

A Comprehensive Review of Green Economy Practices: Policies, Innovations, and Local Insights for Sustainable Development

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Abstract

The transition to a green economy offers a holistic solution to address global challenges such as climate change, resource depletion, and socio-economic inequalities. This review, synthesizing findings from 30 unique studies retrieved through the Garuda Database, explores Indonesia's contributions and global perspectives on advancing green economy initiatives. Wherever possible, primary sources have been prioritized over secondary references to enhance the accuracy and academic robustness of this review. Local innovations, including waste banks, aquaponics, and sustainable dairy farming, exemplify the integration of traditional wisdom with modern sustainability practices. These initiatives have successfully generated socio-economic benefits while addressing environmental challenges at the grassroots level. National strategies, such as Indonesia's carbon neutrality roadmap and renewable energy policies, underscore the country's ambitious efforts to align with global sustainability goals. However, implementation barriers, including regulatory fragmentation and limited infrastructure development, hinder progress.

Sectoral contributions are pivotal in driving the green economy, with waste management, renewable energy, and finance playing critical roles. Waste banks in Indonesia demonstrate the potential for recycling to generate economic value, while renewable energy advancements in solar and geothermal technologies emphasize the importance of reducing carbon emissions and enhancing energy security. Furthermore, financial mechanisms like green sukuk have facilitated investments in sustainable projects, aligning ethical investment principles with environmental objectives.

The review also highlights global comparisons, such as the European Union's Green Deal and China's renewable energy leadership, which provide valuable lessons for scaling green economy initiatives in Indonesia. By addressing implementation gaps and leveraging opportunities for international collaboration and green job creation, Indonesia can position itself as a regional leader in sustainable development. This study underscores the need for coordinated efforts to combine local innovations with global best practices to achieve a sustainable and inclusive future.

Keywords: *Green Economy; Sustainable Development; Renewable Energy; Waste Management; Circular Economy; Garuda Database*

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INTRODUCTION

In this article, the term “green economy” refers to an economic development model that fosters environmental sustainability, social inclusion, and economic resilience. While “sustainable development” and “low-carbon development” are closely related, they are used in this review as complementary frameworks: sustainable development encompasses broader socio-environmental goals, while low-carbon development focuses specifically on reducing greenhouse gas emissions.

The green economy has emerged as a central framework for addressing some of the most pressing challenges facing humanity today, including climate change, resource depletion, and socio-economic disparities. Defined as an economy that seeks to improve human well-being and social equity while significantly reducing environmental risks and ecological scarcities, the green economy promotes sustainable growth by integrating environmental sustainability with economic and social priorities (Rahmawati & Sari, 2023). As the global community strives to achieve the Sustainable Development Goals (SDGs), the green economy provides a viable pathway to align growth and development with environmental stewardship.

Globally, the transition to a green economy has gained momentum, driven by international agreements such as the Paris Agreement, which emphasizes limiting global warming to below 2°C (Latifah & Abdullah, 2022). Countries around the world, including Indonesia, are increasingly recognizing the necessity of transitioning toward sustainable economic models. However, this shift is fraught with challenges, including the need for robust policies, cross-sectoral collaboration, and significant investments in green technologies and skills development (Santoso & Dewi, 2024).

Climate change poses existential risks to ecosystems, societies, and economies worldwide. The Intergovernmental Panel on Climate Change (IPCC) has consistently highlighted the need for transformative changes in energy production, consumption patterns, and natural resource management. Alongside climate risks, socio-economic

inequalities have exacerbated vulnerabilities, particularly in developing regions like Southeast Asia, where populations are disproportionately affected by environmental degradation (Harahap & Futri, 2023).

The green economy framework offers a promising approach to addressing these interconnected challenges. By emphasizing resource efficiency, low-carbon growth, and social inclusion, the green economy fosters resilience in the face of environmental shocks. In Indonesia, this framework has gained traction through innovative local practices, such as the adoption of waste banks and aquaponics, which integrate environmental benefits with socio-economic empowerment (Nugraha & Sulaiman, 2024). These community-based initiatives have demonstrated the potential for scaling sustainable practices across the country.

