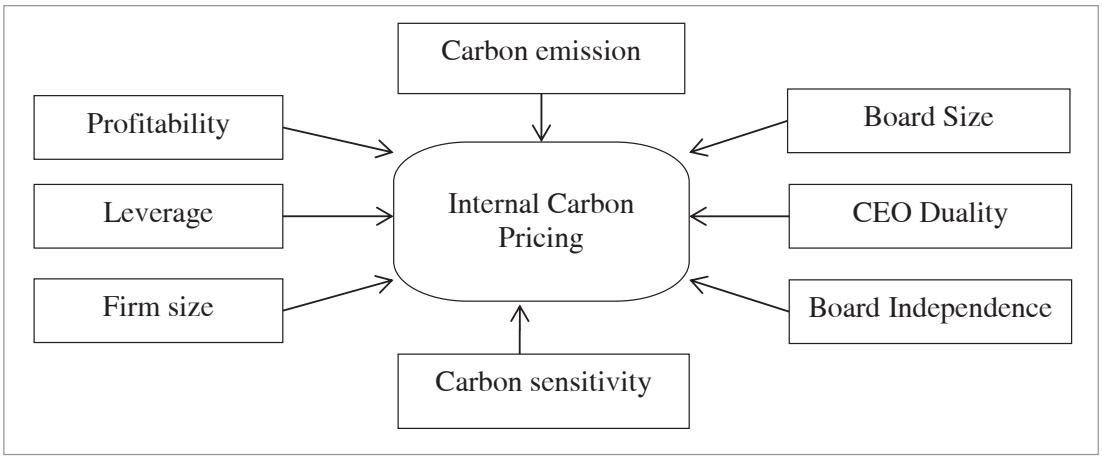

Fig. **Conceptual Model**
Source: Developed by authors.

firms do. Further, firms operating in carbon sensitive sector such as power, energy, coal, chemicals, etc. face greater pressure from stakeholders to reduce CO_2 emission [7, 12]. Hence, carbon sensitivity is expected to have a positive effect on the probability of firms adopting ICP and other carbon management strategy.

H_7: CO_2 emissions level positively affects the adoption of ICP.

H_8: Firms operating in sensitive industries are more likely to adopt ICP.

Following the above discussion, present study proposes a conceptual model (see *Figure*) by comprehending the factors identified through review of extant literature.

RESEARCH METHODS

Variables of study

Present study purports to analyse the firm-specific determinants of adopting ICP as a strategy to integrate emission management and sustainability aspect in business operations. For the given purpose, the determinants are three groups, (i) financial factors, (ii) corporate governance factors, and (iii) environmental factors. Further, ICP has been taken as dependent variable and firm level variables are considered as explanatory variables. *Table 1* describes the variables of the study along with computation and source.

Sample and Data Collection

The present study considers initial sample of Indian firms that report carbon emission related data through CDP questionnaire or sustainability report along with annual financial reporting. Emission disclosure is not mandatory in many emerging economies [35] so as in India therefore a longer time span of 10 years (2013 to 2022) has been adopted to mitigate the limited sample size. The starting year of the study period represents the enforcement of the Kyoto protocol whereas the last year has been chosen considering the latest financial year. The final sample has been selected with the criteria that sample firm must have disclosed CO_2 emission data at least once during the study period. Further, firms with incomplete financial data about control variables are also removed and ultimately 107 firms are selected building unbalanced panel of 1006 firm-year observations. Like carbon emission, internal carbon pricing data has also been extracted from CDP annual report and sustainability report. Financial data pertaining to control variables has been collected from Prowess database of Centre for Monitoring Indian Economy (CMIE).

Data Analysis Techniques

Present research extensively uses regression analysis for estimating the effect of firm related factors on adoption of ICP. Descriptive (mean and standard deviation) and inferential analysis (correlation, multiple regression analysis) have been applied for data analysis. Further, to test multicollinearity, variance inflation factor (VIF) has been used to check the presence of correlation between independent variables. Equation has been formed by considering ICP adoption as dependent variable and firm-specific determinants as explanatory variables. Further, year and firm-effects are also examined due to panel data structure containing cross-sectional time series observations.

