IJESE
*(*International Journal of Econimics, Science, and Education*)*
Volume 3 Number 2 2026

ISSN : 3046-689X (ONLINE)

MEASURING INDONESIA'S SUSTAINABILITY TRANSITION: A LITERATURE REVIEW OF GREEN, BLUE, ENVIRONMENTAL, AND REGIONAL COMPETITIVENESS INDICES

Pardomuan Robinson Sihombing

BPS-Statistics Indonesia, Jln dr Sutomo No 6-8 Jakarta
Correspondence Author Email: robinson@bps.go.id

ABSTRACT

Purpose: This study examines Indonesia's transition toward sustainable development in achieving the 2045 Golden Indonesia Vision by analyzing the performance and challenges reflected in four major sustainability indices: the Green Economy Index (GEI), Indonesian Blue Economy Index (IBEI), Environmental Quality Index (EQI), and Regional Competitiveness Index (RCI). The study addresses the need for a comprehensive understanding of how these indices collectively portray sustainability progress and structural gaps.

Design/methodology/approach: A systematic literature review approach was employed by synthesizing data from government reports, official publications, and academic journals. The study analyzes each index in terms of its conceptual framework, methodology, and key findings to identify patterns, inconsistencies, and policy implications.

Findings:The findings reveal a complex and sometimes contradictory narrative of sustainable development in Indonesia. The GEI indicates progress primarily driven by improvements in the socio-economic pillar. However, the environmental pillar remains consistently weak, with the EQI showing volatility in Marine Water Quality (MWQ), highlighting a gap between blue economy ambitions and ecological realities. Additionally, the IBEI records a relatively low initial national score (43.98), suggesting early-stage development challenges. Meanwhile, the RCI uncovers significant regional disparities in competitiveness, which may act as structural barriers to achieving inclusive and balanced sustainable development.

Research limitations/implications: This study is limited to secondary data sources and literature-based analysis. Future research is recommended to incorporate empirical and quantitative approaches to validate and expand the findings, particularly in assessing inter-index relationships and regional dynamics.

Practical implications: The results suggest the need for more integrated and balanced policy strategies, particularly in strengthening environmental performance, aligning blue economy initiatives with ecological sustainability, and reducing regional competitiveness gaps. Policymakers should prioritize cross-sectoral coordination to ensure more inclusive and sustainable national development.

Originality/value*:* This study provides a comprehensive synthesis of Indonesia's key sustainability indices, offering a holistic perspective that highlights inconsistencies and structural challenges often overlooked in single-index analyses.

Paper type*: Literatur review*

Keyword: *Blue Economy Index, Environmental Quality Index, Green Economy Index, Regional Competitiveness*

A. INTRODUCTION

The 21st century is marked by a paradigm shift in global development towards sustainability, crystallized in an international consensus through the Sustainable Development Goals (SDGs). This agenda requires countries to balance economic, social, and environmental pillars in every

ISSN : 3046-689X (ONLINE)

development policy. For Indonesia, this context coincides with the national ambition outlined in the "Indonesia Emas" 2045 Vision: to become a developed and high-income country. Achieving this vision requires consistent Gross Domestic Product (GDP) growth of 6-7% per year, a target that historically has often been achieved at the expense of environmental sustainability. Thus, Indonesia faces a fundamental double challenge: spurring economic growth to escape the middle-income *trap* while mitigating environmental degradation and the increasingly apparent impacts of climate change.

As a strategic response to this dilemma, the Indonesian government has adopted *the green* and *blue* economy frameworks as "game changers" in the national economic transformation agenda. This concept is explicitly integrated into national planning documents, particularly the 2020-2024 National Medium-Term Development Plan (RPJMN), which places low-carbon development and climate resilience as one of seven key development agendas. This commitment affirms that future economic growth must align with increasing environmental carrying capacity and resilience. However, commitments and policies at the macro level will not be effective without a robust measurement, monitoring, and evaluation framework. Developing composite indices is crucial in translating abstract sustainable development goals into measurable and evaluable targets. These indices serve as a report card for assessing performance and as a diagnostic tool for identifying areas that require further policy intervention and ensuring that economic transformation is on the right track.Several studies have examined the implementation and impact of the green economy in Indonesia. For example, Lumbanraja & Lumbanraja (Lumbanraja & Lumbanraja, 2023) found a positive and significant influence between applying green economy variables and state revenue in the 2011-2020 period. Another study focused on the challenges in implementing green growth programs and conducted a comprehensive literature review on the green economy as a sustainable development strategy. However, there is a significant *gap* between policy discourse and the reality of implementation. Some academics argue that the issue of sustainable development in Indonesia is often still limited to rhetoric, where there is a discrepancy between the narrative of green growth and the reality on the ground (Prasetya & Ali, 2024). This gap is also manifested in data availability; for example, the Ministry of National Development Planning (Bapenas, 2022) only releases GEI at the national level, making it difficult to conduct analysis and formulate effective policies at the regional level (Nurkarim, 2024). Furthermore, critics also highlight the lack of data accuracy and dependence on technology as obstacles in designing effective green economic policies in developing countries such as Indonesia (Nurlaeli & Koerniawan, 2025). Therefore, a comparative review synthesizing findings from various existing indices is crucial to holistically map where progress, contradictions, and gaps in implementation actually lie.

