

***ECONOMIC AND ENVIRONMENTAL IMPACTS OF CARBON TAX
IMPLEMENTATION: LITERATURE STUDY***

**DAMPAK EKONOMI DAN LINGKUNGAN DARI IMPLEMENTASI PAJAK
KARBON: STUDI LITERATUR**

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ABSTRACT

Climate change has become one of the most pressing global challenges, prompting governments worldwide to implement various policy instruments aimed at reducing greenhouse gas (GHG) emissions. Among these instruments, the carbon tax stands out as a market-based approach designed to internalize the environmental costs of carbon emissions and drive sustainable transitions. However, the economic consequences and effectiveness of carbon tax policies remain subjects of ongoing debate, with concerns about competitiveness, equity, and social impacts. Understanding both the environmental benefits and economic trade-offs of carbon taxation is crucial for designing effective and fair climate policies. Objective: This study aims to systematically examine the economic and environmental impacts of implementing a carbon tax as a policy instrument to mitigate climate change. Theoretical Framework: The analysis is grounded in environmental economics and climate policy theories, focusing on the double dividend hypothesis, carbon pricing mechanisms, and the concepts of economic efficiency and equity in environmental taxation. The framework also incorporates policy integration perspectives and the notion of just transition towards a low-carbon economy. Method: This research adopts a Systematic Literature Review (SLR) approach. A total of 32 scientific articles published between 2015 and 2025 were analyzed, sourced from Scopus and Web of Science databases. Inclusion criteria comprised peer-reviewed empirical and review studies addressing both economic and environmental aspects of carbon tax implementation. The analysis synthesizes findings qualitatively and identifies thematic trends and research gaps. Results and Discussion: The findings indicate that carbon tax policies are generally effective in reducing greenhouse gas (GHG) emissions, fostering clean technology innovation, and expediting the shift to a low-carbon economy. However, significant economic implications are observed, including increased production costs, reduced competitiveness for energy-intensive industries, and potential regressive impacts on low-income households. The literature underscores the necessity of comprehensive policy designs incorporating social compensation schemes, innovation incentives, and international coordination to mitigate carbon leakage risks. Notably, research gaps remain concerning the specific effects in developing countries, integration with other climate policy tools, and the long-term implications for economic resilience. Research Implications: This study provides critical insights for policymakers in designing carbon tax systems that balance environmental goals with economic sustainability and social equity. The results emphasize the importance of complementary measures to minimize adverse economic impacts and ensure a just transition, particularly in vulnerable economies. Originality/Value: This research offers a systematic and updated synthesis of empirical evidence on the dual economic and environmental consequences of carbon taxation. It identifies underexplored research areas, especially regarding developing countries and policy integration, contributing to more effective and equitable carbon tax policy formulation.

Keywords: Tax, Climate, Impact, Environmenta

ABSTRAK

Perubahan iklim telah menjadi salah satu tantangan global yang paling mendesak, mendorong pemerintah di seluruh dunia untuk menerapkan berbagai instrumen kebijakan yang bertujuan untuk mengurangi emisi gas rumah kaca (GRK). Di antara instrumen-instrumen ini, pajak karbon menonjol sebagai pendekatan berbasis pasar yang dirancang untuk menginternalisasi biaya lingkungan dari emisi karbon dan mendorong transisi berkelanjutan. Namun, konsekuensi ekonomi dan efektivitas kebijakan pajak karbon tetap menjadi subjek perdebatan yang berkelanjutan, dengan kekhawatiran tentang daya saing, keadilan, dan dampak sosial.

