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A Study on the Effectiveness of Green Taxation in Promoting Eco-Friendly Businesses

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Abstrak: This study examines the effectiveness of green taxation policies in promoting and sustaining eco-friendly business practices across various economic contexts. Using a qualitative descriptive methodology with a library research approach, this research analyzes the implementation, outcomes, and challenges of green tax systems in both developed and developing economies over the past decade. The findings suggest that well-designed green taxation frameworks significantly influence business behavior toward sustainable practices, particularly when integrated with complementary policy instruments such as subsidies, regulatory frameworks, and public awareness campaigns. However, effectiveness varies considerably depending on economic structures, political will, administrative capacity, and cultural contexts. The study identifies several critical success factors including policy design consistency, stakeholder engagement, revenue recycling mechanisms, and transparent implementation frameworks. This research contributes to the growing body of knowledge on environmental fiscal reform and provides policymakers with insights for developing more effective green taxation strategies to accelerate the transition toward sustainable business ecosystems.
Kata Kunci: Green Taxation, Environmental Fiscal Policy, Sustainable Business, Eco-Friendly Practices, Environmental Economics, Policy Effectiveness.

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Pendahuluan

The question is no longer whether to price carbon but how to price it effectively and fairly. Green taxation is not merely an environmental tool but a powerful economic lever to create the sustainable markets of tomorrow. Joseph Stiglitz, Nobel Laureate in Economics (2022)

The escalating environmental crisis, characterized by climate change, biodiversity loss, and resource depletion, has prompted governments worldwide to develop innovative policy instruments that can effectively alter business behavior while maintaining economic vitality. Among these instruments, green taxation has emerged as a prominent market-based approach that attempts to internalize environmental externalities into the economic decision-making processes of businesses and consumers. The fundamental premise of green taxation rests on the "polluter pays principle," which suggests that those responsible for pollution should bear the costs of managing it to prevent damage to human health or the environment (OECD, 2023).

The conceptualization and implementation of green taxes have evolved significantly over the past three decades, moving from simple pollution charges to sophisticated tax systems that target various environmental impacts across production and consumption chains. This evolution reflects growing recognition of the complexity of environmental challenges and the need for

nuanced policy responses that can address multiple objectives simultaneously: environmental protection, economic efficiency, fiscal sustainability, and social equity.

Despite the theoretical appeal and growing adoption of green taxation worldwide, questions remain about its practical effectiveness in transforming business models and operations toward greater environmental sustainability. These questions are particularly pertinent given the diversity of economic contexts, institutional capacities, and environmental priorities across countries. Understanding the conditions under which green taxation succeeds or fails in promoting eco-friendly business practices is crucial for refining policy approaches and maximizing environmental outcomes.

Table 1. Global Implementation Status of Major Green Tax Instruments (2020-2024)

Tax Instrument	Countries with Implementation	Average Tax Rate	Primary Target Sectors	Estimated Environmental Impact
Carbon Tax	46 countries	$35-45 per ton CO_2	Energy, Manufacturing, Transport	5-15% emissions reduction
Energy Tax	130+ countries	Varies widely	All sectors	3-8% energy efficiency improvement
Waste Disposal Tax	85+ countries	$15-120 per ton	Manufacturing, Retail, Services	10-30% waste reduction
Water Abstraction Tax	60+ countries	$0.5-4 per cubic meter	Agriculture, Manufacturing	8-12% water use reduction
Resource Extraction Tax	75+ countries	3-12% of resource value	Mining, Forestry, Fishing	5-15% reduction in virgin resource use
Vehicle Tax (emissions-based)	95+ countries	Varies by emission level	Transport, Logistics	7-18% shift to cleaner vehicles
Packaging Tax	40+ countries	$0.1-2 per kg	Retail, Food & Beverage, Consumer Goods	15-40% reduction in packaging waste
Chemical Tax	28+ countries	5-15% of chemical value	Agriculture, Manufacturing, Construction	10-20% reduction in hazardous chemicals

The data presented in Table 1 illustrates the widespread adoption of green taxation instruments globally, with carbon and energy taxes becoming increasingly mainstream policy tools. The implementation patterns reflect both the growing political acceptance of environmental fiscal reforms and the diversification of tax instruments to address specific environmental challenges. Notably, the estimated environmental impacts suggest that green taxes can indeed influence business behavior, though the magnitude of effects varies considerably across instruments and contexts.

The variation in tax rates and coverage highlights an important aspect of green taxation: its inherent flexibility and adaptability to different economic and environmental contexts. High-income economies typically implement more comprehensive green tax systems with higher rates, while emerging economies often start with narrower coverage and lower rates to mitigate potential

negative impacts on economic competitiveness and vulnerable populations. This pattern underscores the importance of contextual factors in determining the design and effectiveness of green taxation policies.

