Reconstructing Tax Policy for Circular Economy Implementation in Indonesia: A Soft Systems Approach

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KEYWORDS	ABSTRACT
circular economy, tax policy, policy reconstruction, environmental taxation, soft systems methodology, Indonesia.	The transition to a circular economy (CE) represents a fundamental shift from linear resource use to regenerative and sustainable industrial systems. However, Indonesia's current tax policy framework remains fragmented and insufficiently aligned with CE goals. This study examines the need for tax policy reconstruction to support the implementation of a circular economy in Indonesia, employing Soft Systems Methodology (SSM) to explore policy weaknesses and stakeholder dynamics. The findings reveal that existing fiscal instruments lack integration, coherence, and behavioral incentives necessary to catalyze industrial transformation. Drawing on literature and stakeholder mapping, the study proposes a strategic redesign of tax policy—emphasizing differentiated taxation, progressive incentives for recycled products, and systematic carbon taxation. The results highlight the potential of fiscal policy as a leverage point to drive the transition toward circularity, with broader implications for sustainable development, job creation, and environmental quality. The proposed tax policy reforms are designed to accelerate the necessary industrial shifts, considering both economic and environmental aspects, while also enhancing Indonesia's competitiveness in an increasingly sustainability-focused global market.

1. INTRODUCTION

The convergence of global environmental crises—such as climate change, biodiversity loss, and unsustainable resource consumption—has intensified the search for economic models that can reconcile growth with environmental sustainability. Among the most prominent of these is the circular economy (CE), which aims to decouple economic development from resource depletion by maintaining the value of products, materials, and resources in the economy for as long as possible (Korhonen et al., 2018; Kirchherr et al., 2017).

The CE model is increasingly recognized as a strategic framework to achieve the United Nations Sustainable Development Goals (SDGs), particularly SDG 12 (responsible consumption and production) and SDG 13 (climate action). At the European level, the EU Circular Economy Action Plan (2020) lays out an ambitious agenda to transform production and consumption through legislative and fiscal reform. Similarly, countries like Sweden, Taiwan, and China have developed comprehensive circular economy legislation that includes tailored tax instruments to support sustainable transitions (Milios, 2021; European Commission, 2020; Chen et al., 2021).

Indonesia, as an emerging economy with vast natural resources and significant waste

generation challenges, is at a pivotal moment in its development trajectory. National initiatives such as the Low Carbon Development Initiative (LCDI) and Indonesia Vision 2045 underscore a commitment to sustainable growth and environmental stewardship. The government has also partnered with international institutions—such as the UNDP and the Danish Government—to estimate the economic, social, and environmental benefits of implementing CE principles. These studies suggest that CE implementation in priority sectors (e.g., construction, plastics, food, and textiles) could reduce waste by up to 52%, generate 4.4 million green jobs, and add IDR 638 trillion to GDP by 2030 (Bappenas & UNDP, 2021).

However, translating these aspirations into operational reforms remains a significant challenge. While environmental and industrial policy frameworks have begun to reflect CE principles, Indonesia's fiscal and tax systems largely remain aligned with the linear economy, favoring resource extraction, short-term production, and disposability. The current tax structure does not differentiate between renewable and non-renewable inputs, nor does it effectively incentivize reuse, repair, or eco-innovation. Moreover, subsidies and tax exemptions continue to support polluting industries—particularly in energy and extractives—at the expense of more sustainable alternatives (OECD, 2021; Freire-González et al., 2022).

In this context, tax policy becomes a critical leverage point for steering behavior toward circularity. As a tool of economic governance, taxation can internalize environmental externalities, redirect capital flows, and support business model innovation through fiscal incentives or penalties (KPMG, 2013; Milios, 2021). Yet, the design and implementation of such policies require careful alignment with national priorities, institutional capabilities, and industry readiness.

This paper argues that reconstructing Indonesia's tax policy is essential to enable and accelerate the transition toward a circular economy. The approach taken in this study draws on Soft Systems Methodology (SSM)—a qualitative, participatory method that is particularly well-suited to addressing complex, ill-structured policy problems involving multiple stakeholders and competing worldviews (Checkland & Poulter, 2007). Through this lens, the paper identifies key limitations in the current fiscal regime, maps stakeholder dynamics, and proposes strategic directions for a CE-aligned tax policy framework. The study contributes to the growing literature on fiscal reform for sustainability in the Global South and provides practical insights for policymakers aiming to integrate CE principles into economic governance.

Literature Review

Circular Economy and Fiscal Policy
A circular economy involves redesigning production and consumption systems to be regenerative by intent and design. It emphasizes resource efficiency, product life extension, and closed-loop material flows. Fiscal policy, particularly taxation, can play a pivotal role in steering economies toward CE by shaping incentives, correcting externalities, and mobilizing investment (Milios, 2021; OECD, 2021).

The circular economy (CE) aims to redefine growth by decoupling economic activity from the consumption of finite resources. This involves strategies such as designing out waste, maintaining product and material value, and regenerating natural systems (Ellen MacArthur Foundation, 2019; Kirchherr et al., 2017). Achieving this transition requires not only technological innovation and behavioral change but also a supportive policy and fiscal environment.