Internationally, the transition toward a green economy is marked by significant policy milestones. The European Union's Green Deal, for example, is a comprehensive strategy aimed at achieving carbon neutrality by 2050 while stimulating economic growth and innovation (Kartika & Lestari, 2024). Similarly, China's investments in renewable energy and sustainable infrastructure highlight the economic opportunities associated with green transitions (Rahardjo & Kusuma, 2023). These examples provide valuable lessons for countries like Indonesia, where policy integration and implementation remain key challenges.

Despite these advancements, the global shift toward a green economy remains uneven. High-income countries often have the resources and institutional capacity to adopt green technologies and policies, whereas low- and middle-income countries face significant barriers, including financial constraints and limited technological access (Ahmad et al., 2024). This disparity underscores the importance of international collaboration and knowledge sharing in advancing global green economy objectives.

As a nation with abundant natural resources and a large, diverse population, Indonesia is uniquely positioned to lead green economy initiatives in Southeast Asia.

With a roadmap toward carbon neutrality by 2060, the country has set ambitious targets for reducing greenhouse gas emissions and promoting renewable energy (Setiawan & Lestari, 2023). Key sectors, such as agriculture, forestry, and energy, play a critical role in achieving these goals.

Innovative practices at the community level have been a hallmark of Indonesia's green economy transition. Waste banks, for example, have empowered local communities to manage waste more effectively while generating economic value through recycling (Andriani et al., 2023). Similarly, aquaponics has enabled urban and peri-urban households to grow food sustainably, addressing food security challenges while minimizing environmental impacts (Widodo & Kurniawan, 2024). These initiatives highlight the potential of combining local wisdom with modern sustainability practices.

However, significant challenges remain. Policy implementation gaps, lack of coordination among stakeholders, and insufficient investment in green technologies and skills development hinder progress (Rahman et al., 2023). Addressing these challenges requires a holistic approach that integrates national policies with local practices, supported by robust funding mechanisms and capacity-building programs.

This review article aims to explore the multifaceted aspects of the green economy by synthesizing insights from 30 unique references. It provides an in-depth analysis of regional practices, sectoral contributions, and policy frameworks that drive green economy initiatives. The article highlights Indonesia's unique contributions while drawing comparisons with global strategies, such as the EU Green Deal and China's renewable energy policies (Santoso & Dewi, 2024; Latifah & Abdullah, 2022).

CONCEPTUAL FRAMEWORK

Historical Evolution of Green Economy Principles

The concept of the green economy emerged in response to growing global awareness of environmental degradation and socio-economic inequities. Its roots can be traced back to the 1987 Brundtland Report, which introduced the term "sustainable development," emphasizing the need to meet present needs without compromising future generations' ability to meet their own (Damarwanto, 2015). This foundational idea evolved through milestones like the 1992 Rio Earth Summit, which underscored the link between economic activities and environmental sustainability, and the subsequent Kyoto Protocol in 1997, which set binding emission reduction targets for industrialized nations (Rahardjo & Kusuma, 2023).

Over time, the green economy became a more focused framework for aligning environmental priorities with economic growth. It gained global traction with the United Nations Environment Programme (UNEP)'s 2011 report, "Towards a Green Economy," which highlighted the economic benefits of investing in green sectors such as renewable energy, waste management, and sustainable agriculture. The 2015 Paris Agreement further reinforced the need for a green economy by setting global goals to limit temperature rises and promote low-carbon development pathways (Latifah & Abdullah, 2022).

In recent years, the concept has expanded to incorporate equity and social justice, recognizing that vulnerable populations are disproportionately affected by environmental degradation. Frameworks like the EU Green Deal exemplify this evolution, integrating policy measures aimed at achieving carbon neutrality, economic resilience, and social inclusivity (Kartika & Lestari, 2024).

At its core, the green economy is defined as one that improves human well-being and social equity while significantly reducing environmental risks and ecological scarcities. It contrasts sharply with traditional growth models, which often prioritize short-term economic gains at the expense of long-term environmental and social stability (Rahmawati & Sari, 2023).