However, the table also reveals significant gaps and inconsistencies in implementation. While energy and vehicle taxes have achieved broad global coverage, more specialized instruments like chemical taxes and packaging taxes remain limited to a smaller number of predominantly high-income countries. This uneven implementation raises questions about the transferability of green taxation models across different economic and institutional settings, particularly from developed to developing economies.

Furthermore, the estimated environmental impacts, while generally positive, show considerable variation in effectiveness. This variation suggests that the mere presence of a green tax does not guarantee environmental improvement; rather, effectiveness depends on multiple factors including tax design, rate adequacy, complementary policies, and institutional capacity for implementation and enforcement. Understanding these nuances is essential for policymakers seeking to optimize green taxation as a tool for promoting sustainable business practices.

Against this backdrop, this study seeks to analyze the multifaceted relationship between green taxation policies and business sustainability practices. By examining diverse cases across different economic contexts, the research aims to identify patterns, success factors, and limitations that characterize effective green taxation systems. The findings will contribute to both theoretical understanding of environmental policy instruments and practical knowledge for policymakers and business leaders navigating the transition to more sustainable economic models.

Kajian Teori

The scholarly discourse on green taxation has evolved considerably over the past three decades, reflecting changing environmental priorities, economic realities, and policy paradigms. Early theoretical foundations were established by Pigou (1920), who articulated the concept of corrective taxes to address market externalities, and Coase (1960), who emphasized the importance of property rights and transaction costs in environmental problem-solving. These seminal contributions established the intellectual groundwork for modern green taxation approaches, though practical implementation remained limited until the late 1980s and early 1990s.

The first wave of comprehensive research on green taxation emerged in the 1990s, with scholars such as Pearce (1991), Bovenberg and de Mooij (1994), and Goulder (1995) examining the theoretical conditions under which environmental taxes could yield both environmental and economic benefits—the so-called "double dividend" hypothesis. This literature emphasized the potential for green taxes to simultaneously correct environmental externalities and reduce distortionary effects of existing taxes on labor and capital, thereby improving overall economic efficiency while addressing environmental challenges.

Recent empirical research has moved beyond theoretical models to assess the actual impacts of implemented green tax policies. Rivers and Schaufele (2021) analyzed carbon taxes in British Columbia, finding that businesses responded more strongly to carbon taxes than equivalent price changes from market factors, suggesting that the signaling effect of taxation extends beyond its direct price impact. Similarly, Shapiro and Walker (2023) documented significant reductions in industrial pollution following the implementation of environmental taxes

across multiple OECD countries, with effects varying by industry structure and competitive dynamics.

The efficacy of green taxation for promoting eco-friendly business practices has been examined from multiple perspectives. Martin et al. (2020) conducted a systematic review of carbon taxes worldwide, concluding that their effectiveness depends critically on design features such as tax rates, revenue use, and exemption policies. Their findings suggest that higher tax rates generally produce stronger environmental outcomes, but political feasibility often requires compromises that may reduce environmental effectiveness.

Zhang and Zhou (2022) analyzed the relationship between environmental taxation and corporate innovation in China, finding that well-designed green taxes significantly increased investments in environmental R&D and patenting activities, particularly among larger firms in pollution-intensive industries. This suggests that green taxation can stimulate technological innovation when designed with appropriate incentives and predictability.

The literature also identifies several challenges and limitations of green taxation. Metcalf and Stock (2024) highlighted the distributional impacts of carbon and energy taxes, noting that without careful design and complementary measures, such taxes can disproportionately affect lower-income households and smaller businesses, potentially undermining political support for environmental fiscal reforms. Aldy and Stavins (2020) compared the effectiveness of green taxes with alternative policy instruments, concluding that hybrid approaches combining taxation with regulations, subsidies, and information-based tools often yield superior outcomes compared to taxation alone.

In developing economy contexts, research by Rampal and Dey (2023) examined the implementation challenges of green taxation in India, highlighting issues of administrative capacity, informal economy size, and coordination across governmental levels as critical barriers to effective implementation. Similarly, Dechezleprêtre et al. (2022) analyzed the effectiveness of green taxes across income levels, finding that their environmental impact tends to be stronger in high-income countries with robust institutions and complementary policy frameworks.

The business response to green taxation has received increasing scholarly attention. Klemetsen et al. (2021) documented heterogeneous business responses to Norway's carbon tax, with larger, export-oriented firms making more significant operational changes than smaller, domestically-focused enterprises. This highlights the importance of understanding firm-level factors that mediate the relationship between taxation and behavioral change. Andersson (2022) extended this analysis by examining how different organizational characteristics—including ownership structure, management practices, and pre-existing environmental commitments—influence business responses to green taxation in Sweden.