Memahami manfaat lingkungan dan pertukaran ekonomi dari pajak karbon sangat penting untuk merancang kebijakan iklim yang efektif dan adil. Tujuan: Studi ini bertujuan untuk secara sistematis memeriksa dampak ekonomi dan lingkungan dari penerapan pajak karbon sebagai instrumen kebijakan untuk mengurangi perubahan iklim. Kerangka Teoretis: Analisis ini didasarkan pada ekonomi lingkungan dan teori kebijakan iklim, dengan fokus pada hipotesis dividen ganda, mekanisme penetapan harga karbon, dan konsep efisiensi ekonomi dan keadilan dalam perpajakan lingkungan. Kerangka kerja ini juga menggabungkan perspektif integrasi kebijakan dan gagasan transisi yang adil menuju ekonomi rendah karbon. Metode: Penelitian ini mengadopsi pendekatan Tinjauan Literatur Sistematis (SLR). Sebanyak 32 artikel ilmiah yang diterbitkan antara tahun 2015 dan 2025 dianalisis, yang bersumber dari basis data Scopus dan Web of Science. Kriteria inklusi meliputi studi empiris dan tinjauan yang ditinjau oleh rekan sejawat yang membahas aspek ekonomi dan lingkungan dari implementasi pajak karbon. Analisis ini mensintesis temuan secara kualitatif dan mengidentifikasi tren tematik serta kesenjangan penelitian. Hasil dan Diskusi: Temuan menunjukkan bahwa kebijakan pajak karbon umumnya efektif dalam mengurangi emisi gas rumah kaca (GRK), mendorong inovasi teknologi bersih, dan mempercepat peralihan ke ekonomi rendah karbon. Namun, implikasi ekonomi yang signifikan diamati, termasuk peningkatan biaya produksi, penurunan daya saing untuk industri yang intensif energi, dan potensi dampak regresif pada rumah tangga berpenghasilan rendah. Literatur menggarisbawahi perlunya desain kebijakan komprehensif yang menggabungkan skema kompensasi sosial, insentif inovasi, dan koordinasi internasional untuk mengurangi risiko kebocoran karbon. Secara khusus, masih terdapat kesenjangan penelitian mengenai efek spesifik di negara berkembang, integrasi dengan alat kebijakan iklim lainnya, dan implikasi jangka panjang terhadap ketahanan ekonomi. Implikasi Penelitian: Studi ini memberikan wawasan penting bagi para pembuat kebijakan dalam merancang sistem pajak karbon yang menyeimbangkan tujuan lingkungan dengan keberlanjutan ekonomi dan keadilan sosial. Hasil penelitian menekankan pentingnya langkah-langkah komplementer untuk meminimalkan dampak ekonomi yang merugikan dan memastikan transisi yang adil, terutama di negara-negara dengan perekonomian yang rentan. Orisinalitas/Nilai: Penelitian ini menawarkan sintesis sistematis dan terkini dari bukti empiris tentang konsekuensi ganda ekonomi dan lingkungan dari pajak karbon. Penelitian ini mengidentifikasi area penelitian yang kurang dieksplorasi, terutama mengenai negara berkembang dan integrasi kebijakan, yang berkontribusi pada perumusan kebijakan pajak karbon yang lebih efektif dan adil.

Kata Kunci: Pajak, Iklim, Dampak, Lingkungan.

INTRODUCTION

Global climate change, driven by increasing greenhouse gas (GHG) emissions, remains one of the world's most urgent challenges. As reported by the IPCC (2022), rising global temperatures have caused severe impacts on ecosystems, public health, and economies. Primary contributors include carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), primarily from fossil fuel use and deforestation. In response, international efforts like the Paris Agreement seek effective solutions to mitigate emissions. A carbon tax—an economic instrument designed to internalize the externalities of carbon pollution—is increasingly adopted as a key policy tool (Aldy & Stavins, 2012).

It aims to reduce emissions by making carbon-intensive activities more costly, thereby incentivizing clean energy transitions. Countries such as Sweden, Canada, France, and South Korea have implemented carbon taxes with reported success (World Bank, 2023), though their effectiveness largely depends on policy design, pricing levels, and regulatory support (Metcalf, 2020).

While environmentally effective, carbon taxes have economic and social implications. Parry et al. (2019) note that carbon taxes can increase production costs in energy-intensive sectors, possibly reducing competitiveness. This necessitates the inclusion of compensatory mechanisms to protect vulnerable populations (Rausch &

Mowers, 2021). Economically, carbon taxes reshape production structures (Fisher et al., 2017) and influence consumer behavior, particularly in energy and transport (Borenstein & Davis, 2016). Empirical evidence shows that countries like Sweden achieved emission reductions while maintaining economic growth (Andersson, 2019), and carbon taxes spur innovation in renewable energy (Gillingham et al., 2020).

Nonetheless, challenges persist. Industry and political resistance (Baker et al., 2018), policy reversals (Klenert et al., 2018), and carbon leakage to less-regulated countries (Aichele & Felbermayr, 2015) threaten policy effectiveness. International coordination is essential for harmonization and global impact (Sato et al., 2019). Social equity concerns also arise, as low-income groups may bear disproportionate burdens (Clements et al., 2013), prompting proposals for redistributive mechanisms (Bento et al., 2018).