$$\left(\begin{array}{l} Ln\left(\frac{ICP}{1-ICP}\right) = \beta_0 + \beta_1 \times PFTB_{it} + \beta_2 \times FSIZE_{it} + \beta_3 \times LVRG_{it} + \\ + \beta_4 \times BSIZE_{it} + \beta_5 \times BOIND_{it} + \beta_6 \times CEODL_{it} + \beta_7 \times CBEM_{it} + \\ + \beta_8 \times ENST_{it} + \sum_{i=1}^{107} Firmeffect_i + \sum_{t=1}^{10} Yeareffect_t + E_{it} \end{array} \right).$$

Table 1

Description of Variables

Variable	Computation	Source
Dependent		
Adoption of ICP	Indicator variable that takes value as 1 – if the firm adopts ICP, 0 – otherwise	Ben Amar et al. [10]
Independent		
Panel – A Finance factors		
Profitability (PFTB)	$\frac{\text{Operarting Profit}}{\text{Total Asset}}$	Fedorova et al. [50]
Firm Size (FSIZE)	Log (Total Assets)	Halimah and Yanto [25]
Leverage (LVRG)	$\frac{\text{Total Debt}}{\text{Total Asset}}$	Amran et al. [31], Fedorova et al. [50]
Panel – B Governance factors		
Board Size (BSIZE)	Number of board of directors	Fedorova et al [50]
Board Independence (BOIND)	Percentage of independent directors in the board of directors	Amran et al. [31], Fedorova et al. [50]
CEO Duality (CEODL)	Indicator variable that takes value as 1 – if the CEO and chairman are different 0 – otherwise	Fedorova et al. [50]
Panel – C Environmental factors		
Carbon Emission (CBEM)	Log (Total carbon emission)	Desai et al. [18], Kumar and Firoz [49]
Environmental Sensitivity (ENST)	Indicator variable that takes value as 1 – if the firm belongs to sensitive industry; 0 – otherwise	Qureshi et al. [51], Kazakova et al. [52]

Source: Compiled by the authors.

As the dependent variable (ICP adoption) has been measured as categorical variable (dichotomous), binary logistic regression has been applied to estimate equation. Past studies have confirmed the superiority of binary logistic approach over other estimation method whenever the dependent variable is dichotomous [36, 37]. Further, as against other methods, logistic regression does not assume linear relationship between dependent and independent variable [38].

Finally, the study addresses the issue of potential endogeneity using system generalized method of moment (GMM) approach as proposed by authors [39, 40]. Equation has been estimated again by GMM along with Sargan and Hansen test to examine the overall fitness of the model [41, 42].

RESULTS OF DATA ANALYSIS

Descriptive analysis

Table 2 summarizes the sample data using descriptive statistics such as mean, median, and standard deviation. Mean value of ICP adoption is 0.228 which indicates that only 22.80% of sample firms are practicing ICP as a carbon management strategy. As India is an emerging economy, it is not bound to reduce carbon emission as per Kyoto protocol. Due to such voluntary setting, Indian firms are not motivated to adopt

Table 2

Descriptive Results

Particulars	Mean	Median	Std. Devi.	Minimum	Maximum
ICP	0.228	0.000	0.420	0.000	1.000
Panel – A Financial factors					
PFTB	0.071	0.057	0.073	-0.117	0.320
FSIZE	4.826	4.817	0.998	0.611	7.699
LVRG	0.318	0.294	0.234	0.000	0.859
Panel – B Governance factors					
BSIZE	14.578	14.000	3.198	8.000	31.000
BOIND	0.449	0.462	0.121	0.000	0.769
CEODL	0.687	1.000	0.464	0.000	1.000
Panel – C Environmental factors					
CBEM	5.226	4.771	1.606	1.531	7.879
ENST	0.457	0.000	0.023	0.000	1.000

Source: Compiled by the authors.

