

Green Economy and Sustainable Finance as Pillars of Indonesia's Economic Resilience Toward a Developed Nation by 2045

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Abstract: The global shift toward a sustainable economy and finance is essential to address climate change and 21st century uncertainties. While existing studies extensively cover green growth in developed economies, there remains a critical gap in understanding how integrated sustainable finance frameworks specifically catalyze economic transformation in emerging markets like Indonesia, particularly within the context of its 2045 vision. This research addresses this gap by assessing the role of green economy implementation and sustainable finance policies as key pillars in strengthening Indonesia's economic resilience. Employing a qualitative descriptive approach grounded in a comprehensive review of policy reports, international comparative studies, and recent scientific literature, this study offers a novel synthesis of energy transition, digital transformation, and sustainable financial systems. The research contributes by identifying a strategic roadmap that bridges government policy, private sector participation, and technological innovation to achieve long-term resilience. The findings indicate that green investment, renewable energy, and ESG based financial systems are not merely environmental goals but are fundamental drivers of economic stability and national competitiveness. Furthermore, this study demonstrates how sustainable funding tools, such as green bonds and climate finance, can accelerate socio-economically inclusive growth while reducing carbon intensity. The study concludes that the synergy between institutional frameworks and innovative human capital development is the primary determinant of Indonesia's capacity to achieve sustainable prosperity and reach developed nation status by 2045.

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INTRODUCTION

In the 21st century, resolving the pressures of climate change, energy insecurity, digital economic disruptions, and broader sustainability challenges has elevated the shift toward a green economy and sustainable finance into a paramount global priority. Nations worldwide increasingly integrate Environmental, Social, and Governance (ESG) principles, renewable energy adoption, low carbon industrial transformation, and green technological innovation as strategic approaches to achieve sustainable and competitive economic growth. This paradigm shift is essential, as economic stability and resilience increasingly depend on balancing environmental protection, social welfare, technological advancement, and economic development.

Indonesia, as a developing country with abundant natural resources and a significant demographic dividend, occupies a strategic position in this global transition. The nation has a unique opportunity to strengthen economic resilience and promote sustainable development through green economy policies and sustainable financial systems. Realizing the vision of “Golden Indonesia 2045,” which aspires for Indonesia to become an advanced, resilient, and globally competitive nation, requires effective integration of green economy principles into public policy,

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business strategy, and financial planning. In this context, analyzing how sustainable funding systems, and sustainable economic practices contribute to inclusive growth, environmental sustainability, and national competitiveness is critical.

While research into green finance and sustainable economic policies continues to expand, several gaps remain. First, the role of green economy initiatives and sustainable financial instruments in fostering economic stability, job creation, and inclusive development in emerging economies, particularly Indonesia, is not fully understood. Second, while prior investigations have underscored the capability of ESG based funding and clean energy implementation, and green technological innovation, the majority of previous studies are grounded in the landscape of developed countries, thereby triggering bias if directly implemented in emerging market jurisdictions that have regulatory limitations as well as different socio economic dynamics. Addressing these gaps is essential for advancing both academic knowledge and practical policy implementation.

The objectives of this study are threefold. First, it seeks to examine the role of green economy implementation and sustainable finance in enhancing economic stability, national competitiveness, green job creation, and inclusive development in Indonesia. Second, the study analyzes how ESG based financing, green bonds, digital green finance, artificial intelligence (AI) applications, and renewable energy transformations contribute to low carbon economic growth and environmental sustainability. Third, it explores collaborative mechanisms among governments, private sectors, financial institutions, and educational organizations that accelerate green innovation and economic development. By addressing these objectives, this research thoroughly explores the nexus of sustainability, technological innovation, and economic growth, offering valuable insights for scholars and practitioners in economics, management, and business.

The significance of this study lies in both theoretical and practical contributions. Theoretically, it addresses gaps in the literature concerning the operationalization of green economy principles in emerging economies and the effectiveness of sustainable finance in promoting inclusive and resilient growth. While previous research has highlighted the positive impacts of ESG frameworks and green investment in developed nations, evidence from emerging economies remains limited. This study situates Indonesia within the broader discourse of sustainable economic development, providing empirical insights and conceptual frameworks that can inform future research and enrich global understanding of green economic transitions.

