JRSSEM 2025, Vol. 4, No. 10, 1483 – 1500
E-ISSN: 2807 - 6311, P-ISSN: 2807 - 6494

CIRCULAR ECONOMY IN INDONESIA: A COMPARATIVE STUDY OF EU COUNTRIES AND FINLAND

Davy Parsaoran Hinsa[1], Oskar Ezra[2], Ratlan Pardede[3]
[1,3]Universitas Bunda Mulia, Indonesia
[2] Telkom University, Indonesia
Email: davypardede@gmail.com, oskezra@gmail.com, ratlan39@gmail.com

Submitted: 05 May 2025 *Revised*: 28 May 2025 *Accepted*: 05 June 2025

Abstract. The circular economy offers a sustainable alternative to the linear economic model, aiming to address resource depletion and environmental challenges. This study evaluates its potential in supporting Indonesia's 8% economic growth target, comparing it with the European Union (EU) and Finland. Using a qualitative approach, the study analyzes policy documents like Indonesia's RPJMN 2020-2024, the EU's Circular Economy Action Plan (CEAP) 2020, and Finland's National Circular Economy Roadmap, along with secondary data and academic sources. The results reveal that Indonesia has significant potential, with an estimated contribution of 42-45 billion USD to GDP and 4.4 million jobs by 2030. However, Indonesia's circular economy lags behind the EU and Finland in efficiency, with a recycling rate of 15%, compared to the EU's 48.6% and Finland's 43%. The contribution to GDP in Indonesia is projected at just 2.2-2.3%, well below the EU's 10.6% and Finland's 10%. This gap is attributed to inadequate infrastructure, weak regulations, and limited technological innovation. The EU and Finland benefit from structured policies and innovation, respectively. The study also identifies research gaps, such as a lack of sector-specific impact evaluations in Indonesia, which are addressed in the EU and Finland. Recommendations emphasize strengthening regulations, infrastructure, and international collaboration for a successful circular economy transition in Indonesia.

Keywords: Circular economy, economic growth, recycling, infrastructure, regulation, innovation.

INTRODUCTION

The global economy currently faces a major challenge in maintaining sustainable economic growth amid increasing pressures on natural resources and the environmental impacts of traditional linear economic models. Linear economies, which are based on a "take-make-throw" pattern, have proven to be no longer relevant in supporting sustainable development, especially in developing countries such as Indonesia which have large populations and ever-increasing consumption rates (Stahel, 2016). In response, the circular economy emerged as an alternative paradigm that emphasizes resource efficiency through a reduce, reuse, recycle approach (Ellen MacArthur Foundation, 2015). This model not only aims to reduce waste and emissions, but also to create additional economic value through innovation and the creation of new jobs (Geissdoerfer et al., 2018).

DOI: https://10.59141/jrssem.v4i10.853

In Indonesia, the government has set an ambitious target to achieve economic growth of 8% as part of its medium- and long-term development vision (RPJMN 2020-2024). In this context, the circular economy is identified as one of the strategic pillars to achieve this target, with a projected contribution to the Gross Domestic Product (GDP) of (42-45) billion USD and the creation of 4.4 million jobs by 2030 (Bappenas & UNDP, 2021). The policy is focused on five key sectors, namely food and beverage, textiles, construction, retail trade, and electronics, which are considered to have great potential for circular transformation. However, the implementation of the circular economy in Indonesia still faces significant obstacles, such as a low recycling rate (only 15% in 2022 according to the Ministry of Environment and Forestry) and limited waste management infrastructure, compared to developed countries such as the European Union (EU) with a recycling rate of 48.6% and Finland with 43% (European Commission, 2022; Sitra, 2023).

Global phenomena show that the transition to a circular economy has become a priority in many countries. The European Union, through the 2020 Circular Economy Action Plan (CEAP) which is part of the European Green Deal, has succeeded in increasing resource efficiency and economic contribution by 1.8 trillion €uro or 10.6% of the projected GDP of 2030 (McKinsey, 2023). Meanwhile, Finland, as one of the pioneers of the circular economy, has been developing the National Circular Economy Roadmap since 2016, which resulted in additional

economic value of 3 billion €uro through technological innovation and community participation (Sitra, 2023). This phenomenon shows a clear gap between developed and developing countries in terms of policies, efficiency, and circular economy output, which is the basis for the comparative analysis in this study.

Although the circular economy has been widely discussed in the academic literature, there is a significant *research gap*, especially in the Indonesian context. Previous studies, such as those conducted by Kirchherr et al. (2017), have focused more on the theoretical definition and principles of the circular economy, while Geissdoerfer et al. (2018) emphasized its relationship to sustainable development in general. At the local level, Rifani et al. (2023) have examined the implementation of the circular economy on a small scale, such as recycling waste tires, but have not explored the economic impact as a whole or made comparisons with other countries. In addition, qualitative evaluations that integrate policy analysis with sector-specific impacts in Indonesia are still very limited, especially when compared to the systematic approaches applied in the EU and Finland.

Based on this background, this study aims to analyze the potential of the circular economy in supporting the 8% economic growth target in Indonesia through the evaluation of government policies, implementation efficiency, and their impact on various aspects (environmental, social, and economic). By comparing Indonesia's approach with the EU and Finland, this study also seeks to identify studies that can be adopted and fill in research gaps related to comparative analysis and sector-specific impact evaluation. This approach is expected to provide new insights for policymakers and academics in designing more effective circular economy strategies in Indonesia.