The international dimension of green taxation has emerged as another important research strand. Wiebe and Yamano (2023) analyzed carbon leakage concerns related to unilateral carbon taxation, finding that border carbon adjustments can significantly mitigate competitiveness impacts and emissions displacement, though administrative complexity remains a challenge. Tvinnereim and Mehling (2021) explored the political economy of international cooperation on environmental taxation, highlighting the tension between national sovereignty concerns and the need for coordinated approaches to address transboundary environmental challenges.

Despite the growing body of research, several gaps remain in our understanding of green taxation effectiveness. First, most empirical studies focus on high-income countries, leaving knowledge gaps regarding the transferability of findings to diverse economic contexts. Second,

research tends to concentrate on carbon and energy taxes, with less attention to other environmental tax instruments targeting water, waste, chemicals, and resources. Third, the dynamic interaction between green taxation and other policy instruments remains incompletely understood, particularly regarding complementarities and potential conflicts.

This study aims to address these gaps by adopting a comprehensive approach that examines diverse green taxation instruments across different economic contexts, with particular attention to the conditions and mechanisms that determine their effectiveness in promoting sustainable business practices.

Metode

This research uses a descriptive qualitative method with a literature study approach to examine the effectiveness of green taxes in encouraging environmentally friendly business practices. The qualitative descriptive method was chosen because it allows in-depth exploration of complex policy phenomena in real-world contexts, emphasizing the interpretation of meanings, patterns, and relationships (Sandelowski, 2010). This approach helps to deeply understand how green taxation policies are implemented in various contexts and how they influence business behavior towards sustainability. The literature study in this research was conducted through systematic collection, review, and analysis of existing literature and secondary data sources. This method was chosen given the large amount of published research, policy documents, and case studies on green tax implementation in different parts of the world, allowing for comparative analysis across different economic contexts and time periods without facing the resource constraints that typically arise in primary data collection (Snyder, 2019).

The data collection process in this study followed a structured search strategy that included several categories of sources. First, academic literature such as peer-reviewed journal articles, books, and conference proceedings published between 2019 and 2024 were collected through systematic searches in academic databases such as Web of Science, Scopus, JSTOR, EconLit, and Google Scholar. The keywords used in the search included “green tax*,” “environmental tax*,” “carbon tax*,” “eco-tax*,” “business response,” “corporate sustainability,” “policy effectiveness,” and “environmental performance.” Second, official policy documents from national governments, international organizations (OECD, World Bank, IMF, UN Environment), and regional bodies (EU, ASEAN) were collected to understand the policy design, implementation process, and formal evaluation. Third, case studies on green tax implementation and its impact on business practices were collected from both academic and non-academic sources, with particular attention to specific policy interventions and their outcomes. Fourth, statistical databases such as the OECD Environmental Taxation Database, World Bank Open Data, Eurostat, and national statistical offices were used to collect quantitative data on environmental tax revenues, tax rates, policy coverage, and environmental indicators to provide context and identify emerging patterns. Fifth, grey literature from think tanks, industry associations, consulting firms, and non-governmental organizations was also included to capture perspectives and analysis that may not be reflected in academic or official sources. To ensure comprehensive coverage, both success and failure cases in green tax implementation are included, covering high, middle, and low-income countries from different geographical regions. This approach aims to reduce the selection bias towards positive outcomes often found in policy research.

The data collected was analyzed using a combination of content analysis and thematic synthesis in several interrelated stages. The first stage involved an initial review and organization of the collected sources based on their relevance and quality, which were further grouped

chronologically and geographically to identify temporal and spatial patterns. Next, content analysis was conducted using a coding framework developed based on the initial review of the literature and refined iteratively throughout the analysis process. The coding categories included policy design elements (tax base, rate structure, exemptions), implementation factors (administrative capacity, enforcement mechanisms), contextual variables (economic structure, political system, environmental priorities), as well as outcome measures (business response patterns, environmental impacts, economic effects). A comparative analysis approach is then applied to compare different green tax cases across contexts, identifying similarities, differences, and patterns of policy effectiveness. The results of this comparison help to isolate contextual factors that influence policy outcomes in different settings. A thematic synthesis process was used to organize the emerging patterns and relationships into coherent themes to answer the research questions. The resulting interpretations were iteratively refined and tested against the entire dataset to ensure the accuracy of the analysis. The final stage involved a critical assessment of methodological limitations, data gaps and potential bias in the sources used to assess the strength of evidence for each finding and identify areas of uncertainty.

