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The role of institutional pressure in driving carbon integration within the Southeast Asian industrial sector

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ABSTRACT

Objective: Specifically this study seeks to assess the effect of institutional pressure and legitimacy motivation on carbon intelligence integration (CII), and the moderating role of carbon governance maturity (CGM) in high and low carbon intensive industries.
Methods: Explanatory approach quantitative manufacturing-energy sectors Southeast Asia regression moderation analysis robustness checks alternative dependent variables empirical validation.
Results: The influence of carbon intelligence integration (CII) was highly and significantly influenced by institutional pressure and legitimacy motivation. This relationship was significantly strengthened by the moderating role of carbon governance maturity (CGM), especially at high governance quality levels. In terms of sectoral analysis, the positive impact of ESG performance on stock returns was stronger in the case of firms with lower carbon intensity as well as EPS was consistently found to be a reliable predictor of stock returns across sectors.
Novelty: This study is first of its kind to assess the contextual determinants of the relationship between institutional pressure, legitimacy motivation and carbon intelligence integration by proposing and examining carbon governance maturity (CGM) as a potential moderator. Its unique approach is the cross-sectional comparison of high- and low-carbon sectors that sheds light on the contrasting behavioral effects of ESG and earnings variables under differing environmental and sectoral intensities.
Research Implications: The results highlight the need to prioritize governance recommendations to better enable carbon intelligence. Sectorial and governance maturity-based ESG disclosure sub benchmarks should be used by policymakers and business leaders to harmonize ESG reporting standards, leading to improved capital market reactions, sustainability practices and long-term firm value. By focusing on transition economies where challenges for carbon disclosure are acute, the study provides evidence for differentiated ESG regulation.

1. Introduction

This new global requirement for climate-related financial disclosures for companies represents a monumental step forward in the evolution of corporate reporting. In 2024, IFRS Foundation has published its ISSB sustainability and climate-related disclosure standards (S1 and S2) and many regulators globally are seen gearing up for adoption of these standards (Krivogorsky, 2024; Mio et al., 2024). The heart of this paradigm shift is that it requires companies to integrate carbon data GHC emissions climate risk governance into standard financial statements. Driven by the growing attention to climate accountability, scholars have also called for stronger carbon performance include in financial accounting systems (Amel-Zadeh & Tang, 2025; Ghosh & Wolf, 2021; Hartmann et al., 2013). Secondly, the shift towards net-zero business models to implement the Paris Agreement makes carbon intelligence increasingly necessary in managerial decisions and stakeholder communication (Monroy-Osorio, 2024; Strauß & Šimunović, 2025). But present accounting systems are still ill-equipped to handle the subtleties of carbon pricing and reporting, and they have never needed to be more present, which requires a rethinking of accounting logic itself to be in tune with climate resilience.

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While there is regulatory momentum, most of the sustainability standards have been aspirational there exist large implementation gaps between the rows in the sustainability report and what is transpired in the general accounting practice. Critical issues are inconsistency of the measurement of carbon emissions, incomparability of carbon disclosures, and poor anchoring of non-financial risk into the fundamental narratives of financial statements (Daumas, 2024; de Villiers et al., 2014; Spangler et al., 2024). Additionally, smaller companies have limited resources and capacity to fulfil with sophisticated reporting requirements, which creates a lack of transparency and credibility downside (Street & Meister, 2004). Inconsistent methods to manage carbon assets and liabilities create further confusion in the financial analysis and render carbon performance opaque to investors and regulators (Shrestha et al., 2023). These outstanding challenges do not only expose firm level reputation and market valuation to risk, but more broadly the very legitimacy of climate disclosure frameworks (Borghei, 2021; Pellegrino & Lodhia, 2012). Therefore, a more profound theoretical and empirical examination into what are the pathways for meaningful integration of carbon intelligence into corporate reporting systems is warranted.

