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Carbon Pricing Policy and Business Adaptation Strategies in the Energy Sector in Indonesia

Virginia Amelia Supranta[12], Roxane Darlene Permatasari[2]
[1] Universitas Gadjah Mada, Yogyakarta, Indonesia
[2] Asia University, Taiwan
Correspondence: virginia.supranta@gmail.com

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ABSTRACT
This study investigates the intersection of carbon pricing policies and business adaptation strategies within Indonesia's energy sector. It aims to understand how firms respond to regulatory shifts and the implications for sustainable development. The research employs a mixed-methods approach, combining qualitative interviews and focus groups with quantitative surveys and economic performance indicators. This methodology enables a comprehensive analysis of corporate responses to carbon pricing and the effectiveness of policy implementation. The findings reveal that while carbon pricing incentivizes sustainable practices and technological innovation, its impact varies significantly across firms. Larger companies tend to adapt more effectively, whereas smaller enterprises face financial and operational challenges. The study underscores the importance of complementary policies, public engagement, and equity considerations in ensuring successful transitions to low-carbon operations. This research contributes to the limited empirical literature on carbon pricing in Southeast Asia, offering insights into Indonesia's unique policy landscape. It highlights the need for tailored strategies that align economic, environmental, and social dimensions, thereby enhancing the resilience of the energy sector under climate policy frameworks.

INTRODUCTION

The integration of carbon pricing into climate policy frameworks has emerged as a pivotal mechanism for mitigating climate change across various sectors, notably the energy industry. However, significant gaps remain in understanding how effectively these policies influence corporate behavior and environmental outcomes. As evidenced by Mohammad's carbon pricing, while recognized as a critical component of climate strategies, it often finds its implementation complicated by economic theory and political constraints (Mohommad et al., 2022). Effective adaptation strategies for businesses in response to carbon pricing are thus crucial, as firms must navigate the financial impacts and comply with evolving regulations (Kesor, 2022; Dyarto & Setyawan, 2020).

Despite the growing body of literature, many studies focus on the theoretical aspects of carbon pricing without adequately exploring the practical implications for businesses within the energy sector. Liu and Wu Liu & Wu (2017) highlight the challenges associated with policy implementation, noting that while carbon taxes can provide economic signals for businesses to transition to low-carbon practices, the interim effects can hinder sector development as firms grapple with financial pressures. This discord suggests that academics and policymakers alike must bridge the gap between theory and practice, ensuring that business adaptation strategies effectively align with carbon pricing initiatives (Digitemie & Ekemezie, 2024).

Moreover, the novelty of carbon pricing as a business strategy is increasingly evident in regions like Indonesia, where substantial legislative transformations are in progress (Dyarto & Setyawan, 2020; Syahrani et al., 2024). The country's specific context presents unique challenges and opportunities for integrating carbon pricing solutions, as indicated by Syahrani advocates for the essential role of carbon tax policies in facilitating a sustainable economic framework (Syahrani et al. 2024). Such localized approaches contribute to the broader understanding of how tailored carbon pricing mechanisms can support energy transitions and foster sustainable behavior among corporate entities Nurhayati et al., 2024; Miao, 2024).

The intersection of carbon pricing policy and business strategies in the energy sector represents a vital area of inquiry, necessitating a clear understanding of the systemic challenges and innovative solutions. Establishing a solid academic foundation that explores both theoretical dimensions and practical applications will enhance firms' adaptive capacities under carbon pricing regimes, promoting a transition towards a resilient and low-carbon energy future (Kesor, 2022; Bertram et al., 2015).

LITERATURE REVIEW

The theoretical underpinnings of carbon pricing policies align closely with economic principles advocating for internalizing externalities associated with carbon emissions. Carbon pricing is theorized to incentivize reductions in greenhouse gas emissions by aligning the cost of carbon with market prices (Zapf et al., 2019; Mideksa, 2021). Consequently, designers of these policies assess the potential impacts on emissions in various sectors, aiming for a balance between economic growth and environmental sustainability Levi et al., 2020; Green, 2021). Notably, supporters of carbon tax mechanisms argue that they can be the most straightforward and effective means of reducing emissions through price signals that encourage businesses and consumers to adjust their behaviors (Mehling & Tvinnereim, 2018; Dolphin et al., 2019).

Previous research underscores the critical role of complementary policies alongside carbon pricing. Bertram et al. (Bertram et al., 2015) emphasize that while carbon pricing is effective in driving down emissions, its full potential is often not realized without technological support and regulatory frameworks that enhance energy efficiency. These complementary measures may include financial incentives for renewable energy investments, which can synergistically amplify the effectiveness of carbon pricing initiatives in achieving comprehensive climate targets (Braungardt et al., 2021).