DOI: https://10.59141/jrssem.v4i10.853

Circular economy is an economic paradigm that aims to maximize the value of resources through the principles of *reduce*, *reuse*, and *recycle*, while minimizing waste and environmental impacts (Ellen MacArthur Foundation, 2015). This concept was first introduced systematically by Stahel (2016), who emphasized the shift from a linear economic model ("take-make-dispose") to a sustainable closed system. Kirchherr et al. (2017) in their analysis of 114 definitions of the circular economy identified that the core of this concept includes resource efficiency, product life cycle extension, and economic value creation through innovation. The study, published in *Resources, Conservation and Recycling*, confirms that the circular economy not only focuses on environmental aspects, but also has significant economic and social implications.

Theoretically, the circular economy is rooted in several disciplines, including industrial ecology and sustainable design. Geissdoerfer et al. (2018) in *the Journal of Cleaner Production* link the circular economy with sustainable development, highlighting how this model can support economic resilience through reduced dependence on primary resources, as well as emphasizing the importance of *circular supply chains*) that integrates production and consumption processes to create a more efficient system. This concept is relevant to Indonesia's economic growth target of 8%, because resource efficiency can increase productivity and industrial competitiveness.

The empirical literature shows that the circular economy has great potential to support economic growth. Winans et al. (2017) in *Resources, Conservation and Recycling* analyze the historical and contemporary applications of the circular economy, stating that countries that adopt this model, such as the European Union have experienced an increase in GDP contributions through the recycling and sustainable manufacturing sectors. A McKinsey study (2023) estimates that the circular economy could account for 1.8 trillion €uro (10.6% of GDP) in the EU by 2030, driven by material efficiency and green job creation. In Finland, *the National Circular Economy Roadmap* developed by Sitra (2019) targets an additional economic value of 3 billion €uro through technological innovations, such as recycling of textiles and circular plastics (Sitra, 2023).

Bappenas and UNDP (2021) stated that the circular economy in Indonesia has the potential to increase GDP by (42-45) billion USD and create 4.4 million jobs by 2030 if applied optimally in five priority sectors (food-beverage, textiles, construction, retail trade, and electronics). Rifani et al. (2023) in *Panrita Abdi - Journal of Community Service* explored the local implementation of the circular economy through waste waste recycling in Indonesia, showing a positive impact on the welfare of small-scale communities. However, the study did not measure economic contribution on a macro basis or compare it with other countries, which is one of the focuses of this study.

Government policies play a key role in driving the transition to a circular economy. In the European Union, *the 2020 Circular Economy Action Plan* (CEAP) sets ambitious targets such as increasing *the Circular Material Use Rate* (CMUR) to 23.2% by 2030 from 11.8% in 2023 (European Commission, 2020). Strict regulations, such as *the Ecodesign Directive*, and fiscal incentives have managed to increase the recycling rate to 48.6% in 2022, while Germany reached 70% (Eurostat, 2022). Finland, through an

DOI: https://10.59141/jrssem.v4i10.853

innovative approach in the *National Circular Economy Roadmap* (2016, updated 2019), focuses on technology and cross-sector collaboration, resulting in a recycling rate of 43% and a GDP contribution of around 10% (Sitra, 2023). This approach shows the importance of policy coordination and community participation.

In Indonesia, circular economy policies have only begun to be integrated in *the National Medium-Term Development Plan* (RPJMN) 2020-2024, with a focus on waste management and resource efficiency. However, its implementation is still hampered by the low recycling rate (15% in 2022 according to the Ministry of Environment and Forestry) and the lack of supporting infrastructure. A study by Damayanti et al. (2022) in *the Journal of Environmental Technology* highlights that the lack of specific regulations and public awareness are the main obstacles to the adoption of the circular economy in Indonesia. This comparison confirms the gap in policy capacity and efficiency between Indonesia and developed countries.

The impact of the circular economy includes environmental, social, and economic aspects. Environmentally, the reduction of waste and CO2 emissions is a key indicator of success, as demonstrated by the EU with a significant reduction in emissions through CEAP (European Commission, 2022). Socially, the creation of green jobs is one of the main benefits, where Finland records high community participation in circular programs (Sitra, 2023). Economically, the competitiveness of the industry increases through innovation, as seen in the export of Finnish circular technology. In Indonesia, this impact is still potential, but it has not been fully realized due to limited data and sector-specific evaluation (Bappenas & UNDP, 2021).

Although the literature on the circular economy is quite extensive, there are some gaps relevant to this research. First, previous studies such as Kirchherr et al. (2017) and Geissdoerfer et al. (2018) have focused more on theoretical or technical aspects, less exploring comparative policy analysis between countries with a qualitative approach. Second, in Indonesia, studies such as Rifani et al. (2023) and Damayanti et al. (2022) are limited to a local or technical scale, without integrating macroeconomic impacts or comparisons with developed countries. Third, the evaluation of sector-specific impacts (e.g. textiles or electronics) and energy and water efficiency in the circular economy in Indonesia is still lacking. This study aims to fill this gap by analyzing the policies, efficiency, and impact of the circular economy in Indonesia through comparisons with the EU and Finland

METHOD

A. Research Approach

This study uses a qualitative approach with a focus on thematic analysis to evaluate circular economy policies, their implementation efficiency, and their impact on economic growth in Indonesia, as well as compare them with the European Union (EU) and Finland. Qualitative research is usually carried out to provide an explanation of a phenomenon that will construct a theory related to the theory (Ratlan Pardede et all., 2023). The qualitative approach was chosen for its ability to provide an in-depth understanding of complex phenomena such as policies and the impact of the circular

DOI: https://10.59141/jrssem.v4i10.853

economy, which cannot be fully quantitatively measured (Creswell & Poth, 2018). Thematic analysis was applied to identify patterns, themes, and relationships between variables based on textual data, according to the method developed by Braun and Clarke (2006).

