



Integrating Carbon Disclosure into Accounting Theory: Evidence from Global Emissions and Financial Indicators of SAARC nations.

Kaifi Azam¹, Syed Mohd Shahzeb²

¹Assistant Professor, School of Management, IILM University- Greater Noida, knowledge park 2, Uttar Pradesh- 201310 (India) E-mail: kaifizam2010@gmail.com

²Assistant Professor, School of Management, IILM University- Greater Noida, knowledge park 2, Uttar Pradesh- 201310 (India) E-mail: syeds6173@gmail.com

*Corresponding Author's Name: Syed Mohd Shahzeb

Abstract

This study has been done to analyse the integration of carbon disclosure with accounting theory by determining the relationship between financial and environmental factors across six SAARC nations (Bhutan, Bangladesh, India, Sri Lanka, Nepal, and Pakistan). The study aim to analyse the effect of carbon emissions, renewable energy consumption, financial development on gross savings as a measure of macroeconomic resilience. Random Effect model was selected on the basis of Hausman specification test for the panel data analysis. The results of this study support the sustainability-saving nexus for SAARC nations. This study suggest policymakers and financial institutions to pave the way for providing better investment opportunities for sustainable practices both at corporate and national levels. Hence, by doing so, Sustainable Development Goal 13 (climate action) can be supported.

Keywords: Panel Data, Fixed Effects, Random Effects, Carbon Emissions, Financial Development, Gross Savings, SAARC.

Introduction

Rising international anxiety regarding climatic change has placed more pressure on companies as well as nations to release their environmental achievement publicly, specifically the greenhouse gas (GHG) emissions (Siddique et al., 2021). Besides adhering to regulations, carbon disclosure is a tactical show of environmental friendliness and long-term financial risk handling. By systematically reporting climate-related data, policies and transition preparedness, carbon disclosure is central to sustainable business reporting (Liu et al., 2025). The changing landscape requires a reassessment of accounting practices, to incorporate environmental accountability and thus link ecological outcomes to financial performance (Velte et al., 2020).

The current research weaves together carbon disclosure concepts into accounting theory and investigates its empirical association to some key financial variables. Drawing on Stakeholder Theory and Legitimacy Theory (Bedi & Singh, 2024), the analysis of carbon and renewable energy adoption strategies involves how firms and economies will utilize disclosure to maintain social legitimacy, reputation or meet the expectations of stakeholders (Najaf et al., 2024; Lu et al., 2021). Our study specifically examines the connection between carbon emissions, renewable energy adoption, and financial development across six SAARC economies- Bhutan, Bangladesh, India, Sri Lanka, Nepal and Pakistan to assess both the environmental dimension and financial dimension collectively affect gross savings (one

metric that can indicate macroeconomic resilience). We specifically employ CO₂ emissions per GDP (PPP)-higher emissions equate to lower transparency as; share of emissions from renewable energy consumption; GDP growth, and domestic credit to private sector indicators. This is particularly useful and advancing the understanding of the sustainability-savings nexus within a developing context.

Current research has been inconsistent where some studies categorically demonstrate that carbon disclosure in relation to illuminates firm; performance by enhancing transparency and investor confidence, Literature demonstrates a nonlinear/statistical or context dependent impact of carbon disclosure on financial factors of firm performance (Maama & Gani, 2022; Liu et al., 2023). The results generated an interest in the continued search and acquiring knowledge of how the given processes which were caused by disclosure promulgated the influence of carbon strategies and financial performance outcomes. In addition, the incorporation of carbon metrics into accounting frameworks affords a comprehensive understanding for policymakers and investors to assess sustainability at both corporate and national impact levels (Siddique et al., 2021). Well-structured disclosure metrics have the potential to support improvement in both environmental and financial sustainability, creating economic reasons for climate action (Wahyuningrum et al., 2025).