While previous studies have examined the implementation of the green economy in isolation such as the work of Lumbanraja & Lumbanraja (Lumbanraja & Lumbanraja, 2023) this study offers a distinct original contribution by employing a cross-index integration approach. By synthesizing four major indices (GEI, IBEI, EQI, and RCI) simultaneously, this research moves beyond single-dimension analysis to uncover hidden policy incoherences. This comparative analytical framework allows for a diagnostic assessment of whether economic progress aligns with biophysical health and regional capacity, a perspective often missing in existing literature that tends to treat these indices as separate reporting silos.

Based on this urgency, this paper aims to conduct a systematic literature review of several key indices relevant to economic sustainability in Indonesia. Key research questions include how the conceptual, methodological, and empirical frameworks of the Green Economy Index (GEI), Blue Economy Index (BEI), Environmental Quality Index (EQI), and Regional Competitiveness Index (RCI) interact to explain the status of Indonesia's sustainability transition, and where do structural gaps and policy incoherences lie that hinder the achievement of inclusive and sustainable national development targets? This study seeks to synthesize and critically analyze the conceptual framework,

ISSN : 3046-689X (ONLINE)

calculation methodology, published results, and collective narratives presented by these indices regarding Indonesia's progress and challenges in its transition to sustainability.

B. LITERATURE REVIEW

This section outlines the theoretical foundations and current empirical reviews relevant to sustainability measurement in developing countries, particularly Indonesia.

2.1 Theoretical Basis

Ecological Modernization Theory

The analysis of Indonesia's sustainability transition is primarily based on the Theory of Ecological Modernization (EMT). EMT, popularized by Mol (Mol, 2000) and Spaargaren (Spaargaren, 2000), argues that economic growth and environmental protection can be synergized through technological innovation and institutional efficiency, without the need for de-growth. In the Indonesian context, the GEI narrative that emphasizes energy efficiency and reducing emission intensity per unit of GDP is a manifestation of this optimism of EMT. However, sociological critics warn that EMTs in developing countries are often technocratic and fail to touch the root of the inequality of resource distribution.

Decoupling Theory

The concept of decoupling distinguishes between economic growth and environmental pressures. Relative decoupling occurs when environmental impacts grow more slowly than the economy, whereas absolute decoupling occurs when environmental impacts decline as the economy grows. Shi and Smith's (Shi & Smith, 2025)study in developing countries shows that while renewable energy technologies help, aggressive GDP growth often negates those savings, holding countries in a relative phase of decoupling.

Triple Bottom Line (TBL) and Competitive Advantage

Elkington (Elkington, 1998) introduced TBL (People, Planet, Profit) as a sustainability accounting framework. This framework is adopted in the structure of GEI and IBEI. In addition, Porter's hypothesis) suggests that strict environmental regulation can spark innovations that increase competitiveness. In Indonesia, Basunari and Suardana (Basunari et al., 2025) found that regional innovation is positively correlated with the competitiveness index, supporting the relevance of this hypothesis at the regional level.

2.2 Dynamics of the Green and Blue Economy in Indonesia

Green Economy Index (GEI)

Studies by Bappenas (2022) and Nurkarim (Nurkarim, 2024) show an upward trend in Indonesia's GEI score, driven by improvements in energy intensity and social indicators. However, Wijayanti and Sari (Wijayanti & Sari, 2024) highlight that the environmental pillar is often lagging behind the economic pillar, indicating that the transition is still dominated by technical efficiency rather than ecological restoration. Prasetio et al (Prasetio et al., 2025), through bibliometric analysis, also found that the focus of research is still heavy on macro policy aspects, while technical implementation in the field still faces obstacles to technology adoption.