Fiscal policy—particularly taxation—is central to the transition to a CE as it can alter market prices, internalize externalities, and incentivize resource efficiency (OECD, 2021).

Environmental taxes, tax credits for green investment, and preferential treatment for secondary materials are among the key instruments. Moreover, fiscal reform that shifts the tax burden from labor to resource consumption has been suggested as a structural pathway to promote sustainability (Freire-González, 2019).

Despite its potential, empirical studies reveal that environmental tax policies are often designed to increase revenue rather than behavioral change, leading to suboptimal outcomes unless combined with broader environmental objectives (Sterner & Coria, 2012; Ekins & Speck, 2014). Integrating circular economy principles into fiscal architecture remains an evolving field, requiring adaptive governance and inter-sectoral alignment.

International Tax Policy Innovations

The European Union has integrated CE objectives into VAT and customs policies by offering exemptions for recycled materials and eco-products (European Commission, 2020). Sweden has implemented a comprehensive taxation framework including raw material taxes, reuse incentives, and progressive waste taxation (Milios, 2021). Similarly, Taiwan has differentiated tax treatment for CE-compatible assets.

Globally, countries have begun reforming tax systems to align with CE objectives. The European Union's CE Action Plan (2020) encourages Member States to offer differentiated VAT rates for circular products and exemptions for recycled goods. The Extended Producer Responsibility (EPR) model also integrates fiscal disincentives for virgin material usage.

In Sweden, Milios (2021) outlines a three-tier taxation approach across the product life cycle: (1) raw material extraction taxes, (2) repair and reuse subsidies, and (3) landfill and incineration taxes. Taiwan has integrated tax incentives for CE-compatible assets and preferential tariffs for imported green technologies (Chen et al., 2021).

In China, circular economy has been institutionalized through a top-down regulatory framework supported by fiscal tools such as subsidies, tax breaks, and differentiated VAT policies (Geng et al., 2013; Su et al., 2013). OECD (2021) recommends that green depreciation schemes, carbon taxes, and performance-based incentives be part of CE-aligned tax reform strategies. However, uptake and success remain highly dependent on governance capacity, policy coherence, and institutional learning.

Indonesia's Current Tax Instruments

Indonesia's tax regime includes carbon taxation (Law No. 7/2021), green incentives under various decrees (e.g., PMK 34/PMK.010/2017), and limited VAT exemptions. However, these policies are fragmented, inconsistently implemented, and largely ineffective in promoting systemic transformation (Putranti, 2014; UNDP & Bappenas, 2021).

Indonesia has introduced select green fiscal instruments, but they remain scattered across agencies and lack a coherent policy framework. Instruments include:

a. Carbon Tax (Law No. 7/2021): Currently limited to coal-fired power plants, with delayed implementation and unclear market integration mechanisms.

b. Green Incentives: Enacted through decrees such as PMK 34/PMK.010/2017 and PMK 196/PMK.010/2016, targeting import duty exemptions and VAT relief for eco-equipment.

c. Income Tax Relief: Limited accelerated depreciation and investment allowances for green sectors (UNDP & Bappenas, 2021; Putranti, 2014).

However, these policies are not circular economy-specific, nor do they distinguish between renewable and non-renewable inputs. Studies (e.g., Astuti & Charles, 2019; Saputra et al., 2022) highlight that tax benefits are difficult to access, poorly communicated, and often

irrelevant to SMEs—which make up 99% of Indonesia's businesses.

Gaps in Existing Policy

There is no unified policy framework integrating tax tools with CE goals. Current incentives are often general, do not distinguish material sources, and lack performance-based criteria. Moreover, institutional coordination remains weak, and enforcement capacity is limited.

Several structural gaps persist in Indonesia's fiscal approach to sustainability:

a. No integration between environmental, industrial, and tax policy instruments

b. Generalized incentives that do not promote specific CE practices (e.g., remanufacturing, modularity, recycled material use)

c. Lack of dynamic incentives based on life cycle assessment (LCA) or environmental performance

d. Weak institutional coordination between the Ministry of Finance, Ministry of Environment and Forestry, and Ministry of Industry

e. Absence of policy learning and monitoring systems to adapt fiscal measures based on impact evaluations (Damanhuri & Padmi, 2021)

This paper addresses these gaps by synthesizing international CE fiscal models and contextualizing their applicability to Indonesia using Soft Systems Methodology.