Practically, this research delivers evidence backed recommendations for decision makers, business leaders, and financial institutions in designing and implementing green policies and sustainable finance instruments. Understanding the pathways through which green finance, renewable energy adoption, and digital technologies influence economic outcomes can inform regulatory reforms, investment strategies, and cross sector collaborations. Furthermore, this research underscores the critical need for capability development within financial organizations, education, and technological infrastructure, demonstrating that achieving sustainable development goals requires systemic, multi stakeholder approaches rather than isolated interventions.

A review of relevant literature reveals both advancements and limitations. A review of relevant literature reveals both progress and limitations. Studies by scholars demonstrate the role of ESG based investments in mitigating environmental risks and promoting corporate social responsibility (Broadstock et al., 2021). Meanwhile, research indicates that green bonds serve as an efficient tool for financing renewable energy projects (Sadhvani, 2025). Research on digital green finance and AI applications in sustainability has drawn attention to innovations in risk assessment, financial forecasting, and operational efficiency. However, most of these studies focus on global or

developed country contexts, leaving a knowledge gap regarding emerging economies, particularly in understanding how green policies interact with local demographics, institutional frameworks, and business practices to promote sustainable and inclusive growth.

By combining comprehensive literature reviews and critical policy analyses, this study adopts a qualitative descriptive design to resolve these identified gaps, and comparative studies from international reports, government regulations, and recent scientific publications. By synthesizing insights from multiple sources, it evaluates the effectiveness of existing green economy initiatives and sustainable finance mechanisms, while exploring opportunities to enhance economic resilience and national competitiveness. The research situates Indonesia's green economic transition within broader global sustainability trends, demonstrating how local strategies can align with international goals while leveraging national resources and demographic advantages.

In answering the key research questions, this study demonstrates why the investigation is critical. Climate change, digital economic disruption, and the need for inclusive development underscore the importance of effective strategies for green economic transformation. Furthermore, while prior scholarship has highlighted the potential of sustainable finance and green investment, there remains a limited understanding of their implementation in Indonesia, particularly in integrating technological innovations and demographic considerations. By analyzing policy innovation, private sector engagement, financial institution adaptation, and technological integration, this research provides novel insights into mechanisms for achieving sustainable and resilient economic growth.

RESEARCH METHOD

This research applies a qualitative descriptive methodology to evaluate the role of adopting a green economy and sustainable finance in enhancing Indonesia's economic resilience toward achieving the Golden Indonesia 2045 vision. The qualitative descriptive method was selected because it allows for a comprehensive and nuanced understanding of complex socio economic phenomena, particularly those related to sustainable economic transformation. By employing this approach, the study can analyze policies, strategies, and global developments in the fields of green economy and sustainable finance while contextualizing them within Indonesia's unique economic, demographic, and institutional environment. This methodological framework facilitates an in depth exploration of the interactions between environmental sustainability, economic growth, technological innovation, and financial systems, which are essential to achieving long term national resilience.

Table 1. Research Variables and Analytical Dimensions

Research Question	Variable	Dimension	Indicators
RQ1. How does the green economy contribute to Indonesia's economic resilience?	Green Economy	Green Investment	Green industrial investment, sustainable infrastructure, renewable energy investment, green job creation
		Renewable Energy Development	Solar energy, wind energy, hydroelectric energy, geothermal energy, carbon emission reduction
	Economic Resilience	Economic Stability	GDP growth, employment opportunities, adaptive capacity, energy security

Research Question	Variable	Dimension	Indicators
RQ2. How does sustainable finance support the green economic transition?	Sustainable Finance	ESG Finance	ESG investment, sustainability reporting, ESG based financing
		Sustainable Financial Instruments	Green bonds, green sukuk, green credit allocation
		Financial System Challenges	Financing gap, private sector participation, banking support for green sectors
RQ3. How can Digital Green Economic Resilience	Digital Green Economic Resilience (DGER	Digital Green Innovation	AI adoption, IoT utilization, smart grids, green technology implementation
		Green Financial Literacy	Financial literacy level, understanding of ESG, awareness of green investment products
		DGER Outcomes	Economic resilience, investment attractiveness, sustainable growth, Golden Indonesia 2045 readiness

Source: Developed by the authors based on the DGER Framework (2026).