Indonesia Blue Economy Index (IBEI)

As a newer concept, the IBEI launched by Bappenas (2023) uses dynamic weights based on Principal Component Analysis (PCA), which places environmental variables as the primary determinant of performance variance between provinces. The case study of Podungge et al. (Podungge et al., 2025) reveals the challenges of blue economy implementation, where land extractive activities often damage coastal ecosystems, creating a conflict between "blue" growth targets and the reality of pollution.

Environmental Quality Index (EQI)

ISSN : 3046-689X (ONLINE)

Sihombing et al. (Sihombing et al., 2025) conducted an econometric analysis of EQI determinants in 34 provinces. Their findings confirm that GDP has a significant negative correlation with environmental quality, proving that the trade-off between growth and the environment is still fundamental (environment-economy trade-off). On the other hand, the Human Development Index (HDI) and the regional environmental budget are positively correlated. Kusumadewi and Kristanto (Kusumadewi & Kristanto, 2025) added that population pressure and urbanization in big cities such as Jakarta significantly reduce EQI scores.

C. METHODOLOGY

This study uses a literature review design (*systematic literature review*) with a qualitative approach. A literature review is a series of activities related to collecting library data, reading, taking notes, and processing research materials without conducting field research. Sugiyono (Sugiyono, 2019) states that this method is a theoretical study, reference, and other scientific literature relevant to the studied social situation. The main uses of this method are to gather information relevant to the research topic, provide a strong theoretical foundation, and deepen the researcher's understanding of the issues being studied (Sulistyo-Basuki, 2010). This method was chosen to perform a descriptive-comparative synthesis to analyze and integrate findings from various data sources relevant to sustainability indices in Indonesia.

The primary data sources in this study are official publications, technical reports, and presentation materials published by government agencies responsible for the development and management of each index. Specifically, data for the Green Economy Index (GEI) and the Indonesian Blue Economy Index (IBEI) were obtained from the Ministry of National Development Planning (Kementerian PPN/Bappenas) (Bapenas, 2022; Fadlilah et al., 2024). The Environmental Quality Index (EQI) data were sourced from the Ministry of Environment and Forestry (KLHK). Meanwhile, the Regional Competitiveness Index (RCI) data was sourced from the National Research and Innovation Agency (BRIN).

In addition to primary sources, this study also utilizes secondary data from *peer-reviewed* academic journals. Literature searches were conducted through scientific databases using keywords such as "Green Economy Index," "Indonesia Blue Economy Index," "EQI," "Regional Competitiveness Index," "sustainable development in Indonesia," and "green growth in Indonesia." These journals were used to enrich the analysis, provide critical perspectives, and contextualize the findings from government reports within a broader academic discourse.

The selection of literature followed a rigorous protocol to ensure data validity. The inclusion criteria were: (1) Peer-reviewed journal articles and official government reports published between 2020 and 2025; (2) Research focused specifically on the methodology or empirical results of the GEI, IBEI, EQI, and RCI in Indonesia; and (3) Documents available in English or Indonesian. Exclusion criteria involved opinion pieces without empirical data and studies not directly related to the specific indicators of the four indices.

Following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, the initial search across scientific databases (Google Scholar, ScienceDirect) and institutional repositories (Bappenas, KLHK, BRIN) yielded 85 potential sources. After screening titles and abstracts, and conducting a full-text eligibility check, a total of 20 core documents comprising 12 academic papers and 8 official technical reports were selected for the final synthesis and thematic analysis.

The data analysis process was conducted through thematic synthesis. Information extracted from each source was organized based on a predetermined structure, covering four main aspects: (1) institutional background and index objectives, (2) conceptual framework and components, (3) calculation methodology, and (4) reported trends and key findings. After the data for each index were

ISSN : 3046-689X (ONLINE)

mapped, a comparative analysis was conducted to identify convergences, divergences, and cross-index themes that emerged, becoming the basis for discussion and conclusion.

D. RESULTS AND DISCUSSION

Analyzing a series of sustainability indices in Indonesia provides a comprehensive picture of the country's status and direction of transition towards more balanced development. This section presents historical data from each index to provide a quantitative basis before moving on to a more in-depth discussion. The following is a record of each index's scores from inception until the latest available data. The national policy architecture clearly articulates the government's commitment to sustainable development. Integrating low-carbon development into the 2020-2024 RPJMN as one of the priority development agendas is a key foundation. This commitment is reinforced by the document's more ambitious long-term targets, *Long-Term Strategy for Low Carbon and Climate Resilience 2050* (LTS-LCCR 2050), and the target of achieving *Net Zero Emissions* (NZE) by 2060 or sooner. This high-level policy framework demonstrates strong political will. It serves as the foundation for developing and implementing monitoring indices such as the GEI and IBEI and serves as the basis for developing and implementing monitoring indices such as the GEI and IBEI.