This article continues the recent macro- and micro-corporate level literature on climate change by tying climate-related indicators into national-level economic performance measures. The current research focuses on carbon accounting as part of the larger sustainable-development agenda, especially as related to SDG 13 (Climate Action), other SGDs (No Poverty, Hunger, Clean Water and Sanitation, Reduced Inequality, Responsible Consumption and Production, and Life below Water) and broader ESG frameworks (Cheng et al., 2025). Including environmental indicators in accounting theory also add explanatory power to the theory by relating sustainable outcomes to measurable indicators of financial success.

Furthermore, assessing other forms of mandatory reporting, for instance, the south African or United Kingdom voluntary disclosure regimes provide insights on how issues of regulatory alignment may strengthen accountability and comparability in relation to the environmental accounting framework (Nyahuna & Doorasamy, 2023; Alsaifi, 2021). These frameworks illustrate the increasing trend of institutions such as the Climate Disclosure Standards Board, members of which seek reforms of disclosing climate information at the same level of assurance as financial information (Amel-Zadeh & Tang, 2025).

In this regard, the research contributes to the body of knowledge on sustainability accounting due to the empirical study of the relationship between carbon emissions, adoption of renewable energy and financial performance indicators in shaping national savings behaviour. The paper tries to prove that, when the carbon disclosure is integrated into the notion of accounting theory, one may prove the fact that the tendency to write about the environment transparently is not only one of the obedience to the particular rules and regulations but also of one of the primary macroeconomic stability issues and investor trust. Lastly, the paper provides empirical conclusions of the members states of the SAARC that introduction of the carbon disclosure to the orthodoxy of accounting paradigms enhances the environmental responsibility, as well as the financial sustainability, which directs the aim of the quest of a sustainable global economy.

Literature review

The growing relevance of the carbon accounting in world academia displays the pressing necessity to introduce environmental perspective into the conventional financial reporting. In the past ten years, the literature had been studying the voluntary disclosures of environmental information in numerous theoretical perspectives: economic, socio-political, and institutional (Mateo-Marquez et al., 2020). The results show that meaningful carbon disclosure encourages less information asymmetry, and enhances financial performance: carbon disclosure is raised to a strategic choice to generate value in a sustainable manner instead of meeting regulations (Velte et al., 2020)

Carbon accounting seeks to internalize these externalities, but the forms of carbon accounting, given the associated assumptions, precludes attribution of properly that cost in financial terms, restricting therefore the mobilization of capital towards climate action (García-Torea et al., 2021). The institutional context, which includes the quality of governance, stakeholder activism, and policy intent, provides the necessary context to define the "when, how, and to what quality, the firm disclose carbon" (Mateo-Márquez et al., 2020; Adetutu et al. 2024). As operating in a carbon constrained world becomes not just an imperative but a fundamental reinvention of business as usual, firms are under increasing pressure to adopt carbon-reduction programs, publish an emissions reporting framework, and responsibility to institute governance with the purpose of fulfilling these institutional requirements in legitimacy (Hartmann et al. 2013).

A major regulatory change is in process: the shift from climate disclosure on a voluntary basis to compulsory climate disclosure, initiated by the International Financial Reporting Standards (IFRS) S1 and S2, launched by the International Sustainability Standards Board in January 2024 and being implemented in a number of countries, including Australia (Amel-Zadeh & Tang, 2025). This movement can be discussed as the acceptance of carbon accounting as an independent field of research in the accounting profession in general (He et al., 2021), and a growing presence in terms of the global governance of climates and sustainability is becoming visible, according to environmental agreements such as the Paris Agreement (Hazaea et al., 2023).

Most of the existing literature places importance on the practices of disclosure without going a step further to investigate the relationship amidst these practices and operational decision making and performance management (Vaio et al., 2024). It should be noted that the management control process definitely requires additional research on the issues of the implications of stakeholder and institutional pressure on the disclosure practices as such to enhance frameworks that seek to encompass the true corporate position of carbon (Herold et al., 2018). Articles in the recent past, however, have proposed a change in our perception- a move towards a revised form of disclosure of integration where carbon accounting ought to be incorporated by the firm amongst other operational strategies to encourage long-term value generation and in effect offer the pathway to low-carbon transitions (Guo et al., 2020; Amel-Zadeh and Tang, 2025).