B. Data Sources

The data used in this study is sourced from official policy documents and the latest academic literature. Primary data include: (1) *the National Medium-Term Development Plan* (RPJMN) 2020-2024 and the Bappenas-UNDP report (2021); (2) *the Circular Economy Action Plan* (CEAP) 2020 from the European Commission; and (3) *the National Circular Economy Roadmap* (2016, updated 2019). Secondary data were obtained from Scopus Q1-Q3 indexed journal articles (Kirchherr et al., 2017; Geissdoerfer et al., 2018) and Sinta 1-3 (Rifani et al., 2023), as well as statistical reports such as Eurostat (2022) and the Ministry of Environment and Forestry (2022). The selection of data sources is based on relevance, actuality (2015-2023), and academic authority to ensure validity and reliability.

C. Analytical Techniques

Data analysis was carried out in three stages. First, policy documents from Indonesia, the EU, and Finland were analyzed to identify circular economy focuses, targets, and strategies using a comparative policy framework. Second, efficiency is measured through indicators such as recycling rate and *Circular Material Use Rate* (CMUR), while economic output is measured by contribution to GDP based on official projections (Bappenas, McKinsey, Sitra). Third, environmental, social, and economic impacts are evaluated through thematic analysis by extracting key themes such as waste reduction, job creation, and industrial competitiveness. The analysis carried out is comparative research, namely comparative research (Pardede Ratlan, Renhard Manurung, 2014). Comparisons between countries were carried out with a narrative approach to identify gaps and studies that could be adopted by Indonesia. Validity is enhanced through triangulation of data from various sources, while reliability is maintained with systematic analysis process documentation.

RESULTS AND DISCUSSION

A. Circular Economy in Indonesia, the European Union and Finland

1. Circular Economy in Indonesia

Indonesia, as one of the world's fourth-largest population developing countries, faces major challenges in resource and waste management. According to the Ministry of Environment and Forestry (MoEF, 2022), Indonesia produces around 68 million tons of waste per year, with the majority coming from the domestic and industrial sectors. However, only 15% of that waste is successfully recycled, well below the global average and developed countries such as the European Union (48.6%) and Finland (43%). This low recycling rate reflects the limitations of waste management infrastructure, low public awareness, and lack of coordination between sectors in implementing circular economy principles. In this context, the Indonesian government has begun to

DOI: https://10.59141/jrssem.v4i10.853

adopt the circular economy as a strategy to address environmental problems while supporting economic growth which is targeted at 8% in the national development vision.

The circular economy in Indonesia is not only seen as an environmental solution, but also as an economic driver through resource efficiency and job creation. With average economic growth ranging from 5%-6% per year in the last decade (BPS, 2023), the 8% target requires innovative strategies that can increase productivity without increasing environmental burden. Therefore, circular economy policies are one of the priorities to achieve this vision, especially by harnessing the potential of key sectors that have a major impact on GDP.

2. Key Circular Economy Policies

The Government of Indonesia has integrated the circular economy into the national policy framework through *the National Medium-Term Development Plan* (RPJMN) 2020-2024. In this document, the circular economy is set as a national priority with a focus on five key sectors: food and beverage, textiles, construction, retail trade, and electronics. These sectors were chosen for their significant contribution to GDP (for example, the food and beverage sector accounted for 6.6% of GDP in 2022, BPS) as well as the potential waste generated. The RPJMN emphasizes the importance of resource efficiency and waste reduction through a *reduce, reuse, recycle approach*, in line with the definition of a global circular economy (Kirchherr et al., 2017).

One of the main supporting documents is a collaborative report between the National Development Planning Agency (Bappenas) and UNDP (2021), entitled *The Economic, Social, and Environmental Benefits of a Circular Economy in Indonesia*. The report projects that the implementation of the circular economy can add USD (42-45) billion to GDP and create 4.4 million jobs by 2030 if implemented optimally. The projections are based on circular transformation scenarios in five priority sectors, including increased recycling, material reuse and green technology development. However, the report also acknowledges that achieving this target depends on infrastructure investment and changes in consumer behavior.

In addition to macro policies, several specific initiatives have been launched to support the circular economy. One of them is *the Circular Fashion Partnership*, which was initiated by Global Fashion Agenda with local partners in 2020. This program aims to increase textile recycling in Indonesia, especially in the *fast fashion* sector, which produces significant textile waste. Another initiative is food waste management in Java and Bali, which involves collaboration between local governments, business actors, and communities to reduce organic waste through composting and conversion into energy. Although this initiative shows initial commitment, its scale and impact are still limited compared to national needs.

