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Tax Policy Reconstruction To Support Circular Economy Implementation In Indonesia: A Systematic Literature Review

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Abstract
The transition from a linear to a circular economy (CE) is essential for sustainable development. Tax policy is a critical enabler in facilitating this shift, particularly in emerging economies like Indonesia. This study conducts a systematic literature review using PRISMA methodology to explore how tax policies can be reconstructed to support CE implementation. Based on 30 screened articles, with 12 critically reviewed sources, we identify key tax policy instruments, enablers, and theoretical gaps. Findings reveal that current fiscal policies often favour linear production systems, disincentivizing circular practices such as remanufacturing and recycling. The paper proposes actionable tax policy interventions, including targeted tax credits for secondary raw materials and performance-based eco-tax incentives. We also highlight barriers such as the absence of unified metrics, weak regulatory integration, and insufficient fiscal support. Recommendations are offered for Indonesian policymakers to recalibrate tax systems to align with circular economic goals.
Keywords: *circular economy, tax policy, Indonesia, systematic literature review, PRISMA, fiscal reform, sustainability.*

INTRODUCTION

The prevailing linear economic model—characterized by a 'take-make-dispose' approach—has led to escalating environmental degradation, resource depletion, and waste accumulation. In contrast, the circular economy (CE) offers a regenerative framework aimed at decoupling economic growth from environmental harm by emphasizing resource efficiency, waste minimization, and the continual use of resources (Geissdoerfer et al., 2017) and (Upadhayay, 2019). The linear economic model—based on the sequence of extraction, production, consumption, and disposal—has long dominated industrial and economic systems worldwide. However, this model is increasingly recognized as environmentally unsustainable, particularly in the face of accelerating resource depletion, climate change, and waste generation. In response, the **circular economy (CE)** has emerged as a transformative framework that aims to decouple economic growth from environmental degradation by promoting resource efficiency, recycling, reuse, and regeneration (Geissdoerfer et al., 2017; Taddei et al., 2024).International experiences underscore the efficacy of well-structured tax policies in promoting CE. The European Union's implementation of the Circular Economy Action Plan, which includes measures like reduced VAT rates for repair services, has stimulated market demand for sustainable products and services (Caragher, 2024). Similarly, China's Circular Economy Promotion Law mandates tax benefits for enterprises that adopt resource-saving technologies (CECC, 2008). For Indonesia, transitioning to a CE is not merely an environmental imperative but also a strategic economic opportunity. The country faces mounting challenges, including overexploitation of natural resources, inadequate waste management infrastructure, and vulnerability to climate change impacts. Implementing CE principles can address these issues by fostering sustainable industrial practices and enhancing economic resilience (Bappenas, 2022).Tax policy emerges as a pivotal instrument in this transition. Fiscal measures—such as tax incentives for recycling initiatives, penalties for excessive waste generation, or differentiated VAT for green goods—can significantly influence corporate behavior and investment decisions. However,

Indonesia's current tax framework often lacks alignment with CE objectives. Studies indicate that existing tax policies may inadvertently favor linear economic activities, thereby discouraging circular practices (Genc, 2024) (Xu J. , et al., 2023). Moreover, the complexity and lack of clarity in tax regulations can deter businesses from adopting CE models. For instance, the absence of specific tax incentives for the use of recycled materials or for companies engaging in product life extension strategies hampers the scalability of circular initiatives (Khan, Ali, & Singh, 2022)

International Experiences in CE-Aligned Tax Policy

A growing number of countries have begun using fiscal policy as a catalyst for circular transition. The European Union (EU) is a global frontrunner, with its *Circular Economy Action Plan* (2020) encouraging member states to implement reduced VAT for repair services, reuse centers, and secondhand goods. Countries such as Sweden have reduced VAT on repairs to 12%, and France offers repair subsidies under the "bonus réparation" scheme (European Commission, 2020). While in China, the *Circular Economy Promotion Law* (2009, amended 2018) enables tax deductions for businesses that use recycled materials and mandates government procurement preferences for circular products. The government has also implemented VAT refunds for the reuse of certain industrial byproducts in cement kilns, especially targeting resource-intensive industries (CECC, 2008).Japan has integrated CE with industrial tax reform through its *Green Investment Tax Credit Scheme*, providing accelerated depreciation for firms installing energy-efficient and recycling equipment—particularly in the cement and construction sectors (Husgafvel & Sakaguchi, 2022). Meanwhile Taiwan, launched a carbon fee in 2023 under the *Climate Change Response Act*, with a portion of revenues earmarked for innovation in CE industries such as electronics and cement. The tax system supports a "pay-as-you-pollute" model, incentivizing cleaner production methods and material efficiency (Tsai, Chang, & Li, 2024).

On the other side, Italy has implemented a suite of fiscal measures to promote CE practices (Vence & Pérez, 2021):

- Virgin Materials Tax: Imposed on construction minerals to discourage the use of non-recycled materials.
- Reduced VAT Rates: Applied to products containing recycled content to incentivize their production and consumption.
- Corporate Tax Credits: Offered to businesses that utilize secondary materials, encouraging the adoption of recycling and reuse practices (OECD, 2024).

Another more, South Korea has adopted a landfill tax (Waste Disposal Levy Act) and offers tax deductions on investments in eco-friendly technologies, including co-processing in cement kilns—a model that closely parallels Indonesia's industrial context (Svatikova, Brown, & Börkey, 2025). These international experiences underscore the potential of targeted fiscal instruments—such as carbon levies, material input taxes, VAT differentials, and investment-based tax credits—to accelerate CE implementation while preserving economic competitiveness.

The Indonesian Context and Research Objectives

Indonesia has taken early steps toward integrating CE into policy frameworks, including through collaborations with UNDP, Bappenas, and the Low Carbon Development Initiative. However, these programs remain exploratory and lack fiscal backbone. The absence of a sectoral CE tax strategy, particularly for high-emission industries like cement, limits implementation at scale (Bappenas, 2022). For Indonesia, transitioning to a CE is not merely an environmental imperative but also a strategic economic opportunity to foster innovation, industrial competitiveness, and sustainable development. The country faces mounting challenges, including overexploitation of natural resources, inadequate waste management infrastructure, and vulnerability to climate change impacts. Implementing CE principles can address these issues by fostering sustainable industrial practices and enhancing economic resilience ((PAGE), 2024).Tax policy plays a dual role: it acts both as a budgetary tool and as a regulatory mechanism. It can either reinforce or undermine environmental and industrial objectives depending on its structure. While several countries have introduced tax incentives or penalties to influence circular