Data Analysis and Validation

The qualitative data analysis was systematically conducted through five iterative stages to ensure descriptive objectivity and analytical depth:

1. Data Reduction: Filtering out redundant data and organizing the synthesized evidence into fixed thematic categories, namely: green economy policies, sustainable finance instruments, renewable energy initiatives, ESG adoption barriers, digital technological innovations, and macro economic resilience metrics.
2. Information Classification: Grouping the contextual data based on operational barriers, institutional capacities, and cross sectoral dependencies to map the structural bottlenecks in the Indonesian financial system.
3. Critical Interpretation: Analyzing the practical implications of existing regulatory complexities such as the bureaucracy of the Green Taxonomy and public risk perceptions against global sustainability standards to evaluate their alignment with the 2045 strategic targets.
4. Data Presentation: Synthesizing the thematic findings into structural flowcharts, conceptual models (Figure 1), and comparative matrices (Table 1) to visually present the interlinkages between digital innovation, green literacy, and fiscal gaps.
5. Conclusion Drawing: Integrating the processed insights to formulate actionable, evidence based policy adjustments and strategic socio economic recommendations for multi stakeholder governance.

To secure the validity, credibility, and trustworthiness of the synthesized results, the study implemented strict source triangulation. All qualitative claims, institutional gaps, and empirical realities regarding Indonesia's green transition were cross verified across three distinct reporting levels: macro level global development frameworks (World Bank/UNEP), national regulatory

frameworks (OJK/Ministry of Finance directives), and independent academic literature. This cross verification ensures that the final thematic conclusions are balanced, objective, and free from single perspective bias.

RESULTS AND DISCUSSION

This study's insights establish that green economic practices and sustainable financial systems function as a fundamental framework in strengthening Indonesia's economic resilience and advancing its strategic vision of becoming a developed nation by 2045 the Golden Indonesia 2045 Vision. Empirical evidence from cross country studies shows that adopting a green economy framework, as recommended by the United Nations Environment Programme (UNEP, 2019), has been shown to strengthen a country's macroeconomic foundations in the face of external shocks (Wolf, 2024). In line with this evidence, Indonesia's institutional embrace of green policy tools plays a key role in advancing the transition to a low emission economy, fostering green investment flows, accelerating renewable energy deployment, and enhancing environmentally mindful industrial productivity.

Green Investment and Economic Resilience

Empirical evidence maps a robust correlation between green investment structures and enhanced national economic resilience. Green investments including sustainable infrastructure, clean energy projects, and eco friendly industrial expansion create forward looking economic growth opportunities, reduce environmental degradation, and expand employment in emerging sectors (Zhou et al., 2020; World Bank, 2021). Indonesia's experience mirrors global patterns: countries that prioritize sustainable investment instruments attract local and global investments aimed at securing consistent, enduring yields (Vial, 2019). Evidence from multiple reports indicates that green investment contributes significantly to GDP growth while mitigating climate risk exposures (IEA, 2020; UNDP, 2018). The methodological use of secondary data and the systematic literature analysis employed in this study facilitated a holistic mapping of financial investment trends in relation to economic metrics, reinforcing the conclusion that sustainable finance mechanisms positively interlink with national economic performance.