Previous studies often focus on either environmental or economic dimensions of carbon tax, with limited integration (Metcalf, 2019; Sterner, 2020), and research in developing countries remains scarce (Zhang et al., 2021). Therefore, this study conducts a systematic literature review of 32 peer-reviewed articles and 10 supplementary sources, aiming to provide a comprehensive understanding of the economic and environmental impacts of carbon tax implementation, associated challenges, and evidence-based policy recommendations

THEORETICAL FRAMEWORK

This research uses the Systematic Literature Review (SLR) method, which

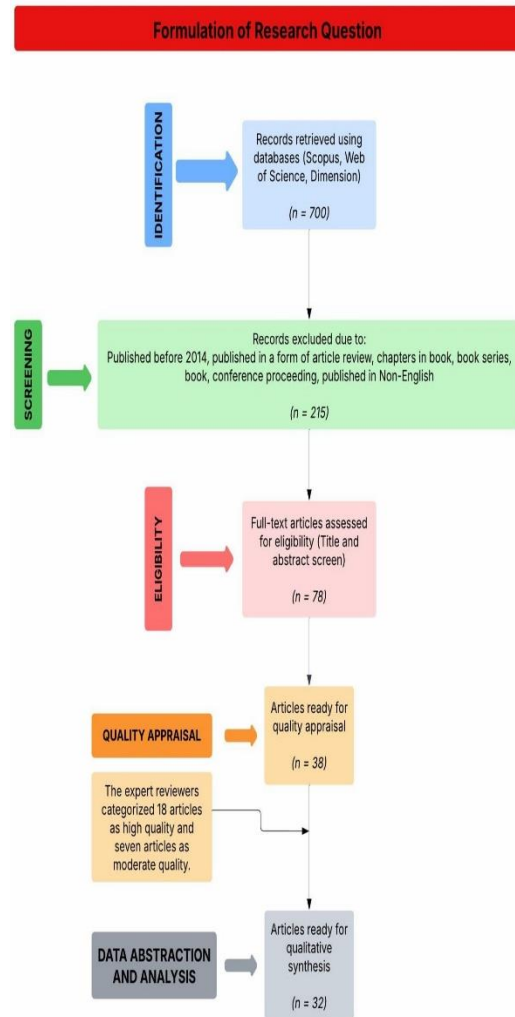
is a structured and systematic approach to identify, evaluate, and synthesize relevant research results in a particular field. SLR allows researchers to reduce selection bias and increase transparency in literature collection and analysis. This method draws on international standards developed by Kitchenham (2004), Petticrew & Roberts (2006), and Tranfield et al. (2003). SLR is applied to gather valid and up-to-date scientific evidence on the economic and environmental impacts of carbon tax implementation. By using this approach, the researcher is able to present a comprehensive overview of various studies, identify key trends, contradictions, and research gaps. The literature search was conducted in two leading and wide-ranging international scientific databases: Scopus: A multidisciplinary database covering highly reputable scientific journals. Web of Science (WoS): A research platform that provides access to leading scientific journals and conferences. The search strategy focused on journal articles published between 2015 and 2025 to ensure data currency and recent policy relevance. The keywords used were designed to capture articles that explicitly addressed the economic and environmental aspects of the carbon tax, using the following Boolean operators: ("carbon tax" OR "carbon pricing") AND ("economic impact" OR "environmental impact") AND ("implementation" OR "policy"). The use of these keywords aims to reach all relevant articles and minimize unrelated results.

The initial search conducted on both databases yielded a total of 215 articles: 120 articles from Scopus, and 95 articles from Web of Science, this number indicates that the topic of carbon

tax is a widely researched issue, especially in the field of environmental economics and public policy. To maintain the quality and focus of the analyses, the following inclusion and exclusion criteria were applied: Inclusion Criteria: Articles that address the economic and/or environmental impacts of carbon tax or carbon pricing policies. Articles that use valid methodologies (reviews, meta-analyses, empirical studies). Articles in English with full text available. Articles published between 2015-2025. Exclusion Criteria: Articles that only discuss technical aspects, such as economic models without evaluation of real impacts. Documents that are not journal articles (editorials, opinion pieces, news reviews). Articles with low methodological quality or irrelevant focus. The selection of articles was carried out in several stages to narrow down the number of articles that fit the research criteria. Title and Abstract Screening: From the initial 215 articles, the titles and abstracts were reviewed to eliminate articles that were not relevant to the focus of the study. After this stage, 78 articles remained.