This integration strengthens the credibility and usefulness of environmental information, allowing managers and investors to measure emissions, evaluate climate risks, and discover new avenues for green innovation (Bui et al., 2022; Tóth et al., 2021). However, methodological inconsistencies are a significant issue. Differences in definitions of boundaries, data validation, and certain occupancy sector-specific methodologies still exist across national and international frameworks

(Christy et al., 2023). The literature has thus called for the requisite of more robustness and standardization for the resolution of the credibility viability of carbon emissions overall, and to access comparisons across firms and jurisdictions (Christy et al., 2023; Borghei, 2021; Bazhair et al., 2022).

Recent work also turned to discussion related to environmental cost accounting, sustainability reporting, and connection to financial performance (Mondal et al., 2024). Considering environmental data as part of financial statements could eliminate uncertainties in stakeholder's mindsets, reduce peripheral risks when managing and reporting, and facilitate forms of sustainable production. Furthermore, It was noted that carbon disclosure also complemented the link of environmental innovation and cost management to financial performance, specifically within carbon venturing industries (Alsaifi, 2021).

Theoretical frameworks, such as Positive Accounting Theory and Stakeholder Theory, provide conceptual clarity in rationalizing why firms may disclose information about the environment and the influence they intend with that behaviour on performance. This frameworks imply that firms are merely considering how the application of carbon accounting can reduce the agency issues and create legitimacy among the different stakeholders of the firms (Mondal et al., 2024). Government and financial institutions in the developing economies of the SAARC region are focusing on carbon accounting as one of their strategic urgent agendas with the goal of achieving economic development and environmental knowledge.

The present research aims at contributing to this debate by exploring the empirical correlation of carbon intensity with the uptake of renewable energy and macro-financial performance by use of the gross savings as a macro-financial variable. This method bridges research gaps between micro-research on carbon disclosures and macro-practice evaluation of sustained economies and bring news speculations on how carbon accounting could become part of the financial theory and practice. This is because it transcends disclosure and therefore, deserves the transformational capacity of carbon accounting as the tool of financial disclosure, policy alignment and transition over to sustained economies.

Conceptual Framework

This study explores the interconnection among Carbon-dioxide emissions, renewable energy consumption and domestic credit to private sector in affecting gross saving rate across 6 SAARC economies. The conceptual framework of this study is based on the idea that the way people act in developing countries is affected by both the environmental factors and financial factors. Gross Savings act as a proxy for a country's capacity for its investment and economic resilience (Loayza et., 2000). In the long run, a greater savings rate promotes long-term fiscal sustainability and capital formation, both of which are needed for long-run growth. Figure 1. represent conceptual framework for this study.

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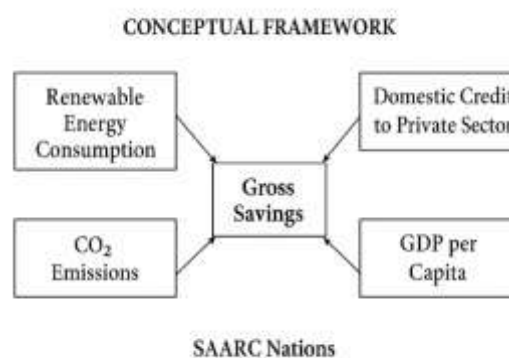


Figure 1. Conceptual Framework

Renewable energy consumptions shows a shift towards more clean energy operations and sustainability. It has been theoretically shown that increased use of renewable energy enhances cost efficiency and reduction in import of non-renewable energy sources and finally stimulate savings and investment (Sadorsky, 2009). Economies emitting high Carbon emissions depict consumption led by growth which results in the decline of aggregate savings, however the countries which are follows the path of sustainable energy may be able to balance economic production and saving pattern (Shahbaz et al., 2013).