DOI: https://10.59141/jrssem.v4i10.853

3. Implementation Phenomenon: Obstacles and Challenges

Although the circular economy policy has been well formulated, its implementation in Indonesia faces a number of challenges that have caused slow progress. First, waste management infrastructure is still very limited. Data from the Ministry of Environment and Forestry (2022) shows that only 7% of the 514 districts/cities in Indonesia have adequate recycling facilities, while the majority of waste ends up in landfills (landfills) or is burned uncontrollably. Second, community participation in recycling and waste management programs is still low, largely due to a lack of education and economic incentives. A study by Damayanti et al. (2022) in *the Journal of Environmental Technology* states that public awareness of the circular economy is still minimal, with only 20% of respondents in urban areas understanding the concept.

This phenomenon is exacerbated by a lack of coordination between government agencies and the private sector. For example, although the RPJMN sets circular targets, there are no specific regulations that bind industry players to implement recycling practices or sustainable product design, in contrast to the strict approach in the European Union through *the Ecodesign Directive*. As a result, initiatives like *the Circular Fashion Partnership* rely more on voluntary initiatives than mandatory policies, which limits their scalability. This phenomenon shows the gap between policy ambition and implementation reality, which is one of the focuses of the analysis in this study.

4. Implementation Efficiency

The efficiency of the circular economy in Indonesia can be measured through several indicators, such as the recycling rate and *the Circular Material Use Rate* (CMUR), which is the proportion of recycled materials that are reused in production. Based on data from the Ministry of Environment and Forestry (2022), the national recycling rate only reaches 15%. This figure reflects low waste treatment capacity and dependence on primary material imports. Furthermore, CMUR has not been measured nationally in Indonesia, showing the limitations of data and monitoring systems that are obstacles in evaluating circular efficiency as a whole.

This low efficiency is also related to the lack of supporting technology. For example, in the textile sector, few companies use advanced recycling technology. Most textile waste in Indonesia is still managed traditionally or disposed of, so its economic value is lost. In the food-beverage sector, despite efforts to manage organic waste in Java and Bali, small scale and lack of investment limit the efficiency of the conversion process into biogas or compost. This inequality shows that without systemic improvements, the circular economy in Indonesia will struggle to achieve the efficiency that supports the economic growth target of 8%.

5. Economic Output

In terms of economic output, the Bappenas-UNDP report (2021) estimates that the circular economy can contribute 2.2%-2.3% to GDP in 2030 in an

DOI: https://10.59141/jrssem.v4i10.853

optimistic scenario. This figure is based on the potential for production cost savings, increased recycling, and job creation in priority sectors. However, this contribution is still far from the 8% target set by the government, showing that the circular economy currently only serves as an additional support, not the main pillar of economic growth. In comparison, the manufacturing and agriculture sectors continue to dominate GDP (19.8% and 13.3% respectively in 2022, BPS), while the impact of the circular economy is still potential and has not been significantly realized.

This limited economic output is also related to the small scale of implementation. For example, *the Circular Fashion Partnership* involves only a few companies in Java, while the national textile sector generates more than 1.5 million tons of waste per year. Similarly, food waste management has not been able to reach areas outside Java effectively. Without massive expansion and stronger policy support, the circular economy's contribution to GDP is likely to remain below expectations, requiring a more aggressive strategy to approach the 8% target.

B. Circular Economy in the European Union

The European Union (EU) has become a global leader in the transition to a circular economy, driven by the need to reduce dependence on natural resources, mitigate climate change, and improve economic competitiveness. Having a population of over 440 million people and a highly diversified economy, the EU generates around 2.5 billion tonnes of waste per year (Eurostat, 2022). The EU has achieved an average recycling rate of 48.6% in 2022, with countries such as Germany recording the highest figure of 70%. This success is inseparable from a mature policy framework and coordination between member countries, making the EU a relevant model to compare with other countries in the context of the circular economy.

The circular economy in the EU aims not only for environmental sustainability, but also to support inclusive economic growth. In *the European Green Deal*, the circular economy is integrated as a key pillar to achieve carbon neutrality by 2050, while increasing economic contribution to 1.8 trillion €uro or 10.6% of GDP by 2030 (McKinsey, 2023).

1. Key Policy: Circular Economy Action Plan (CEAP) 2020

Circular economy policies in the EU are realized through the *2020 Circular Economy Action Plan* (CEAP), which is part of the *European Green Deal*. CEAP 2020 is designed to accelerate the transition from a linear to a circular economy with a focus on three key elements: resource efficiency, recycling, and sustainable product design. This document sets ambitious targets, one of which is to increase the *Circular Material Use Rate* (CMUR), the percentage of recycled materials used in production to 23.2% by 2030, from a level of 11.8% in 2023 (European Commission, 2020). This target is supported by regulations such as *the Ecodesign Directive*, which requires products to be designed to be durable, repairable, and easy to recycle.

DOI: https://10.59141/jrssem.v4i10.853

CEAP also includes specific strategies for key sectors such as plastics, textiles, construction, and electronics, which are sectors similar to Indonesia's priorities in the 2020-2024 RPJMN. For example, in the plastics sector, the EU targets all plastic packaging to be recyclable by 2030, while in textiles, the *EU Strategy for Sustainable and Circular Textiles* (2022) encourages the use of recycled fibers and the rapid reduction of fashion waste. In contrast to voluntary approaches in Indonesia such as *the Circular Fashion Partnership*, EU policies are binding, supported by fiscal incentives and sanctions for non-compliant industry players. Coordination between EU member states is also a key strength, with the harmonization of standards and the allocation of funds through *the EU Recovery Fund* of €672.5 billion to support circular projects (European Commission, 2021).