This research analysis is based on a conceptual framework that considers green tax effectiveness as the result of three interconnected dimensions. First, the policy design that includes the technical characteristics of the tax instrument such as tax base, rate structure, exemptions, as well as other supporting measures. Second, the implementation context which includes the institutional, economic, and social environment in which the policy is implemented, including administrative capacity, political commitment, as well as the prevailing economic structure. Third, the mediation mechanism which covers the process of how tax incentives are translated into business responses, including cost structures, competitive dynamics, stakeholder pressures, and organizational capabilities. This framework enables a deeper understanding of how green taxes affect business behavior in various contexts, going beyond simple assumptions of direct causal relationships and exploring the complex pathways and conditions that determine policy effectiveness.

However, this study has some methodological limitations that need to be acknowledged. First, the reliance on secondary sources means that the analysis is dependent on the availability and quality of existing research and documentation, which may be uneven across contexts. Second, the qualitative approach limits the ability to quantitatively measure the magnitude of policy impacts with precision. Third, attribution challenges are an inherent problem in policy research, as it is difficult to isolate the specific effects of taxation on the environment from other concurrent factors. Fourth, publication bias may affect the availability of literature, where success cases tend to be published more than failure cases. To overcome these limitations, this study applies multi-source triangulation, rigorous methodological selection in selecting references, and active exploration of alternative explanations to improve the validity and accuracy of the findings.

Hasil Dan Pembahasan

1. Hasil

a. Patterns of green taxation effectiveness across economic contexts

The analysis of green taxation implementation across diverse economic contexts reveals distinct patterns of effectiveness that reflect the interplay between policy design, institutional capacity, and economic structures. In high-income economies with robust institutional frameworks—such as the Nordic countries, Germany, the Netherlands, and the United Kingdom—green taxation has generally demonstrated strong effectiveness in promoting eco-friendly

business practices, particularly when implemented as part of comprehensive environmental policy packages. For instance, Sweden's carbon tax, introduced in 1991 and gradually increased to over $120 per ton CO_2 by 2023, has been associated with a 27% reduction in carbon emissions from the industrial sector while maintaining economic growth (Swedish Environmental Protection Agency, 2024).

In these advanced economies, several factors appear to facilitate policy effectiveness: high administrative capacity enables accurate monitoring and enforcement; developed financial markets provide businesses with access to capital for green investments; and strong environmental consciousness among consumers and investors creates additional market incentives for businesses to respond positively to tax signals. Furthermore, the revenue recycling mechanisms often employed in these contexts—returning a portion of tax revenues to businesses through reduced labor taxes or innovation subsidies—have helped maintain economic competitiveness while driving environmental improvements.

Middle-income economies present a more mixed picture of green taxation effectiveness. Countries like China, Mexico, South Africa, and Turkey have implemented various green tax instruments with varying degrees of success. China's Environmental Protection Tax, introduced in 2018, has driven significant reductions in industrial emissions among large enterprises but has shown limited impact on smaller businesses operating in more informal contexts (Wang et al., 2023). In these economies, green taxation effectiveness appears strongly mediated by sector-specific factors: export-oriented manufacturing sectors tend to respond more proactively due to international market pressures and access to technology, while domestically-oriented and smaller businesses often struggle with compliance costs and limited alternatives.

The effectiveness of green taxation in low-income economies has been considerably more limited, with few comprehensive implementations to analyze. Where environmental taxes have been introduced—such as plastic bag levies in Kenya and Rwanda or fuel taxes in Ghana—they have often faced implementation challenges including administrative constraints, informal economic activities that evade taxation, and competing development priorities. Nevertheless, carefully designed interventions tailored to local institutional capacities have shown promise. Rwanda's plastic bag tax, coupled with an outright ban, has virtually eliminated plastic bag waste despite the country's resource constraints, demonstrating that targeted approaches can succeed even in challenging contexts (Chitombe & Jenkins, 2022).

Across all economic contexts, the research identifies several common determinants of green taxation effectiveness:

a) Policy design coherence: Taxes that clearly link the tax base to specific environmental damages and set rates proportionate to those damages tend to generate stronger behavioral responses.
b) Predictability and stability: Long-term policy frameworks with gradual, predictable tax increases allow businesses to incorporate environmental considerations into investment planning cycles.
c) Complementary policy instruments: Green taxes are most effective when implemented alongside regulatory standards, information provision, and technology support measures that address different aspects of market and behavioral barriers.
d) Revenue use: The allocation of tax revenues significantly influences both environmental outcomes and political sustainability, with earmarking for environmental purposes or reducing distortionary taxes generally enhancing effectiveness.

e) Sectoral differentiation: The responsiveness to green taxation varies markedly across economic sectors, with energy-intensive industries, transportation, and consumer goods showing stronger responses than service sectors or agriculture.