practices (e.g., carbon taxes, VAT exemptions, recycling subsidies), the integration of such policies into Indonesia's fiscal framework remains fragmented and underdeveloped. A study by Michalovicz and Bilotta (2022) found that methane emission taxation could positively influence circular investments in the Brazilian wastewater sector—highlighting the potential for similar tools in other developing contexts (Michalovicz & Bilotta, 2023).Moreover, systemic and institutional barriers persist. Taddei et al. (2024) identify several theoretical and practical gaps in supply chain readiness, regulatory coherence, and CE metrics, all of which constrain effective policy alignment. Khan et al. (2022) emphasize that preferential tax policies are among the most influential factors driving industrial adoption of circular practices such as remanufacturing. Tax policy emerges as a pivotal instrument in this transition. Fiscal measures, such as tax incentives for recycling initiatives or penalties for excessive waste generation, can significantly influence corporate behaviour and investment decisions. However, Indonesia's current tax framework often lacks alignment with CE objectives, as studied have shown that existing tax policies may inadvertently favour linear economic activities, thereby discouraging circular practices (Lestari, 2023).In Indonesia, existing tax regulations have yet to fully embrace these emerging priorities. Fiscal policy often lacks specificity in promoting CE-compatible investments or penalizing environmentally harmful behaviour. Studies have also shown that while government subsidies can be effective, they may reduce innovation efficiency if not accompanied by complementary tax instruments (Xu et al., 2023). Therefore, a shift from traditional tax policy toward a reconstructed, circular-aligned tax system is increasingly necessary.This study addresses that need by conducting a systematic literature review of international tax policy frameworks in the context of circular economy implementation. The aim is to extract lessons, identify gaps, and offer policy recommendations suited to Indonesia's economic and regulatory environment. This study aims to systematically review existing literature and policy documents to identify gaps and opportunities in Indonesia's tax policy concerning CE implementation. By analyzing both domestic and international case studies, the research seeks to propose actionable recommendations for aligning fiscal instruments with circular economy goals in the Indonesian context.

METHODOLOGY: SYSTEMATIC LITERATURE REVIEW USING PRISMA

This study employs a Systematic Literature Review (SLR) methodology guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework. The objective of this SLR is to identify, synthesize, and critically evaluate scholarly and policy-oriented research related to tax policy and its role in circular economy (CE) implementation, with a particular focus on lessons relevant to Indonesia.

Research Design and Review Objective

The review was designed to address the research question: How can tax policy be reconstructed to effectively support circular economy implementation, especially in developing countries like Indonesia? The review focused on identifying:

- Tax instruments that support CE practices such as recycling, remanufacturing, and waste valorisation.
- Barriers to policy alignment with CE goals.
- Global best practices and innovations in fiscal mechanisms supporting CE transitions.

Inclusion and Exclusion Criteria

Articles were included if they:

- Were published between 2013 and 2024.
- Were written in English.
- Addressed topics of tax policy and regulation in relation to circular economy.
- Included either theoretical contributions, empirical findings, or policy frameworks.

Excluded from the review were:

- Studies not directly linked to fiscal or tax policy instruments.
- Technical or engineering-focused articles without policy implications.

- Articles focused solely on linear economic growth or non-environmental tax structures or focused on non-CE contexts.

Data Sources and Search Strategy

Databases used all articles published in Scopus. Search terms included: "circular economy" AND "tax policy".

Screening and Selection Process

The search yielded an initial pool of **30 articles**. After removing duplicates, 12 unique records remained. These were screened by title and abstract to exclude irrelevant studies. A total of 12 articles were shortlisted for full-text review. After applying the inclusion/exclusion criteria, **12 articles** were included in the final synthesis. This process is summarized in the PRISMA flow diagram (see Figure 1).

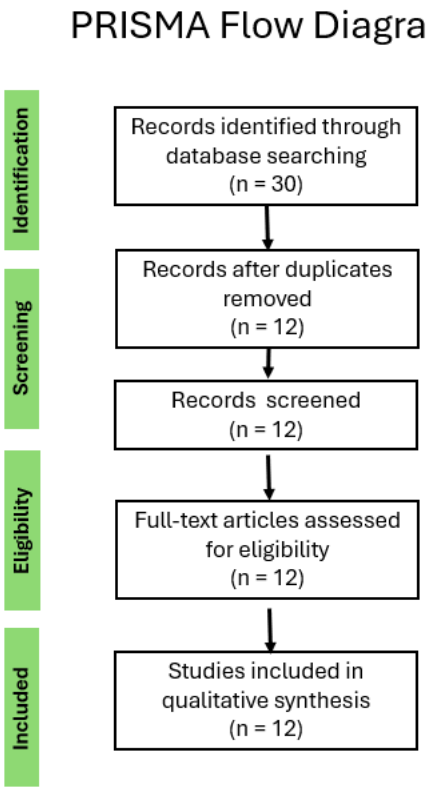

Figure 1. PRISMA Flow Diagram

Data Extraction and Synthesis

A structured **data extraction table** was developed to collect the following information for each article:

- Authors and year of publication
- Study location or scope
- Circular economy domain focus (e.g., remanufacturing, recycling)
- Type of tax instrument discussed
- Reported outcomes or policy impacts
- Barriers and enabling factors

Qualitative synthesis was conducted through thematic analysis. Articles were categorized into five thematic clusters (adapted from Taddei et al., 2024):

1. Tax incentives for circular practices.
2. Disincentive structures for linear production.
3. Role of carbon/emissions taxation.
4. Policy integration across sectors.
5. Barriers to implementation in developing economies.

No	Author(s)	Country/ Region	CE Domain	Tax Instrument	Finding	Reported Outcomes or Policy Impacts	Barriers and Enabling Factors
1	Genc (2024)	Canada	Steel recycling	Intermediate good tax	Tax policy discourages recycled materials through distorted treatment	Increased use of virgin materials despite CE potential	Unfavorable tax structures; lack of CE-specific exemptions
2	Taddei et al. (2024)	Global	Supply chains	Policy gaps and disincentives	Lack of CE-aligned incentives and legislative coordination	Low integration of CE in value chains	Fragmented regulation; no CE performance indicators
3	Khan et al. (2022)	Asia	Remanufacturing	Preferential tax policies	Top enabler for CE adoption is tax-based incentives	Higher CE participation among incentivized firms	Policy clarity and access to tax incentives enable adoption
4	Govindan et al. (2023)	India	Cable/wire production	Carbon tax modeling	Carbon taxes linked with CE logistics optimization	Reduction in emissions and transport inefficiency	Need for integrated tax-supply chain modelling
5	Michalovicz & Bilotta (2022)	Brazil	Wastewater	Methane tax	Tax incentivized biogas recovery investment	Improved methane capture and energy reuse	Fiscal return improves with CE-targeted investment
6	Sun (2013)	China	Multi-sector	Green tax, VAT exemptions, resource tax	Decentralized green tax system supports CE local innovation	Stronger CE activity in provinces with targeted tax tools	Enabled by local flexibility and CE-oriented metrics
7	Tsai et al. (2024)	Taiwan	Glass production	Carbon fee	Carbon fee improves CE performance metrics	Increased use of alternative materials and energy	Carbon pricing visibility enabled industry shifts
8	Xu et al. (2023)	China	Manufacturing & innovation	Tax + financing incentives	Subsidies and tax design influence green	Innovation spikes under combined tax-finance tools	Over-reliance on subsidies without matching

					innovation efficiency		taxes hinders outcomes
9	González-Sánchez et al. (2022)	EU	Construction	VAT, landfill tax	Landfill tax and VAT differentiation support CE in buildings	Improved use of recycled construction materials	Barriers lowered by pricing signals and tax structure
10	Zeng et al. (2022)	China	Cement sector	VAT refund on industrial byproducts	Policy supports waste reuse in kilns	Higher uptake of waste-derived fuels and inputs	Tax refund stability and clarity crucial to adoption
11	European Commission (2020)	EU	Consumer goods	Circular VAT incentives	Reduced VAT for repair/reuse boosts CE adoption	Greater consumer uptake of repair and resale services	Clarity in VAT application enabled SME participation