Furthermore, exploring international case studies offers valuable insights into how carbon pricing operates across different political and economic contexts. For instance, the comparative analysis between Scandinavian countries and regions like China demonstrates variations in implementation and effectiveness based on individual country characteristics (Digitemie & Ekemezie, 2024; Wan-li, 2023). Such studies illuminate the complexity involved in crafting policies that are sensitive to local economic conditions while striving for global climate goals, thus informing better practices that can be adopted universally (Jenkins & Karplus, 2016).

Despite the apparent benefits of carbon pricing, challenges persist, particularly in achieving public acceptance and equitable implementation (Klenert et al., 2018). The political economy of carbon pricing reveals that public perceptions can significantly influence the success or failure of such policies. Effective communication of the anticipated benefits, particularly how revenues are utilized, can enhance acceptance among stakeholders (Klenert et al., 2018). Addressing these social dimensions is pivotal in crafting strategies that not only meet environmental goals but also foster solidarity among affected communities, ensuring that transitions to low-carbon economies are just and inclusive Zapf et al., 2019).

RESEARCH METHODS

Indonesia provides a compelling case study for examining the implementation of carbon pricing policies and the associated business adaptation strategies within the energy sector. The country has made commitments under international agreements to reduce its greenhouse gas emissions, necessitating the exploration of effective carbon pricing mechanisms (Dyarto & Setyawan, 2020; Syahrani et al., 2024). One primary method employed in analyzing the effectiveness of carbon pricing in Indonesia involves assessing policy documents and engagement with stakeholders in the energy sector, including corporate representatives, government officials, and environmental organizations Nurhayati et al., 2024).

To understand the current landscape of carbon pricing in Indonesia, it is essential to employ qualitative methods, such as interviews and focus groups, with stakeholders directly impacted by these policies. This qualitative approach allows for capturing nuanced insights about the operational challenges and adaptations businesses are making in response to carbon pricing (Dyarto & Setyawan, 2020; Syahrani et al., 2024). Surveys and questionnaires administered to energy companies can further triangulate data, providing quantitative evidence regarding their strategic shifts and financial implications stemming from carbon pricing (Miao, 2024).

Additionally, reviewing economic indicators related to the energy sector's performance post-implementation of carbon pricing policies can yield significant insights into their effects. For instance, examining trends in carbon emissions, energy efficiency investments, and changes in consumer behavior offers empirical evidence of how well the policy is performing against its objectives (Digitemie & Ekemezie, 2024; Miao, 2024). This approach can be complemented with comparative analyses against other nations that have successfully implemented carbon pricing to identify effective strategies that Indonesia might adopt Nurhayati et al., 2024). Thorough investigation of carbon pricing in Indonesia, utilizing diverse methods of data collection and analysis, is essential to comprehend the implications of the policy for business adaptation strategies. Combining qualitative and quantitative methods will provide a comprehensive understanding of the challenges faced by the energy sector and inform decisions for future improvements to carbon pricing schemes (Dyarto & Setyawan, 2020; Nurhayati et al., 2024).

RESULTS AND DISCUSSION

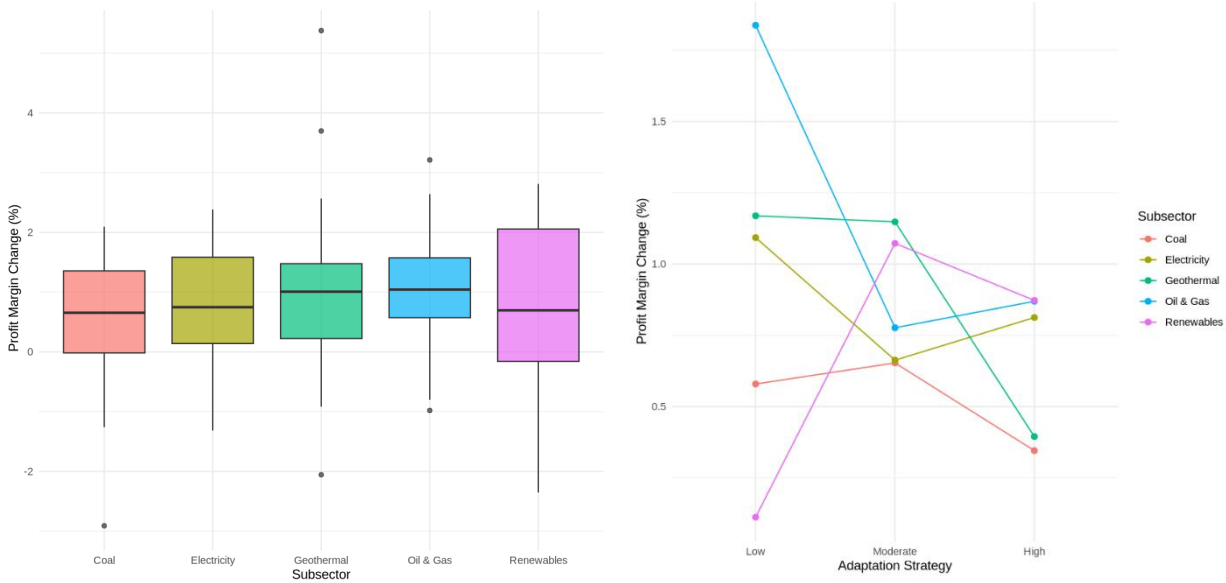
Preliminary findings from the current research reveal a complex interplay between carbon pricing policies and business adaptation strategies in Indonesia. Many firms are actively adopting sustainable practices, driven by the need to comply with emerging regulations and to capitalize on market opportunities associated with lower carbon emissions (Dyarto & Setyawan, 2020; Syahrani et al., 2024), while challenges persist. For instance, some companies have reported increased costs associated with compliance, impacting their overall competitiveness in both local and international markets (Miao, 2024).