Table 1. Summary of selected literature on circular economy-aligned tax

No	Author (s)	Country/ Region	Focus Area	Policy Instrument	Findings / Implications
1	Milios (2021)	Sweden	Life-cycle taxation	Raw material tax, reuse incentives, landfill tax	System-wide taxation supports CE behaviour change
2	Freire Gonzalez (2019)	EU	Green tax reform	Resource vs labor tax shift	Fiscal reform must address distributional fairness
3	Chen et al. (2021)	Taiwan	Asset taxation	Tax deductions for CE-aligned tech	Fiscal incentives promote CE innovation
4	Geng et al. (2013)	China	Regulatory + fiscal mix	VAT exemptions, subsidies	Top-down coordination critical for implementation
5	OECD (2021)	Multinational	Policy guidance	Depreciation, carbon pricing	Strong institutional design essential for CE alignment
6	UNDP & Bappenas (2021)	Indonesia	Scenario modeling	Various incentives	CE can add IDR 638T GDP, needs enabling fiscal policies
7	Putranti (2014)	Indonesia	Policy evaluation	Tax incentives	Existing green tax policy is ineffective and incoherent

2. METHOD

This study adopts the Soft Systems Methodology (SSM) as its core research approach to explore the reconstruction of Indonesia's tax policy in support of circular economy (CE) implementation. SSM is a qualitative, interpretive, and participatory methodology developed by Peter Checkland,

designed to address ill-structured and complex problem situations that involve divergent perspectives, conflicting interests, and social-political dynamics (Checkland & Poulter, 2007; Checkland, 1981). It is especially suited to situations where traditional quantitative or engineering-based approaches fail to capture human and institutional complexity.

The complexity of fiscal reform for CE lies not only in economic modeling but also in navigating competing stakeholder worldviews—between policymakers, industries, and the public—regarding taxation, environmental values, and governance structures. For this reason, SSM provides a holistic framework for problem exploration and solution generation in the context of institutional design and sustainability policy (Jackson, 2003; Midgley, 2000). In contrast to conventional problem-solving methods that presume a single "correct" solution, SSM embraces the social construction of problems and the necessity of negotiation and learning to arrive at culturally feasible and systemically desirable changes (Flood & Jackson, 1991; Midgley, 2000). It is especially suitable for environmental policy and public sector governance where competing interests, unclear system boundaries, and dynamic feedback are involved—as is the case with CE tax policy reform.

SSM has been applied in multiple policy and governance contexts, including waste management planning (Williams & van Aartsen, 2011), integrated urban development (Antunes et al., 2006), and environmental education (Bunch, 2003). In this study, it provides a structured process to (a) identify gaps in Indonesia's current tax policy framework, (b) capture the diverse concerns of stakeholders, and (c) model a conceptually coherent tax system aligned with CE principles.

In previous studies, SSM has proven effective in domains such as waste management planning (Williams & van Aartsen, 2011), participatory urban governance (Antunes et al., 2006), and environmental education (Bunch, 2003). This research extends its application to fiscal policy reform, leveraging its capacity to handle policy ambiguity, diverse stakeholder interests, and institutional complexity.

SSM Stages Applied

This study follows five of the seven SSM stages, as outlined below, corresponding to Checkland's conventional SSM learning cycle:

1. Problem Identification

We begin by exploring real-world symptoms and perceived issues within Indonesia's tax policy system—particularly its misalignment with CE objectives. Sources include literature, government documents, and stakeholder observations. This stage aligns with SSM's acknowledgment that problem situations are "messy" and socially constructed (Checkland & Scholes, 1990).

2. Rich Picture

A visual tool is used to illustrate the relationships, conflicts, and interests of key actors (government agencies, industry, public). The rich picture technique helps uncover cultural, political, and systemic tensions in fiscal governance (Monk & Howard, 1998).

3. Root Definition & CATWOE Analysis

The system under investigation is defined through Root Definitions, structured using the CATWOE mnemonic: Customers, Actors, Transformation process, Weltanschauung (worldview), Owners, and Environmental constraints. This framework allows for the inclusion of diverse stakeholder perspectives and normative assumptions in system design (Flood & Jackson, 1991).

4. Conceptual Model

Based on the root definitions, we construct a logical model of activities that would exist in an ideal system. This helps compare the "ought-to-be" structure with existing institutional arrangements. The conceptual model is not prescriptive but serves as a conversation tool between theory and reality.

5. Comparison with Reality

This stage juxtaposes the conceptual model with Indonesia's current tax framework. Discrepancies and gaps are discussed, leading to desirable and culturally feasible changes. Iterative stakeholder reflection is part of this diagnostic phase (Checkland & Poulter, 2006).

While many SSM-based studies focus on the first five stages, this research proceeds through all seven stages of the SSM learning cycle, to identify not only system shortcomings but also to propose and contextualize feasible policy changes and long-term learning mechanisms for sustainable fiscal governance. The additional of Stage 6 (Desirable + Feasible Change) to bridge analysis with real-world policy pathways and can addresses not just analysis but also culturally feasible and systemically desirable change. While Stage 7 (Action & Learning) to strengthens this paper contribution by proposing not just what *should* change, but *how* change can evolve over time, which is ideal for policymaking in complex systems. In this Stage 7 also provide consideration for the implementation and iterative learning cycle, which is important in real-world policy reform.

This study employs all seven stages of SSM, following the learning cycle developed by Checkland (1981) and refined through later applications in systems thinking for public administration.