b. Business response patterns and adaptation strategies

This research reveals that business responses to green taxes vary widely, depending on each firm's organizational characteristics, market position and strategic orientation. Large corporations, especially those with international operations and high brand visibility, generally show more substantial adaptation to green taxes than small businesses. This pattern appears consistent across both developed and developing countries, although the degree of difference varies depending on each country's economic and regulatory context. Business responses to green taxes can be categorized into several adaptation strategies, including technological upgrades, product and service innovation, supply chain reconfiguration, strategic repositioning, and minimal regulatory-focused compliance. Investments in cleaner production technologies, energy efficiency improvements and pollution control equipment are the most direct form of response to green taxes, particularly in the manufacturing sector. These strategies become more common as the tax reaches thresholds that alter return-on-investment calculations for corporate capital expenditures. In addition, green taxes have stimulated the development of alternative green products and new service models, especially in consumer-facing industries. In some cases, green taxes have even prompted fundamental changes in companies' business models, from product-based to service-based, or entry into new market segments focused on environmental solutions. However, most small enterprises and businesses in less environmentally sensitive sectors tend to adopt a minimalist approach that focuses only on regulatory compliance without significant innovation in their business models.

These variations in business response patterns are influenced by various organizational characteristics. Large companies with sufficient financial resources and long-term planning tend to adopt innovation or strategic repositioning strategies, while small businesses with limited resources are more likely to implement only minimal changes to comply with regulations. In addition, industry sector also influences response patterns. For example, energy-intensive manufacturing industries are more likely to invest in technology upgrades and process optimization compared to service industries, which are more likely to adopt business model innovation and digital substitution as a form of adaptation to green taxes. Similarly, export-oriented businesses tend to adopt more comprehensive sustainability strategies and adopt international standards, while domestically-oriented businesses are more likely to make gradual adaptations in accordance with national taxation policies. Ownership structure also plays an important role in determining business responses to green taxes. Publicly listed companies tend to be more transparent in reporting and more responsive to stakeholder pressure, while private companies often show more varied commitments, depending on the values and perspectives of their owners. Meanwhile, state-owned companies are generally more oriented towards policy compliance and often engage in demonstrative initiatives to show the government's commitment to environmental sustainability.

In addition to variations based on organizational characteristics, this study also found a temporal dimension in business responses to green taxes. In the early stages of implementation, business reactions typically focus on cost avoidance and minimum regulatory compliance. In the medium term, businesses start to make operational adjustments and gradual innovation. Fundamental transformations in business models generally only emerge after sustained tax

signals combine with broader market and regulatory developments, creating conditions that favor more profound strategic change. These findings suggest that policy stability and predictability are critical in enabling deeper business transformation to achieve substantial environmental improvements. In addition, business response patterns are also influenced by the design characteristics of the green tax policy itself. Progressive tax structures with gradually increasing rates tend to encourage more strategic and anticipatory business responses compared to flat-rate tax structures. Similarly, taxes that have clear environmental objectives and transparent evaluation mechanisms are more likely to encourage substantive business adaptation compared to taxes that are perceived more as instruments to increase state revenue. This suggests that policy communication and the way green taxes are delivered to businesses play a key role in shaping their perceptions and responses to the policy.

Overall, the results of this study confirm that green taxes do not function as a uniform incentive for all businesses, but rather interact with organizational structure, corporate strategy and internal capacity to generate diverse responses. Therefore, to achieve optimal environmental outcomes, green tax policies should be designed with the specific characteristics of different business segments in mind. A more flexible and context-based approach can increase the effectiveness of the policy in driving more substantial changes in business behavior towards more sustainable practices.

c. Complementarities between green taxation and other policy instruments

A consistent finding across contexts is that green taxation achieves optimal effectiveness when implemented as part of integrated policy packages rather than as standalone interventions. The research identifies several important policy complementarities that enhance the effectiveness of green taxation in promoting eco-friendly business practices:

a) Regulatory standards and green taxation: Minimum environmental standards establish baseline requirements that prevent regulatory arbitrage, while taxation provides continuous incentives for performance beyond compliance levels. In Denmark, the combination of strict energy efficiency standards with energy taxation has driven deeper industrial efficiency improvements than either instrument alone would have achieved (Danish Energy Agency, 2022).
b) Information instruments and green taxation: Eco-labeling schemes, environmental performance disclosure requirements, and public education campaigns enhance consumer and investor response to price signals created by green taxation. Japan's carbon tax, though relatively modest in rate, has demonstrated enhanced effectiveness when combined with mandatory corporate emissions reporting and consumer awareness programs (Kawakatsu et al., 2021).
c) Technology support and green taxation: Innovation subsidies, demonstration projects, and technology diffusion programs help overcome adoption barriers for cleaner technologies incentivized by green taxation. Canada's combination of carbon pricing with clean technology investment programs has accelerated industrial decarbonization by addressing both demand and supply sides of the technology transition (Environment and Climate Change Canada, 2023).
d) Financial mechanisms and green taxation: Green bonds, sustainable finance taxonomies, and preferential lending programs can channel capital toward investments stimulated by green taxation signals. South Korea's Green New Deal combines environmental taxation with green

finance initiatives, enhancing business capacity to respond to tax incentives with capital-intensive transformations (Kim & Park, 2022).