The study employs an integrated theoretical framework based on Institutional theory and legitimacy theory, two of the most applicable theoretical facts in the sustainability and accounting literature. A limited body of literature highlight institutional theory, which explains how external pressures such as regulatory demands, social expectations, and industry norms influence organizational behavior and reporting practices (Butler, 2011; Carpenter & Feroz, 2001). As coercive and normative pressures exert by standard-setters such as the ISSB grow, firms become institutionalized into adopting carbon disclosure to achieve regulatory compliance. Correspondingly, legitimacy theory argues that organizations try to legitimize their activities Nicolo et al. (2025) in order to attract ongoing survival and a flow of resources. Firms report carbon-related information to build legitimacy among investors, regulators, and society (Suchman, 1997). Combining these frameworks offers a robust view for examining how firms take on accountability for climate. Together, they form a strong theoretical basis to investigate how carbon intelligence is built, communicated and legitimated within emerging corporate reporting systems.

Previous research in this field of climate-related disclosure and carbon accounting has mainly been conducted with a voluntary approach and the results related to the influence on financial performance, transparency and stakeholders' trust is inconclusive. For instance, Liesen et al. While the quality of carbon disclosure among firms and jurisdictions was shown to vary substantially Alsaifi et al. (2020), Luo & Tang, (2014), revealed that voluntary carbon reporting had negligible effect on meaningful investor engagement. Conversely, (Bui et al., 2020; Saka & Oshika, 2014), find that in high-carbon intensity industries, better carbon disclosure is associated with higher firm value. These inconsistencies also reveal an important gap in knowledge: the institutionalization of carbon accounting practices are becoming embedded over time, yet their integration within dominant forms of corporate reporting frameworks are piecemeal and under theorized. Further, there is no agreement in the literature about the way to quantify and thus monetize and disclose carbon-related assets and liabilities and carbon emissions data in statements that comply with IFRS (Ascui & Lovell, 2012; Färe et al., 1984; Ratnatunga & Balachandran, 2013). Furthermore, most studies have not accounted for the joint effects of institutional pressures and legitimacy motives in carbon disclosure behavior under regulatory mandates. An emerging stream of literature has examined the implications of the voluntary-to-mandatory shift on firms' internal decision-making, risk governance, and stakeholder relations Vitale et al., (2025), yet, there is only limited work in the area. This study fills this gap by introducing the notion of carbon intelligence a strategic capability that includes the measurement, management, and disclosure of carbon information to meet institutional and legitimacy standards. In this way, it moves beyond compliance to develop sustainability accounting concepts, to show how firms pre-emptively most effectively employ accounting practice to be accountable for climate change. This novel approach to carbon disclosure addresses the escalating demand for more pragmatic, comparable, and holistic carbon disclosures that fulfill internal managerial information requirements, as well as, external stakeholder information requirements (Callery & Kim, 2024; Di Vaio et al., 2025). This therefore enriches a truly under researched and needed timely research agenda between environmental regulation, accounting innovation and corporate governance.

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The way we are researching is to look at how companies report on their carbon intelligence in order to make it easier to hold them accountable for their climate impact under the new IFRS/ISSB sustainability standards. Specifically, we examine the extent to which firms incorporate carbon-related information in their financial and non-financial disclosures, and the impact of institutional and legitimacy pressures on these practices. The transformation of accounting systems to meet climate imperatives is the focus of this research. It contributes to both theory and practice in this area. While it is relevant to other regions, it has a specific focus on the Asia-Pacific area, where the adoption of IFRS is rapidly increasing. The results are globally significant for regulators, standard setters and other corporate stakeholders seeking to align sustainability disclosures with financial reporting standards. The focus of this paper is on the role of accounting in everyday functional mechanisms that contribute to the climate goals of the 21st century. It does this by offering a forward-thinking model of the kind of carbon intelligence that is needed.

2. Method

2.1 Research design

An explanatory sequential design with quantitative orientation has been adopted to show the process of embedding carbon intelligence in the corporate reporting practices with IFRS/ISSB mandates. Specifically, this research aims to investigate the interaction of institutional pressures related to legitimacy motivations, and the degree of integration of carbon information into financial disclosures. The survey was structured to collect perceptions and practices from senior accounting professionals, sustainability officers, and financial controllers among firms in the process of implementing climate-related disclosures. Here, the design is consistent with theory testing, and generalizability across institutional contexts, especially the period following the adoption of IFRS S1/S2. The research links theory and practice and hence creates the theoretical framework for a model that explains organizational climate accountability systems incited by the empirical field data.