Stage 1: Entering the Problem Situation
The research begins by identifying symptoms of dysfunction within Indonesia's existing tax policy landscape, particularly its failure to support circular economy goals. Problem identification was based on:
a. Literature on Indonesia's green fiscal policy instruments
b. Policy evaluations of the Carbon Tax (Law No. 7/2021)
c. Reports from UNDP, Bappenas, and OECD on CE potential and fiscal gaps

Stage 2: Expressing the Problem Situation

A rich picture was developed to map actors, conflicts, and policy fragmentation:
a. Government ministries (Finance, Industry, Environment)
b. Industry players (especially manufacturing and extractive sectors)
c. The general public (as both taxpayers and beneficiaries)

The rich picture illuminated underlying causes of inaction, such as: Fragmented regulatory mandates; Misaligned incentives; Weak institutional collaboration and Limited awareness of CE fiscal mechanisms.

Stage 3: Root Definitions and CATWOE Analysis
Root definitions of the "ideal system" were developed using the CATWOE framework:
a. Customers: Citizens and future generations
b. Actors: Ministries and tax authorities
c. Transformation: From linear to CE-aligned tax governance
d. Weltanschauung: Tax policy is a strategic driver of sustainable development
e. Owners: Government of Indonesia, supported by parliament
f. Environmental constraints: Institutional inertia, global trade rules, capacity limits

Stage 4: Conceptual Modeling
Using the root definitions, conceptual models were constructed to visualize ideal activities and feedback loops, such as:
a. Differentiated tax rates for recycled vs. virgin materials
b. Integration of CE criteria into tax benefit eligibility
c. Real-time environmental performance monitoring linked to tax incentives

Stage 5: Comparing with the Real World
The conceptual model was compared with Indonesia's existing tax structure. Key discrepancies included:

a. Uniform VAT treatment regardless of material origin
b. Absence of green depreciation schemes or performance-based tax relief
c. Administrative complexity in claiming green incentives

This comparison revealed opportunities for reform and informed the change proposals in the next stage.

Stage 6: Defining Culturally Feasible and Systemically Desirable Changes
At this stage, the study proposes realistic, yet transformative changes to Indonesia's fiscal policy framework that align with institutional constraints and political feasibility:
a. Short-term: Simplify access to existing green incentives, introduce pilot eco-VAT program
b. Medium-term: Enact tax differentiation for recycled content, adopt green asset depreciation
c. Long-term: Shift tax base from labor to resource use; embed CE metrics into fiscal policy evaluation

These proposals draw on successful international examples (EU, Sweden, Taiwan) but are grounded in Indonesia's context using scenario and stakeholder analysis.

Stage 7: Taking Action to Improve the Problem Situation
The final stage outlines an implementation and feedback pathway, including:
a. Formation of an inter-ministerial task force to align fiscal and environmental objectives
b. Launch of pilot demonstration projects (e.g., CE tax zones or incentives for SMEs in recycling sectors)
c. Establishment of a learning system within the Ministry of Finance to iteratively assess, adjust, and expand CE-aligned tax instruments

This stage emphasizes continuous learning and stakeholder participation, ensuring that policy reform is adaptive and responsive to system dynamics (Blackmore, 2010).

Table 2. SSM Stages Applied (Full Cycle)

SSM Stage	Application in This Study
Stage 1: Entering the problem situation	Identification of key challenges in Indonesia's current tax policy system, particularly the misalignment with circular economy (CE) goals. Explored through literature review, policy document analysis, and stakeholder reports.
Stage 2: Expressing the problem situation	Developed a rich picture showing actors (government, industry, public), their interrelations, tensions, and external pressures. This revealed fragmentation across ministries, limited fiscal incentives, and low public engagement in CE.
Stage 3: Formulating root definitions of relevant systems	Created multiple Root Definitions for ideal tax systems using the CATWOE framework, representing different stakeholder perspectives (e.g., Ministry of Finance vs. industry associations). This helped articulate the "purpose" and "boundary" of the system.
Stage 4: Building conceptual models of the systems named in the root definitions	Constructed conceptual models of activities required for CE-aligned tax governance—such as integrating lifecycle-based tax instruments, aligning with CE goals, and feedback loops for monitoring.
Stage 5: Comparing the models with the real world	Compared conceptual models with the current Indonesian tax system. Found major gaps in integration, weak cross-ministerial collaboration,

SSM Stage	Application in This Study
	and misaligned incentives. Used comparison to identify feasible policy reforms.
Stage 6: Defining possible changes which are both feasible and desirable	Identified culturally feasible and systemically desirable changes, such as: (1) a phased roadmap for eco-taxation, (2) pilot programs for eco-VAT on recycled goods, and (3) public-private fiscal dialogues. These were informed by global practices but tailored to Indonesian political and institutional context.
Stage 7: Taking action to improve the problem situation	Proposed policy interventions and iterative learning loops—e.g., integrating monitoring systems within the Ministry of Finance, updating tax codes for CE alignment, and launching multi-agency task forces. Emphasized that implementation should be adaptive and participatory.