Table 1. Trends in Green Economy Index (GEI) Scores and Their Pillars, 2011-2020

Year	Pillar			Score
	Environmental	Economic	Social	GEI
2011	44.15	48.70	48.75	47.20
2012	43.26	49.60	52.99	48.59
2013	42.43	55.41	54.34	50.80
2014	43.40	58.92	55.58	52.85
2015	41.31	57.32	55.64	51.54
2016	42.37	64.26	57.94	55.28
2017	47.01	64.22	59.17	57.13
2018	47.84	63.59	61.50	57.79
2019	48.24	57.89	63.03	56.04
2020	52.35	64.98	59.00	59.17

Source: Ministry of National Development Planning, 2022

The Green Economy Index (GEI) was officially launched by the Ministry of National Development Planning/Bappenas in August 2022 as one of the 'game changers' to support Indonesia's economic transformation. This launch reaffirms the government's commitment to making the GEI a *tangible* and accurate measuring tool in evaluating the transition to a green economy, which balances economic growth, social welfare, and environmental quality. This transition is projected to provide various benefits, including average GDP growth of 6.1-6.5% per year until 2050, creating 1.8 million green jobs by 2030, and reducing emission intensity by up to 68% by 2045. The index comprises 15 multidimensional indicators grouped into three pillars: economic, social, and environmental, and is planned to be one of the macro development targets in future national planning documents.

Historical data from 2011 to 2020 shows that the GEI composite score has increased by 25% from 47.20 to 59.17. Analysis by pillar reveals different dynamics. The Economic pillar shows the most progressive improvement, jumping from 48.70 in 2011 to 64.98 in 2020, driven mainly by significant improvements in Final Energy Intensity. The Social pillar also shows a stable growth trend, rising from 48.75 to 59.00, despite a decline in 2020 due to the impact of the COVID-19 pandemic, which increased unemployment rates.

ISSN : 3046-689X (ONLINE)

Although the GEI composite score shows a positive trend, a more in-depth analysis at the pillar level reveals a crucial paradox. The Environmental pillar consistently records the lowest composite score each year compared to the economic and social pillars, with a final score of 52.35 in 2020. This data indicates that Indonesia's "green economy" progress is driven more by socio-economic and energy efficiency improvements rather than by fundamental improvements in environmental quality or accelerated energy transition. This finding aligns with other analyses highlighting that, despite the positive and significant impact of the green economy on state revenue ([10), the main challenge remains implementing environmental policies. For example, although the score for the Renewable Energy Share indicator tripled in a decade (from 8.98 to 28.86), this indicator remains one of the lowest-scoring. The contribution of renewable energy, which is still far from the national target of 23% by 2025, shows that "growth" in "green growth" still outweighs its "green" component. This trajectory risks steering Indonesia toward a more brown economy. *Efficient*, rather than a truly *green* economy, thereby threatening the sustainability of growth itself in the long term. Indonesian Blue Economy Index (IBEI)

The Indonesian Blue Economy Index (IBEI) is the most recently developed index by Bappenas. The first data published for 2023 presents scores at the provincial level and a national average score of 43.98. The official launch of this index is planned for 2025.36. Therefore, historical data in time series format for IBEI is not yet available. As the world's largest archipelagic country, the marine-based economic potential is highly strategic. To guide and measure its development, Bappenas launched the Indonesian Blue Economy Index (IBEI) as part of the *Indonesia Blue* Economy *Roadmap*. The IBEI is designed as a comprehensive tool to measure blue economy performance at the provincial level. Its structure consists of three main pillars (Economy, Environment, and Society), which are further broken down into 11 sub-pillars and 44 specific indicators. The national average IBEI score in 2023 is 43.98, indicating that the overall implementation of the blue economy is still in its early stages.

One of the methodological advantages of IBEI is the use of hierarchical *Principal Component Analysis* (PCA) to determine the weight of each pillar and sub-pillar. This approach allows weights to be generated automatically based on variance in the data, making it more objective and statistically robust than arbitrary weighting. The results of the calculations for IBEI 2023 show that the Environment pillar has the highest weight (37%), followed by the economy (33%) and Social (31%) pillars. In terms of results, there are significant variations in performance between provinces, with South Sulawesi (80.86) and East Java (71.63) ranking at the top.