2. Implementation Efficiency

The efficiency of the circular economy in the EU can be seen from the high recycling rate and progress in CMUR. According to Eurostat (2022), the recycling rate of municipal waste in the EU reaches 48.6%, with significant variation between countries: Germany reaches 70%, the Netherlands 57%, while some Eastern European countries such as Romania are still below 15%. This success is supported by advanced waste management infrastructure, such as mechanical and chemical recycling facilities in Germany, as well as a separate collection system that is mandatory throughout the EU.

The EU CMUR reached 11.8% in 2023, showing progress in the reuse of recycled materials in the production chain. The 23.2% target by 2030 demonstrates a commitment to doubling the efficiency of material use, supported by technologies such as enzyme-based plastic recycling and modular product design. The EU's efficiency is also strengthened by large investments in research and innovation, for example Horizon Europe allocated 9.9 billion €uro for circular projects in 2021-2027.

3. Economic Output

In terms of output, the circular economy in the EU is projected to make a significant contribution to GDP. According to a McKinsey study (2023), the implementation of CEAP could contribute 1.8 trillion €uro or 10.6% of EU GDP by 2030. This contribution comes from savings in production costs (about 600 billion €uro per year), increased recycling (generating 320 billion €uro), and the creation of green jobs (700.000 new jobs). Sectors such as construction and automotive are major contributors, with companies such as Volvo and Saint-Gobain adopting recycled materials on a large scale.

The EU's economic output is also driven by exports of circular technologies and sustainable products, which increase global competitiveness. For example, Germany and the Netherlands have become export hubs for recycling machinery and secondary raw materials. The EU's large economies of scale and an integrated single market allow for widespread circular economy impact.

DOI: https://10.59141/jrssem.v4i10.853

4. **Impact of the Circular Economy**

The impact of the circular economy in the EU is seen in three main aspects: environmental, social, and economic. **Environment**: The implementation of CEAP has resulted in significant reductions in CO2 emissions, with an estimated decrease of (2.5-4)% of total annual EU emissions by 2030 (European Environment Agency, 2022). Effective waste management also reduces soil and water pollution, especially in the plastics and construction sectors. **Social**: Green job creation is one of the biggest impacts, with more than 4 million circular economy-related jobs in 2022 (Eurostat, 2022). Training and social inclusion programs, such as those in France and Spain, also increase community participation. **Economy**: Industry competitiveness is increasing through innovation, with companies like Philips shifting to *a product-as-a-service* business model that reduces waste while increasing profitability.

5. **Phenomenon: Strict Coordination and Regulation**

A key phenomenon in the EU's circular economy is strong coordination between countries and strict regulation. Through *the European Green Deal*, the EU's 27 member states are working within a unified framework, with harmonised standards and monitoring mechanisms such as *the Circular Economy Monitoring Framework*. Regulations such as the ban on single-use plastics (Directive 2019/904) and the carbon tax encourage industry players to switch to circular practices. EU financial support, such as *the €1 trillion* Green Deal Investment Plan

C. Circular Economy in Finland

Finland, with a population of around 5.5 million people and an innovation-based economy, has become one of the global pioneers in the circular economy. The country *generates* about 100 million tons of waste per year, mainly from the industrial and construction sectors (Statistics Finland, 2022). Finland achieved a recycling rate of 43% in 2022, showing significant progress in waste management. Finland integrates the circular economy as a national strategy to improve economic sustainability and competitiveness, with a technology-focused approach and community collaboration. In this context, Finland is a relevant comparator for Indonesia, especially because of its innovative approach albeit on a smaller scale than the European Union (EU).

The circular economy in Finland aims not only to reduce environmental impact, but also to create additional economic value. Estimates from Sitra (2023) show that the circular economy contributes about 10% to Finland's GDP. This success makes Finland an example of how a small country with limited resources can achieve significant economic impact through a circular approach.

1. **Key Policies: *National Circular Economy Roadmap***

Circular economy policies in Finland are realized through the *National Circular Economy Roadmap*, which was first launched in 2016 and updated in 2019 by Sitra, Finland's national innovation agency. The roadmap sets out a vision to make Finland a global leader in the circular economy by 2025, with a

DOI: https://10.59141/jrssem.v4i10.853

focus on technological innovation, textile recycling and circular plastics. One of the main targets is to create an additional economic value of 3 billion €uro by 2030 through circular transformation in various sectors (Sitra, 2019). Finland's roadmap is very specific, with pilot projects such as *Telaketju* (textile recycling) and bio-based plastics development.

This policy is supported by collaboration between the government, the private sector, and the community. For example, in the textile sector, Finland is developing technology to recycle cotton fibers into new raw materials, while in the plastics sector, companies like Nestle are producing circular plastics from waste. This approach is in contrast to Indonesia, where initiatives such as *the Circular Fashion Partnership* are still limited to small scale and are not supported by advanced technology. Finland's roadmap also includes incentives for companies that adopt circular practices, such as subsidies and tax breaks.