Domestic credit to private sector reflects the financial capacity of a nation. Availability of the credit enhances investment and income level of the nation which can result in the increased saving. However, a credit, beyond a certain limit also depicts greater consumption pattern and savings. GDP per capita (Constant US\$) reflects the aggregate economic capacity and the income level of a nation. The life cycle hypothesis shows that in the initial stages of the economic growth, increase in income results in increased savings, however this may not be the same after a while.

Data & Methodology

Panel data for all the variables i.e, Gross Savings (% of GDP) as a proxy for financial indicator, Renewable Energy Consumption (% of the total enegy use), Cabon-dioxide (CO2) emissions per capita as a proxy for carbon intensity, Domestic Credit to Private Sector (%of GDP) as a control variable, and GDP per capita (constant US\$) as a control variable has been collected from World Development Indicators (WDI) covering the period 2000-2021 for 6 SAARC nations (Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka). The remaining two countries are not considered in this study due to unavailability of data.

Panel data research design has been adopted for this analysis to determine the effect of macroeconomic, environmental and financial factors on gross savings for six SAARC nations. This methodology covers both cross sectional and time series areas due to which the results shows more variability (Gujarati, 2012). This estimation technique has been used to identify the country specific

heterogeneity as well as temporal dynamics in determining the effect of environmental, financial and macroeconomic indicators on gross savings for SAARC nations. Pooled OLS has been applied in order to compare baseline and then Hausman test to choose the appropriate model for the analysis i.e. fixed effect or random effect.

Fixed Effects (FE) model is also commonly referred to as Least Squares Dummy Variable (LSDV) model, which is a model that explains the unobserved heterogeneity among entities and it does so by permitting each cross-sectional unit to have its own intercept term (Gujarati, 2012). This method entails that the individual specific features comprising of the institutional quality, the policy environment, or the socio-economic structure, might not only affect the dependent variable, but it will not undergo any change over time. The FE model will also give a consistent estimate of the parameters of time-varying regressors since it captures these unobserved effects.

The Fixed Effects model in the framework of the current research aids in isolating the differences in gross savings within each country across time holding the existing country-specific factors constant through the sample time (2000-2021). This is especially applicable to the economies in SAARC where structural aspects of the economies like the governance structure, the demographic make-up in countries, or the industrial structure could vary across countries, but be relatively similar within the countries.

The Random Effects (RE) model is based on the assumption that the unobserved individual effects (μ_i) are randomly distributed within the cross sectional units and not correlated with the explanatory variables considered in the model (Gujarati, 2012). In contrast to the FE model, the intercept is not common to all countries in

RE model. The RE model can give better results for the sample taken from a large population and when unobserved country specific effects are considered as random rather than fixed.

To begin the process, stationarity of data has been checked for the analysis. The General economic model according to these method is specified as follows:

$$GS_{it} = \beta_0 + \beta_1 REC_{it} + \beta_2 CO2_{it} + \beta_3 DCPS_{it} + \beta_4 GDP_{it} + \epsilon_{it} \dots\dots\dots \text{eq 1}$$

$$GS_{it} = \beta_0 + \beta_1 REC_{it} + \beta_2 CO2_{it} + \beta_3 DCPS_{it} + \beta_4 GDP_{it} + \mu_i + \epsilon_{it} \dots\dots\dots \text{eq 2}$$

Equation 1 represents fixed effect model and equation 2 represents random effect model. GS_{it} represents Gross Savings (% of GDP) and considered as dependent variable, REC_{it} represent Renewable Energy Consumption (% of the total energy use), $CO2_{it}$ represent Carbon-dioxide (CO_2) emissions per capita, $DCPS_{it}$ represent Domestic Credit to Private Sector (% of GDP), GDP_{it} represent GDP per capita (constant US\$), μ_i represent country specific unobserved effect and ϵ_{it} represent error term.