Data Sources and Analysis

Through SSM, the study not only models a new policy framework but also engages with the social learning process necessary to navigate fiscal transformation in complex policy systems (Blackmore, 2010).

The study draws on a combination of:

a. Secondary data: Government policy documents (e.g., Law No. 7/2021, PMK decrees), international CE tax literature, and institutional reports from OECD, UNDP, and Bappenas.

b. Stakeholder insights: Synthesized from previous consultation initiatives, pilot projects on carbon taxation, and documented industry responses to CE incentives.

c. Literature synthesis: Informed by systematic review findings (see Table 1), particularly policy design elements that can be transferred to Indonesia's fiscal architecture.

This study triangulates data from the following sources:

a. Policy documents: National tax legislation, CE policy drafts, fiscal decrees (PMK series)

b. Institutional reports: UNDP, OECD, Bappenas, IESR, and the Ministry of Finance

c. Academic literature: Synthesized from a systematic literature review on CE taxation (see Table 1)

d. Stakeholder mapping: Derived from documented responses and pilot evaluations (e.g., Carbon Tax trials)

SSM enabled a systems-based understanding of institutional bottlenecks and facilitated the design of an integrated fiscal policy model to support CE transitions.

RESULT AND DISCUSSION

This section presents the findings derived from applying the full cycle of Soft Systems Methodology (SSM), including stakeholder mapping, CATWOE analysis, and conceptual modeling. Through this process, the study surfaced both structural and behavioural constraints in Indonesia's fiscal policy landscape and outlined pathways for reform that are culturally feasible and systemically desirable.

Rich Picture and Stakeholder Analysis

The rich picture (see Figure 1) offers a visual synthesis of the problem situation, drawing attention to institutional fragmentation, low stakeholder engagement, and systemic disconnects between policy ambition and fiscal mechanisms.
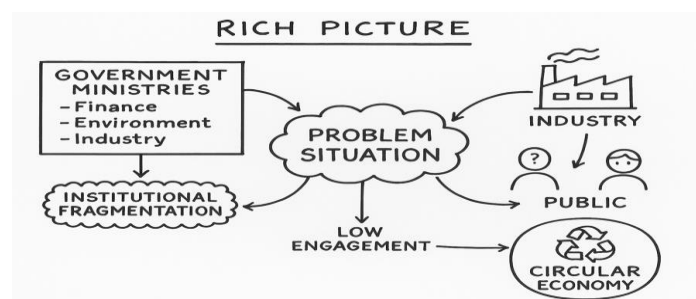
Figure 1. Rich picture of the problem situation in Indonesia's tax policy for circular economy implementation.

Three primary stakeholder groups were identified:

a. Government Ministries: Including the Ministry of Finance, Ministry of Environment and Forestry, and Ministry of Industry. While these actors are central to regulatory and fiscal policy, siloed mandates and lack of interagency collaboration lead to policy incoherence.

b. Industry Players: Particularly from resource-intensive sectors (cement, plastics, textiles), who are both sources of environmental pressure and potential leaders in CE innovation. However, they often face high compliance costs, uncertain incentives, and limited fiscal support for green investments (UNIDO, 2022).

c. Public/Citizens: As both taxpayers and beneficiaries of CE reforms, the public is essential to long-term success. However, awareness of CE benefits is low, and behavioural change is minimal without targeted fiscal nudges (e.g., subsidies for eco-products, progressive landfill fees).

This stakeholder constellation highlights a classic "policy-practice gap": CE is acknowledged at the strategy level, but fiscal instruments lack the behavioural triggers and institutional support to drive systemic change (Ekins & Speck, 2014).

CATWOE Analysis

To construct a "root definition" of the ideal system, a CATWOE analysis was conducted. Table 3 summarizes the components derived from stakeholder insights and conceptual synthesis.

Table 3. CATWOE Components and Conceptual Synthesis

Component	Description
C (Customer)	General public and future generations, who benefit from cleaner environments, green jobs, and sustainable growth.
A (Actor)	Ministry of Finance, Tax Authority, and local government units responsible for tax administration and reform implementation.
T (Transformation)	Transition from a fragmented, linear tax structure to a coherent, circular economy-aligned tax policy framework.
W (Weltanschauung)	A belief that tax policy is not merely for revenue generation, but a strategic tool to internalize environmental externalities and stimulate green innovation.
O (Owner)	Government and legislative bodies with the authority to approve, revise, or block fiscal policy changes.
E (Environmental Constraints)	Political economy pressures, global economic competitiveness, fiscal deficit concerns, and weak public trust in tax administration.

This structured analysis informs the subsequent conceptual model, guiding the construction of a system that is both desirable and realistically implementable.