The theoretical underpinnings of the green economy are grounded in several key principles:

- **Sustainable Development:** This principle, central to the green economy, advocates for a balance between economic growth, environmental protection, and social well-being. It emphasizes intergenerational equity, ensuring that future generations inherit a habitable planet (Harahap & Futri, 2023).
- **Circular Economy:** A subset of the green economy, the circular economy focuses on minimizing waste and maximizing resource efficiency. It promotes recycling, reuse, and sustainable production practices, thereby reducing the environmental footprint of economic activities (Andriani et al., 2023).
- **Low-Carbon Development:** Reducing greenhouse gas emissions is a cornerstone of the green economy. Investments in renewable energy, energy efficiency, and low-carbon technologies are essential for transitioning to sustainable economic systems (Ahmad et al., 2024).
- **Social Inclusion and Equity:** The green economy seeks to address socio-economic disparities by promoting inclusive growth. This involves creating green jobs, improving access to resources, and ensuring that marginalized communities benefit from sustainability initiatives (Nugraha & Sulaiman, 2024).

Key Characteristics of the Green Economy

The green economy is characterized by its emphasis on eco-efficiency, resilience, and inclusivity. These characteristics differentiate it from conventional economic models. 1) **Eco-Efficiency.** By prioritizing resource efficiency and minimizing waste, the green economy ensures that economic activities generate maximum value with minimal environmental impact. For example, waste bank initiatives in Indonesia have demonstrated how recycling can create economic opportunities while reducing landfill usage (Santoso & Dewi, 2024). 2) **Resilience.** The

green economy aims to build resilience against environmental and economic shocks. Investments in renewable energy and sustainable agriculture enhance adaptive capacity, particularly in regions vulnerable to climate change (Setiawan & Lestari, 2023). 3) Inclusivity. Recognizing the importance of equity, the green economy promotes policies and practices that ensure fair distribution of benefits. For instance, Islamic finance principles have been integrated into green initiatives to align ethical investments with sustainability goals (Hasan & Zulkifli, 2023).

Academic literature has significantly contributed to shaping the conceptual framework of the green economy. Studies have highlighted the economic benefits of transitioning to sustainable practices, such as job creation, improved health outcomes, and enhanced biodiversity (Widodo & Kurniawan, 2024). Additionally, theoretical models have explored the relationship between green investments and economic resilience, emphasizing the multiplier effects of green technologies on GDP growth (Rahman et al., 2023).

Empirical evidence from case studies, such as Indonesia's carbon neutrality roadmap, demonstrates the feasibility of aligning national policies with global sustainability goals (Latifah & Abdullah, 2022). Similarly, the EU Green Deal has provided a blueprint for integrating environmental, economic, and social objectives within a cohesive policy framework (Kartika & Lestari, 2024).

As the green economy continues to evolve, several emerging trends are shaping its trajectory through advancements in renewable energy, waste-to-energy technologies, and sustainable agriculture are driving the transition to a green economy. These innovations are essential for reducing reliance on fossil fuels and enhancing resource efficiency (Rahardjo & Kusuma, 2023). Effective implementation of the green economy requires harmonization across sectors and governance levels. This includes aligning local, national, and international policies to achieve shared

sustainability goals (Andriani et al., 2023). Addressing global challenges like climate change necessitates collaborative efforts among nations. Initiatives such as the Paris Agreement and the EU Green Deal highlight the importance of collective action in advancing the green economy (Ahmad et al., 2024). Ensuring that the benefits of the green economy are equitably distributed remains a priority. This involves targeting investments in marginalized communities and addressing systemic inequalities that hinder sustainable development (Nugraha & Sulaiman, 2024). This conceptual framework establishes a foundation for understanding the principles, characteristics, and implications of the green economy. By synthesizing insights from historical evolution, theoretical models, and empirical evidence, it provides a comprehensive lens through which to examine the regional and sectoral applications discussed in subsequent sections.

REGIONAL APPLICATIONS

This section provides a localized exploration of green economy initiatives in Indonesia, contextualized within broader global sustainability trends.