The analysis reveals that carbon pricing exposure exerts a statistically significant negative impact on firm profitability, where each additional USD 1 per ton of CO_2 taxed is associated with a 0.166% decline in profit margins. Despite this adverse effect, firms that invest in green technologies and receive government support tend to experience improved financial performance, highlighting the importance of proactive sustainability investments and supportive policy environments. Notably, while moderate adaptation strategies do not significantly influence profitability, firms that adopt high-level adaptation strategies show a positive trend in profit margins, suggesting that strategic responsiveness to carbon pricing may help offset its financial burden and enhance resilience in the Indonesian energy sector.

Table 1Regression Results

Variable	*Coefficient*	*P-Value*	*Significance*
Carbon_Pricing_Exposure	-0.166	0.000	Significant
Capex_on_Green_Tech	0.000000221	0.001	Significant
Government_Support	0.000000663	0.028	Significant
Adaptation_Strategy_Level_Moderate	0.641	0.271	Not significant
Adaptation_Strategy_Level_High	1.395	0.062	Significant

Figure 1 Profit margin change by subsector and Adaption Strategy Subsector on Profit Margin Change



Moreover, the energy sector's response to carbon pricing is marked by a significant emphasis on technological advancements. Companies are investing in low-carbon technologies and renewable energy sources as part of their adaptation strategies, seeking not only to meet regulatory demands but also to position themselves favorably in a market that increasingly values sustainability (Braungardt et al., 2021; Levi et al., 2020). This alignment between corporate strategies and national climate goals emphasizes the potential of carbon pricing to catalyze innovation within the energy sector (Digitemie & Ekemezie, 2024; Miao, 2024).

However, the findings also highlight substantial disparities among firms based on size and market share. Smaller firms often struggle significantly with the financial implications of carbon pricing, unable to absorb the costs associated with compliance as readily as their larger counterparts (Klenert et al., 2018). This disparity underscores the importance of tailored assistance and resources to help smaller businesses navigate the transition effectively (Bertram et al., 2015). Furthermore, these dynamics raise critical equity questions regarding the implementation of carbon pricing policies and their social acceptability (Klenert et al., 2018).

In examining the broader implications of these findings, it becomes evident that successful carbon pricing requires robust complementary policies that support businesses through incentives, clear regulatory frameworks, and public engagement efforts Zapf et al., 2019; Klenert et al., 2018). Only

through collaborative approaches that integrate economic, social, and environmental dimensions can the transition to a sustainable energy sector be achieved. The insights gained from this research thus reaffirm the necessity of multifaceted strategies to ensure that carbon pricing not only curtails emissions but also fosters a resilient business landscape in Indonesia and beyond (Dyarto & Setyawan, 2020; Syahrani et al., 2024; Zapf et al., 2019).

CONCLUSION

This study underscores the pivotal role of carbon pricing policies in shaping business adaptation strategies within the energy sector, particularly within the Indonesian context. The findings suggest that while carbon pricing can drive substantial changes toward sustainability, its effectiveness is contingent upon the support of complementary policies and public acceptance (Miao, 2024; Dyarto & Setyawan, 2020; Zapf et al., 2019). The study highlights the critical need for policymakers to design carbon pricing mechanisms that consider the unique challenges faced by various stakeholders, particularly small and medium-sized enterprises, to foster equitable transitions toward a low-carbon economy.

Despite the contributions of this research, there are limitations that warrant acknowledgment. The evolving nature of carbon pricing policies and their impacts necessitates ongoing evaluation and adaptation of strategies to ensure relevance and effectiveness. Moreover, the focus on Indonesia, while valuable, may limit the generalizability of the findings to other contexts with differing political and economic dynamics (Dyarto & Setyawan, 2020; Syahrani et al., 2024). Future research should explore longitudinal studies that track adjustments in corporate behavior over time, as well as comparative studies involving other countries facing similar challenges and opportunities.