Renewable Energy Development and Structural Transformation

A core component of Indonesia's green economy transition is renewable energy development. Solar, wind, hydroelectric, and geothermal projects contribute to emissions reduction and energy diversification (IRENA, 2020). National policy frameworks and global energy assessments consistently demonstrate that renewable energy investment secures energy corridors and stimulates local economies through green jobs and technology transfer (REN21, 2022; ILO, 2022). As shown in Table 1, renewable energy expansion has measurable impacts on carbon emission reductions and helps meet national commitments under the Paris Agreement (UNEP, 2021). These results substantiate theoretical models asserting that renewable energy adoption enhances macroeconomic resilience by reducing dependency on volatile fossil fuel markets (Yadav & Mahalik, 2024; Kilian & Zhou, 2022).

ESG Finance and Financial Stability

Digital Green Economic Resilience: Conceptual and Operational Framework

One of the primary theoretical contributions of this study is the development of the Digital Green Economic Resilience (DGER) framework. While previous studies have examined green

economy, sustainable finance, and digital transformation separately, limited research has integrated these elements into a unified resilience framework. Recent studies emphasize the importance of sustainable finance in supporting green transitions (Albuquerque et al., 2020; Broadstock et al., 2021), renewable energy adoption in strengthening economic resilience (Kilian & Zhou, 2022; Yadav & Mahalik, 2024), and digital innovation in improving sustainability outcomes (Gorjian et al., 2022; Popp, 2022). However, an integrated model explaining how these factors interact to strengthen national economic resilience remains underdeveloped.

This study defines Digital Green Economic Resilience (DGER) as:

"The capacity of an economic system to maintain stability, adapt to environmental and economic disruptions, and sustain long term inclusive growth through the integration of sustainable finance, green economic transformation, and digital technological innovation."

The concept extends traditional economic resilience theory by arguing that resilience in the digital era depends not only on macroeconomic stability but also on the ability to mobilize sustainable finance, accelerate green transformation, and leverage digital technologies for environmental and economic objectives.

The DGER framework proposes a sequential causal mechanism:



Source: Author's Data Processing Results

Figure 1. The DGER framework

This framework serves as the conceptual foundation for interpreting the empirical findings presented in the following sections.

Table 2. Operational Dimensions of Digital Green Economic Resilience (DGER)

Dimension	Operational Definition	Indicators	Supporting Studies (2020–2025)
Sustainable Finance Capacity	Ability to mobilize capital toward sustainable development	Green bonds, green sukuk, ESG investment, green credit, regulations	Albuquerque et al. (2020); Broadstock et al. (2021); Wang et al. (2022)
Green Economic Transformation	Structural transition toward low-carbon economic activities	Renewable energy, emission reduction, green industry, resource efficiency	IRENA (2022); UNEP (2021); Wolf et al. (2024)
Digital Green Innovation	Use of digital technologies to support sustainability	AI, IoT, smart grids, green technologies, digital monitoring	Gorjian et al. (2022); UNCTAD (2019); OECD (2024)
Economic Resilience Outcomes	Capacity to maintain economic stability and adaptability	Growth stability, jobs, investment, energy security, adaptive capacity	Hepburn et al. (2020); Cohen & Tubb (2021); Wolf et al. (2024)

Source: Developed by the authors based on recent literature (2020–2025)

Table 3. Contribution of Green Economy and Sustainable Finance to Indonesia’s Economic Resilience

Aspect	Implementation	Positive Impact
Renewable Energy	Solar and wind energy development	Reduction of carbon emissions
Green Investment	Green industrial investment	Economic growth enhancement
ESG Finance	Sustainability-based financing	Long-term investment stability
Digital Innovation	Green technology and AI	Operational efficiency
Green Jobs	Sustainable industries	New employment opportunities

Source: *International Energy Agency (IEA, 2023)*

These findings are theoretically grounded in green growth and sustainable development frameworks that emphasize the necessity of harmonizing economic expansion with ecological stewardship (Wolf et al., 2024; UNEP, 2019). They support the argument that environmental objectives, when fully integrated into economic policy and financial systems, can serve as catalysts rather than constraints for sustainable development (Sachs et al., 2019; Dasgupta, 2021).