Indonesia

Indonesia has positioned itself as a key player in advancing the green economy within Southeast Asia. With its abundant natural resources and diverse ecosystems, the country has adopted a multi-faceted approach to integrating environmental sustainability with socio-economic development. Local communities in Indonesia have demonstrated innovative approaches to implementing green economy practices. Waste banks, for example, have become a cornerstone of community-driven waste management. These initiatives enable households to sort and recycle waste, earning financial benefits while reducing the environmental burden of landfills. Studies have shown that waste banks not only generate economic value but also foster

environmental awareness among participants (Andriani et al., 2023). This model has been particularly successful in urban areas like Banjarmasin and Pontianak, where high population density exacerbates waste management challenges (Siregar & Hasibuan, 2023).

Another notable innovation is aquaponics, a sustainable farming method that combines aquaculture with hydroponics. In urban areas like Surabaya, aquaponics has empowered communities to grow vegetables and fish in limited spaces, addressing food security concerns while promoting resource efficiency (Widodo & Kurniawan, 2024). This practice has also been integrated with educational programs to raise awareness about sustainable agriculture and its role in combating climate change.

Dairy farming in Pasuruan provides another example of how local wisdom has been leveraged to advance green economy goals. By adopting sustainable farming practices, such as utilizing organic feed and managing livestock waste for biogas production, farmers have minimized environmental impacts while enhancing productivity (Utami et al., 2024). These practices demonstrate the potential of integrating traditional knowledge with modern sustainability techniques.

National Strategies

At the national level, Indonesia has committed to achieving carbon neutrality by 2060. The country's roadmap emphasizes transitioning to renewable energy, enhancing forest conservation efforts, and promoting sustainable land use. Renewable energy, in particular, has been identified as a key driver of Indonesia's green economy. Investments in solar, wind, and geothermal energy have increased significantly, supported by government incentives and international collaborations (Ahmad et al., 2024).

However, implementing these strategies has not been without challenges. Policy integration remains a critical issue, with overlapping regulations and lack of coordination among government agencies hindering progress (Rahman et al., 2023). Additionally, the transition to a green economy requires substantial financial investments, which pose significant barriers for developing countries like Indonesia. The government has attempted to address this issue through green bonds and Islamic finance mechanisms, aligning ethical investment principles with sustainability goals (Hasan & Zulkifli, 2023).

Despite these challenges, Indonesia has made notable progress in conserving its rich biodiversity. Initiatives such as mangrove restoration projects and reforestation programs have helped mitigate climate change impacts while supporting local livelihoods. For instance, the restoration of mangroves along coastal areas has not only enhanced carbon sequestration but also provided a buffer against storm surges and coastal erosion (Kartika & Lestari, 2024).

Global Comparisons

While Indonesia has made strides in advancing its green economy, comparisons with global initiatives reveal both opportunities and areas for improvement. The European Union's Green Deal serves as a benchmark for integrating environmental, economic, and social objectives within a cohesive policy framework. By setting ambitious targets for carbon neutrality by 2050, the EU has demonstrated the importance of aligning policy measures with long-term sustainability goals (Latifah & Abdullah, 2022).

One key aspect of the EU Green Deal is its emphasis on circular economy principles, which promote resource efficiency and waste minimization. This approach has been instrumental in reducing environmental footprints across industries and can provide valuable lessons for Indonesia, particularly in sectors like manufacturing and agriculture (Rahardjo & Kusuma, 2023). The EU's comprehensive approach to policy

integration, stakeholder engagement, and financial incentives highlights the importance of multi-level governance in advancing green economy objectives.

China offers another compelling case study, with its significant investments in renewable energy and sustainable infrastructure. As the world's largest producer of solar panels and wind turbines, China has leveraged its manufacturing capacity to drive the global green economy. Additionally, its Belt and Road Initiative incorporates green development principles, emphasizing sustainable infrastructure projects in partner countries (Ahmad et al., 2024). Indonesia can draw insights from China's ability to scale renewable energy projects and integrate them with national development plans.

Lessons Learned

Several key lessons can be drawn from Indonesia's experience and global comparisons:

- **Community Engagement:** Empowering local communities through initiatives like waste banks and aquaponics has proven effective in addressing environmental challenges while promoting socio-economic development.
- **Policy Integration:** Aligning national strategies with local practices and global frameworks is essential for achieving sustainable development goals. This includes streamlining regulations and fostering inter-agency collaboration (Setiawan & Lestari, 2023).
- **Financial Innovation:** Mechanisms such as green bonds and Islamic finance play a critical role in mobilizing resources for green economy initiatives. These tools can help bridge funding gaps and attract investments in sustainable sectors (Hasan & Zulkifli, 2023).
- **Global Collaboration:** Partnerships with international organizations and governments can enhance capacity-building efforts and provide access to advanced technologies and best practices (Rahman et al., 2023).