Conceptual Model

Based on the root definition and stakeholder dynamics, a conceptual model was developed to visualize the key functions of a CE-aligned tax policy system. The model includes feedback mechanisms and policy levers that support sustainable industrial behavior and green consumer choices.
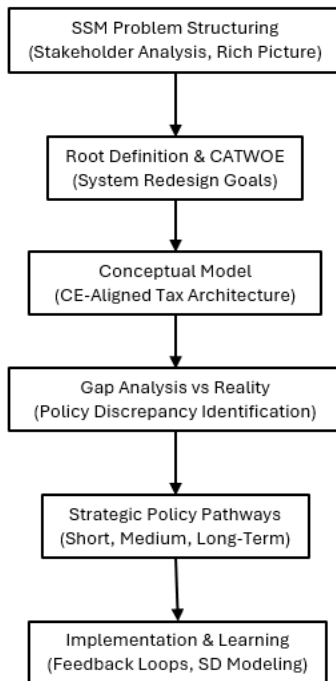

Figure 2. Conceptual framework linking SSM to Circular Economy tax reform stages.
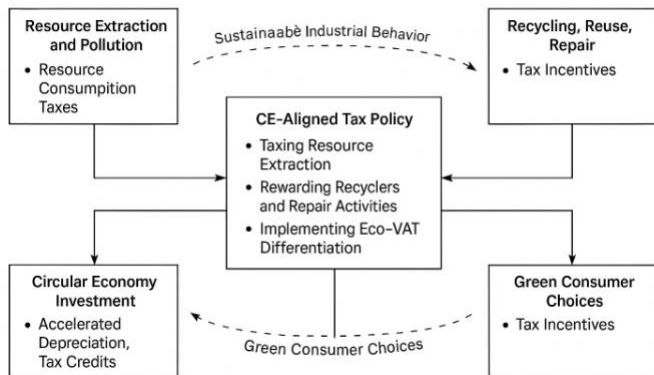

Figure 3. The conceptual model of a CE-aligned tax policy system illustration

Key shifts represented in the model include:

a. Taxing resource extraction and pollution: Introduce resource consumption taxes, increase coverage of the carbon tax, and integrate pollution-based penalties.

b. Rewarding recycling, reuse, and repair: Offer VAT reductions or exemptions for products with certified recycled content or that support circular models (repair shops, refurbishes).

c. Eco-VAT differentiation: Create tiered VAT rates, lower for environmentally friendly products and services, standard or higher for linear economy goods.

d. Simplified compliance for SMEs: Develop one-stop portals and standard deduction schemes for CE-eligible businesses, particularly MSMEs in waste valorization and remanufacturing sectors.

e. Incentivizing CE investment: Implement accelerated depreciation schemes for CE-aligned technologies and provide tax credits for circular process innovation (OECD, 2021).

Discussion

The findings from the application of SSM reveal that while Indonesia has made rhetorical and strategic commitments to a circular economy, its tax policy remains structurally misaligned with CE principles. This section explores key barriers, reflects on comparative policy practices, and proposes future research directions using System Dynamics modeling to analyze fiscal feedback and leverage points.

5.1 Barriers in the Existing Tax Framework

Indonesia's fiscal instruments currently reflect a legacy of linear economic logic—favoring resource extraction, production, and consumption over reuse and circularity. Several institutional and design-level constraints impede transformation:

a. Lack of material differentiation in tax rates: VAT is applied uniformly regardless of a

product's lifecycle impact, offering no fiscal signal to prefer recycled or durable goods. This uniformity fails to internalize environmental externalities (OECD, 2021).

b. Absence of targeted tax relief for recycled materials or CE-compliant technologies: Despite PMK 34/PMK.010/2017 providing exemptions for green equipment, few provisions explicitly incentivize recycling, repair, or remanufacturing activities (UNDP & Bappenas, 2021).

c. Carbon tax implementation delayed and narrowly scoped: Law No. 7/2021 introduced a carbon tax initially targeting coal-based power plants at IDR 30/kg CO_2e. However, its rollout has been postponed multiple times, and the rate remains significantly lower than the World Bank's recommended US\$25–50/ton CO_2e for developing countries (World Bank, 2022).

d. Institutional fragmentation and limited cross-ministerial coordination: Policy disjuncture exists between fiscal authorities (Ministry of Finance) and environmental bodies (KLHK). This is evident in overlapping or underutilized schemes such as the Green Taxonomy 1.0 and CE roadmaps, which lack fiscal anchors (OJK, 2022; Kementerian Keuangan RI, 2023).

e. Administrative complexity and lack of MSME engagement: Small and medium enterprises—key enablers of CE practices—often face procedural hurdles in accessing fiscal incentives. Most are unaware of available schemes or lack capacity to comply with eligibility requirements (IESR, 2023).

These barriers indicate a need for holistic tax policy reconstruction, addressing not only rates and incentives but also governance structures, monitoring frameworks, and behavioural design.