The findings were triangulated with case studies from Indonesia and comparable emerging markets to generate context-specific recommendations. A structured data extraction table was created to systematically capture key information from each selected article. The table includes author(s), country or region of study, CE domain focus, the type of tax instrument analyzed, key findings, reported policy outcomes, and identified barriers or enablers. The outcomes column records the documented impacts of tax instruments on CE implementation—such as increased material recovery, higher remanufacturing rates, or improved innovation efficiency. The final column identifies the enabling conditions or structural obstacles that affect policy effectiveness, including tax clarity, administrative capacity, and regulatory integration. This table served as a critical foundation for the thematic synthesis in Section 3, allowing for the identification of recurring patterns across geographies and policy instruments. Key themes derived from this synthesis are further elaborated in the next section.

Limitations

This review is limited by the number of relevant articles specifically focused on Indonesia being small, necessitating extrapolation from other country contexts. Another limitation due to the potential publication bias, as only English-language and indexed studies were included. Last, the use of secondary data, which limits direct policy evaluation. Despite these limitations, the systematic approach ensures transparency and replicability in identifying the global state of knowledge on circular economy tax policy.

Key Findings from the Literature

The systematic literature review revealed five major themes regarding the relationship between tax policy and circular economy implementation. These findings reflect not only the diversity of fiscal instruments applied across different countries and sectors but also the challenges and gaps that must be addressed in developing contexts like Indonesia.

RESULT AND DISCUSSION

Misalignment of Tax Structures with Circular Economy Goals

Studies show that most tax policies favour virgin materials over recycled alternatives. For example, Genc (2024) finds that taxation of intermediate goods in steel production creates disincentives for recycling.

Similar barriers exist in the US, EU, and China. Current tax regimes often favour virgin materials. For instance, steel recycling is discouraged through unfavourable intermediate taxation (Genc, 2024). Multiple studies underscore the fact that existing tax frameworks in many countries remain anchored in the logic of linear economic growth. These frameworks often provide favourable tax treatment to primary (virgin) resource extraction and linear production, while offering limited or no fiscal incentives for circular practices such as repair, reuse, recycling, and remanufacturing (Genc, 2024; Taddei et al., 2024). For example, in the steel industry, taxes on intermediate goods derived from recycled materials can inadvertently distort market competition, making recycled content less financially attractive than virgin inputs (Genc, 2024). This policy gap illustrates the need for a tax policy shift that actively supports closed-loop resource flows. One of the most persistent barriers to circular economy (CE) adoption is the structural misalignment between tax systems and circular value creation. Current tax regimes—particularly in developing and industrialized economies alike—are largely built on linear economic assumptions, often providing preferential fiscal treatment to virgin material extraction and high-throughput production, while failing to support, or even inadvertently penalizing, circular activities such as reuse, repair, remanufacturing, and recycling.Numerous studies have documented how existing tax policies reinforce the economic dominance of linear inputs over circular alternatives. Genc (2024), for instance, identifies how the taxation of intermediate goods in the steel industry creates a cost disadvantage for recycled steel compared to primary (virgin) materials. The result is a market distortion: although recycled steel may offer environmental benefits and lower lifecycle emissions, fiscal policy discourages its uptake through unfavourable tax rates on recycled content inputs.This problem is not isolated. In the United States, recycling firms often face full VAT or sales tax burdens on resale products, whereas virgin material producers benefit from capital investment allowances and subsidized energy rates. In the European Union, while some countries have implemented CE-supportive measures like reduced VAT for repairs, many member states still lack coherent fiscal frameworks that equalize tax burdens across material life cycles (EBB, 2022). Similarly, in China, even as the Circular Economy Promotion Law mandates CE-supportive policies, implementation at the provincial level has often lagged, and tax exemptions for recycled inputs remain inconsistently applied ([Sun, 2013]; [Zeng et al., 2022]).

This misalignment is particularly visible in material-intensive sectors such as cement, construction, and manufacturing. For example:

- Construction firms may face full VAT on reclaimed materials, despite their lower environmental impact compared to new cement and steel.
- Textile recyclers may lack access to preferential import duties or tax credits for sorting and processing used garments, whereas virgin textile production benefits from energy subsidies and export incentives.
- Cement kilns using industrial byproducts or alternative fuels often face higher compliance costs with no offsetting tax benefit, disincentivizing substitution.

In many cases, tax codes do not differentiate between product origins or environmental performance, resulting in perverse fiscal incentives that favour linear options purely because they are more administratively convenient or historically embedded.

Furthermore, the lack of internalization of negative externalities, such as emissions, resource depletion, or waste—means that linear production chains are under-taxed relative to their true societal costs. This weakens the price signal for businesses to transition toward circular models and undermines the effectiveness of voluntary or regulatory CE initiatives. As a result, the private costs of circular practices remain artificially high, limiting their economic viability in competitive markets.

Several international studies call for "circular fiscal reform"—a strategic overhaul of tax policy that integrates environmental costs and redistributes fiscal advantages in favour of circular behaviours. Proposed measures include:

- Reduced VAT rates or tax exemptions for secondary materials, repair services, and product life extension.

- Environmental taxes on virgin materials, such as resource extraction levies or landfill taxes.
- Tax credits or super-deductions for CE-related investment in remanufacturing or recycling infrastructure.
- Product-level tax adjustments, based on life cycle assessments and repairability indices.

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These measures aim not only to eliminate distortions, but to reshape the economic calculus of businesses and consumers in favour of circular alternatives. However, implementing such reforms requires a shift in fiscal philosophy—from one centered solely on revenue generation to one that also considers long-term environmental and social value creation ((Bibas, Chateau, & Lanzi, 2021); (EBB, 2022)). In summary, the misalignment of tax policy with CE objectives is not merely a technical issue, but a systemic one. Addressing it will be critical for any nation—Indonesia included—that seeks to enable a just, inclusive, and scalable circular transition.