Results and Discussion

Unit Root Test

It is necessary to find out the stationarity element of the concerned data before analysing the panel model in order to ensure that the data is valid and unbiased. Finding out the stationarity will also give the order of integration of the concerned which pave the way for method of model selection. Augmented Dickey Fuller (ADF-Fisher) and Phillips-Peron (PP-Fisher) panel unit root test has been done in this study to find out the stationarity properties.

Table 1. Unit root results

Variable	ADF		PP	
	Level	First difference	Level	First difference
GS	19.9219**		8.96613	64.431*
GDP	17.8067	20.7281**	17.8067	20.7281**
Co2	10.8722	21.024**	9.03849	54.6577*
REC	9.27914	23.3041**	6.79731	68.7542*
DC	8.29181	21.0327**	4.27246	47.5493*

Source: Author's Calculation

Note:- * represents significance at 1 percent level

** represents significance at 5 percent level

*** represents significance at 10 percent level

The results (reported in Table 1) shows that all the concerned variables under the study - Gross Savings, CO_2 Emissions, Renewable Energy Consumption, GDP, and Domestic Credit to the Private Sector are non-stationary at level and stationary at first difference. This implies that all the variables are showing the property of integrated of order one i.e. $I(1)$. With this result, further analysis has

been done after converting the data at first difference to avoid the risk of spurious regression.

Hausman Test

Hausman Specification test is used for this study to identify most appropriate model between FE and RE. This test analyse whether the errors (μ_i) are correlated

with the regressors or not. The null and alternative hypothesis for this test are as follows:

H_0 : Random Effect model is appropriate (non-correlated)

H_1 : Fixed Effect model is appropriate (correlated)

Table 2. Hausman Test Results

Hausman				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		0	4	1

Source: Author's Calculation

For this test, it is considered that null hypothesis is rejected, if the p-value is less than 0.05, and then alternative hypothesis alternative hypothesis is rejected when the p-value is greater than 0.05. The result of the Hausman test in this study showed that the p-value is 1, which shows that there is no correlation between the estimators. Therefore, according to this result, this study moves forward with Random Effects model in determining the relationship between the concerned variables for SAARC nations.

Fixed Effects and Random Effects

Results for both Fixed Effects and Random Effects for six SAARC nations has been reported in Table 3 and Table 4 respectively. Hausman test confirms that Random Effects model is suitable for our model. The results reveal critical insights for the relationship between environmental and financial indicators within the region.

Table 3. Fixed Effect		
Variable	Coefficient	Prob.
REC	0.287183	0.0009
GDP	-0.152673	0.3658
DC	0.116818	0.0612
Co2	-0.284621	0.0934
R-squared	0.167618	

Source: Author's Calculation

Table 4. Random Effect Results		
Variable	Coefficient	Prob.
REC	0.244165	0.0031
GDP	-0.12244	0.4411
DC	0.110246	0.0977
Co2	-0.245249	0.1192

Source: Author's Calculation

The result of random effects model shows that the coefficient of renewable energy consumption (REC) is positive and statistically significant at 1 percent level according to p-value. This implies that 1 percent increase in the consumption of renewable energy results in a 0.24 percent increase in Gross Savings. This positive relation implies that as the economy shifts towards renewable energy sources, the dependence as well as the long term expenses on import of non-renewable reduces which also strengthen fiscal and household savings. Hence, this result validate the opinion that moving towards cleaner energy strengthen environmental sustainability and economic resilience in the concern countries.

Relationship between domestic credits to the private sector (DC) is also positive and significant at 10 percent level, implying that 1 percent change in financial factor results in approximately 0.11 percent change in gross savings. This result suggest that easy access to capital and better investment opportunities leads to higher savings. The proper operation of credit markets in the economy utilizes the idle resources, encourage entrepreneurial activities which stimulate aggregate savings. This result also supports the existing empirical evidences in finding the relationship between financial development and macroeconomic activities in developing nations.

As per the result of random effects model GDP per capita (GDP) shows a negative but statistically insignificant relationship with the Gross Savings. The relationship between these variables shows that when the economy phases the expansion period, individual's consumption expenditure may exceed savings temporarily which is more relevant in the short run for the developing nations.