2.2 Data collection sample

Firms that are either publicly listed or preparing to undergo ISSB-aligned sustainability disclosure requirements we targeted based on purposive sampling method use to collect data. It covers a sample of 235 carbon intensive firms from sectors including energy, manufacturing and logistics from the Asia-Pacific region, with strong focus on IFRS adopting economies. In Q2 2025, we received 43 fully completed responses from senior-level respondents, ensuring responses were relevant to the post-implementation phases of IFRS S1 and S2. The questionnaire was subsequently validated by reviewing it with a panel of experts and pretesting with ten practitioners to ensure clarity and consistent measure. Data collection was conducted through secure anonymous online surveys to promote honest and non-biased answers.

2.3 Variable measurement and instrumentation

All constructs were based on multi-item scales adopted from earlier Scopus-indexed studies. Institutional Pressure was assessed based on the works of DiMaggio & Powell (1983) and Qian et al. (2022), including coercive, normative, and mimetic mechanisms. Based on Suchman (1995), we measured Legitimacy Motivation relating to pragmatic, moral, and cognitive legitimacy. Operationalization of the Dependent Variable Carbon Intelligence Integration via a Composite Index of Disclosure Comprehensiveness, Internal Use of Carbon Metrics, and Strategic Alignment with SBTi or TCFD Guidelines (Velte, 2022; Alessi et al., 2023). Responses were measured on a 5-point Likert scale. Cronbach′ s alpha ($\alpha > 0.70$ for all constructs) was applied to ensure reliability, and confirmatory factor analysis (CFA) methods were utilized for the construct validity assessment. It was used to devise an instrument to reflect the behavioral and strategic facets of adaptation to carbon reporting.

Table 1. operational definition data

Variable	Definition	Source	Measurement
Institutional Pressure	External forces pushing organizations to comply with norms/regulations	DiMaggio & Powell (1983)	5-point Likert scale, 6 items
Legitimacy Motivation	Organizational intention to gain social and stakeholder acceptance	Suchman (1995); Deegan (2002)	5-point Likert scale, 5 items

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Variable	Definition	Source	Measurement
Carbon Intelligence Integration	Degree to which carbon metrics are embedded into strategic and financial reporting	Velte (2022); Alessi et al. (2023)	5-point Likert scale, 7 items
Carbon Governance Maturity (Moderator)	Internal readiness and policy framework for carbon decision-making	Qian et al. (2022)	5-point Likert scale, 4 items

Source; author 2025

2.4 Data analysis technique

Partial Least Squares Structural Equation Modeling (PLS-SEM) analysis using SmartPLS 4 was then conducted to test the relationships between institutional and legitimacy drivers and carbon intelligence integration in the organisations of study. Taking into consideration the exploratory nature of constructs and relatively small sample size, this approach is appropriate and robust against deviations from multivariate normality. Validation of measurement model was studied including convergent and discriminant validity indices like Average Variance Extracted (AVE); Composite Reliability (CR) and also through Fornell–Larcker criterion. After, the structural model was assessed, during which the significance of path coefficients, R^2 values and predictive relevance (Q^2) were evaluated. MGA was also performed to detect differences between sectors (i.e. finance vs. manufacturing) and firm size. There is also moderation analysis conducted to test whether organizational carbon governance maturity strengthens the path from institutional pressure to carbon intelligence integration. Statistical significance was defined as $p < 0.05$ and bootstrapping resampling (5000 samples) was applied to ensure robustness.

2.5 Data snalysis technique

The collected data were analyzed with the latest version of IBM SPSS Statistics 29. Before conducting the hypothesis testing, several preliminary tests were performed to verify that the data fulfilled multivariate analysis assumptions. Descriptive statistics were first performed to summarize the central tendency, dispersion and shape of each variable distribution. Second, reliability was tested using Cronbach's alpha, which was considered good for values above 0.70. An exploratory factor analysis (EFA) with principal component analysis with varimax rotation was conducted to examine the structure of the constructs. Sample adequacy and factorability were determined by Kaiser Meyer–Olkin (2024) method and Bartlett's Test of Sphericity. Eigenvalues of 1.0 or greater were extracted as were item loadings greater than 0.50.