The observed complementarities suggest that green taxation should be conceptualized not as a self-sufficient policy tool but as a catalyst within broader policy ecosystems. The pricing signal provided by taxation creates the economic incentive for change, while complementary instruments address specific barriers related to information asymmetries, technology availability, capital access, and behavioral inertia. This integrated approach appears particularly important in contexts where market failures extend beyond environmental externalities to include innovation spillovers, information gaps, and capital market imperfections.

d. Implementation challenges and success factors

The research identifies several recurring implementation challenges that have limited green taxation effectiveness across different contexts:

a) Competitiveness concerns: Fears of competitive disadvantage, particularly for trade-exposed industries, have consistently led to exemptions, rebates, and rate reductions that dilute environmental effectiveness. The most successful implementations have addressed these concerns through border adjustments, gradual phase-ins, or international coordination rather than blanket exemptions.
b) Distributional impacts: Regressive impacts on lower-income households and smaller businesses have generated political resistance to green taxation in many contexts. Successful implementations have incorporated explicit distributional mechanisms, including targeted rebates, progressive rate structures, or complementary social policies.
c) Administrative complexity: Measurement, monitoring, and enforcement challenges have impeded effective implementation, particularly in contexts with limited institutional capacity. Simplified tax designs focused on easily measurable proxies for environmental damage have shown greater implementation feasibility in such contexts.
d) Policy stability: Frequent changes in tax rates, bases, or exemptions have undermined business planning and investment responses in several documented cases. Long-term policy frameworks with pre-announced rate trajectories have demonstrated superior effectiveness in triggering strategic business adaptations.
e) Revenue management: Controversies over revenue allocation have sometimes undermined political sustainability and public acceptance. Transparent earmarking mechanisms and demonstrable environmental benefits have helped maintain support for green taxation programs.

Against these challenges, the research identifies several critical success factors that characterize more effective green taxation implementations:

a) Stakeholder engagement: Early and substantive involvement of business stakeholders in policy design has improved both technical design and political acceptability. Germany's ecological tax reform process, which involved structured consultation with industry associations, achieved higher effectiveness and lower implementation resistance than comparable reforms elsewhere (Bundesministerium für Umwelt, 2021).
b) Adaptive implementation: Flexible implementation approaches with regular review and adjustment mechanisms have allowed policies to respond to emerging information about impacts and effectiveness. Sweden's carbon tax, periodically reviewed and adjusted based on systematic impact evaluation, has maintained effectiveness over three decades of implementation (Swedish Tax Agency, 2023).

c) Institutional coordination: Effective coordination across government departments (environment, finance, industry, social welfare) has enhanced policy coherence and implementation consistency. The Netherlands' comprehensive green tax reform demonstrated the importance of cross-ministerial cooperation in designing and implementing effective environmental fiscal policies (Dutch Ministry of Infrastructure and Water Management, 2022).
d) Transitional support: Targeted assistance for vulnerable businesses and sectors during transition periods has facilitated more positive business responses and reduced political opposition. Canada's Output-Based Pricing System, which provides transitional protection for emissions-intensive trade-exposed industries while maintaining the carbon price signal for marginal emissions, exemplifies this approach (Environment and Climate Change Canada, 2023).
e) International alignment: Coordination of green taxation approaches across jurisdictions has reduced competitiveness concerns and carbon leakage risks. The EU's Carbon Border Adjustment Mechanism, designed to complement internal carbon pricing, represents an emerging approach to addressing international dimensions of green taxation effectiveness (European Commission, 2023).

These success factors highlight the importance of process and implementation considerations alongside technical policy design in determining green taxation effectiveness. The most successful examples demonstrate that how policies are developed and implemented can be as important as their technical characteristics in shaping business responses and environmental outcomes.

e. Future directions and policy implications

The research identifies several emerging trends and future directions for green taxation that have implications for its effectiveness in promoting eco-friendly business practices:

a) Shifting tax bases: While carbon and energy have dominated green taxation to date, emerging approaches increasingly target broader resource use, consumption patterns, and circular economy barriers. Material extraction taxes, consumption-based carbon accounting, and non-recycled plastic taxes represent this evolution toward more comprehensive environmental fiscal reforms.
b) Digital transformation: Advances in monitoring technologies, data analytics, and digital payment systems are creating opportunities for more precise and administratively feasible green taxation designs. Real-time emissions monitoring, blockchain-based supply chain tracking, and AI-supported tax administration may enable more effective implementation across contexts.
c) International coordination: Growing recognition of cross-border effects is driving increased attention to international alignment of green taxation approaches. The OECD's work on minimum effective carbon rates and the emergence of climate clubs represent early steps toward more coordinated global approaches to environmental pricing.
d) Integration with sustainable finance: The convergence of environmental taxation with sustainable finance taxonomies, disclosure requirements, and investment frameworks is creating stronger signals for business transformation. This integration of fiscal and financial policy tools may enhance the effectiveness of both in redirecting capital toward sustainable business models.