Carbon-dioxide emissions (C) depicts a negative (-0.24) and statistically insignificant relationship with gross savings. This negative relationship between the concerned variables shows that Gross Savings may diminish due to higher industrial activity and high level of pollution. This may also be the cause of higher environmental mitigation cost and reduced resource efficiency. This is a developing trend, but not yet statistically significant, which means that the lack of control over carbon intensity can destabilize the macroeconomy in the long run, which supports the necessity of an efficient system of environmental accounting and carbon-management methods.

Policy Implications

As per the results of the Random Effects model, suggested by Hausman specification test, there are some important policy implications for the SAARC nations. Results showed that renewable energy consumption and gross savings have a positive and significant relationship and due to this positive relationship SAARC nations should invest in the clean and sustainable energy sources which will give them environmental as well as economic returns. Policy makers needs to give priority to pave the way for fiscal stimulus, technology transfer and regional economic transfer in order to enhance the renewable energy consumption. Hence, the huge dependence on the import of non-renewables will be reduced and national savings in the long run will be increased. This has been in line with Sustainability Development Goal 7 (Affordable and Clean Energy) which facilitates energy security and efficiency.

The positive effect of the domestic credit to the private sector highlights the needs and role of the financial institutions in transferring savings to productive investments. Policy makers are advised to reinforce financial inclusion frameworks, promote green financing instruments. They are also advised to give priority to ensure that there should be the access to the required credit for working in the sustainable sectors like renewable energy, green technologies, and future-saving industries. Hence, not only saving and investment will be promoted but this will also strengthen the macroeconomic resilience.

In the meantime, GDP and CO₂ emissions have a negative relationship, which means that the potential of long-term savings can be undermined during an uncontrolled economic growth and the impoverishment of the environment. Therefore, it is important to introduce carbon disclosure and environmental responsibility in national accounting and fiscal planning. Regional policies through the SAARC framework

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integrated with regional green finance engine e.g. a SAARC Green Finance Mechanism or Regional Carbon Disclosure Initiative could be used to enable common transitions to the low carbon approach towards SDG 13 (Climate Action) without compromising long term economic welfare.

Conclusion

This study has been done to analyse the integration of carbon disclosure with accounting theory by determining the relationship between financial and environmental factors across six SAARC nations. Panel data was collected for the analysis covering the period 2000-2021. The Fixed and the Random Effects models were applied to the analysis using panel data techniques, and the Hausman test was used to prove the applicability of the Random Effects specification. The findings indicate the positive and statistically significant impact of the use of renewable energy over gross savings, which illustrates the economic advantages of moving towards cleaner energy sources. Likewise, domestic credit to the private sector also moves in the same direction and has a positive impact on savings performance; hence, the mobilisation of resources through financial development, which focus on sustainable growth. On the contrary, there are negative and statistically insignificant effects of GDP and CO₂ emissions which indicate that the impact of short term consumption pressures and environmental costs can moderate the savings effects. In general, the results accentuate the interdependency of financial and environmental systems being valuable enough to suggest the integration of carbon disclosure and green accounting into the conventional financial reporting models. Hence, macroeconomic stability, and environmental resilience across the SAARC nations can be enhanced by augmenting investment opportunities in renewable energy, strengthening financial inclusion and also aligning the country specific policies with the sustainable goals.

References

1. Adetutu, M. O., Odusanya, K., Stathopoulou, E., & Weyman-Jones, T. (2024). The Impact of Firm Technology on Carbon Disclosure: The Critical Role of Stakeholder Pressure. *Oxford Bulletin of Economics and Statistics*, 86(6), 1438. <https://doi.org/10.1111/obes.12633>
2. Alsaifi, K. (2021). Carbon disclosure and carbon performance: Evidence from the UK's listed companies. *Management Science Letters*, 117. <https://doi.org/10.5267/j.msl.2020.8.023>
3. Amel-Zadeh, A., & Tang, Q. (2025). MANAGING THE SHIFT FROM VOLUNTARY TO MANDATORY CLIMATE DISCLOSURE: THE ROLE OF CARBON ACCOUNTING. *The British Accounting Review*, 101594. <https://doi.org/10.1016/j.bar.2025.101594>
4. Bazhair, A. H., Khatib, S. F. A., & Amosh, H. A. (2022). Taking Stock of Carbon Disclosure Research While Looking to the Future: A Systematic Literature