Empirical Reality and Sustainable Finance Implementation Gaps in Indonesia

Table 4. Sustainable Finance Implementation Gaps and Barriers toward Golden Indonesia 2045

Level of Analysis	Key Components	Empirical Conditions in Indonesia	Implications for the Green Transition and Economic Resilience
Gap with Developed Economies	Policy and institutional capacity	Carbon pricing mechanisms remain underdeveloped, green tax incentives are limited, ESG standards are still evolving, and technological innovation lags behind advanced economies.	Reduces national competitiveness and slows the transition toward a sustainable green economy
Indonesia’s Structural Challenges	Infrastructure, human capital, technology, regulation, and institutional capacity	Limited green infrastructure, uneven human capital quality, low technological readiness, suboptimal regulatory frameworks, and constrained institutional capacity.	Hinders the effective implementation of green economy and sustainable finance policies.
Root Causes of Low Sustainable Financial Literacy	A. Low Basic Financial Literacy	Many citizens and MSMEs still have limited understanding of basic financial products, functions, and risks.	Reduces public participation in sustainable financial instruments and green investments.
	B. High-Risk Perception and Long Payback Periods	Green projects are often perceived as high risk investments with relatively slow returns	Weakens investor confidence and limits private sector participation in green financing.
	C. Complexity of the Indonesian Green Taxonomy (TKBI)	Businesses face difficulties in classifying their activities as “Green” or “Transition” due to technical and	Restricts access to green financing and slows sustainable investment growth.

Level of Analysis	Key Components	Empirical Conditions in Indonesia	Implications for the Green Transition and Economic Resilience
Sustainable Financial System Bottlenecks	D. Information Asymmetry among Retail Investors	administrative complexities. Public awareness and education regarding green investment products remain limited compared to conventional financial products.	Leads to low adoption of green mutual funds, green sukuk, and other sustainable investment instruments.
	Low Green Financial Literacy	Limited understanding of ESG principles, green bonds, green sukuk, and sustainable investment mechanisms.	Weakens the mobilization of capital required for sustainable development.
	NDC Financing Gap	Climate mitigation financing needs are estimated at IDR 3,461 trillion, while the national budget covers only around 20–30% of this requirement.	Creates a significant funding deficit for green transition initiatives.
	Government Dominance in Green Bonds and Green Sukuk	Sustainable financial instruments are primarily issued by the government and large state owned enterprises.	Private sector participation remains limited.
	Low Green Credit Allocation	Green lending accounts for less than 10–12% of total banking credit portfolios	Restricts financial support for renewable energy and environmentally sustainable sectors
Sustainable Financial System	Green Bonds, Green Sukuk, ESG Finance, Green Credit, Sustainable Investment	Sustainable finance instruments are growing but remain insufficient to support large scale green transformation.	Becomes the primary bottleneck in achieving sustainable economic development.
Green and Digital Economic Transformation	Renewable Energy Development	Expansion of solar, wind, hydro, and geothermal energy requires substantial investment	Supports carbon emission reduction and energy security.
	AI-Based Smart Grids	Adoption remains limited and fragmented.	Improves energy efficiency and grid resilience.
	Low Carbon Industries	Implementation varies across sectors and regions	Facilitates industrial decarbonization and sustainable production.
	ESG Implementation	ESG adoption continues to strengthen across financial and corporate sectors.	Enhances corporate sustainability and long term competitiveness.
	Green Technologies	Require stronger investment support and	Increases green productivity and

Level of Analysis	Key Components	Empirical Conditions in Indonesia	Implications for the Green Transition and Economic Resilience
Expected Outcomes		innovation ecosystems.	environmental performance
	Sustainable Economic Growth	Increased productivity and economic diversification.	Strengthens long term economic resilience.
	National Energy Security	Diversified renewable energy sources.	Reduces dependence on fossil fuels and external energy shocks.
	Global Competitiveness	Increased investment attractiveness and innovation capacity.	Enhances Indonesia's position in the global economy.
	Sustainable Investment Growth	Long term capital mobilization toward green sectors.	Supports sustainable development objectives
Ultimate Goal	Golden Indonesia 2045	Green Job Creation	Expansion of employment opportunities in sustainable industries
		A resilient, inclusive, low carbon, and globally competitive economy	Achieving developed country status through sustainable economic transformation.