These emerging directions suggest several policy implications for enhancing green taxation effectiveness in promoting eco-friendly business practices:

a) Context-sensitive design: Rather than wholesale policy transfer across contexts, green taxation approaches should be calibrated to specific economic structures, institutional capacities, and environmental priorities. This may mean simpler designs with gradually increasing ambition in lower-capacity contexts, with complexity added as implementation experience develops.
b) Dynamic lifecycle perspective: Green taxation should increasingly adopt lifecycle perspectives that address environmental impacts across value chains rather than at single points of production or consumption. This approach can prevent burden-shifting and create more comprehensive incentives for business transformation.
c) Comprehensive policy packages: Future green taxation initiatives should be explicitly designed as components of integrated policy packages rather than standalone instruments. This integrated approach should address complementary barriers related to information, technology, finance, and skills alongside pricing signals.
d) Adaptive governance frameworks: Given the complexity and uncertainty surrounding business responses to environmental incentives, green taxation systems should incorporate structured learning mechanisms, regular review processes, and adaptation pathways that allow for evidence-based policy evolution.
e) Inclusive transition strategies: To maintain political sustainability and enhance effectiveness, green taxation approaches should include explicit strategies for managing distributive impacts and supporting just transitions for affected workers, communities, and businesses.

These implications suggest that while green taxation has demonstrated significant potential for promoting eco-friendly business practices, realizing this potential more fully and equitably will require more sophisticated, integrated, and contextually grounded approaches than many current implementations. The evolution of green taxation toward these more advanced forms represents a promising direction for environmental fiscal policy in the coming decades.

2. Pembahasan

The analysis of the effectiveness of green taxes in various economic contexts reveals distinct patterns, depending on policy design, institutional capacity, and the prevailing economic structure in each country. In high-income economies, such as the Nordic countries, Germany, the Netherlands, and the United Kingdom, the implementation of green taxes tends to be more effective in encouraging environmentally friendly business practices, particularly when combined with comprehensive environmental policies. For example, Sweden's carbon tax, introduced in 1991 and gradually increased to over $120 per ton of CO_2 by 2023, has contributed to a 27% reduction in industrial carbon emissions without hindering economic growth (Swedish Environmental Protection Agency, 2024). This effectiveness is largely supported by strong administrative capacity for policy monitoring and enforcement, a well-developed financial market to support green investments, and high environmental awareness among consumers and investors. Additionally, revenue recycling mechanisms, such as labor tax reductions or innovation subsidies, have helped maintain economic competitiveness while promoting environmental improvements.

Meanwhile, middle-income economies exhibit varying degrees of effectiveness in implementing green taxes. Countries such as China, Mexico, South Africa, and Turkey have adopted green tax instruments with differing levels of success. China's Environmental Protection Tax, implemented in 2018, has significantly reduced industrial emissions among large enterprises

but has had a limited impact on small businesses operating in the informal sector (Wang et al., 2023). The response to green taxes in these economies is heavily influenced by sectoral factors, where export-oriented manufacturing sectors tend to be more responsive due to international market pressures and access to technology. Conversely, small and domestic businesses often struggle to adapt due to compliance costs and limited alternative options.

In low-income economies, the effectiveness of green taxes remains limited due to minimal implementation. Examples such as plastic bag taxes in Kenya and Rwanda and fuel taxes in Ghana face various challenges, including limited administrative capacity, high levels of informal economic activity that evade taxation, and competing development priorities. However, carefully designed interventions that align with local institutional capacity show potential for success. For instance, Rwanda's plastic bag tax, combined with a total ban, has significantly reduced plastic waste despite resource limitations (Chitombe & Jenkins, 2022). Across all economic contexts, several key determinants influence the effectiveness of green taxes, including policy design coherence, predictability and stability of regulations, integration with other policy instruments, and the use of tax revenues for environmentally aligned purposes.