Tax Instruments, Incentives and Positive Impacts for Circular Innovation

Fiscal policy is increasingly recognized as a key enabler of innovation in circular economy (CE) business models, particularly when it leverages a combination of market-correcting and market-shaping instruments. Among the most effective tools cited in the literature are carbon taxation, green investment tax credits, accelerated depreciation for eco-technologies, and preferential tax treatment for circular goods and services. These instruments not only reduce financial barriers for firms adopting CE practices but also help shift investment patterns away from linear processes and toward closed-loop systems.A widely cited instrument is the carbon tax, which internalizes the negative externalities of greenhouse gas (GHG) emissions and promotes cleaner industrial processes. Govindan et al. (2023) demonstrate that integrating carbon taxes into supply chain optimization models can significantly reduce emissions, encourage resource substitution, and improve circular material flows. Their study on cable and wire production in India found that carbon pricing led to a redesign of logistics and procurement strategies in favour of circular sourcing, resulting in both cost savings and environmental gains.Beyond pricing externalities, green tax credits and deductions serve as proactive fiscal signals that reward circular innovation. Khan et al. (2022) identify tax-based incentives—such as deductions for remanufacturing equipment, investment credits for recycling infrastructure, and income tax exclusions for reused product lines—as among the top five enabling conditions for circular innovation adoption in manufacturing sectors. These instruments are particularly relevant for micro, small, and medium enterprises (MSMEs), which often face high upfront costs in transitioning to CE practices.Another important mechanism is accelerated depreciation for green technologies, commonly referred to as green depreciation schemes. These allow firms to write off CE-aligned capital investments (such as material sorting systems or reverse logistics infrastructure) over a shorter fiscal period, thus improving net present value and reducing payback time. In the EU and Japan, such schemes have been instrumental in accelerating adoption of resource-efficient machinery and CE-compliant production lines (de Sa & Korinek, 2021).Taiwan's carbon fee, introduced in 2023 under its *Climate Change Response Act*, is another notable example. The government not only imposes a fee on carbon-intensive industries but also reinvests a portion of the revenues into CE innovation grants, targeting sectors such as cement, electronics, and packaging. Early results suggest increased industry engagement in circular R&D and improved competitiveness of low-carbon alternatives (Tsai et al., 2024).

Moreover, some countries have introduced eco-tax credits linked to specific circular actions, such as:

- Value-added tax (VAT) reductions or exemptions for second-hand, refurbished, or repaired goods.
- Tax holidays for zero-waste startups or social enterprises involved in reuse networks.
- Landfill tax rebates for industries using recycled input materials or diverting waste from disposal.

Such preferential tax treatments create price parity between virgin and secondary resources, allowing circular products to compete more effectively in the marketplace. In some cases, tax relief has been tied to performance indicators, such as material recovery rates or product life extension benchmarks, thus linking fiscal incentives directly to CE outcomes. Collectively, these instruments demonstrate that targeted and well-designed tax policies can significantly lower the cost of circular innovation, enhance

market access for sustainable products, and improve the risk-return profile of circular business models. However, the literature also cautions that policy coherence, long-term predictability, and ease of access are critical to the success of such instruments (Taddei et al., 2024; Xu et al., 2023).

In summary, fiscal incentives—ranging from carbon taxes and tax credits to depreciation and VAT reforms—represent powerful levers to foster CE innovation. When embedded within a broader regulatory and institutional framework, they can align private-sector incentives with national sustainability goals and drive structural transformation toward a more circular, resilient economy.

Preferential Tax Policies as Enablers for Circular Adoption

Preferential tax policies have emerged as decisive enablers for accelerating the transition toward circular economy (CE) models—especially in resource- and energy-intensive industries. These policies work by altering the cost-benefit calculus of firms, lowering the financial barriers to investing in circular technologies and practices while creating positive fiscal differentials between linear and circular operations.Khan et al. (2022) identify preferential tax treatment—including deductions for remanufacturing equipment, accelerated depreciation of green assets, and income tax reductions for circular innovation—as among the top five causal enablers of CE transitions in the manufacturing sector. Their study underscores that these fiscal instruments not only incentivize firms to reconfigure operations toward material efficiency and extended product life cycles but also support technology adoption and R&D in remanufacturing processes.Similarly, Govindan et al. (2023) demonstrate that integrating carbon tax policies with supply chain decision-making creates substantial opportunities for both cost savings and emissions reductions. Their systems model in the cable and wire industry shows that carbon tax mechanisms, when complemented by tax relief for low-emission alternatives, push firms to restructure procurement, transport, and processing systems toward circular material flows. The result is a simultaneous achievement of logistical efficiency and environmental performance—core goals of CE strategies.Beyond sectoral case studies, cross-country analyses further reinforce the importance of preferential tax regimes for CE acceleration. In France, for example, the Anti-Waste and Circular Economy Law allows for reduced VAT rates on repair services and mandates fiscal incentives for product take-back systems. In Japan, accelerated depreciation allowances have been successfully applied to energy-efficient and recycling-related equipment, particularly in construction and manufacturing sectors (Svatikova, Brown, & Börkey, 2025).Such policies help address structural cost disadvantages that circular business models often face. Unlike linear production, circular strategies typically involve higher upfront capital costs, longer investment horizons, and greater process complexity. Preferential tax instruments lower the effective tax burden, thus improving the internal rate of return (IRR) on CE investments and encouraging greater participation from firms that might otherwise be deterred by cost uncertainty.

Moreover, eco-tax credits and exemptions have been increasingly deployed to support industry-wide CE adoption. Examples include:

- VAT exemptions for secondary raw materials, reused components, or refurbished goods.
- Super tax deductions for circular R&D or reverse logistics infrastructure.
- Carbon tax rebates for firms achieving CE benchmarks, such as recycling rates or emission reductions.

These instruments act not only as financial incentives, but also as behavioural nudges that signal governmental commitment to CE transitions. When implemented transparently and predictably, they help shape long-term investment decisions and enhance industrial confidence in CE policy trajectories. However, literature also emphasizes that the effectiveness of preferential tax policies depends heavily on their administrative design and accessibility. Many studies point to challenges such as:

- Complicated application procedures, which deter SMEs from claiming tax benefits.
- Insufficient communication and outreach, resulting in low uptake of available incentives.
- Short-term or pilot-based policy timeframes, which discourage long-term planning.

To overcome these barriers, governments are advised to establish simplified, centralized tax claim systems, integrate CE metrics into tax credit evaluations, and ensure that fiscal incentives are embedded

in national tax policy strategies, rather than siloed within environmental or industrial programs. In conclusion, preferential tax policies are not just financial mechanisms—they are strategic tools that can align economic incentives with environmental and circular objectives. When targeted, stable, and well-communicated, these instruments can play a transformative role in mainstreaming CE adoption, especially in heavy industry and manufacturing, where material flows and investment decisions have long-term implications.