International Comparisons and Policy Transfer

Lessons from international practice—particularly in the EU and Nordic countries—can inform Indonesia's fiscal innovation toward a CE-aligned system.

a. European Union: The CE Action Plan (2020) encourages differentiated VAT for sustainable goods and promotes EPR (Extended Producer Responsibility) as a fiscal and regulatory tool. EU member states such as the Netherlands and Germany apply reduced VAT on repair services and reusable materials to stimulate market demand (European Commission, 2020).

b. Sweden: Milios (2021) outlines a comprehensive fiscal design where resource extraction is taxed, labor taxes are reduced for repair services, and landfill levies fund waste prevention programs. This circular fiscal model shifts the burden from labor to pollution.

c. Taiwan: Offers tax credits for CE-aligned assets, subsidizes green equipment investment, and applies preferential tariffs on eco-friendly imports. This fiscal environment has enabled Taiwan to become a regional leader in recycling and circular industrial practices (Chen et al., 2021).

d. China: Integrates CE principles into national tax policy via VAT exemptions for recycled materials and reduced business income tax rates for certified circular manufacturers (Geng et al., 2013; Su et al., 2013). Strong regulatory coordination ensures vertical policy coherence.

For Indonesia, policy transfer is possible if contextualized through:
a. Regulatory simplification for SMEs

b. Sector-specific instruments (e.g., for construction, cement, or plastics)

c. Inclusion of circular indicators in national fiscal planning documents (e.g., RPJMN)

System Dynamics Perspective

While SSM has helped diagnose institutional gaps and propose conceptual changes, the next step is to simulate policy impacts under dynamic conditions. System Dynamics (SD) offers a robust methodology for modeling complex fiscal-environmental systems.

Key justifications for applying SD in future work include:

a. Capturing time-delayed effects of tax policy on investment, waste generation, and recycling rates

b. Testing different policy scenarios (e.g., increasing carbon tax rates, introducing eco-VAT, or bundling fiscal and behavioral incentives)

c. Visualizing feedback loops such as:

  ○ *"Tax incentive → CE investment → material reuse → reduced extraction"*

  ○ *"Resource tax → cost signals → firm behavior → CE innovation"*

SD modeling has been used effectively in similar contexts. For example, Winans et al. (2017) applied system modeling to analyze industrial symbiosis dynamics in the U.S., while Halog & Manik (2011) developed feedback models for sustainable resource use in Southeast Asia. A system dynamics extension could help Indonesian policymakers anticipate nonlinear responses, avoid policy rebound effects, and design adaptive fiscal pathways.

Below is the Policy Transfer Matrix: Barriers and Opportunities, summarizing critical gaps in Indonesia's current CE-related tax policy and the international practices that can inform reform.

Table 4. Policy Transfer Matrix: Barriers and Opportunities, summarizing critical gaps in Indonesia

No	Category	Barriers in Indonesia	International Example	Transferable Opportunity
1	VAT Policy	Uniform VAT, no material-based differentiation	EU: Reduced VAT for repairs, reused products (European Commission, 2020)	Introduce eco-VAT rates for CE products
2	Resource Extraction Tax	No specific tax for virgin/ raw materials	Sweden: Tax on raw materials, landfill levies (Millios, 2021)	Phase in extraction tax with revenue earmarking for green R&D
3	Recycling Incentives	Lack of fiscal relief for recyclers and repair sector	Taiwan: Tax credits and import duty exemptions for CE-aligned assets (Chen et al, 2021)	Provide VAT exemptions or depreciation for recycled content
4	Carbon Pricing	Low rate, limited scope, and delayed implementation	EU & Canada: Dynamic carbon markets with tax floors (OECD, 2021; World Bank, 2022)	Gradually increase carbon tax and broaden sector coverage
5	Administrative Coordination	Fragmented mandates between fiscal	Taiwan & China: Centralized inter-ministerial CE task forces	Create a CE Fiscal Coordination

			(Geng et al, 2013; Su et al., 2013)	Unit within Ministry of Finance
6	SME Access to Incentives	Complicated procedure and low awareness	Germany: Simplified CE compliance schemes for SMEs (Kirchherr et al, 2018)	Develop CE incentive helpdesks for SMEs with standard templates

Policy Recommendations

The findings and comparative analysis presented in this study point to an urgent need for a structured, multi-tiered reform of Indonesia's tax policy to enable circular economy (CE) implementation. Policy recommendations are framed around two interrelated dimensions:

a. Instrumental design: What types of tax mechanisms should be introduced or restructured

b. Institutional enablement: What governance reforms are required to support these fiscal measures

To ensure feasibility and impact, recommendations are grouped into short-term, medium-term, and long-term interventions, in line with adaptive policy design principles (OECD, 2012; Blackmore, 2010).

Short-Term (2025–2027): Rapid, Visible Adjustments

These actions require relatively minor legislative changes and can demonstrate quick wins for CE transition:

a. Introduce eco-VAT differentiation for CE-aligned goods and services, such as:
   o Repaired and reused products
   o Products with >50% recycled content
   o Waste sorting, refurbishing, and repair services
   o Reference: European Commission (2020)

b. Expand and publicize tax incentives under PMK 34/PMK.010/2017 to explicitly include:

   o CE technologies (e.g., modular design equipment)

   o Small-scale recycling and repair enterprises (Bappenas & UNDP, 2021)

c. Create a Circular Economy Incentive Portal (CEIP) under the Directorate General of Taxes for MSMEs, consolidating information and offering helpdesk functions.

d. Establish a CE Fiscal Coordination Unit (CFCU) within the Ministry of Finance to ensure inter-ministerial coherence, modeled on Taiwan's inter-agency CE taskforce (Chen et al., 2021).