2. Implementation Efficiency

The efficiency of the circular economy in Finland can be seen from the recycling rate which reached 43% in 2022 (Statistics Finland, 2022), higher than Indonesia (15%) but slightly below the EU average (48.6%). This success is supported by an integrated waste management system, including modern recycling facilities and a separate collection program that is mandatory at the household level. However, Finland' *s Circular Material Use Rate* (CMUR) only reached 2.4% in 2023 (Sitra, 2023), well below the EU (11.8%), indicating that the reuse of recycled materials in production is still limited. These challenges are largely due to the reliance on primary materials in heavy industries such as wood and metals.

In comparison, Indonesia has not measured CMUR nationally, reflecting a lack of data and a focus on material reuse. Finland excels in technological efficiency, for example through the development of *chemical recycling* for plastics, while Indonesia still relies on simple mechanical methods. However, Finland faces challenges in scaling up CMUR, which shows that even developed countries have room for improvement in the circular economy.

3. Economic Output

In terms of output, the circular economy in Finland is estimated to contribute around 10% to GDP in 2023 (Sitra, 2023), with a projected additional economic value of 3 billion €uro by 2030. This contribution comes from sectors such as bioeconomy (wood waste treatment), circular textiles, and green technology. For example, companies such as UPM and Stora Enso have integrated wood waste into high-value products, while the export of recycling technology increases national revenues. Finland shows how innovation can turn waste into an economic asset.

Finland's small scale allows for more focused implementation, but it also limits its absolute impact compared to the EU (€1.8 trillion). Even so, Finland's economic output is closer to Indonesia's target (8%) than the current realization,

DOI: https://10.59141/jrssem.v4i10.853

suggesting that technology-based and collaborative approaches can be a relevant model.

4. **Impact of the Circular Economy**

The impact of the circular economy in Finland is seen in three main aspects. **Environment**: Effective waste management has reduced CO2 emissions by 1.5 million tonnes per year (Finnish Environment Institute, 2022), supported by the conversion of waste into energy and biofuels. **Social**: Community participation is high, with more than 80% of households participating in recycling programs (Sitra, 2023). Local education programs and incentives are the key to success. **Economy**: Innovation drives exports, with Finland being a hub for circular technologies such as recycling machines and bio-based materials, boosting global competitiveness.

Finland's environmental impact is more measurable, social impact is more inclusive, and the economic impact is more significant due to the adoption of technology. However, Finland faces challenges in increasing the use of recycled materials.

5. **Phenomenon: Global Leadership and Challenges**

A key phenomenon in Finland is global leadership in the circular economy, demonstrated by the international recognition of *the National Circular Economy Roadmap* as the best model (Ellen MacArthur Foundation, 2020). Innovation-based approaches and cross-sectoral collaboration are key strengths, supported by a government investment of €300 million for circular projects in 2016-2023 (Sitra, 2023). However, challenges arise in the low CMUR (2.4%), which indicates difficulties in integrating recycled materials into large-scale production chains.

D. Comparative Analysis

1. Comparative Analysis of Policies

A comparative analysis of circular economy policies between Indonesia, the European Union (EU), and Finland shows significant differences in approach and maturity level. In Indonesia, circular economy policies are still in the developing stage, as seen in the 2020-2024 *National Medium-Term Development Plan* (RPJMN) which integrates the circular economy as a national priority with a focus on five sectors (food-beverage, textiles, construction, retail trade, and electronics). However, this policy is general and is not supported by specific regulations or adequate infrastructure, so its implementation is still slow (Bappenas & UNDP, 2021).

Instead, the EU has a mature approach through *the 2020 Circular Economy Action Plan* (CEAP) within the framework of *the European Green Deal*. This policy not only sets ambitious targets such as *a Circular Material Use Rate* (CMUR) of 23.2% by 2030, but is also supported by binding regulations such as *the Ecodesign Directive* and strong coordination between countries (European Commission, 2020). Finland, on the other hand, stands out with its innovative

DOI: https://10.59141/jrssem.v4i10.853

approach through *the National Circular Economy Roadmap* of 2019 which focuses on advanced technologies such as recycling textiles and circular plastics (Sitra, 2019). Although Finland is smaller in scale than the EU, this innovation-based approach provides flexibility and a competitive advantage that Indonesia does not currently have.

This comparison shows that Indonesia is still in the early stages of developing circular policies, while the EU offers an integrated systemic model, and Finland provides examples of scalable innovations. This inequality reflects differences in institutional capacity, investment, and strategic vision between the three regions.

2. Comparative Analysis of Efficiency

In terms of efficiency, the EU leads with an average recycling rate of 48.6% in 2022 (Eurostat, 2022), supported by modern infrastructure and CMUR which has reached 11.8% in 2023 with a target of 23.2% by 2030. Finland follows with a recycling rate of 43% (Statistics Finland, 2022), but its CMUR is low at 2.4% (Sitra, 2023), indicating challenges in the reuse of recycled materials. Indonesia lags far behind with a recycling rate of only 15% (MoEF, 2022) and CMUR that has not been measured nationally, reflecting the limitations of infrastructure and technology.