carbon reduction policy, which can be explained by the lower adoption rate. *Table 2* (Panel — A) presents the descriptive results for financial variables used to predict the adoption of ICP. The average profitability (measured by return on asset) is 7.10% and median value is 5.70%, which reflect moderate to low profitability. Further, standard deviation value of ROA is very close to mean value (7.30%) indicating high level of volatility in profit earning. Average asset size of selected firms is 4.83 with standard deviation of 0.998 indicating medium to large size firms with low variability in firm size. Mean (median) value of leverage is 0.318 (0.294) which indicates that majority of firm assets are financed by owners' fund and companies rely less on borrowings. Panel B of table 3 reports the descriptive statistics of governance related factors. The mean of board size (BSIZE) is 14.58 with minimum and maximum value of 8 and 31 respectively. The values indicate adequate level of board size as per the legislation of companies. Further, the proportion of independent directors is 0.449, suggesting that 45% (approx.) of the total directors are appointed as independent. The mean CEODL is 0.687, showing that 68.7 percent of firms have different chairman and CEO representing distinct role to be performed by CEO and chairman of the firm. Standard deviation value of CEO duality is 0.464 indicating low level of variability in the results. Lastly, panel C of *Table 3* describes the descriptive results of environmental factors, which included carbon emission and environmental sensitivity. Mean (median) value of carbon emission is 5.226 (4.771) which is equivalent to 7.82 million metric ton reflecting the emission intensity of Indian firms. Further, environmental sensitivity as measured by dichotomous variable reflects average value as 0.457, which indicates that 45.7 percent of sample firms are from sensitive industries such as coal, energy, chemical, and such others. Based on the descriptive results discussed, it can be concluded that sample firms possess characteristics such as moderate profitability, medium size, moderate borrowings, and high polluting. Further, an important finding from descriptive results is lower adoption of ICP as carbon management practices.

Correlation Analysis

Table 3 summarizes the Pearson correlation coefficients between dependent and independent variables for the ICP adoption model. As indicated in the *Table 3*, except board independence, all other factors have significant correlation with ICP practices. Among financial factors, profitability and firm size are positively and significantly correlated with ICP adoption whereas leverage has significant negative relation with ICP practices. High profit firms have sufficient financial resources whereas large firms are highly noticeable in market which motivates such firms to

adopt ICP in the business operations. Among governance factors, board size (CEO duality) has significant negative (positive) relation with ICP adoption whereas board independence has positive but insignificant relation. Finally, analyzing the environmental factor, it can be inferred that variables, carbon emission and environmental sensitivity, have significant positive relation with ICP practices. Such results are consistent with past findings of [18, 27, 29, 34]. Another important implication of correlation analysis is to understand multicollinearity among independent variables. As the highest correlation coefficient between independent variables is –0.374 (size and leverage) which is below 0.5, hence multicollinearity is under control. Besides, variance inflation factor (VIF) has been computed for robustness, but no variables produce a VIF greater than the threshold limit of 10 [43]. Hence, the data is suitable for further analysis.

Table 3

Correlation Coefficients

Variables	ICP	PRFT	FSIZE	LVRG	BSIZE	BOIND	CEODL	CBEM	ENST
ICP	1.000								
PRFT	0.148**	1.000							
FSIZE	0.227**	–0.184	1.000						
LVRG	–0.220**	–0.125**	–0.374*	1.000					
BSIZE	–0.073**	0.080	–0.058	0.247**	1.000				
BOIND	0.052	0.176*	–0.037	–0.313**	–0.264**	1.000			
CEODL	0.135*	0.020	–0.156	0.097*	0.083	–0.096*	1.000		
CBEM	0.133*	–0.034	0.279**	–0.062	0.193	–0.188	0.003	1.000	
ENST	0.126**	–0.101	0.332**	0.041	0.090	–0.175	–0.002	0.267**	1.000

Source: Compiled by the authors.
Note: * significant 5%, ** significant 1%.

Econometric Results

Results of binary logistic regression model are portrayed in *Table 4*. First, Omnibus test as well as Hosmer and Lemeshow test has been computed to test the overall model fit, and both have prescribed identical conclusion regarding the statistical significance ($\chi^2 = 86.845$, $p < 0.01$) of the model. Further, the pseudo R^2 value is 0.265 which determines that the computed model can explain 26.50% variations in the probability of ICP adoption among the selected firms. Further, percentage accuracy in classification (PAC) is 79.10% which defines the success rate of in predicting the probability of firms' adoption of ICP. Finally, overall results indicate that other than board independence, CEO duality, and carbon emission, other selected factors have significant effect on the adoption of ICP as emission management policy. Considering the financial factors, profitability and firm size has positive impact on ICP adoption whereas leverage has significant negative effect on ICP practices of the firm. However, among the governance and environmental factors, only board size and environmental sensitivity affect the adoption of ICP.