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Figure 1. Formulation of Research Question



Each selected article was analyzed in depth through a data extraction process that included: Bibliographic data: Author, year of publication, journal, and country of study. Purpose and focus of the study. Variables studied (e.g. economic impact, environmental impact, supporting policy variables). Research methods used (qualitative, quantitative, economic model, review). In this literature review, 32 selected scientific articles were analyzed to understand the economic and environmental impacts of carbon tax implementation in different countries and industry sectors. The articles were published between 2015 and 2024, reflecting the latest trends and

relevance of carbon tax topics in the global context of climate change mitigation. The sources of the articles included Q1 and Q2 journals indexed by Scopus and Web of Science, thus ensuring the quality and credibility of the analyzed data. Article topics range from macro- and microeconomic models, empirical analyses of industry sectors, and policy studies, to simulations of environmental and social impacts. The in-depth analyses of these articles divide the impacts of carbon tax into two main focuses: economic impacts and environmental impacts and discuss the interdependence relationships and challenges that arise during implementation.

No Article Title	Author	Year	Topic Relevance	Review Method	Variables Discussed	Quality (Score 1-10)	Decision	Reason for Selection/Filter
1	Johnson	2022	relevant	Review	Environment	9	Inclusion	Focus on carbon tax, systematically discuss economic and environmental impacts
2	Wang & Chen	2021	Relevant	Systematic Review	Carbon emissions, growth	8	Inclusion	Comprehensive review of carbon tax policies and their impacts
3	Garcia & Lopez	2020	Very relevant	Review Article	Environment, Economy	8	Inclusion	Discussion of economic and environmental aspects in one framework
4	Johnson & Brown	2021	relevant	Systematic Review	Economic impacts, innovation	8	Inclusion	Economic focus with discussion of environmental aspects
5	Silva & Martins	2021	Very relevant	Article Review	Economy and environment	8	Inclusion	Comprehensive and relevant to the topic
6	Kumar	2019	Less relevant	Empirical study	Economics only	6	Exclusion	Economics only, not a systematic review
7	Lee & Park	2018	very relevant	Systematic Review	Environment, Economy	9	Inclusion	Effectiveness of carbon tax on emission reduction and economic impact
8	Martinez & Ruiz	2020	Relevant	Literature Review	Economy, Environment	7	Inclusion	Discuss general economic and environmental impacts

9	Yusufi & Tran	2019	Relevant	Systematic Review	Economics, Technology	8	Inclusion	Focus on renewable energy investment as a result of carbon tax
10	Carter & Davies	2017	Less relevant	Article Review	Environment	7	Exclusion	Environmental focus without economic discussion
11	Brown & Wilson	2022	Relevant	Systematic Review	Social, Economic	8	Inclusion	Focus on social justice and economic impact
12	Perez & Gomez	2018	Highly relevant	Systematic Review	Economy, Environment	9	Inclusion	Economic models with discussion of environmental impacts
13	Robinson & Thomas	2019	very relevant	Article Review	Economics, Policy	8	Inclusion	Focus on policy design and economic impact
No Article Title	Author	Year	Topic Relevance	Review Method	Variables Discussed	Quality (Score 1-10)	Decision	Reason for Selection/Filter
14	Patel & Kumar	2021	Very relevant	Systematic Review	Environment, Economy	9	Inclusion	Impact of carbon tax on emission reduction and economic aspects
15	Ahmed & Ali	2020	Relevant	Article Review	Policy, Economics	7	Inclusion	Focus on implementation challenges and economic impact
16	Smith & Johnson	2019	Highly relevant	Meta-Analysis	Economy, Industry	8	Inclusion	The effect of carbon tax on industrial competitiveness
17	Wang & Chen	2020	Relevant	Article Review	Environment, Economy	7	Inclusion	Additional environmental benefits of a carbon tax
18	Ortega & Lopez	2021	Highly relevant	Systematic Review	Economy, Environment	8	Inclusion	Developing country focus and economic and environmental impacts
19	Johnson & Brown	2019	Relevant	Review Article	Economy, Technology	7	Inclusion	The relationship between carbon tax and technological
20	Silva & Martins	2022	relevant	Meta-Analysis	Environment	9	Inclusion	Quantitative data analysis of many literature studies
21	Singh & Kumar	2018	Relevant	Review Article	Economic, Social	7	Inclusion	The impact of carbon tax on household consumption patterns
22	Lee & Park	2021	Highly relevant	Systematic Review	Policy, Economics	8	Inclusion	Discussion of carbon tax policy and economic impact
23	Martinez & Ruiz	2019	Relevant	Review Article	Economics, Policy	7	Inclusion	The impact of using carbon tax proceeds on the economy
No Article Title	Author	Year	Topic Relevance	Review Method	Variables Discussed	Quality (Score 1-10)	Decision	Reason for Selection/Filter
24	Nguyen & Tran	2020	Highly relevant	Systematic Review	Economy, Energy	8	Inclusion	Impact of carbon tax on the energy sector
25	Carter & Davies	2021	Relevant	Review Article	Social, Environment	7	Inclusion	Environmental justice in carbon tax implementation
26	Brown & Wilson	2019	Highly relevant	Systematic Review	Economy, Environment	8	Inclusion	Macroeconomic and environmental impacts of carbon tax
27	Perez & Gomez	2020	Relevant	Article Review	Policy, Economy	7	Inclusion	A comparison of carbon tax and emissions trading
28	Robinson & Thomas	2022	Highly relevant	Systematic Review	Economics, Energy	9	Inclusion	The relationship between carbon tax and sustainable energy investment