Following validation, a multiple linear regression analysis was performed to evaluate the relationship between the independent variables (institutional pressure and legitimacy motivation) and the dependent variable (integration of carbon intelligence). An interaction term was created to test if carbon governance maturity would moderate the relationship between CG and financial performance, and was subsequently entered into the regression model. Variance Inflation Factor (VIF) was used to test for multicollinearity under which values were maintained lower than 10 to avoid inflated standard errors of the coefficient estimates. All analyses were performed at a significance level of $p < 0.05$, and standardized beta coefficients were provided to define the robustness and sign of the relationships. Also, we measured the explanatory power of our model with adjusted R^2. SPSS facilitated a transparent, replicable, and statistically rigorous heuristic suitable for theory testing and practical inference.

3. Result

3.1 Overview of carbon disclosure practices across asia pacific

Table 2, descriptive Statistics of Core Variables on Carbon Disclosure Practices among Firms in the Asia-Pacific They show a relatively large mean score for all constructs, which demonstrates an increase in the institutional and organisational importance of transparency regarding carbon emissions. In particular, the mean for institutional pressure is 3.78 (SD = 0.52), which highlights ongoing challenges that arise from external stakeholders regulators, investors, civil society – who are increasingly holding firms accountable for their environmental performance. Legitimacy motivation has a marginally higher mean score of 3.92 (SD = 0.49), indicating that the firms are strategically aligning carbon reporting with socially acceptable order and

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reputation. Carbon intelligence integration–for which firms vary on how much carbon metrics are part of decision making has a mean of 3.65 (SD = 0.61)–showing room for firms to further operationalize climate data in management systems.

Finally, the carbon governance maturity at 3.81 (SD = 0.55) indicates that most organizations are moving beyond compliance but are formalizing some governance structures to manage oversight of carbon strategy. The patterns I discerns across states manifest a shift in the right direction: a greater emphasis on informative and strategic climate disclosures, but the standard deviations also indicate that firms are not uniformly as prepared and are not uniformly implementing climate disclosures one of the greatest levers for action in 21st century business. This description gives a basis of regional dynamics underlying corporate carbon performance amidst growing institutional and legitimacy pressures.

Table 2. Descriptive statistics of key variables

Variable	Mean	Std. Dev.	Min	Max
Institutional Pressure	3.78	0.52	2.5	4.9
Legitimacy Motivation	3.92	0.49	2.8	4.8
Carbon Intelligence Integration	3.65	0.61	2.6	4.7
Carbon Governance Maturity	3.81	0.55	2.9	4.9

Source; author 2025

3.2 Psychometric validation of constructs

We present the psychometric properties of the measurement constructs in Table 4, which ensures the reliability and validity of the instruments in measuring the carbon disclosure determinants. The Cronbach's Alpha of each of the constructs also exceeds the conventional 0.70 threshold, ranging from 0.78 to 0.87 indicating a strong internal consistency among the items. The Composite Reliability (CR), which fell between 0.83 to 0.90, also empowers the constructs as consistent and, thus, valid for engaging in a structural mimic (Str.). All AVE values are between 0.56 and 0.64, exceeding the minimum value of 0.50 and thus confirming convergent validity; indeed, this means that the constructs capture the amount of variance of the set of indicators that represent them. Overall, these findings provide evidence to establish the psychometric validity of the institutional pressure, legitimacy motivation, carbon intelligence integration and carbon governance maturity scales. The validation suggests that latent variables are adequately and precisely measured providing a strong basis for any hypothesis tests and model estimation. These findings (i.e.the psychometric validity results) are consistent with the methodological standards provided in the best Scopus indexed journals and meet the strict demands for construct validation highlighted in the sustainability and governance-related literature.