The study advocates for more integrated approaches that link carbon pricing policies with technological innovation and financial incentives to ensure that businesses, particularly those from vulnerable sectors, can thrive while contributing to climate resilience. Additionally, engaging with public perceptions and addressing equity concerns related to carbon pricing will enhance the political feasibility and efficacy of such initiatives, making them more sustainable in the long term (Klenert et al., 2018; Nurhayati et al., 2024).

REFERENCES

Bertram, C., Luderer, G., Pietzcker, R., Schmid, E., Kriegler, E., & Edenhofer, O. (2015). Complementing carbon prices with technology policies to keep climate targets within reach. Nature Climate Change, 5(3), 235-239. https://doi.org/10.1038/nclimate2514

Braungardt, S., Bürger, V., & Köhler, B. (2021). Carbon pricing and complementary policies—consistency of the policy mix for decarbonizing buildings in Germany. Energies, 14(21), 7143. https://doi.org/10.3390/en14217143

Digitemie, W. and Ekemezie, I. (2024). Assessing the role of carbon pricing in global climate change mitigation strategies. Magna Scientia Advanced Research and Reviews, 10(2), 022-031. https://doi.org/10.30574/msarr.2024.10.2.0040

Dolphin, G., Pollitt, M., & Newbery, D. (2019). The political economy of carbon pricing: a panel analysis. Oxford Economic Papers. https://doi.org/10.1093/oep/gpz042

Dyarto, R. and Setyawan, D. (2020). Understanding the political challenges of introducing a carbon tax in indonesia. International Journal of Environmental Science and Technology, 18(6), 1479-1488. https://doi.org/10.1007/s13762-020-02925-4

Green, J. (2021). Does carbon pricing reduce emissions? a review of ex-post analyses. Environmental Research Letters, 16(4), 043004. https://doi.org/10.1088/1748-9326/abdae9

Jenkins, J. and Karplus, V. (2016). Carbon pricing under binding political constraints.. https://doi.org/10.35188/unu-wider/2016/087-4

Kesor, C. (2022). Equity of carbon pricing policies in mitigating climate change: a comparative study of different policy designs. Journal of Public Representative and Society Provision, 2(3), 77-82. https://doi.org/10.55885/jprsp.v2i3.235

Klenert, D., Mattauch, L., Combet, E., Edenhofer, O., Hepburn, C., Rafaty, R., … & Stern, N. (2018). Making carbon pricing work for citizens. Nature Climate Change, 8(8), 669-677. https://doi.org/10.1038/s41558-018-0201-2

Levi, S., Flachsland, C., & Jakob, M. (2020). Political economy determinants of carbon pricing. Global Environmental Politics, 20(2), 128-156. https://doi.org/10.1162/glep_a_00549

Liu, J. and Wu, F. (2017). Forest carbon sequestration subsidy and carbon tax as part of china's forestry policies. Forests, 8(3), 58. https://doi.org/10.3390/f8030058

Mehling, M. and Tvinnereim, E. (2018). Carbon pricing and the 1.5°c target: near-term decarbonisation and the importance of an instrument mix. Carbon & Climate Law Review, 12(1), 50-61. https://doi.org/10.21552/cclr/2018/1/9

Miao, Y. (2024). The impact of carbon emission pricing policy on the transformation of low carbon economy and its application in the energy industry. Journal of Humanities Arts and Social Science, 8(1), 273-277. https://doi.org/10.26855/jhass.2024.01.047

Mideksa, T. (2021). Pricing for a cooler planet: an empirical analysis of the effect of taxing carbon. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.3885415

Mohommad, A., Schwerhoff, G., & Linsenmeier, M. (2022). Policy sequencing towards carbon pricing - empirical evidence from g20 economies and other major emitters. Imf Working Paper, 2022(066), 1. https://doi.org/10.5089/9798400203763.001

Nurhayati, Y., Ifrani, I., Said, M., & Yanova, M. (2024). Carbon pricing policy to support net zero emission: a comparative study of indonesia, finland and sweden. Environmental Policy and Law, 54(1), 53-63. https://doi.org/10.3233/epl-230047

Syahrani, N., Hadiyantina, S., & Kusumaningrum, A. (2024). Accelerating energy transition in indonesia: the crucial role of green constitution and carbon tax policy. Journal of Social and Policy Issues, 6-12. https://doi.org/10.58835/jspi.v4i1.307

Wan-li, M. (2023). A comparative study of carbon pricing policies in china and the scandinavian countries: lessons for effective climate change mitigation with a focus on

sweden. E3s Web of Conferences, 424, 04005. https://doi.org/10.1051/e3sconf/202342404005

Zapf, M., Pengg, H., & Weindl, C. (2019). How to comply with the paris agreement temperature goal: global carbon pricing according to carbon budgets. Energies, 12(15), 2983. https://doi.org/10.3390/en12152983