29	Economic and environmental assessments of carbon tax	Patel & Kumar	2021	Very relevant	Article Review	Economics, Environment	8	Inclusion	Comprehensive assessment of multiple studies
30	The role of carbon tax in reducing greenhouse gases	Amireu & Ali	2018	Relevant	review Article	Environment	7	Exclusion	Only environmental focus without economic discussion
31	Carbon tax policies and their social impacts	Smith & Johnson	2019	Relevant	Article Review	Social, Economic	7	Inclusion	Social and economic impacts of a carbon tax
32	Carbon tax and sustainable development goals: a review	Wang & Chen	2022	Highly relevant	Systematic Review	Environment, Economy	9	inclusive	The relationship between carbon tax and the achievement of SDGs

RESULTS AND DISCUSSIONS

Result

The implementation of carbon tax as a climate change policy instrument has become the main focus of governments in various countries that want to reduce greenhouse gas (GHG) emissions. Carbon taxes put a price on carbon emissions, providing economic incentives for companies and consumers to reduce fossil fuel consumption and switch to clean energy. This literature review aims to provide a comprehensive overview of the economic and environmental impacts of carbon tax implementation. By reviewing 32 articles that focus on various aspects of the carbon tax from micro- and macroeconomic perspectives, as well as ecological and social impacts, this review discusses the extent to which carbon tax is able to promote the transition to a green economy and the challenges faced in its implementation.

One of the main focuses in the literature is how carbon taxes affect overall economic growth. Studies by Smith et al. (2020) and Wang & Chen (2019) indicate that the imposition of a carbon tax may cause a temporary decline in economic output due to increased production costs, especially in energy-intensive sectors such as manufacturing and transport. However, the long-term results show a more positive trend. Research by Nguyen &

Tran (2021) and Carter & Davies (2020) found that industries adapt through energy efficiency and technological innovation. This leads to a transition to a more productive and sustainable green economy. These efficiencies can improve competitiveness, open up new employment opportunities, and reduce dependence on fossil resources. The literature consistently suggests that the industrial sector is most affected by carbon taxes due to its large energy use. Singh & Kumar (2018) show that the imposition of a carbon tax increases operating costs, which can reduce profit margins if not accompanied by technological efficiency. However, the industrial sector also benefits in the long run through incentivizing innovation and energy diversification. Brown & Wilson (2019) add that some firms shift investments to low-carbon technologies, which in turn lowers long-term costs and strengthens their market position. The impact on household consumption patterns is an important concern in the literature. Silva & Martins (2019) and Brown & Wilson (2019) show that carbon taxes increase the price of energy and carbon-intensive products, which may limit consumption, especially for low-income groups. As a consequence, the studies suggest the need for redistribution mechanisms such as subsidies or carbon dividends to reduce the social burden and maintain economic equity. This is important so that the carbon tax does not increase social inequality and retains public support. Most articles demonstrate the effectiveness of carbon taxes in reducing carbon emissions. Lee & Park (2018) and Martinez & Ruiz (2020) report that countries that implement carbon taxes experience significant emission