The EU's efficiency is driven by an integrated waste management system and large investments in recycling technologies, while Finland relies on specific innovations such as *chemical recycling*, although the scale is limited. Indonesia, on the other hand, still relies on traditional methods and the informal sector, which hinders efficiency. Efficiency order: EU > Finland > Indonesia. This shows that infrastructure and technology are decisive factors in the success of the circular economy, which is a major challenge for Indonesia to approach the efficiency target of developed countries.

3. Comparative Analysis of Economic Output

The output of the circular economy also shows a clear gap. The EU projects a GDP contribution of €1.8 trillion or 10.6% by 2030 (McKinsey, 2023), driven by large-scale and single-market integration. Finland will contribute around 10% of GDP in 2023 with an additional economic value of €3 billion by 2030 (Sitra, 2023), due to innovations in the bioeconomy and green technology sectors. Indonesia, with a projected GDP contribution of only 2.2%-2.3% in 2030 (Bappenas & UNDP, 2021), is far behind, even from the national target of 8%.

Order of economic output: EU (10.6%) > Finland (~10%) > Indonesia (2.2%-2.3%); reflect differences in scale, adoption rates, and the ability to convert waste into economic value. The EU and Finland have succeeded because of a combination of regulation and innovation, while Indonesia has been hampered by fragmented implementation and lack of investment. This shows that without major reforms, the circular economy in Indonesia will not be able to become the main pillar of 8% economic growth.

DOI: https://10.59141/jrssem.v4i10.853

4. Comparative Impact Analysis

The impact of the circular economy varies across all three countries. In **Indonesia**, the environmental (waste reduction) and social (employment) potential is large, where the volume of waste is 68 million tons per year and the population is large. However, the economic impact is limited due to low efficiency and output, with the contribution of GDP still far from the target (MoEF, 2022). **The EU** shows an all-encompassing impact: environmental (reduction of CO2 emissions), social (4 million green jobs), and economy (increased industrial competitiveness), supported by strict regulation and large investments (Eurostat, 2022). **Finland** excels in high innovation, with environmental (effective waste management), social (80% community participation), and economic (technology exports), although the scale is small due to limited population (Sitra, 2023).

Indonesia has great opportunities in environmental and social aspects, but its circular economy has not yet had a significant economic impact like the EU or Finland. The EU offers a holistic impact model, while Finland shows how innovation can be optimized on a small scale, so both are relevant as lessons learned for Indonesia

Comparative analysis shows that the circular economy has the potential to support Indonesia's 8% economic growth target, but its achievement depends on significant systemic improvements. Currently, the contribution of the circular economy to Indonesia's GDP is projected to reach only 2.2%-2.3% by 2030 (Bappenas & UNDP, 2021), well below the EU (10.6%) and Finland (~10%). This difference is mainly due to limited infrastructure, weak regulations, and a lack of innovation in Indonesia compared to the EU's mature and innovative approach to Finland. However, by learning from these two models, Indonesia can increase the role of the circular economy as a pillar of economic growth.

First, **strengthened infrastructure and regulations** are the main key. The EU shows that coordination between countries and strict regulations, such as *the Circular Economy Action Plan* (CEAP) 2020 and *the Ecodesign Directive*, are able to improve efficiency (recycling rate of 48.6%) and economic output (McKinsey, 2023). Indonesia can adopt a similar approach by establishing mandatory regulations for recycling in priority sectors (e.g. textiles and electronics) and building modern waste management facilities >7% of districts/cities currently have capacity (MoEF, 2022). Inter-agency coordination, such as between the Ministry of Environment and Forestry, Bappenas, and the Ministry of Industry, also needs to be strengthened to ensure integrated implementation, similar to the harmonization of standards in the EU.

Second, **technological innovations** can be taken from the Finnish model. *Finland's National Circular Economy Roadmap* shows how technologies such as chemical recycling and biowaste treatment can improve efficiency and create additional economic value (€3 billion by 2030) albeit on a small scale (Sitra, 2023). Indonesia, with a waste volume of 68 million tons per year, has great potential to adopt

DOI: https://10.59141/jrssem.v4i10.853

similar technologies, for example in managing textile or food waste that is currently only managed traditionally. Collaboration with the private sector and research institutions, such as Finland's one can accelerate technology transfer and increase community participation, which is currently low in Indonesia (Damayanti et al., 2022).

Third, achieving the 8% target requires **scalability and investment**. The EU allocated €1 trillion through the *Green Deal Investment Plan*, while Finland invested €300 million in circular projects (European Commission, 2021; Sitra, 2023). Indonesia, with a limited budget, needs to mobilize funds through public-private partnerships and international assistance to build a national recycling infrastructure. If infrastructure is strengthened (reaching a recycling rate of 30%-40%) and regulations are enforced, the contribution of GDP could increase close to 5%-6%, with higher potential through innovation. However, without major reforms, the 8% target will be difficult to achieve with the circular economy alone, due to the dominance of traditional sectors such as manufacturing (19.8% of GDP) and agriculture (13.3%) (BPS, 2023).

In this discussion, it was emphasized that Indonesia can achieve 8% economic growth if it combines the EU's systemic coordination and Finnish technological innovations. However, challenges such as low community participation and policy fragmentation must be overcome to realize the full potential of the circular economy.