- Review. *Sustainability*, 14(20), 13475. <https://doi.org/10.3390/su142013475>
5. Bedi, A., & Singh, B. (2024). Exploring the impact of carbon emission disclosure on firm financial performance: moderating role of firm size. *Management Research Review*, 47(11), 1705. <https://doi.org/10.1108/mrr-01-2023-0015>
 6. Borghei, Z. (2021). Carbon disclosure: a systematic literature review. *Accounting and Finance*, 61(4), 5255. <https://doi.org/10.1111/acfi.12757>
 7. Bui, B., Houque, M. N., & Zahir-ul-Hassan, M. K. (2022). Moderating effect of carbon accounting systems on strategy and carbon performance: a CDP analysis. *Journal of Management Control*, 33(4), 483. <https://doi.org/10.1007/s00187-022-00346-7>
 8. Cheng, S., Yu, C.-P., & Hou, H. (2025). Investigating the role of financial development in mitigating carbon emissions across diverse financial economies. *Economic Change and Restructuring*, 58(1). <https://doi.org/10.1007/s10644-025-09855-6>
 9. Christy, A. P., Elnahass, M., Amézaga, J. M., Browne, A., & Heidrich, O. (2023). A dynamic framework to align company climate reporting and action with global climate targets. *Business Strategy and the Environment*, 33(4), 3103. <https://doi.org/10.1002/bse.3635>
 10. Garcia-Torea, N., Giordano-Spring, S., Larrinaga, C., & Rivière-Giordano, G. (2021). Accounting for Carbon Emission Allowances: An Empirical Analysis in the EU ETS Phase 3. *Social and Environmental Accountability Journal*, 42, 93. <https://doi.org/10.1080/0969160x.2021.2012496>
 11. Guo, T., Zha, G., Lee, C. L., & Tang, Q. (2020). Does corporate green ranking reflect carbon-mitigation performance? *Journal of Cleaner Production*, 277, 123601. <https://doi.org/10.1016/j.jclepro.2020.123601>
 12. Hartmann, F., Perego, P., & Young-Ferris, A. (2013). Carbon Accounting: Challenges for Research in Management Control and Performance Measurement. *Abacus*, 49(4), 539. <https://doi.org/10.1111/abac.12018>
 13. Hazaea, S. A., Al-Matari, E. M., Alosaimi, M. H., Farhan, N. H. S., Abubakar, A., & Zhu, J. (2023). Past, present, and future of carbon accounting: Insights from scholarly research. *Frontiers in Energy Research*, 10. <https://doi.org/10.3389/fenrg.2022.958362>
 14. He, R., Luo, L., Shamsuddin, A., & Tang, Q. (2021). Corporate carbon accounting: a literature review of carbon accounting research from the Kyoto Protocol to the Paris Agreement. *Accounting and Finance*, 62(1), 261. Wiley. <https://doi.org/10.1111/acfi.12789>
 15. Herold, D. M., Farr-Wharton, B., Lee, K., & Groschopf, W. (2018). The interaction between institutional and stakeholder pressures: Advancing a framework for categorising carbon disclosure strategies. *Business Strategy & Development*, 2(2), 77. <https://doi.org/10.1002/bsd2.44>
 16. Loayza, N., Schmidt-Hebbel, K., & Servén, L. (2000). What drives private saving across the world? *Review of Economics and Statistics*, 82(2), 165–181. <https://doi.org/10.1162/003465300558678>
 17. Liu, R., Rahman, M. R. C. A., & Jamil, A. H. (2025). From Policy Mandates to Market Signals: Causal and Dynamic Effects of Carbon Information Disclosure on Firm Value. *International Journal of Financial Studies*, 13(2), 98. <https://doi.org/10.3390/ijfs13020098>