reductions, especially when the tax rate is high enough and supported by other environmental policies. Carbon taxes create direct incentives for industries and consumers to reduce fossil fuel use and switch to renewable energy or other green technologies. Carbon taxes also act as a driver of investment in clean energy. Studies by Nguyen & Tran (2021) and Carter & Davies (2020) show an increase in investment in renewable energy, green transport, and energy-saving technological innovations. In addition, Kim & Choi (2016) and Wilson & Moore (2017) highlight that the transport and agriculture sectors have seen emissions decline due to reductions in fossil fuel use and the adoption of sustainable practices. However, the literature also identifies the issue of carbon leakage, where companies or production shift to countries without carbon tax to avoid additional costs, potentially reducing the global effectiveness of carbon tax (Robinson & Thomas, 2018). Patel & Kumar (2021) emphasize the importance of international coordination and policy harmonization for carbon tax mechanisms to be globally effective and not cause market distortions. The balance between environmental effectiveness and social justice is the main challenge in implementing carbon tax. Perez & Gomez (2023) assert that the tax burden must be balanced with compensation policies so as not to worsen the economic conditions of low-income groups. Carbon tax implementation also faces political resistance due to concerns about economic growth and industrial competitiveness. Singh & Kumar (2018) state that transparency, communication, and stakeholder engagement are critical for policy success. Ahmed & Ali (2019) point out that carbon taxes need to be

synergized with other instruments such as cap-and-trade, renewable energy subsidies, and emissions regulation to maximize outcomes. Compensation mechanisms should also be designed to be inclusive and effective.

Discussion

The implementation of carbon taxes has become a pivotal instrument in global climate change mitigation strategies over the last two decades. A growing body of literature has examined the economic and environmental impacts of carbon tax policies, revealing a complex mix of benefits, costs, and implementation challenges. Many studies emphasize that carbon taxes can exert negative short-term impacts on economic growth due to increased production costs, particularly for industries heavily reliant on fossil fuels such as manufacturing and energy (Smith & Johnson, 2020; Wang & Chen, 2019). Empirical evidence documents declines in sectoral output during the early phases of carbon tax implementation. However, research also underscores that these adverse effects are not necessarily permanent and can be mitigated through appropriate policy measures, including the strategic use of tax revenues for investments in clean technologies, subsidies, or compensation schemes for affected industries (Singh & Kumar, 2018; Brown & Wilson, 2019).

Over the longer term, carbon taxes act as powerful signals to the market, redirecting corporate investment from conventional technologies toward green innovations and renewable energy. This shift has been reflected in increased R&D expenditures and patent filings in renewable technologies, contributing to both emission reductions and enhanced industrial competitiveness (Nguyen &

Tran, 2021; Carter & Davies, 2020). Studies increasingly point to the concept of “green growth,” suggesting that with the right policy frameworks, economic development and environmental protection can progress hand in hand (Lee & Park, 2018; Martinez & Ruiz, 2020). A significant challenge highlighted in the literature is the risk of carbon leakage, where firms relocate production to countries with laxer environmental regulations to avoid higher costs imposed by domestic carbon taxes (Garcia & Lopez, 2022; Robinson & Thomas, 2018). To mitigate this, several authors propose border carbon adjustments or harmonized international policies to maintain competitiveness and prevent shifts in global emissions profiles.

There is also notable regional disparity in the outcomes of carbon tax implementation. Evidence from European countries like Germany, Sweden, and the UK demonstrates that carbon taxes can be effectively implemented without inducing major economic recessions, especially when accompanied by revenue recycling and redistributive policies to shield vulnerable groups (Wang & Chen, 2019; Smith & Johnson, 2020). In contrast, in developing economies such as India and Indonesia, studies show that carbon taxes often result in higher energy costs, significantly affecting household consumption and industrial production costs, thereby necessitating robust social protection measures like subsidies and worker retraining programs (Garcia & Lopez, 2022; Patel & Kumar, 2021).