Future Directions

As Indonesia continues its transition toward a green economy, there is a need to scale successful local practices, strengthen policy frameworks, and foster international collaboration. By integrating local wisdom with global strategies, Indonesia can position itself as a leader in sustainable development within Southeast Asia. Additionally, targeted investments in education and skills training will be critical for preparing the workforce to participate in green industries (Nugraha & Sulaiman, 2024).

This section highlights how regional innovations and national strategies, when combined with insights from global comparisons, can create a robust foundation for advancing the green economy. By addressing existing challenges and leveraging opportunities, Indonesia can pave the way for a sustainable and inclusive future.

SECTORAL CONTRIBUTIONS

The transition to a green economy relies heavily on the contributions of various sectors that collectively drive sustainable development. This section explores the role of waste management, renewable energy, and finance and employment in advancing green economy initiatives, with a focus on case studies from Indonesia and global practices.

Waste Management

Waste management is a critical component of the green economy, addressing environmental degradation while creating economic opportunities. In Indonesia, innovative approaches have transformed waste management into a profitable and sustainable sector.

Waste banks (bank sampah) have become a cornerstone of Indonesia's waste management strategy. These community-driven programs allow individuals to exchange recyclable materials for financial rewards, fostering both environmental and economic benefits. For instance, the Bank Sampah Cangkir Hijau in Pontianak has successfully engaged local communities in recycling efforts while generating income through creative crafts made from waste materials (Andriani et al., 2023). This model not only reduces landfill waste but also empowers marginalized groups, particularly women, by involving them in waste processing activities (Arifin & Maulana, 2023).

Recycling and Circular Economy: The adoption of circular economy principles has further enhanced waste management practices. By focusing on recycling and reusing materials, Indonesia has reduced its reliance on virgin resources and minimized waste generation. Case studies demonstrate how local governments have implemented policies to support waste segregation and recycling infrastructure, enabling private sector participation in the circular economy (Santoso & Dewi, 2024).

National and regional policies play a crucial role in promoting effective waste management. The government's support for waste banks and recycling programs, combined with incentives for private sector investment, has strengthened Indonesia's capacity to manage waste sustainably (Setiawan & Lestari, 2023).

Renewable Energy

The renewable energy sector is at the heart of the green economy, offering solutions to reduce greenhouse gas emissions and enhance energy security. Indonesia has made significant progress in adopting renewable energy technologies, though challenges remain.

Adoption of Renewable Technologies: Indonesia has prioritized the expansion of solar, wind, and geothermal energy to diversify its energy mix. The National

Energy Policy aims to increase the share of renewable energy to 23% by 2025 (Ahmad et al., 2024). Projects like the development of large-scale solar farms and wind energy installations in coastal areas have demonstrated the potential of renewable technologies to meet growing energy demands while reducing carbon emissions.

As one of the largest geothermal energy producers globally, Indonesia has tapped into its abundant geothermal resources to generate clean electricity. Investments in geothermal plants have not only reduced reliance on coal but also created employment opportunities in rural areas (Rahardjo & Kusuma, 2023). Despite these advancements, the renewable energy sector faces significant barriers, including inadequate infrastructure, regulatory gaps, and limited access to financing. Addressing these challenges requires stronger policy integration and collaboration between public and private sectors (Latifah & Abdullah, 2022).

The financial sector and labor market are integral to supporting the green economy. By facilitating investments in sustainable projects and developing green skills, these sectors enable the transition to low-carbon and inclusive growth.

Micro, small, and medium enterprises (MSMEs) have played a pivotal role in advancing green initiatives, particularly in sectors like agriculture, waste management, and renewable energy. Supported by Islamic finance principles, which emphasize ethical and sustainable investments, MSMEs have successfully implemented projects that align with green economy goals (Hasan & Zulkifli, 2023). For example, Islamic financial products like green sukuk have provided funding for renewable energy projects and infrastructure development.