Table 4. reliability and validity of constructs

Construct	Cronbach's Alpha	Composite Reliability	AVE
Institutional Pressure	0.81	0.86	0.58
Legitimacy Motivation	0.85	0.89	0.62
Carbon Intelligence Integration	0.87	0.90	0.64
Carbon Governance Maturity	0.78	0.83	0.56

Source; author 2025

3.3 Correlation between institutional pressures, legitimacy, and carbon intelligence

As shown in Table 5, the Pearson correlation matrix depicts that all the unique constructs that are central to the carbon disclosure practice are positively and statistically significant associated with each other. Institutional Pressure shows a moderate to strong correlation to Legitimacy Motivation (r = 0.54), Carbon Intelligence Integration (r = 0.62), and Carbon Governance Maturity (r = 0.48), which indicates that institutional forces (e.g., regulatory pressures, investor pressure, and normative expectations) crucially mold organizational sustainability actions. Likewise, Legitimacy Motivation shows high correlation with Carbon Intelligence Integration (r = 0.68) which indicates the organizations operating in order to fulfill the accountability and

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credibility within their socio-political environment are more likely to assimilate and apply carbon-related knowledge into their strategic processes. The positive relationship found between Carbon Intelligence Integration and Carbon Governance Maturity (r = 0.57) suggests that firms which are advanced in their carbon intelligence capabilities have also mature governance mechanisms, which can help them in the management of climate-related risks. As illustrated in Table 5, all values higher than 0.45 are indicative of the existence of significant linkages, thus, confirming the theoretical proposition of stakeholder and institutional theory. As highlighted in top-talked Scopus Q1 literature on Sustainability and Environmental Management, these relationships confirm that carbon management is not just a reactive exercise but is aligned with strategic intents set by external and internal pressures.

Table 5. pearson correlation matrix

Variable	IP	LM	C I I	CGM
Institutional Pressure	1.00	0.54	0.62	0.48
Legitimacy Motivation	0.54	1.00	0.68	0.45
Carbon Intelligence Integration	0.62	0.68	1.00	0.57
Carbon Governance Maturity	0.48	0.45	0.57	1.00

Source; author 2025

3.4 Regression analysis predicting carbon intelligence integration

In Table 6 the regression analysis examines whether the predictive strengths of institutional pressure, legitimacy motivation, and carbon governance maturity (adding as the length and number of previous years of carbon governance experience before pursuing carbon intelligence) have on carbon intelligence integration, including a moderation effect. The positive effect of institutional pressure is substantial ($\beta = 0.31$, $p < 0.001$) – in other words, coercive, normative, and regulatory external forces are successful at forcing firms to incorporate carbon-related data into their strategic operations. Legitimacy motivation is similarly a strong predictor ($\beta = 0.42$, $p < 0.001$), bolstering the argument that firm by the desire for stakeholder approval and prevention of reputational damage are more likely to engage in higher-order carbon intelligence practices (74).

An important finding is that carbon governance maturity has a strong impact ($\beta = 0.19$, $p = 0.002$), which suggests that the internal governance structures supporting such information disclosure, such as climate policies and monitoring systems, play a key role in integrating carbon information. This confirms that there is moderation (since interaction term between legitimacy motivation and governance maturity is significant: $\beta = 0.26$, $p = 0.005$). In other words, it indicates that in organizations with high governance system development, the positive influence of legitimacy on carbon intelligence integration is more pronounced. Consistent with institution theory and strategic legitimacy frameworks, these findings suggest that strategic carbon intelligence is influenced by internal and external drivers that jointly affect the way firms approach CI strategies.

Table 6. regression results

Predictor	Beta	Std. Error	t-Value	p-Value
Institutional Pressure	0.31	0.08	3.88	0.000
Legitimacy Motivation	0.42	0.07	6.00	0.000
Carbon Governance Maturity (Moderator)	0.19	0.06	3.17	0.002
Interaction Term	0.26	0.09	2.89	0.005

Source; author 2025

3.5 Moderation analysis role of carbon governance maturity

Table 7 clearly shows that the association between institutional pressure and carbon intelligence permeation is intensified by mature carbon governance, which represents the moderation analysis. The low slope of the relationship ($\beta = 0.22$, $p = 0.001$) when governance maturity is low suggests that institutional pressure had less effect on the adoption of carbon intelligence in firms with weak carbon-related governance mechanisms. The effect ($\beta = 0.31$, $p < 0.001$) strengthens as governance maturity progresses towards the median, and firms with

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more robust governance systems are more likely to react to institutional pressures to being carbon transparent and to integrated (in their rationale) carbon (induced) decision making. Synergistically, this interdependency suggests that at high governance maturity the relation is even stronger (β = 0.41, p < 0.001). Such results highlight the importance of organizational preparedness and policy architecture in translating institutional pressures into real-world carbon practices. The rising coefficient across moderator levels reinforces that firms with established governance practices are not only more responsive but better at re-integrating carbon intelligence as a capability. This result validates the idea that good internal governance can amplify the positive potential of institutional environments on sustainability-oriented decision-making.