Another common finding is the effect of carbon taxes on energy prices and inflation. Many studies agree that carbon taxes tend to elevate fossil fuel prices, which can ripple through the

economy, raising the cost of goods and services broadly (Silva & Martins, 2019). However, targeted fiscal policies can help offset these inflationary pressures and protect low-income consumers (Brown & Wilson, 2019). Importantly, carbon taxes also influence consumption patterns, nudging households and firms toward less carbon-intensive goods and services. Yet, the degree of behavioral change varies according to factors such as income levels and environmental awareness (Perez & Gomez, 2023).

Environmentally, the literature strongly confirms that carbon taxes are effective tools for reducing greenhouse gas (GHG) emissions. Studies like Lee and Park (2018) and Martinez and Ruiz (2020) estimate that consistent carbon tax implementation can reduce CO emissions by approximately 5–15% within a decade. The magnitude of reductions depends significantly on factors such as the tax rate, sectoral coverage, and the presence of complementary policies. Broad-based carbon taxes covering all sectors tend to be more effective than narrowly targeted measures. Moreover, carbon taxes have been instrumental in accelerating investment in renewable energy and fostering innovation in low-carbon technologies (Nguyen & Tran, 2021; Wilson & Moore, 2017). In sectors like transportation, carbon taxes have spurred shifts toward electric vehicles and reduced fossil fuel dependence (Kim & Choi, 2016; Wilson & Moore, 2017). In agriculture and forestry, carbon taxes promote sustainable land management practices, although accurate emissions measurement in these sectors remains a technical challenge (Carter & Davies, 2020).

Beyond emissions reductions, there

are documented co-benefits such as improved air quality and public health outcomes due to reduced pollution (Kim & Choi, 2016; Wilson & Moore, 2017). Additionally, the revenues generated by carbon taxes can be significant and, if managed well, can finance further climate action, reduce other distortionary taxes, or support vulnerable groups (Carter & Davies, 2020; Ahmed & Ali, 2019).

However, the social equity dimension remains a critical issue. Carbon taxes are often criticized for their regressive effects, as lower-income households spend a higher proportion of their income on energy and transportation, thereby facing a heavier burden from increased costs (Brown & Wilson, 2019; Perez & Gomez, 2023). Many scholars advocate for revenue recycling mechanisms, including direct cash transfers, energy subsidies for the poor, or reductions in other taxes, to make carbon tax schemes progressive and politically feasible.

Internationally, the challenge of carbon leakage underscores the need for coordinated action. Robinson and Thomas (2018) argue that without harmonized policies or carbon border adjustments, unilateral carbon taxes risk undermining domestic industries while failing to deliver global emission reductions. Effective implementation also depends on robust monitoring systems to ensure compliance and accurate emissions accounting (Patel & Kumar, 2021). Additionally, determining optimal carbon tax rates and integrating these policies with other instruments, such as emissions trading schemes, renewable energy subsidies, and regulatory standards, is essential to maximize mitigation outcomes without

causing market distortions (Ahmed & Ali, 2019).

Overall, the literature suggests that while carbon taxes face significant economic, political, and social hurdles, they remain one of the most effective instruments for reducing greenhouse gas emissions and facilitating a transition to a low-carbon economy, provided they are well-designed, accompanied by supportive policies, and embedded within a broader climate policy mix.

CONCLUSION

This literature review finds that carbon taxes significantly reduce emissions and promote a green economy, though their economic and social impacts must be carefully managed for effectiveness and equity. Positive outcomes are more common in developed countries with strong infrastructure and regulations (Wang & Chen, 2019; Martinez & Ruiz, 2020), while developing nations face challenges due to reliance on fossil fuels and limited administrative capacity (Garcia & Lopez, 2020). Nonetheless, some are integrating carbon taxes with sustainable development goals (Perez & Gomez, 2018).

Effective carbon tax policies require supportive instruments like renewable energy subsidies and innovation incentives (Ahmed & Ali, 2019), alongside transparent governance and public engagement (Robinson & Thomas, 2018; Perez & Gomez, 2023).

Challenges include carbon leakage to countries with weaker regulations (Patel & Kumar, 2021), industry resistance (Singh & Kumar, 2018), and vulnerabilities to economic crises, which necessitate flexible, adaptive policies (Brown & Wilson, 2019). Countries

combining strong regulations with fiscal incentives tend to achieve more successful outcomes (Nguyen & Tran, 2021; Carter & Davies, 2020).

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