Medium-Term (2027–2030): Structural Reform and Institutional Innovation

These reforms require deeper institutional coordination and budget planning cycles:

a. Phase in a resource extraction tax on virgin raw materials (e.g., limestone, sand, timber), using revenues to subsidize circular infrastructure and green R&D.
   o Reference: Sweden's extraction and landfill tax model (Milios, 2021)

b. Expand carbon tax coverage beyond coal-fired power plants to include industrial emitters and transport sectors. Link carbon tax revenue to circular industrial support funds.

- Reference: World Bank (2022), Indonesia's own Green Economy Index (Bappenas, 2022)

c. Enable green depreciation schemes for CE-aligned capital investment by industries (OECD, 2021)

d. Incentivize public procurement standards that prioritize CE-compliant suppliers through VAT relief and fast-track tax processing (UNIDO, 2022)

Long-Term (2030 onward): Systemic Redesign

These are deeper fiscal architecture changes requiring regulatory overhaul and strong political will:

a. Shift from labor-based taxation to resource-based taxation: Align with global discourse on green fiscal reform by reducing payroll taxes for CE labor sectors and increasing tax on high-footprint materials (Freire-González, 2019; Ekins & Speck, 2014)

b. Mandate integration of CE indicators into fiscal performance evaluation: e.g., tax expenditure reviews must include CE outcomes, environmental return-on-investment, and resource efficiency metrics.

c. Adopt System Dynamics modeling for fiscal planning: Embed scenario-based planning and feedback loop simulations into CE tax policy design, enabling adaptive reform under uncertainty (Halog & Manik, 2011).

d. Institutionalize an annual CE Fiscal Policy Report, reporting to Parliament and the public to increase transparency and build trust.

Here is the summary of CE Tax Reform Roadmap, outlining policy actions and their

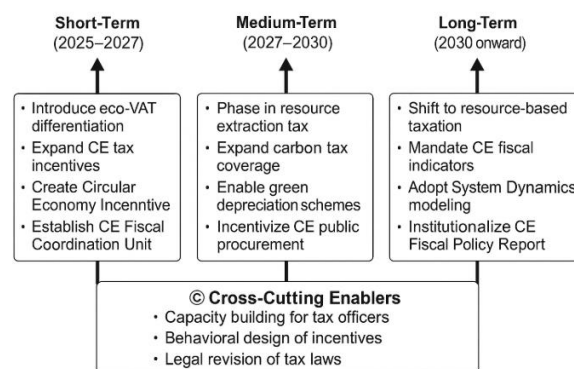goals across short-, medium-, and long-term horizons.

Figure 4: Policy Roadmap timeline

Cross-Cutting Enablers

a. Capacity building for local tax officers on CE instruments and compliance frameworks.

Local tax officers require capacity-building initiatives to operationalize CE principles, particularly in interpreting tax codes related to green incentives and ensuring compliance. Studies show that decentralized implementation success hinges on frontline institutional knowledge (Bawole et al., 2020).

b. Behavioral design of incentives to ensure uptake (e.g., automatic enrollment of SMEs into incentive schemes unless opted out).

Behavioral economics literature supports the use of automatic enrollment ("opt-out" design) to boost participation in sustainability schemes (Thaler & Sunstein, 2008). Indonesia could apply such nudges for SMEs to access CE fiscal schemes by default unless they choose otherwise.

c. Legal revision of UU PPN (VAT Law) and UU HPP (2021) to provide explicit mandates for CE-linked fiscal instruments.

Current legal frameworks such as UU PPN and UU HPP lack explicit mandates or definitions aligned with circularity. A legal revision should introduce a "green tax article" that incorporates life-cycle assessment (LCA) benchmarks, similar to EU directives under the Green Deal

(OECD, 2021).

3. CONCLUSION

This study reveals that Indonesia's fiscal landscape remains anchored in a linear economy model, lacking strategic alignment with circularity. Through the Soft Systems Methodology, this research illuminated system-level dysfunctions and mapped a pathway toward culturally feasible and systemically desirable tax reforms. The conceptual model and proposed roadmap provide not only a policy blueprint but also a contribution to the methodology of public finance transformation in developing countries. Future studies could build on this work by integrating System Dynamics modeling to simulate the long-term economic, environmental, and institutional impacts of CE-aligned tax policy. These insights hold relevance for policymakers, fiscal authorities, and development agencies navigating the complexities of sustainable economic transitions.

This study shows that Indonesia's current tax policy is inadequate to support a circular economy. By using Soft Systems Methodology, we identified the gaps and proposed a conceptual model for tax policy reconstruction. Policy innovations should focus on rewarding circular practices, penalizing linear resource exploitation, and simplifying tax mechanisms. A strategic, phased, and systemic tax policy roadmap is essential to facilitate the transition to a circular economy, stimulate green innovation, and ensure environmental and economic sustainability.

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