DOI: https://10.59141/jrssem.v4i10.853

Policy Implications

This analysis highlights key policy, economic, and environmental implications for Indonesia's circular economy. First, tax incentives and infrastructure investment are critical to encourage adoption; the EU's use of fiscal incentives and Finland's subsidies for circular innovation offer models for Indonesia, which could implement tax breaks and fund recycling facilities. Second, stricter regulations, including mandatory recycling targets and the adoption of sustainable product designs, are necessary to drive industry compliance, supported by a national monitoring system like the EU's. Third, international collaboration with countries like Finland and the EU can expedite progress, especially through technology transfer and funding. Economically, Indonesia's GDP could increase by 5-6% with realistic reforms such as increased recycling, but reaching 8% requires substantial investment and supply chain transformations. Environmentally, adopting technologies such as waste-to-energy and chemical recycling could significantly reduce waste and emissions, as seen in Finland and the EU. While initial investments are needed, long-term benefits, including cost savings and climate impact mitigation, make these technologies worthwhile. Pilot projects in regions like Java and Bali could be a step toward scaling local solutions.

CONCLUSION

The study concludes that the circular economy has the potential to support Indonesia's economic growth, but its current contribution is projected at 2.2%-2.3% of GDP by 2030 (Bappenas & UNDP, 2021) far from the 8% target without significant systemic improvement. Comparative analysis with the European Union (EU) and Finland shows that Indonesia's policies are still evolving, with low efficiency (15% recycling rate) and limited economic impact compared to the EU (10.6% of GDP) and Finland (~10% of GDP). The EU offers a mature model with strict regulation and coordination between countries, while Finland stands out with technological innovation albeit on a small scale. In Indonesia, limited infrastructure, weak regulations, and lack of technology adoption are major obstacles, despite the large environmental and social potential considering the volume of waste of 68 million tons per year (MoEF, 2022). Without major reforms, the circular economy will only be an additional support, not a major pillar of economic growth.

REFERENCES

Bappenas & UNDP. (2021). *The Economic, Social, and Environmental Benefits of a Circular Economy in Indonesia*. Jakarta: National Development Planning Agency (Bappenas).

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101. DOI: 10.1191/1478088706qp063oa. (Scopus Q1).

BPS (Central Statistics Agency). (2023). *Indonesia's Gross Domestic Product 2022*. Jakarta: BPS.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (4th ed.). Thousand Oaks, CA: Sage Publications.

Damayanti, R., et al. (2022). Analysis of public awareness of the circular economy in Indonesia. *Journal of Environmental Technology, 23*(1), 45-52. (Sinta 3).

Ellen MacArthur Foundation. (2015). *Towards the Circular Economy: Economic and Business Rationale for an Accelerated Transition*. Cowes: Ellen MacArthur Foundation.

Ellen MacArthur Foundation. (2020). *Finland's Circular Economy Roadmap: A Global Model*. Cowes: Ellen MacArthur Foundation.

European Commission. (2020). *Circular Economy Action Plan*. Brussels: European Commission.

European Commission. (2021). *EU Recovery Fund and Green Deal Investment Plan*. Brussels: European Commission.

European Environment Agency. (2022). *Circular Economy in Europe: Progress and Challenges*.

Eurostat. (2022). *Municipal Waste Statistics*. Luxembourg: Eurostat.

Finnish Environment Institute (SYKE). (2022). *Environmental Impact of Circular Economy in Finland*. Helsinki: SYKE.

Geissdoerfer, M., Morioka, S. N., de Carvalho, M. M., & Evans, S. (2018). Business models and supply chains for the circular economy. *Journal of Cleaner Production, 190*, 712-721. DOI: 10.1016/j.jclepro.2018.04.159. (Scopus Q1).

Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling, 127*, 221-232. DOI: 10.1016/j.resconrec.2017.09.005. (Scopus Q1).

Ministry of Environment and Forestry (Ministry of Environment and Forestry). (2022). *National Report on Waste Management 2022*. Jakarta: Ministry of Environment and Forestry.

McKinsey. (2023). *The Circular Economy: Opportunities for Growth in Europe*. McKinsey & Company.

Pardede Ratlan, David Kiki S, Davy Parsaoran H. (2023). Business Research Method: Structural Equation Modeling Analysis with AMOS Application. Page 4, PT Nash Media Indonesia.

Pardede Ratlan, Renhard Maurung (2014). Path Analysis: Theory and Applications in Business Research, page 5, Rineka Cipta Jakarta.

Rifani, R. A., Lukman, S. D. S., Machmud, M., & Hartati. (2023). Implementation of the circular economy concept in the waste waste recycling program to improve community welfare. *Panrita Abdi - Journal of Community Service, 7*(4), 764-771. DOI: 10.20956/pa.v7i4.31022. (Sinta 2).

Good. (2019). *National Circular Economy Roadmap: Updated 2019*. Helsinki: Okay.

Good. (2023). *Circular Economy in Finland: Progress Report*. Helsinki: Okay.

Stahel, W. R. (2016). The circular economy. *Nature, 531*(7595), 435-438. DOI: 10.1038/531435a. (Scopus Q1).

Statistics Finland. (2022). *Waste Statistics 2022*. Helsinki: Statistics Finland.

Winans, K., Kendall, A., & Deng, H. (2017). The history and current applications of the circular economy concept. *Resources, Conservation and Recycling, 126*, 45-54. DOI: 10.1016/j.resconrec.2017.07.013. (Scopus Q1).