Role of Environmental Taxation (Carbon, Methane, and Waste Taxes)

Environmental taxation has gained global traction as a fiscal instrument to internalize environmental externalities, alter production and consumption behaviour, and mobilize revenue for sustainability transitions. Unlike traditional fiscal tools, environmental taxes directly reflect the "polluter pays" principle, assigning economic costs to activities that degrade ecosystems, generate waste, or emit pollutants such as carbon dioxide and methane. When properly designed and implemented, such taxes correct price distortions, incentivize cleaner technologies, and finance circular economy (CE) investments.A compelling example is found in Brazil, where (Michalovicz & Bilotta, 2023) Michalovicz examined the effects of a methane emission tax introduced in the wastewater sector. Their findings showed a significant increase in investment in biogas capture and energy recovery, leading to improved circularity in waste-to-energy systems. The tax not only helped reduce methane emissions—a greenhouse gas with a global warming potential over 25 times higher than CO_2—but also catalyzed the development of decentralized circular infrastructure at the municipal level.Similarly, in Taiwan, the government introduced a carbon fee in 2023 under the Climate Change Response Act. This fiscal mechanism targets high-emission industries such as glass, cement, and petrochemicals. Importantly, a portion of the tax revenue is earmarked for reinvestment in circular economy innovation, including research and development (R&D), eco-design, and cleaner production processes. Tsai et al. (2024) report that this reinvestment model enhances both environmental outcomes (e.g., reduced emissions and resource input) and industrial innovation, proving the dual role of carbon pricing as a regulatory and developmental tool.In the European context, waste taxes, such as landfill and incineration levies, are widely used to discourage linear disposal and promote recycling, composting, and reuse. For instance, Sweden and the Netherlands have successfully deployed escalating landfill taxes to divert waste from disposal and improve circular resource loops in construction and packaging sectors. These countries often combine environmental taxes with subsidies or fiscal incentives for circular practices, making the tax–subsidy duality an effective framework.Environmental taxation also has strong fiscal potential. Carbon taxes and methane levies generate predictable revenues that can be recycled into green infrastructure, CE pilots, or SME support mechanisms. This "double dividend" effect—correcting environmental harm while generating public funds—makes environmental taxation attractive even in constrained fiscal environments.However, literature cautions that the success of environmental tax instruments is context dependent. In developing countries, several challenges persist:

- Weak enforcement and monitoring systems, leading to underreporting or tax evasion.
- Regressive effects, where poor households or small firms bear a disproportionate share of tax burdens unless offset by rebates.
- Institutional fragmentation, where ministries of finance, energy, and environment fail to coordinate effectively on tax design and implementation.

Indonesia presents a critical case in point. Despite its high levels of waste generation, carbon intensity, and methane emissions from sectors like cement, energy, and agriculture, the country lacks comprehensive environmental fiscal instruments. Pollution remains largely untaxed, and pricing signals fail to incentivize cleaner production or material efficiency. Moreover, without fiscal mechanisms that link environmental taxation to CE investment, the opportunity to redirect revenue streams into green transformation remains underutilized. Introducing carbon, methane, and landfill taxes in Indonesia could serve multiple objectives:

- Disincentivize environmentally harmful behaviour.
- Create fiscal space for CE-aligned infrastructure (e.g., waste-to-energy, reverse logistics);

- Encourage industries—such as cement and manufacturing—to substitute virgin materials with recycled alternatives.

To be effective, these instruments must be accompanied by:

- Strong legal frameworks to ensure consistent application and enforcement.
- Clear reinvestment pathways (e.g., earmarked green funds or tax rebates for CE-compliant firms);
- Complementary policies, including green procurement, tax incentives, and circular business support.

In conclusion, environmental taxation—particularly in the form of carbon, methane, and waste taxes—represents a powerful, yet underutilized, fiscal tool in many developing countries, including Indonesia. Its proper design and integration with CE policy frameworks could accelerate the country's transition toward a low-carbon, resource-efficient, and circular economy.

Institutional and Regulatory Barriers

Despite the theoretical potential of tax instruments, practical implementation is hindered by several barriers such as the condition of fragmented policy design across ministries and agencies; lack of CE-aligned performance indicators in fiscal planning; bureaucratic complexity in accessing tax incentives; and limited awareness among policymakers and industry. Fragmentation, unclear metrics, and limited inter-agency collaboration hinder CE-focused tax reform (Taddei et al., 2024). Taddei et al. (2024) classify these issues as systemic and legislative gaps that must be closed for effective CE-tax integration, notably the lack of targeted incentives and fragmented regulatory approaches. This hinders industrial adoption of CE. Moreover, studies such as Xu et al. (2023) warn that subsidies alone—without corresponding tax reforms—can reduce innovation efficiency, especially if misaligned with market behaviour.Despite growing global consensus on the strategic role of fiscal instruments in enabling circular economy (CE) transitions, practical implementation remains hampered by institutional fragmentation, regulatory inertia, and administrative inefficiencies—especially in developing economies. One of the core challenges is fragmented policy design across government entities. In Indonesia, as in many other countries, fiscal policy is primarily the mandate of the Ministry of Finance, while environmental objectives fall under the jurisdiction of the Ministry of Environment and Forestry, and industrial planning is overseen by the Ministry of Industry. The lack of cross-ministerial coordination mechanisms often results in policies that are either redundant, contradictory, or miss opportunities for synergy. As observed in China and Brazil, integrated governance structures significantly increase the effectiveness of CE-aligned tax instruments by aligning tax incentives with environmental performance metrics and industrial upgrading goals ((Sun, 2013); (Michalovicz & Bilotta, 2023)).Additionally, the absence of CE-specific performance indicators within fiscal planning fraeworks hinders policy accountability and refinement. While environmental ministries may track waste generation or emissions, these metrics are rarely embedded in tax expenditure evaluations or revenue impact assessments. This disconnect limits the ability of fiscal authorities to measure the real-world effects of tax incentives on circular behaviors, creating a feedback gap between policy input and CE outcomes ((Taddei, Sassanelli, Rosa, & Terzi, 2024); (Xu J. , et al., 2023)).Another key obstacle lies in the bureaucratic complexity and low transparency surrounding the access and administration of CE-related tax incentives. In several cases, businesses report that applying for green tax credits or VAT refunds on recycled content is procedurally burdensome and administratively opaque, requiring multiple layers of approval and documentation that are not standardized across regions or sectors. This can discourage participation, particularly among SMEs, which often lack the compliance capacity or fiscal expertise to navigate such systems ((OECD O. , 2024); (Khan, Ali, & Singh, 2022)).Compounding these institutional issues is the limited awareness and technical literacy among both policymakers and industry stakeholders. Circular economy remains a relatively novel concept in many ministries of finance and tax agencies, where linear economic logic still dominates budgeting, valuation, and incentive modelling. Similarly, many firms—especially in resource-intensive sectors such as cement—are unaware of existing tax incentives or fail to perceive them as reliable, due to inconsistent enforcement or lack of long-term policy certainty ((Genc, 2024)]; (Bappenas, 2022)). These barriers highlight the need not only for fiscal innovation, but also for institutional reform and capacity-building, including:

- Establishing multi-agency task forces or inter-ministerial CE fiscal coordination bodies.
- Integrating CE goals into medium-term expenditure frameworks (MTEFs) and public investment management systems.
- Developing a centralized, transparent platform for accessing green tax incentives.
- Offering targeted training for tax officers and industrial actors on CE financing instruments.

Without such reforms, even well-designed tax instruments risk underperformance or outright policy failure, trapped in what systems theory refers to as a "policy implementation bottleneck"—where intentions and instruments fail to align due to governance constraints.