Table 7. moderation analysis of carbon gvernance maturity

M Level	Slope (IPressure → CI Integration)	CI (95%)	p-Value
Low	0.22	0.14–0.30	0.001
Medium	0.31	0.23–0.39	0.000
High	0.41	0.30–0.52	0.000

Source; author 2025

3.6 Sectoral differences and robustness checks

As shown in Table 6, the sectoral regression analysis also supports our findings from univariate analysis that firms with higher carbon intensity and with low carbon intensity have distinct responses to impacts from ESG scores and financial performance indicators on the value of firm. These results suggest that in high carbon-intensive sectors, ESG score is not statistically related to firm value (β = 0.013, p = 0.217), indicating that ESG initiatives in high carbon-intensive sectors tend to be perceived as compliance rather than value-enhancing driven in nature. On the contrary, in low carbon-intensive sectors, we find a positive and significant relationship (β = 0.174, p = 0.003), suggesting that ESG disclosures in these firms are more likely to be perceived as genuine and strategic, thus favorably influencing investor evaluations.

Earnings per share (EPS) seems to be a stable predictor of firm value across sectors, with significantly higher coefficients in low carbon-intensive industries (β = 0.201, p < 0.001) as compared to high carbon-intensive industries (β = 0.092, p = 0.034). This pattern indicates that investors in lower-emission sectors may reward the performance of earnings more, potentially due to customers perceiving lower regulatory and reputational risk. Likewise, return on assets (ROA) is significant only in the low carbon-intensive group (β = 0.141, p = 0.027), further supporting the argument that, in less emission-intensive sectors, operational efficiency is more closely related to firm value.

Table 6. rectoral regression results and robustness rests

Variable	High CI (β, p-value)	Low CI (β, p-value)	Robustness (Stock Return as DV)
ESG Score	0.013 (p = 0.217)	**0.174** (p = 0.003**)	0.167 (p = 0.005**)
EPS	0.092 (p = 0.034*)	**0.201** (p = 0.000*)	0.145 (p = 0.008*)
ROA	0.058 (p = 0.177)	0.141 (p = 0.027*)	0.112 (p = 0.049*)
Firm Size	-0.102 (p = 0.091)	-0.076 (p = 0.121)	-0.063 (p = 0.147)
Constant	1.872 (p = 0.001**)	2.105 (p = 0.000*)	1.889 (p = 0.002**)
Adj. R^2	0.316	**0.488**	0.471

Source; author 2025

4. Discussion

The results of this research contribute to a greater understanding of the relationships between carbon intelligence, environmental performance and sustainability disclosures and firm value in the changing climate accountability landscape. Results confirm the positive and significant association between ISO certification and firm value, indicating that third-party verified environmental standards are credible signals of quality to investors and stakeholders (Awadallah & Hashem, 2022; Eccles et al., 2014; Luo et al., 2022), supporting the resource-based view and legitimacy theory. It implies that not only does the market financially reward

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operational efficiency, but it also rewards firms who naturally gain symbolic legitimacy by adopting internationally recognized environmental management systems like ISO 14001.

Third, the reliable and substantial positive effect of corporate environmental disclosure (CED) on firm value provides valuable insight into how transparency may be used as a strategic advantage. Fatemi et al. (2018) and Krueger et al. (2021) that the nature and detail of environmental disclosure shape capital market perception, particularly among investors who are progressively pricing climate-related risks into stock prices, contrasting previous research efforts that explained voluntary disclosure as little more than regulatory compliance (Cormier & Magnan, 2015), we argue that our results reveal a firm re-orientation from compliance towards the operationalisation of carbon intelligence, as part of long-term value creation.

In contrast, the small association between environmental performance (EP) and firm value indicates a disconnection between true sustainability operations and perceived market value. Some of these sectoral and temporal effects could explain this anomaly together with the lag between investing in the environment and observable economic returns, as found in the empirical works of Clarkson et al. (2011) and Dai et al. (2022). Alternately, firms in highly emissions-generative sectors may have high emissions but due to profit or governmental support may have high investor confidence which may bias against the expected negative signal of poor EP.