Workforce transformation is essential for the green economy, requiring training programs that equip individuals with the skills needed for emerging industries. In Indonesia, green skills training has focused on areas such as renewable energy installation, waste management, and sustainable agriculture (Nugraha &

Sulaiman, 2024). These programs have not only enhanced employability but also ensured that the labor market aligns with sustainability objectives.

Investments in green sectors have generated significant employment opportunities, particularly in renewable energy and waste management. For instance, the expansion of solar energy projects has created jobs in manufacturing, installation, and maintenance, contributing to economic growth while reducing environmental impact (Ahmad et al., 2024).

Global Comparisons

While global innovations provide a guiding framework, Indonesia's sectoral responses reveal unique adaptation strategies shaped by its socio-economic conditions. Indonesia's sectoral contributions to the green economy can be contextualized within global practices, offering valuable lessons and insights.

Waste Management in Europe: European countries, particularly those under the EU Green Deal, have set benchmarks for sustainable waste management by implementing strict recycling targets and promoting the circular economy. These practices provide a framework for Indonesia to strengthen its waste management policies and infrastructure (Kartika & Lestari, 2024). In addition, China's aggressive investment in renewable energy infrastructure, supported by strong regulatory frameworks and national planning, presents another useful model. Indonesia could draw lessons from China's centralized coordination and long-term commitment to low-carbon development to accelerate its own energy transition and policy effectiveness.

Renewable Energy in China: As a global leader in renewable energy production, China has demonstrated the economic potential of large-scale investments in solar and wind technologies. Indonesia can learn from China's ability

to mobilize public and private resources to accelerate renewable energy adoption (Rahman et al., 2023).

Green Finance in the Middle East: Islamic finance has been effectively leveraged in the Middle East to fund large-scale renewable energy projects and sustainable infrastructure. Indonesia's adoption of green sukuk aligns with this trend, offering opportunities to expand financing for green initiatives (Hasan & Zulkifli, 2023).

5. Challenges and Opportunities

The transition to a green economy offers significant benefits, including environmental preservation, economic resilience, and social equity. However, it is fraught with challenges that must be addressed to realize these benefits fully. At the same time, numerous opportunities exist to accelerate progress toward a sustainable and inclusive green economy. This section explores these challenges and opportunities, with a particular focus on Indonesia and lessons from global practices.

Challenges

1. Implementation Gaps Between Policy and Practice

One of the most significant barriers to advancing the green economy is the gap between policy design and practical implementation. Although Indonesia has introduced ambitious policies, such as the carbon neutrality roadmap and renewable energy targets, translating these into actionable outcomes remains a challenge (Setiawan & Lestari, 2023). Factors contributing to this gap, such as overlapping regulations across sectors and levels of government create confusion and hinder the implementation of green initiatives (Rahman et al., 2023). For example, waste management policies often lack uniformity, resulting in inefficiencies and limited private sector engagement. Many local governments lack the technical expertise and resources needed to implement green policies effectively (Santoso & Dewi, 2024). This

is particularly evident in rural areas where infrastructure and human capital are limited.

2. Infrastructure and Public Education Barriers

The lack of adequate infrastructure is a critical obstacle to scaling green economy initiatives. In sectors like renewable energy and waste management, insufficient investment in infrastructure such as limits the adoption of sustainable practices (Ahmad et al., 2024). Specific challenges The development of solar and wind energy projects is often hampered by inadequate transmission networks and grid integration capabilities (Latifah & Abdullah, 2022). Geothermal energy projects also face logistical challenges, such as the remote locations of resource-rich areas.

In urban areas, the absence of efficient waste segregation and recycling facilities undermines the effectiveness of programs like waste banks (Andriani et al., 2023). Rural communities face additional challenges due to limited access to waste disposal infrastructure.

Public awareness and education also play a crucial role in the success of green economy initiatives. However, low levels of environmental literacy in many regions hinder the adoption of sustainable practices (Nugraha & Sulaiman, 2024). Without adequate education, individuals and businesses may resist changes required for a green transition.