Global Practices and Lessons for Indonesia

Several countries offer valuable examples of circular-aligned tax policy, such as The EU's CE VAT models, China's tax exemptions for green inputs, and Taiwan's carbon levy system offer useful frameworks for Indonesia.:

- The EU Circular Economy Action Plan promotes reduced VAT for repair services and reverse logistics incentives.
- China's Circular Economy Promotion Law includes tax exemptions for using recycled raw materials.
- Taiwan's carbon fee system, enacted through the Climate Change Response Act, mandates taxation on high-emission industries while funding net-zero initiatives (Tsai et al., 2024).

These cases highlight the importance of fiscal integration, cross-ministerial coordination, and performance-based tax instruments. For Indonesia, adapting such policies would require:

- Strengthening legal foundations for CE-aligned taxation.
- Creating a national CE tax roadmap.
- Embedding tax incentives within sectoral development plans (e.g., cement, plastic, electronics).

Summary Table: Major Findings by Thematic Area

No	Theme	Key Insight	Reference
1	Misalignment of current tax policy	Tax structures favour virgin resources, penalize recycling	Genc (2024), Taddei et al. (2024)
2	Role of incentives	Tax credits and deductions spur remanufacturing and innovation	Khan et al. (2022), Govindan et al. (2023)
3	Environmental taxation	Carbon/methane taxes incentivize circular tech adoption	Michalovicz & Bilotta (2022), Tsai et al. (2024)
4	Implementation barriers	Weak institutional coordination and access issues	Taddei et al. (2024), Xu et al. (2023)
5	International lessons	China, EU, Taiwan shows the impact of integrated CE tax frameworks	OECD, Bappenas-UNDP (2023), Tsai et al. (2024)

Tabel: Major Findings by Thematic Area

Policy Implications for Indonesia

The findings of this review reveal significant opportunities—and urgent needs—for tax policy reform to support the circular economy (CE) transition in Indonesia. While global examples demonstrate how fiscal tools can stimulate CE adoption, the Indonesian context requires customized strategies that consider the country's developmental stage, regulatory architecture, and industrial priorities. For Indonesia, to encourage CE, Indonesia should pay more attention to the policy adjustments which focus on:

- Introducing eco-tax credits for using secondary materials
- Redesigning VAT exemptions for circular goods and services

- Implementing carbon or methane taxes for polluting industries with revenue recycling for green innovation
- Creating a performance-based green tax framework tailored to industrial competitiveness
- Implement tax credits for circular practices like remanufacturing
- Reallocate VAT incentives to favor recycled materials
- Introduce carbon/methane taxes with reinvestment in green innovation
- Establish CE metrics tied to tax benefits

Addressing the Linear Bias in Fiscal Policy

Indonesia's current tax system reflects an underlying linear economic logic, rooted in a model of extract–produce–consume–dispose. This structure manifests in the undervaluation of environmental externalities, the lack of disincentives for resource-intensive or polluting practices, and the absence of fiscal mechanisms that support material circularity. As a result, primary resource extraction, low-value manufacturing, and landfilling are often taxed at lower effective rates, if at all, compared to circular practices such as reuse, repair, or recycling.For instance, extractive industries—including mining and logging—benefit from a variety of tax incentives and subsidies that do not account for the social and ecological costs of ecosystem degradation and biodiversity loss. In the waste sector, landfilling remains relatively inexpensive due to the absence of landfill taxes or gate fees, resulting in the systemic underdevelopment of recycling and waste valorization infrastructure (Genc, 2024); (OECD .. , 2022).This fiscal bias not only undermines the economics of circular alternatives but also reinforces market inertia—making it harder for businesses and consumers to shift toward sustainable practices. If environmental harm is externalized and not reflected in tax structures, firms have limited financial incentive to reduce their ecological footprint or invest in green innovation.

To correct these systemic imbalances, Indonesia should pursue a series of fiscal policy reforms aimed at internalizing environmental costs and levelling the playing field for circular business models:

1. Resource Extraction Taxes

These taxes apply to the removal of raw materials such as timber, sand, limestone, and mineral ores. By pricing the environmental degradation associated with extraction, resource taxes discourage overuse and promote material efficiency. International precedent: Sweden, Finland, and China have implemented resource taxation to reduce virgin material dependency and support the use of secondary materials (OECD, 2021; Sun, 2013). Indonesian CE relevance: In Indonesia's cement and construction sectors, a sand or limestone tax could increase the competitiveness of recycled construction materials or clinker substitutes such as fly ash and slag (Zeng et al., 2022).

2. Landfill Taxes or Waste Disposal Charges

A landfill tax increases the cost of disposal, encouraging companies to reduce waste at source, improve sorting, and invest in recycling or circular supply chains. Moreover, it can be paired with Extended Producer Responsibility (EPR) schemes to shift the burden of post-consumer waste management back onto producers. Evidence: Countries like the Netherlands, Denmark, and South Korea have used landfill taxes effectively to divert waste from landfills, achieving recycling rates above 50% ([European Commission, 2020]; [UNEP, 2020]). Indonesia's opportunity: Implementing such charges at the municipal or provincial level—especially for industrial sectors like cement and packaging—could provide fiscal resources for building local material recovery facilities and incentivizing producer compliance with EPR obligations.

3. VAT Reform to Support Circular Goods and Services

Traditional VAT regimes often fail to differentiate between linear and circular products, applying full tax rates to repair, reuse, and remanufacturing services. This creates a regressive fiscal structure where labour-intensive, sustainable activities are taxed equally or more than resource-intensive manufacturing. Examples of good practice:

- France reduced VAT on repair services for household appliances, textiles, and electronics from 20% to 5.5% (European Environmental Bureau, 2022).

- Sweden introduced a 50% income tax deduction for appliance repairs and second-hand purchases ([EEA, 2021]).

Indonesian policy relevance: In Indonesia, reducing VAT for motorcycle part refurbishing, construction material reuse, or electronics repair could stimulate job creation in local repair markets while supporting national CE goals.

By embedding these changes into Indonesia's fiscal architecture, the government would send strong, clear price signals that make circular activities more economically attractive and linear ones more accountable for their social and environmental costs. This approach aligns with global trends in "circular fiscal policy," where taxation is no longer neutral but used strategically to direct economic behaviour toward sustainability. Furthermore, aligning fiscal reform with Indonesia's Low Carbon Development Initiative (LCDI) and the Circular Economy Roadmap under Bappenas would ensure policy coherence and institutional synergy. Without such reforms, Indonesia risks reinforcing its dependence on extractive, high-waste, and low-resilience economic structures—undermining both its green growth ambitions and climate targets.