It is not merely a technical choice, but instead yields. The fact that the PCA model statistically assigns the highest weight to the environmental pillar, driven by sub-pillars such as resource quality, marine conservation, and renewable energy, is strong empirical validation. This data means that variations in marine environmental health are statistically the most significant determining factor explaining differences in overall blue economy performance across Indonesian provinces. This finding quantitatively supports the argument that healthy marine ecosystems are not merely a *co-benefit* but a fundamental prerequisite for a productive and sustainable blue economy. This data aligns with academic views that emphasize the importance of conservation in the blue economy framework. This result provides a strong basis for rejecting policies prioritizing exploiting marine resources at the expense of environmental health.

Table 2. Environmental Quality Index (EQI) Score Trends and Their Components, 2020-2024

Index	2020	2021	2022	2023	2024
Water Quality Index (WQI)	53.53	52.82	53.88	54.59	54.78

ISSN : 3046-689X (ONLINE)

Index	2020	2021	2022	2023	2024
Air Quality Index (AQI)	-	-	88.06	88.67	90.13
Land Quality Index (IKL)	59.54	60.72	60.72	61.79	61.95
Marine Water Quality Index (MWQ)	-	-	84.41	78.84	81.67
EQI Composite	71.67	71.45	72.42	72.54	73.53

Source: Ministry of Environment and Forestry, 2025

Unlike the GEI and IBEI, which measure economic transformation, the Environmental Quality Index (EQI) managed by the Ministry of Environment and Forestry serves as a direct barometer of the actual health of ecosystems. At the national level, the EQI is a composite index calculated from four main components: the Water Quality Index (IKA) for rivers, the Air Quality Index (IKU), the Land Quality Index (IKL), and the Marine Water Quality Index (MWQ). The national IQLI calculation uses an aggregation formula with predetermined fixed weights, namely IQLI = (0.34 × WQI) + (0.428 × AQI) + (0.133 × LQI) + (0.099 × MQI).

Based on the latest data for 2024, the national EQI score reached 73.53, an increase of 0.99 points from the previous year. This increase was driven by improvements in all components, particularly significant increases in the Air Quality Index (up 1.46 points) and the Marine Water Quality Index (up 2.83 points). However, behind this positive trend, volatility in the marine component is an important note. After experiencing a sharp decline from 84.41 in 2022 to 78.84 in 2023, the MWQ score recovered to 81.67 in 2024.

The sharp fluctuations in the MWQ score, despite showing improvement in 2024, remain a serious sign of vulnerability, especially when compared to the national ambition to develop a blue economy. Studies show that the quality of the living environment in Indonesia is significantly influenced by factors such as population density and economic growth, which often exert negative pressures. ([27)] While the overall EQI picture appears to be improving partly due to its heavy weighting on air quality, the unstable health of marine ecosystems points to critical underlying weaknesses. This phenomenon points to potential policy incoherence or an "implementation gap" (*implementation gap*) between the economic development goals promoted by Bappenas through IBEI and the environmental protection mandate carried out by KLHK (Kementrian Lingkungan Hidup dan Kehutanan, 2022)(Statistik, 2022) through EQI. Pursuing blue economic growth that is not balanced with consistent and measurable environmental protection will ultimately damage the natural resource base that underpins the economy, thereby threatening its long-term sustainability.

Table 3. Average National Regional Competitiveness Index (RCI) Scores

Year	National Average Score
2022	3.26
2023	3.44
2024	3.43

Source: National Research and Innovation Agency, 2025

ISSN : 3046-689X (ONLINE)

Sustainability at the national level cannot be separated from capacity and productivity at the regional level. The Regional Competitiveness Index (RCI), developed by BRIN, measures this aspect by adopting the *Global Competitiveness Index* (GCI) framework from *the World Economic Forum* (WEF). The RCI is built on four main components (enabling environment, human resources, markets, and innovation ecosystem) supported by 12 pillars: Institutions, Infrastructure, Health, and Skills.

The results of the 2024 RCI measurement show a national average score of 3.43 on a scale of 5. Although there has been a slight fluctuation from previous years, the most notable finding remains consistent: there is a concentration of provinces with high competitiveness scores, almost all of which are located on the island of Java. This pattern is in line with economic contribution data, where the national GDP is still heavily supported by Java.