Finally, the last sub-section of data analysis portrays the results of GMM regression analysis (refer *Table 5*). As suggested by past studies, research in the domain of corporate finance, generally exposed to issue of endogeneity arising from reverse causality and omitted variables [44]. The dependent variable may affect the explanatory variable such as adoption of ICP can affect the environmental performance and profitability. To correct the problem of potential endogeneity, the regression model has been re-estimated using GMM approach [45, 23], and the results are described in *Table 5*. Several tests such as Wald — χ^2 — for model significance, Sargan test of overidentifying restrictions, and the Arellano — Bond test for serial correlation haves been performed and the results are within the acceptable range indicating the robustness of results. Further, as the regression co-efficient of both methods are congruent, the conclusion and implications are drafted based on logistic regression.

Table 4

Regression Output (Using Binary Logistic Method)

Particulars	Co-efficient	Std. Error	p-value
Constant	−2.116*	0.900	0.019
PRFT	3.780**	1.087	0.001
FSIZE	0.295**	0.106	0.005
LVRG	−1.491**	0.490	0.002
BSIZE	−0.082**	0.026	0.002
BOIND	0.653	0.735	0.374
CEODL	0.252	0.182	0.165
CBEM	0.125	0.079	0.114
ENST	0.553*	0.254	0.030
Firm Effect	Yes		
Year Effect	Yes		
Omnibus Test / LR Statistic (Sign. Value)	86.845 (0.000)		
Hosmer and Lemeshow Test (Sign. Value)	11.826 (0.159)		
Pseudo R^2	0.265		
PAC	79.10%		

Source: Compiled by the authors.
Note: * significant 5%, ** significant 1%.

Table 5

Regression Output (Using Generalized Method of Moments)

Particulars	Co-efficient	Std. Error	p-value
Constant	−0.102*	0.240	0.027
PRFT	1.147**	0.317	0.000
FSIZE	0.082**	0.026	0.002
LVRG	−0.378**	0.119	0.002
BSIZE	−0.026**	0.008	0.001
BOIND	0.198	0.211	0.350
CEODL	0.082	0.052	0.114
CBEM	0.037	0.023	0.107
ENST	0.149*	0.074	0.045
Year Effect	Yes		
Wald − χ^2	209.492 (0.0017)		
Sargan Test (sign-value)	0.283		
AR (1) (sign-value)	0.039		
AR (2) (sign-value)	0.171		

Source: Compiled by the authors.
Note: * significant 5%, ** significant 1%.

DISCUSSION

The results indicate that profitability has significant positive effect on adoption of ICP confirming the findings of past studies [2, 7, 10, 12, 16, 18]. High profitability enhances the firms' ability to invest in eco-friendly projects. Profitable firms have higher financial resources at their disposal to undertake environment management operations. Further, firm size also has significant positive effect on adoption of ICP and the results confirm the findings of the legitimacy theory as well as past empirical studies [46, 47]. Large companies are more noticeable and are continuously being scrutinized by investors, government, media, and general public which force them to adopt environmental policies [48]. Further, large firms have enough resources permitting the managers to afford voluntary disclosures compared to smaller companies [24]. Finally, the negative effect of leverage can be explained as high levered firms experience a pressure from lenders and creditors to invest in economically viable projects to ensure timely payment of interest and principle. Due to such pressure, corporate managers are discouraged to integrate sustainability aspect while appraising an investment proposal which further enhance their inability to adopt ICP practices.

Analysis of governance and environmental related factors postulates that only board size and environmental sensitivity has significant impact on ICP practices of selected firms. Current study concludes significant negative impact of board size on firm value. Larger board size brings more diversity in decision making which several times hampers the coherent decision making process. Further, as the number of board members increases, firm control dilutes and disperses which also affects harmonized functioning of organization. Such causes can explain the inverse effect of board size on the adoption of ICP. Yet another important factor affecting ICP adoption is environmental sensitivity. Results indicate that environmentally sensitive firms have higher potential to adopt ICP. Due to high proclivity to pollute the environment, sensitive firms face greater risk relating to climate change due to their large share in national carbon emission [49]. These firms are subject to stringent regulatory norms [33] and therefore they are more likely to adopt ICP in the business operations.