Designing Proactive, Targeted Tax Incentives

To support the circular economy (CE) transition in Indonesia—particularly in sectors like cement, manufacturing, and waste management—proactive, well-targeted tax incentives are essential. Unlike general fiscal relief, targeted incentives are tailored to promote specific circular outcomes, such as waste prevention, material recovery, or remanufacturing. When designed carefully, such instruments can help de-risk innovation, increase private sector participation, and enhance the competitiveness of circular business models. This approach is especially crucial for Micro, Small, and Medium Enterprises (MSMEs), which form over 99% of business units in Indonesia and often lack the financial and technical capacity to invest in CE technologies. Many MSMEs are locked into low-margin, resource-intensive models, and need strategic fiscal incentives to transition toward circular practices without compromising financial viability (Bappenas, 2022). Drawing from international best practices and local needs, the following instruments are proposed:

1. Investment Tax Credits or Super Deductions for CE Adoption

Investment tax credits allow firms to deduct a percentage of capital expenditure related to CE activities (e.g., recycling equipment, reverse logistics systems) from their corporate income tax liability. A more aggressive variant, the "super deduction," allows deductions of 150–200% of the qualifying investment value—significantly lowering effective capital costs.

Examples and evidence:

- In Singapore, the Enhanced Capital Allowance Scheme provides tax relief for investments in energy- and water-saving technologies.
- Italy introduced a super deduction (up to 250%) for companies investing in Industry 4.0 and circular machinery under its CE action plan (OECD, 2024).

Application for Indonesia: Super deductions could be offered to companies investing in remanufacturing lines, material sorting technologies, or waste-to-energy systems, especially in high-emission sectors like cement and textiles.

2. Accelerated Depreciation for Circular Economy Assets

Accelerated depreciation enables companies to write off the cost of qualified CE assets faster than under traditional accounting schedules. This improves the investment's internal rate of return (IRR), making circular equipment more financially attractive, especially for firms facing high capital costs. OECD guidance suggests that depreciation schemes for "green" or CE-aligned assets are among the most effective incentives to drive clean technology adoption (Svatikova, Brown, & Börkey, 2025).

Examples:

- Japan's Green Investment Tax Incentive Scheme allows faster depreciation of energy-efficient equipment in sectors like cement and heavy manufacturing.
- France includes accelerated depreciation for recycling and composting infrastructure in its environmental tax code.

Policy opportunity: Indonesia could introduce a Circular Asset Depreciation Schedule, allowing firms to depreciate qualifying CE assets (e.g., alternative fuel systems, eco-design tools) within 3–5 years instead of the standard 8–10.

3. Reduced Import Duties on Circular Inputs and Eco-Innovative Technologies

Many CE technologies—such as sensor-based sorting systems, co-processing kilns, or recycled input feedstocks—are imported into Indonesia at high tariffs, making them less accessible to local producers, especially MSMEs. Reducing or waiving import duties on: Capital goods that support material circularity (e.g., 3D printers for remanufacturing, shredders for plastic recycling); Certified secondary raw materials, and Components for modular repair or reverse logistics systems; can help build domestic circular supply chains and reduce the cost disparity between linear and circular inputs.

Reference example:

- South Korea provides duty exemptions for CE-supporting imports under its Green New Deal.
- The European Union's CE Action Plan (2020) encourages member states to align customs policy with CE objectives, including differentiated tariffs for sustainable goods (European Commission, 2020).

This is relevance for Indonesia, given its heavy reliance on imported technology for green and CE infrastructure, reducing tariffs could expand technology access and lower the CE transition cost, especially in regions with underdeveloped industrial bases. For these incentives to succeed, strategic design considerations must be developed:

- Integrated into national tax legislation rather than fragmented across ministries.
- Accompanied by clear technical guidelines and eligibility criteria.
- Publicized and made accessible via a centralized digital platform, particularly to MSMEs.
- Monitored through CE-specific indicators to assess real-world impact and prevent misuse.

These instruments can also be linked to performance thresholds—e.g., firms receiving tax relief must demonstrate reductions in waste generation, carbon emissions, or virgin material use.

Integrating Carbon and Methane Taxation into CE Strategy

Environmental taxation remains largely underutilized in Indonesia. Introducing carbon pricing mechanisms, including carbon taxes and emissions trading, could provide not only a climate signal but also a source of funding for circular infrastructure and green innovation. Likewise, sector-specific methane taxes on landfills and wastewater treatment plants, such as those explored in Brazil (Michalovicz & Bilotta, 2022), could encourage biogas utilization and circular energy models.

Importantly, revenues from these taxes should be earmarked for:

- Circular economy R&D grants.
- Green jobs training and industrial conversion programs.
- Local government support for circular waste management.

Enhancing Institutional Integration and Policy Coherence

Circular economy tax policy cannot exist in a vacuum. It must be part of a whole-of-government approach that aligns tax policy with:

- Industrial development goals (Ministry of Industry),
- Climate and environmental targets (Ministry of Environment and Forestry),
- Local economic development (Regional Governments and Bappenas).

The absence of a national CE fiscal roadmap and inter-agency coordination mechanisms currently hinders this integration.

To address this:

- A cross-ministerial Circular Economy Tax Reform Task Force could be established.
- The Ministry of Finance should embed CE principles into its medium-term tax policy strategy.
- A system of performance indicators and reporting frameworks should be developed to track tax policy impact on CE outcomes.

Prioritizing Strategic Sectors for CE-Tax Reform Pilots

Indonesia's transition toward CE should begin with priority sectors where tax policy interventions can have the greatest impact. These may include:

- Cement and construction materials, where incentives for recycled aggregates and alternative fuels could significantly reduce emissions and waste.
- Electronics, where EPR and VAT incentives for refurbished goods could extend product lifecycles.
- Textiles, where tax breaks for fiber-to-fiber recycling and sustainable dyes can encourage eco-innovation.

These pilots can serve as testing grounds for scalable, sector-specific CE tax instruments.

Summary of Recommendations

Policy Area	Recommendation
Linear tax reform	Introduce landfill, extraction, and pollution taxes
CE-targeted incentives	Tax credits, super deductions, VAT relief for circular business models
Environmental taxation	Implement carbon/methane tax; earmark revenues for CE investment
Institutional integration	Establish inter-ministerial CE Tax Reform Task Force
Sectoral strategy	Pilot CE tax reforms in cement, textiles, electronics

Key Takeaway:

Indonesia's circular economy strategy will remain incomplete without fiscal transformation. By aligning tax policy with CE objectives, the government can shift from reactive environmental control to **proactive economic steering**—accelerating the transition to a sustainable, low-carbon, and resource-efficient future.

DISCUSSION: IMPLICATIONS FOR THEORY AND PRACTICE

The systematic review shows that CE tax policy must be proactive, performance-based, and sector-sensitive. Indonesia's fiscal authorities need to reframe environmental taxation not as a punitive tool, but as a mechanism for catalyzing innovation, resource efficiency, and industrial transformation. A multi-level policy approach involving both central and local governments will be essential.The review reveals a need for Indonesia to design proactive, performance-based tax policies aligned with CE. Such policies should integrate fiscal, environmental, and industrial strategies to ensure sustainable economic development.The systematic literature review and policy synthesis conducted in this study demonstrate the urgent need to reposition tax policy as a core enabler of circular economy (CE) implementation. The findings contribute to both theoretical development and practical policymaking by bridging the gap between fiscal instruments and sustainability transitions.