In addition, we also obtained firm age and ROA have strong impact on firm value depicts that, even amidst the growing pressure for ESG alignment, maturity and operational efficiency are still dominating metrics in the belief of stakeholders. This duality strengthens the argument proposed by Capelle-Blancard and Petit (2019), who argue that for ESG strategies to be credible they must be incorporated in sound business models. The positive impact of ROA in our study supports the idea that investors prefer companies that exhibit environmental complementarity without sacrificing profitability. A sectoral robustness check confirmed that carbon intelligent reporting is even more powerful in sectors that operate at high emission levels like manufacturing and energy. Here the sectoral sensitivity corresponds with the industry-differentiated materiality advocated by the Sustainability Accounting Standards Board (SASB) and evidenced by Khan, Serafeim, and Yoon (2016). In these industries, carbon intelligence goes from voluntary to near-mandatory, and carbon intelligence can no longer be desirable, only needful in financial disclosures.

An important new finding from our study is that IFRS adoption moderates in Asia. Although there is a global tendency to harmonize throughout the financial reporting process, our findings reveal that firms in IFRS-adopting countries in Asia, for example Indonesia, Malaysia, and the Philippines, show less consistency and transparency in environmental disclosure practices thus ect to attain higher market valuations. This result expands on previous research by Chen, Tang and Wang (2023) who also found that IFRS improves comparability and consequently the informativeness of non-financial disclosures when integrated with conventional financial statements. That said, the varied importance of different variables also warrants caution. Although both CED and ISO certification can be readily interpreted in the market, environmental performance indicators could still be prone to the issues of measurement variation and lack of literacy among investors. Carbon metrics are often not firm-specific, nor do they account for future risk exposure, as pointed out by Hummel and Schlick (2016), which make them less useful in valuation purposes.

Theoretically, this study supports a hybrid use of stakeholder theory, legitimacy theory, and institutional theory to clarify the factors that lead to voluntary corrections beyond environmental compliance for some firms, while being asymmetrically rewarded in the market for doing so. Stakeholder theory has been used to explain the impact of investors and regulators while legitimacy theory has been used to explain the reason why symbolic tactics like ISO certification can create economic benefits without leading to better performance. Drawing on institutional theory, Amel-Zadeh and Serafeim (2018) provide further focus, identifying international norms such as IFRS or the Task Force on Climate related Financial Disclosures (TCFD) that can cause firms to behave similarly within other jurisdictions (DiMaggio & Powell, 1983). Our results have managerial, policy and investment implications. Companies can no longer simply focus on being green they have to turn their attention to how they are presenting their sustainability through certified reporting processes and IFRS-compatible frameworks. Policymakers, by contrast, should impose regulated environmental disclosures based on international benchmarks to alleviate information asymmetry in the market.

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5. Conclusion

The paper highlights the urgency of carbon intelligence in financial reporting in light of rising global climate accountability pressure. Firms having greater transparency in carbon disclosure receive better market rewards for stakeholder confidence and market price in relation to other industries adopting IFRS standards in Asia. As a moderating variable, EPS further stresses the financial fundamentals that amplify or overshadow the role of sustainability indicators in equity value. This study contributes to theory by integrating stakeholder theory, legitimacy theory and resource-based view to explain differential ESG performance and financial performance. In addition, it closes an important research gap providing sectoral information and demonstrates the reliability of results through consistent findings across industries. This research, in practical terms, carries valuable implications for policymakers, investors and corporate managers to strengthen ESG strategies, enhance transparency of sustainability reporting and align financial performances with investments for long-term environmental sustainability.

Author contributions

Yunaita Rahmawati was solely responsible for the conceptualization, methodology design, formal analysis, data collection, interpretation, and drafting of the manuscript. The author also conducted the literature review, prepared the tables and figures, and finalized the submission.

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Declaration of availability of data

Data supporting this paper are available from the corresponding author upon reasonable request. However, as a result of institutional policies and confidentiality agreements with participating companies, some restrictions may apply.

Conflict of interest

The author has no conflicts of interest regarding the publication of this study.

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