IMPLICATIONS OF RESEARCH

Considering the dearth of conclusive research on ICP adoption, present study provides several implications for academicians, managers, and policy makers. The extant literature on carbon management has mainly focused on developed nations whereas current study explores the determinants of ICP practices in an emerging economy. Thus, present research validates the findings of past studies and enriches the existing knowledge domain of environmental research. Further, to the best of authors' knowledge, current research is a pioneering work comprehending tridimensional approach of financial, governance, and environmental factors to describe the adoption of ICP among Indian firms. Corporate managers can consider findings of present study to design their environmental management policy. As the results depict positive impact of profit and firm size, managers working in large and profitable companies should focus on adoption of ICP (if not done yet) as they will be continuously scrutinized by various stakeholders. Similarly, the study also concludes positive effect of environmental sensitivity on the adoption of ICP. Therefore, managers of such firms should take progressive steps to integrate carbon management practices such as ICP due to higher emission of carbon by sensitive firms. For regulators and policy makers, present research enumerates several implications. First, the study reveals that very few companies (23%) have integrated ICP in their project evaluation and business appraisal process. Considering the growing ecological effects of economic activities, it is very essential for regulators to draft and implement policy framework to measure and control environmental performance of firms. Further, as the study highlights the important determinants of ICP adoption among Indian companies, regulators can construct their governing framework on these factors to enhance acceptability of the guiding principles.

CONCLUSION AND LIMITATIONS

Stakeholder pressure and government regulations have forced companies to evaluate the climate effects of their existing as well as proposed economic endeavors. Corporations are gradually adopting environment management strategies to respond the ongoing need. Present study aims analyse the factors affecting one of such strategy, i.e. ICP using panel data of 107 companies for a period of 10 years. Current research measures ICP adoption as dichotomous variable and estimate binary logistic regression using financial, corporate governance, and environmental related determinants. Based on results, the study concludes that adoption of ICP is very low among the selected firms which posit a distressing situation for the policy makers. Besides, factors such as profitability, size, leverage, board size, and environmental sensitivity are significant determinants of firms' choice of accepting ICP. Provided the limited exploration of this domain, present provide valuable

contribution to the existing pool of knowledge and elucidates managerial as well as policy implications.

Though current research attempts to present the ICP determinants comprehensively, there are several areas that require further probing. First, current study is based on Indian sample firms. However, a multi-country approach by including other emerging nations can be adopted to study the effect of institutional setting. Second, apart from current factors, capital market based factors such as market value, volatility, and changes in global stock market can be considered in future studies. Third, present research adopts quantitative approach of research. However, a qualitative study can be performed to study the barriers and enablers of ICP adoption from the managerial perspective.

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ABOUT THE AUTHORS / ИНФОРМАЦИЯ ОБ АВТОРАХ

Rajesh Desai — PhD, Assist. Prof., Department of Business Administration and Commerce, School of Liberal Studies, Pandit Deendayal Energy University, Gandhinagar, Gujarat, India
Раджеш Десаи — PhD, доцент, Школа либеральных исследований, Энергетический университет имени Пандита Диндаяла, Гандхинагар, Гуджарат, Индия
https://orcid.org/0000-0003-3611-8409
rajesh.desai8@gmail.com; rajesh.desai@sls.pdpu.ac.in

Avani Raval — PhD, Assist. Prof., Institute of Management, Nirma University, Ahmedabad, Gujarat, India
Авани Равал — PhD, доцент, Институт менеджмента, Университет Нирма, Ахмадабад, Гуджарат, Индия
https://orcid.org/00000-0002-3933-6316
Corresponding author / Автор для корреспонденции:
avaniraval@nirmauni.ac.in

Narayan Baser — PhD, Assoc. Prof., School of Management, Pandit Deendayal Energy University, Gandhinagar, Gujarat, India
Нараян Басер — PhD, доцент, Школа нефтяного менеджмента, Энергетический университет Пандита Диндаяла, Гандхинагар, Гуджарат, Индия
https://orcid.org/0000-0002-6052-4514
baser_narayan@yahoo.com; narayan.baser@spm.pdpu.ac.in

Dipti Saraf — PhD, Assist. Prof., Institute of Management, Nirma University, Ahmedabad, Gujarat, India
Дипти Сараф — PhD, доцент, Институт менеджмента, Университет Нирма, Ахмадабад, Гуджарат, Индия
https://orcid.org/0000-0002-2030-6635
diptisaraf10@gmail.com

Authors' Stated Contribution:
Rajesh Desai — statement of the problem, development of the concept of the article, data analysis.
Avani Raval — literature review, introduction, data collection.
Narayan Baser — methodology, conclusion and compilation.
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