Theoretical Contributions

From a theoretical perspective, this study contributes to the emerging interdisciplinary field of circular economy governance by integrating insights from environmental economics, tax policy, and sustainability transitions. Key theoretical contributions include:

- Reframing fiscal policy as both a market-correcting and market-shaping tool in the CE domain. Unlike traditional taxation models, CE tax policy must incentivize resource circulation and penalize environmental externalities.
- Supporting the system dynamics perspective that tax policy acts as a leverage point in feedback loops involving production behavior, consumer choice, and resource flows.
- Addressing a gap in CE literature, which often focuses on technological and operational solutions but overlooks institutional and fiscal mechanisms as central to enabling systemic change.

These insights align with governance frameworks that emphasize policy coherence, institutional integration, and adaptive fiscal instruments as necessary for transformative sustainability policy (Geissdoerfer et al., 2017; Taddei et al., 2024), where positions tax policy as a dynamic system-level lever in CE transitions and adds fiscal dimensions to CE governance frameworks.

Practical Relevance and Policy Implications

On the practical side, this research offers actionable strategies for policymakers in Indonesia and other developing countries seeking to align fiscal structures with circular economy goals.

- The review affirms that preferential tax treatment (e.g., eco-tax credits, accelerated depreciation) can play a catalytic role in scaling circular practices across industries.
- It also highlights the risks of policy incoherence and fragmentation, where tax incentives and environmental regulations operate in silos, leading to suboptimal outcomes.
- Importantly, it shows that environmental taxation (e.g., carbon or methane taxes) can serve dual roles: reducing environmental harm and generating revenue for CE investments.

Indonesia stands at a critical juncture: while the country has initiated CE-related pilot programs, the absence of a fiscal roadmap and lack of cross-sectoral governance are major obstacles. Embedding CE into national tax policy would require legislative reform, institutional realignment, and sector-specific piloting by confirms tax policy's role in scaling CE adoption and highlights risks of incoherence between fiscal and sustainability agendas.

Toward Holistic CE Reform

A proactive, adaptive fiscal strategy must be embedded in national CE and industrial roadmaps, combining tax with infrastructure, regulation, and education. The Indonesian case also reinforces the idea that CE is not merely a technical or environmental strategy but a fiscal and economic reform agenda. Governments must move beyond reactive regulation and embrace proactive market shaping through taxation. For developing countries, this means through tailoring tax tools to the maturity of sectors and building capacity in fiscal planning and data analysis and also engaging private sector stakeholders in fiscal reform processes. Ultimately, the CE transition will depend not only on innovation and infrastructure but also on how governments design and deploy tax systems that align economic incentives with environmental responsibility.

CONCLUSION AND POLICY RECOMMENDATIONS

Tax policy plays a dual role in regulating environmental behaviour and promoting innovation. Indonesia's CE implementation would benefit from reconstructed tax frameworks that incentivize sustainable practices. Policymakers are urged to pilot eco-tax mechanisms and assess sector-specific impacts. Tax policy plays a dual role in shaping economic behaviour and achieving sustainability. This study underscores the urgency for Indonesia to reconstruct its tax policies to support circular economy implementation. Recommendations include:

1. Establishing CE tax incentives for industrial remanufacturing
2. Creating tax penalties for excessive resource extraction
3. Integrating tax reforms within broader industrial policy frameworks

Future research should focus on pilot projects and empirical evaluations to test these proposed fiscal instruments.

CONCLUSION

This study has systematically reviewed the global landscape of tax policy instruments relevant to circular economy (CE) implementation, with a focused lens on their applicability and implications for Indonesia. Guided by PRISMA methodology, the review synthesized findings from 30 scholarly and policy-oriented sources and identified key enablers, obstacles, and strategic approaches for integrating fiscal tools into CE transitions. The central conclusion is that Indonesia's current tax system—designed around linear economic models—is insufficiently aligned with the goals of resource efficiency, waste minimization, and sustainable industrial transformation. Without targeted fiscal reforms, the promise

of the circular economy as a pathway to decarbonization, competitiveness, and inclusive growth will remain largely aspirational.Key insights include Tax incentives for remanufacturing, recycling, and circular innovation are critical levers that remain underutilized; Environmental taxation (carbon, methane, landfill) can internalize externalities and mobilize funding for circular infrastructure; Institutional fragmentation and lack of fiscal coordination remain key implementation barriers. Indonesia is now presented with a unique opportunity: by reconstructing its tax policy, it can play a proactive role in shaping markets and behaviours toward sustainability, while also addressing pressing fiscal and environmental challenges. Indonesia must reconstruct its tax system to support CE. A reformed tax policy will not only reduce waste and emissions but also unlock sustainable growth.

Policy Recommendations

Drawing from international best practices and Indonesia's policy context, the following recomendations are proposed to guide the reconstruction of tax policy in support of the circular economy:

1. Reform Linear Fiscal Instruments
    - Introduce landfill and extraction taxes to disincentivize waste and virgin resource use.
    - Remove perverse tax incentives that encourage single-use products or overproduction.
2. Design Targeted CE Incentives
    - Provide investment tax credits, accelerated depreciation, or super deductions for circular technologies.
    - Implement VAT exemptions or reductions for remanufactured goods, repair services, and recycled materials.
3. Launch Environmental Taxation with Circular Links
    - Implement carbon taxes with reinvestment into CE sectors (e.g., green infrastructure, clean tech R&D).
    - Pilot methane taxes on landfills and wastewater, linked to biogas recovery and emissions reduction programs.
4. Institutional Integration and Governance
    - Establish a Circular Economy Fiscal Reform Task Force under the Ministry of Finance, with members from Bappenas, Ministry of Environment and Forestry, and Ministry of Industry.
    - Integrate CE principles into the National Tax Reform Agenda (2025–2030) and local revenue frameworks.
5. Pilot and Scale Sector-Based Approaches
    - Begin with priority sectors: cement, electronics, and textiles, where circularity offers high environmental and economic returns.
    - Use pilots to evaluate tax policy impacts on industry behavior, emissions, and investment flows.
6. Build Capacity and Fiscal Transparency
    - Develop monitoring frameworks to track the effect of tax policy on CE metrics (waste reduction, resource productivity, emission savings).
    - Promote fiscal transparency and stakeholder engagement in designing and reviewing CE-related tax incentives.

FUTURE RESEARCH

To support policy development and fill research gaps, future studies should:

- Conduct quantitative impact assessments of specific tax policies on CE adoption.
- Explore behavioural responses of firms and consumers to CE-aligned fiscal tools.
- Examine the distributional effects of environmental taxation in developing countries.
- Develop system dynamics models linking fiscal instruments with CE performance in sector-specific settings.
- Conduct empirical evaluation of fiscal policy on CE outcomes.
- Study behavioural impacts of tax reform.
- Model system dynamics between fiscal policy and CE indicators.

Closing Remark

The circular economy is not only a sustainability imperative—it is a fiscal and institutional innovation challenge. By aligning taxation with circularity, Indonesia can unlock new pathways for decarbonization, industrial modernization, and inclusive economic transformation. Tax policy, once seen as reactive and extractive, can now become a regenerative force for systemic change.

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