Source: Developed by the authors based on the synthesis of research findings, the Digital Green Economic Resilience (DGER) Framework (2026), data from the Financial Services Authority (OJK), the Ministry of Finance of the Republic of Indonesia, and relevant green economy literature.

Table 4 connects empirical findings to the study's three objectives by assessing how sustainable finance and green economy instruments foster economic stability and job creation. It analyzes the role of ESG financing and energy transitions in low carbon growth, emphasizing that cross sectoral synergy is vital to accelerating green innovation and achieving the Golden Indonesia 2045 vision.

RQ1: How does the green economy contribute to Indonesia's economic resilience?

The table demonstrates that renewable energy development, low carbon industries, ESG implementation, and green technologies strengthen economic resilience through economic diversification, energy security, emission reduction, and sustainable job creation.

RQ2: How does sustainable finance support the green economic transition?

The findings show that green bonds, green sukuk, ESG finance, green credit, and sustainable investment serve as critical financing mechanisms for supporting green transformation. However, implementation remains constrained by financing gaps, low green credit allocation, and limited private-sector participation.

RQ3: How can Digital Green Economic Resilience (DGER) support Golden Indonesia 2045?

The table illustrates that sustainable finance functions as the foundation for digital green innovation (e.g., AI based smart grids and green technologies), which subsequently drives green economic transformation and ultimately enhances economic resilience.

Therefore, the findings confirm that achieving Golden Indonesia 2045 requires not only economic growth but also the integration of sustainable finance, green transformation, digital innovation, and improvements in financial literacy to overcome existing structural bottlenecks.

When cross examined with the theoretical framework illustrated in Figure 2, these empirical realities expose a critical bottleneck in Indonesia's strategic pathway. Figure 2 conceptualizes a

sequential, interdependent flow where Sustainable Finance Instruments act as the foundational catalyst to drive Green Technological Innovation and Renewable Energy Deployment, ultimately resulting in National Economic Resilience.

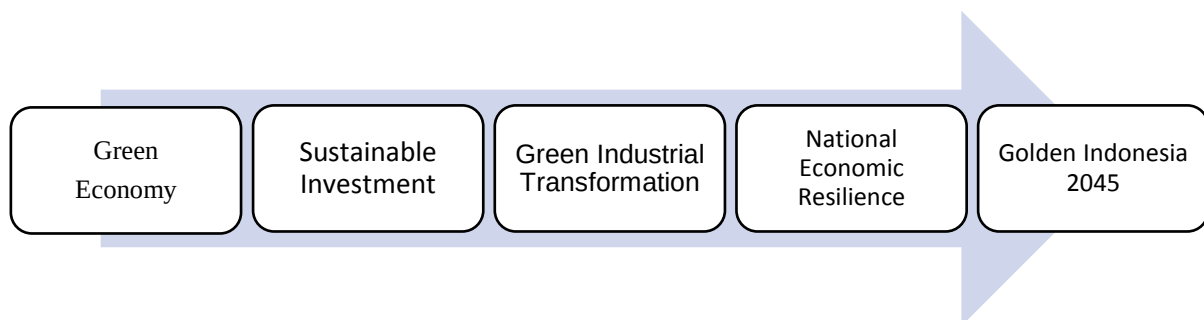
However, the empirical findings demonstrate that the "Financial System" pillar in Figure 2 is currently bottlenecked by the low green literacy and the massive state budget deficit. Because commercial banks allocate less than 12% to green sectors and private corporations avoid green bonds due to high issuance costs, the catalytic flow intended to fund renewable energy and AI driven smart grids is disrupted. Without correcting the root causes of low literacy (Points A to D) and addressing the funding gap, the conceptual sequence in Figure 2 cannot successfully translate into long term structural resilience or developed nation status by 2045. Therefore, closing the financial literacy gap is not merely an educational goal, but a structural prerequisite to unlocking the entire macro model of Sustainable Development in Indonesia.