3. Financial Constraints

The financial requirements for green economy initiatives are substantial, particularly for developing countries like Indonesia. Limited access to financing for

renewable energy projects, waste management infrastructure, and green skills training remains a significant challenge (Hasan & Zulkifli, 2023). Key issues include:

Investments in green technologies often require significant initial capital, which can deter private sector participation (Widodo & Kurniawan, 2024).

Lack of Green Financing Mechanisms: While instruments like green sukuk have been introduced, their reach and impact remain limited due to a lack of awareness and regulatory support (Rahardjo & Kusuma, 2023).

Opportunities

Despite these challenges, the green economy presents numerous opportunities for Indonesia and other countries to achieve sustainable development goals.

1. International Collaboration

Global cooperation offers significant potential for overcoming barriers to green economy adoption. International initiatives like the Paris Agreement and ASEAN Green Initiative provide platforms for knowledge sharing, capacity building, and financial support (Santoso & Dewi, 2024). Opportunities for Indonesia include collaborating with developed countries to access advanced technologies in renewable energy, waste management, and sustainable agriculture (Ahmad et al., 2024). For further, leveraging international funding mechanisms, such as climate funds and development bank loans, to support green projects (Hasan & Zulkifli, 2023).

2. Job Creation and Economic Growth

The green economy has significant potential to generate employment and drive economic growth. In Indonesia, sectors like renewable energy, waste management, and sustainable agriculture offer opportunities to create green jobs and stimulate local economies (Rahmawati & Sari, 2023). Specific examples include expanding solar and wind energy projects can create jobs in manufacturing, installation, and maintenance

(Latifah & Abdullah, 2022). Furthermore, programs like waste banks have already demonstrated their ability to generate income for local communities while addressing environmental challenges (Andriani et al., 2023).

3. Advancing Green Skills Development

Workforce transformation is critical for the green economy, requiring targeted efforts to equip individuals with the skills needed for sustainable industries. Training programs in renewable energy installation, recycling management, and sustainable agriculture have shown promising results in Indonesia (Nugraha & Sulaiman, 2024). These programs not only enhance employability but also ensure that the labor market aligns with the demands of a green economy.

4. Harnessing Local Innovations

Indonesia's rich cultural heritage and traditional knowledge offer unique opportunities for advancing the green economy. Initiatives like waste banks and aquaponics have successfully integrated local wisdom with modern sustainability practices, providing scalable models for other regions (Widodo & Kurniawan, 2024). By leveraging these innovations, Indonesia can strengthen community participation and foster inclusive growth.

RECOMMENDATIONS

Transitioning to a green economy requires clear and actionable recommendations. These include stronger policy frameworks, better workforce development, and increased collaboration among stakeholders to overcome challenges and seize new opportunities. A robust and cohesive policy framework is crucial to advancing the green economy in Indonesia. Enhancing regulatory clarity, integrating policies across sectors, and incentivizing green investments are key priorities. Addressing inconsistent and overlapping regulations can improve the

implementation of green initiatives, such as integrating waste management policies with urban planning to enhance recycling and waste segregation (Rahman et al., 2023; Andriani et al., 2023). Expanding green financing mechanisms, including green bonds and sukuk, can mobilize private sector investments in renewable energy, waste management, and sustainable agriculture. Offering tax incentives and subsidies can further encourage businesses to adopt green technologies (Hasan & Zulkifli, 2023; Widodo & Kurniawan, 2024). Policies must also include effective monitoring and enforcement mechanisms, such as setting clear metrics to evaluate progress in achieving sustainability targets like carbon reduction and resource efficiency (Latifah & Abdullah, 2022).

Developing human capital is equally vital, as workforce development is the backbone of the green economy. Targeted training programs that address skill gaps in sectors like renewable energy, waste management, and sustainable agriculture can enhance employability and support the growth of green industries (Nugraha & Sulaiman, 2024). For example, training initiatives focused on solar panel installation and maintenance create job opportunities while advancing renewable energy adoption (Ahmad et al., 2024). Additionally, environmental education in schools and public awareness campaigns can cultivate a culture of sustainability, ensuring long-term societal benefits (Rahmawati & Sari, 2023). Workforce development should also prioritize inclusivity by empowering marginalized groups, such as women and rural populations. Programs like waste banks have shown how such efforts can simultaneously generate economic and environmental benefits (Arifin & Maulana, 2023).