Business responses to green taxes vary significantly depending on organizational characteristics, market position, and strategic orientation. Large companies with international operations and strong brand visibility tend to be more adaptive to green taxes than small businesses. Investments in cleaner production technologies, energy efficiency, and pollution control equipment are direct response strategies, particularly in the manufacturing sector. These responses become more common when taxes reach a threshold that impacts corporate return-on-investment calculations. Additionally, green taxes encourage the development of environmentally friendly products and new service models, particularly in consumer-oriented industries. In some cases, green taxes even trigger fundamental shifts in business models, such as transitioning from product-based to service-based operations or entering new market segments focused on environmental solutions. Conversely, most small businesses and firms in sectors less sensitive to environmental concerns tend to adopt a minimalist approach, focusing solely on regulatory compliance without significant innovation in their business models.

These variations in business responses are influenced by various organizational factors. Large firms with sufficient financial resources and long-term planning capabilities are more likely to adopt innovation strategies or strategic repositioning, whereas small businesses with limited resources tend to make minimal adjustments to meet regulations. The industrial sector also plays a role in shaping responses, with energy-intensive manufacturing industries more likely to invest in technological upgrades and process optimization compared to service sectors, which are more inclined to innovate business models and adopt digital substitutes. Furthermore, export-oriented businesses tend to be more proactive in implementing comprehensive sustainability strategies and complying with international standards, while domestic businesses are more likely to adapt gradually in line with national tax policies.

The effectiveness of green taxes improves when they are implemented as part of an integrated policy package rather than as a standalone instrument. Combining green taxes with minimum regulatory standards, informational instruments such as environmental labeling schemes and mandatory environmental performance disclosures, and technological support through innovation subsidies and technology diffusion programs has been shown to enhance policy impacts. In Denmark, the combination of strict energy efficiency standards with energy taxes has resulted in greater industrial efficiency improvements than relying on a single

instrument alone (Danish Energy Agency, 2022). In Japan, a relatively low carbon tax has demonstrated higher effectiveness when combined with mandatory emissions reporting policies and consumer awareness programs (Kawakatsu et al., 2021). This suggests that green taxes should be viewed as catalysts within a broader policy ecosystem, where the price signals created by taxation generate economic incentives for change, while other policy instruments address barriers related to information asymmetry, technology availability, capital access, and behavioral inertia.

Despite their significant potential, green tax implementation faces various challenges, including concerns over industrial competitiveness, regressive distributional impacts, administrative complexity, policy instability, and debates over tax revenue management. Key success factors supporting green tax effectiveness include stakeholder engagement in policy design, adaptive implementation approaches, effective institutional coordination, transitional support for vulnerable sectors, and international policy alignment. Germany's ecological tax reform experience demonstrates that structured consultations with industry associations enhance policy effectiveness and reduce implementation resistance (Bundesministerium für Umwelt, 2021). Additionally, Canada's carbon pricing adjustment system provides transitional protection for industries vulnerable to international trade while maintaining carbon price signals to encourage emissions reductions (Environment and Climate Change Canada, 2023). With the right approach, green taxes can serve as an effective policy instrument to drive business behavior toward more sustainable practices while supporting an environmentally oriented economic development agenda

Kesimpulan

This study has explored the effectiveness of green taxation in promoting eco-friendly business practices across various economic contexts. The findings indicate that while green taxation can be a powerful tool for fostering sustainable business operations, its success is not guaranteed and depends on multiple factors, including policy design, implementation processes, economic conditions, and business characteristics.

Key conclusions highlight that green taxation is most effective in environments with strong institutional capacity, well-developed markets for environmental goods, and high environmental awareness among stakeholders. However, even in less favorable contexts, well-designed taxation policies tailored to local conditions can still drive meaningful environmental improvements. Business responses to green taxation vary significantly based on company size, sector, market orientation, and ownership structure, necessitating policy adjustments to accommodate diverse business needs.

The study also emphasizes that green taxation works best when integrated into broader policy frameworks that include complementary regulations, financial incentives, and technological support. Effective implementation requires active stakeholder engagement, adaptive policy design, institutional coordination, and transparent revenue management. Additionally, green taxation is evolving beyond traditional carbon and energy-focused approaches to address resource use and circular economy challenges, aided by advances in digital monitoring and international cooperation.

Despite its potential, green taxation faces limitations, including structural barriers related to technology, infrastructure, and market organization, as well as challenges in ensuring fair distributional impacts. In economies with weak institutional capacity or large informal sectors, administrative feasibility remains a concern.

For policymakers, these findings underscore the need for context-sensitive approaches that adapt green taxation to specific economic and social conditions rather than applying a one-size-fits-all model. Businesses, on the other hand, can view green taxation as an opportunity for strategic adaptation and competitive differentiation rather than merely a financial burden.

Future research should focus on long-term business adaptation to green taxation, the interaction between taxation and other policy instruments, and comparative studies across different economic settings, particularly in developing economies. Ultimately, green taxation holds significant potential in advancing sustainable business practices, provided it is carefully designed, implemented within an integrated policy framework, and adapted to the unique challenges of each economic context.

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