Comparative Insights and Challenges

While encouraging, Indonesia's progress still reveals structural challenges. Limited green infrastructure development, human capital gaps, and low levels of sustainable financial literacy among stakeholders constrain the pace of implementation. Comparative analyses with advanced economies indicate gaps in technological readiness, regulatory coherence, and institutional capacity (World Bank, 2021; UNECE, 2020). For example, regulatory frameworks in developed countries often feature more comprehensive carbon pricing mechanisms, clearer tax incentives for green investment, and more mature sustainability reporting standards (European Commission, 2020; UK Government, 2021). These gaps highlight areas where Indonesia can strengthen its policy architecture and capacity building.

Integrated Model Toward Golden Indonesia 2045

Figure 2 presents an integrated model that conceptualizes the sequential and interdependent relationship between green economy components and sustainable finance as enablers of national resilience and long term prosperity. This theoretical model aligns with existing frameworks in sustainability transitions literature, which underscore systemic coherence across policy, finance, and innovation domains (Geels et al., 2017; Köhler et al., 2019).



Source: Author's Data Processing Results

Figure 2. Integrated Green Economy and Sustainable Finance Model Toward Golden Indonesia 2045

The findings validate the proposition that green economy strategies strengthen the structural foundations of economic resilience by diversifying productive capacities, enhancing adaptive

capabilities, and fostering sustainable job creation (Cohen & Tubb, 2018; Hepburn et al., 2020). Practically, these results recommend that policymakers, financial regulators, and private sector actors intensify efforts to institutionalize renewable energy targets, enhance ESG frameworks, promote digital transformation, and expand financial incentives that support sustainable business practices.

Limitations and Future Research

While offering valuable findings, this investigation inherently notes several limitations related to its reliance on secondary data and literature review without direct empirical field observation. This approach, while robust for synthesizing macro level insights, may not fully capture regional variations in implementation outcomes or stakeholder perceptions. Future research should incorporate quantitative metrics and mixed method designs to empirically test causal relationships between policy interventions, investment flows, and resilience outcomes. Longitudinal studies would also enable examination of trends over time and measurement of policy effectiveness across different governance contexts.

CONCLUSION

This study concludes that the integration of green economy and sustainable finance plays a crucial role in strengthening Indonesia's economic resilience and supporting the achievement of Golden Indonesia 2045. The findings demonstrate that renewable energy development, green investment, ESG implementation, low carbon transformation, and green innovation contribute to economic diversification, energy security, environmental sustainability, and the creation of green employment opportunities.

Sustainable finance instruments, including green bonds, green sukuk, ESG finance, and green credit, are identified as key drivers of the green transition. However, Indonesia still faces major challenges, such as limited private sector participation, financing gaps for climate commitments, low green credit distribution, and insufficient sustainable financial literacy. These barriers reduce the effectiveness and speed of green economic transformation.

This research introduces the Digital Green Economic Resilience (DGER) framework, which integrates sustainable finance, digital innovation, and green economic transformation as a strategic pathway toward a resilient and sustainable economy. The framework highlights that sustainable finance enables digital technologies, such as artificial intelligence, smart systems, and green innovation, which accelerate Indonesia's transition toward a low carbon economy.

To achieve Golden Indonesia 2045, Indonesia requires stronger policy coordination, expanded green infrastructure financing, improved ESG and financial literacy, simplified green taxonomy implementation, and greater private sector involvement. Although this study is limited by its reliance on secondary data and literature analysis, the findings provide a foundation for future empirical research using quantitative and mixed method approaches.

Ultimately, the successful integration of sustainable finance, digital innovation, and green economic transformation will determine Indonesia's capacity to build an inclusive, resilient, and globally competitive economy by 2045.

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Gratitude is further expressed to all parties involved in supporting the advancement of sustainable development initiatives, green innovation, and environmental awareness, which have become important foundations for this study. It is hoped that this research will contribute to intellectual development, strategic policymaking, and long term economic sustainability transformation for Indonesia's future competitiveness in the global era.

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