 18. Liu, Y. S., Zhou, X., Yang, J., Hoepner, A. G. F., & Kakabadse, N. (2023). Carbon emissions, carbon disclosure and organizational performance. *International Review of Financial Analysis*, 90, 102846. <https://doi.org/10.1016/j.irfa.2023.102846>
 19. Maama, H., & Gani, S. (2022). Carbon accounting, management quality, and bank performance in East Africa. *Environmental Economics*, 13(1), 114. [https://doi.org/10.21511/ee.13\(1\).2022.10](https://doi.org/10.21511/ee.13(1).2022.10)
 20. Mateo-Márquez, A. J., González, J. M. G., & Ramírez, C. Z. (2020). The influence of countries' climate change-related institutional profile on voluntary environmental disclosures. *Business Strategy and the Environment*, 30(2), 1357. <https://doi.org/10.1002/bse.2690>
 21. Mondal, Md. S. A., Akter, N., & Ibrahim, A. M. (2024). Nexus of environmental accounting, sustainable production and financial performance: An integrated analysis using PLS-SEM, fsQCA, and NCA. *Environmental Challenges*, 15, 100878. <https://doi.org/10.1016/j.envc.2024.100878>
 22. Najaf, K., Ali, M., Asiaei, K., & Dhiaf, M. M. (2024). The Impact of carbon emissions on market performance: fintech versus non-fintech. *Electronic Commerce Research*. <https://doi.org/10.1007/s10660-024-09866-x>
 23. Nyahuna, T., & Doorasamy, M. (2023). The Effect of Mandatory Carbon Disclosure on Financial Performance: Evidence From South African Listed Carbon-Intensive Companies. *International Journal of Environmental Sustainability and Social Science*, 4(3), 635. <https://doi.org/10.38142/ijesss.v4i3.378>
 24. Sadorsky, P. (2009). Renewable energy consumption and income in emerging economies. *Energy Policy*, 37(10), 4021–4028. <https://doi.org/10.1016/j.enpol.2009.05.003>
 25. Shahbaz, M., Hye, Q., Tiwari, A.K., & Leitaó, N.C. (2013). Economic growth, energy consumption, financial development, trade openness and CO₂ emissions in Indonesia. *Energy Policy*, 61, 145–157. <https://doi.org/10.1016/j.rser.2013.04.009>
 26. Siddique, M. A., Akhtaruzzaman, M., Rashid, A., & Hammami, H. (2021). Carbon disclosure, carbon performance and financial performance: International evidence. *International Review of Financial Analysis*, 75, 101734. <https://doi.org/10.1016/j.irfa.2021.101734>
 27. Tóth, Á., Szigeti, C., & Suta, A. (2021). Carbon Accounting Measurement with Digital Non-Financial

- Corporate Reporting and a Comparison to European Automotive Companies Statements. *Energies*, 14(18), 5607. <https://doi.org/10.3390/en14185607>
28. Vaio, A. D., Zaffar, A., & Chhabra, M. (2024). Intellectual capital and human dynamic capabilities in decarbonization processes for net-zero business models: an in-depth examination through a systematic literature review. *Journal of Intellectual Capital*, 25(7), 23. <https://doi.org/10.1108/jic-01-2024-0015>
 29. Velte, P., Stawinoga, M., & Lueg, R. (2020). Carbon performance and disclosure: A systematic review of governance-related determinants and financial consequences. *Journal of Cleaner Production*, 254. <https://doi.org/10.1016/j.jclepro.2020.120063>
 30. Wahyuningrum, I. F. S., Baroroh, N., Yanto, H., Hidayah, R., Puspita, A. S., & Elviana, L. D. (2025). Corporate Governance: Driving Climate Change Disclosure and Advancing SDGs. *Journal of Risk and Financial Management*, 18(5), 234. <https://doi.org/10.3390/jrfm18050234>