Collaboration among governments, businesses, academia, and civil society is essential to achieving green economy goals. Public-private partnerships (PPPs) can drive the development of green infrastructure and technologies, with successful examples including renewable energy projects that involve collaboration between the

government and private companies (Santoso & Dewi, 2024). International partnerships also play a critical role, providing access to funding, technology, and expertise through initiatives like the ASEAN Green Initiative and the Paris Agreement (Rahardjo & Kusuma, 2023). Engaging local communities in sustainability initiatives, such as waste management and sustainable agriculture, ensures that solutions are context-specific and inclusive (Widodo & Kurniawan, 2024).

By addressing policy gaps, developing a skilled workforce, and fostering collaboration across stakeholders, Indonesia can effectively transition to a green economy. These recommendations not only advance environmental sustainability but also support economic growth and social inclusion, positioning Indonesia as a leader in green development within the region.

CONCLUSION

The transition to a green economy is a pivotal step in addressing global challenges such as climate change, resource scarcity, and socio-economic inequalities. Through the integration of environmental sustainability, economic resilience, and social inclusivity, the green economy presents a viable pathway toward achieving the Sustainable Development Goals (Rahmawati & Sari, 2023). This review has synthesized insights from 30 unique references, highlighting Indonesia's contributions, sectoral advancements, and challenges within the broader global context. By examining local innovations, sectoral contributions, and global comparisons, this article provides a comprehensive understanding of the green economy's potential and limitations.

Indonesia's local innovations, such as waste banks, aquaponics, and sustainable dairy farming, demonstrate how grassroots initiatives can effectively address environmental and socio-economic challenges (Andriani et al., 2023; Nugraha & Sulaiman, 2024). These practices showcase the importance of integrating local wisdom with modern sustainability techniques to create scalable solutions. At the

national level, Indonesia's carbon neutrality roadmap and renewable energy policies reflect ambitious commitments to sustainability. However, implementation gaps, such as inconsistent regulations and inadequate infrastructure, highlight the need for greater policy integration and resource allocation (Setiawan & Lestari, 2023; Latifah & Abdullah, 2022).

Globally, initiatives like the European Union's Green Deal and China's leadership in renewable energy offer valuable lessons for Indonesia. These examples underscore the importance of aligning national policies with international frameworks to foster collaboration and innovation (Kartika & Lestari, 2024; Rahardjo & Kusuma, 2023). By leveraging international partnerships, Indonesia can access advanced technologies, green financing mechanisms, and knowledge-sharing platforms, accelerating its transition toward a sustainable economy (Santoso & Dewi, 2024).

Sectoral contributions play a critical role in advancing the green economy. Waste management, for instance, has emerged as a key driver of sustainability in Indonesia, with initiatives like waste banks creating economic value while reducing environmental impact (Arifin & Maulana, 2023). Renewable energy adoption, particularly in solar and geothermal sectors, highlights the potential for clean energy to reduce carbon emissions and enhance energy security (Ahmad et al., 2024). Meanwhile, the financial sector, supported by Islamic finance principles and green sukuk, has facilitated investments in green technologies and infrastructure (Hasan & Zulkifli, 2023). The development of green skills and workforce transformation further ensures that the labor market aligns with sustainability objectives, creating new employment opportunities and driving economic growth (Nugraha & Sulaiman, 2024).

Despite these advancements, challenges persist. Implementation barriers, such as regulatory fragmentation, limited financing, and public awareness gaps, hinder

progress (Rahman et al., 2023). Addressing these issues requires a multi-pronged approach, including stronger policy frameworks, targeted workforce development, and collaborative partnerships across sectors (Widodo & Kurniawan, 2024). At the same time, opportunities for green job creation, international collaboration, and technological innovation present promising avenues for accelerating progress toward a greener economy.

In conclusion, this review highlights the multifaceted nature of the green economy and its potential to address global and local sustainability challenges. By combining local innovations with global best practices, Indonesia can emerge as a leader in green development. Future research and policy efforts should focus on addressing implementation barriers, scaling successful models, and fostering collaboration to ensure that the green economy benefits all stakeholders. With concerted efforts, Indonesia and the global community can pave the way for a sustainable and inclusive future.

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