The RCI results reveal that the fundamental elements for building a productive, innovative, and sustainable economy, such as strong institutions, adequate infrastructure, and skilled human resources, are not evenly distributed across the archipelago. This spatial disparity poses a serious threat to the national sustainability agenda. Sustainable development requires inclusive growth, but RCI data shows that the foundations for this are still very uneven, a reality highlighted in the BRIN study, which found that Indonesia's competitiveness profile is at a moderate level and uneven across regions. Regions outside Java, many of which are rich in natural resources for the green and blue economy (e.g., maritime potential in Eastern Indonesia), lack the fundamental competitiveness to manage and develop this potential sustainably. Without targeted interventions to strengthen "basic requirements" (*fundamental requirement factors*) in less competitive regions, the national push for a green and blue economy risks exacerbating existing inequalities and triggering unsustainable resource exploitation practices as a shortcut to catching up.

An analysis of the four indices together reveals a more complete picture. A comparison of methodologies, as summarized in Table 4, shows a diversity of approaches to measuring sustainability, from statistics-based (PCA in IBEI) to fixed weights (EQI). These methodological choices inherently influence the narrative produced by each index.

Table 4. Comparison of Sustainability Index Methodology Frameworks in Indonesia

Attributes	Green Economy Index (GEI)	Indonesian Blue Economy Index (IBEI)	Environmental Quality Index (EQI)	Regional Competitiveness Index (RCI)
Responsible Institutions	Ministry of National Development Planning/Bappenas	Ministry of National Development Planning/Bappenas	Ministry of Environment and Forestry (KLHK)	National Research and Innovation Agency (BRIN)
Main Objectives	To measure progress in the transformation towards an economy that balances growth, social welfare, and environmental quality.	Measuring cross-provincial blue economy performance to support the Blue Economy Roadmap.	Measuring the quality of environmental media (water, air, land, sea) as indicators of ecosystem health.	Measuring regional productivity and competitiveness levels as the foundation for economic development.

ISSN : 3046-689X (ONLINE)

Attributes	Green Economy Index (GEI)	Indonesian Blue Economy Index (IBEI)	Environmental Quality Index (EQI)	Regional Competitiveness Index (RCI)
Core Pillars/Components	3 Pillars (Economy, Society, Environment)	3 Pillars (Economy, Environment, Society)	4 Components (Water Quality Index, Air, Land, Seawater)	4 Components (Supporting Environment, Human Resources, Market, Innovation Ecosystem)
Number of Indicators	15 Indicators	44 Indicators	Hundreds of parameters at monitoring points, aggregated into 4 component indices.	64 Indicators (Provinces), 51 Indicators (Regencies/Cities)
Calculation/Weighting Methodology	Normalization and aggregation (method not detailed in source)	Multi-level *Principal Component Analysis* (PCA) for automatic data-based weighting.	-weighted aggregation with *predetermined fixed weights*.	Adopting the Global Competitiveness Index (GCI) framework, hierarchical aggregation.

A synthesis of key findings reveals several cross-sectoral themes. The narrative of progress presented by GEI is undermined by the persistently low performance of its environmental pillar. The ambitious goals of IBEI and the Blue Economy Roadmap face real challenges in the form of volatile marine ecosystem health, as reflected in the MWQ score. Furthermore, the scope of national ambitions in GEI and IBEI is limited by the reality of regional capacity gaps revealed by RCI.

The gap between policy targets and measurable results provides empirical evidence for the criticism often raised in academic literature, which states that implementing sustainable development in Indonesia is sometimes still limited to rhetoric. The gap between the improving GEI score and the environmental challenges that persist, or between the Blue Economy Roadmap and the fluctuating MWQ score, can manifest this gap between rhetoric and reality. The policy implications are clear: a siloed approach to viewing and using these indices is no longer adequate. Policy makers need an integrated view. For example, RCI results should be the basis for determining where green infrastructure investment is most urgently needed to build regional capacity. EQI data, particularly MWQ, should trigger reviewing regulations and practices in sectors covered by GEI and IBEI, such as fisheries and marine.

Discussion

The data presented in Tables 1 and 2 suggests a gap in the practical application of Ecological Modernization Theory (EMT). While GEI scores show an upward trend, the volatility in Marine Water Quality (MWQ) despite blue economy ambitions indicates that "technological optimism" has

ISSN : 3046-689X (ONLINE)

not yet successfully mitigated anthropogenic pressure on ecosystems. This points to a state of "relative decoupling" rather than "absolute decoupling," where efficiency improvements are overshadowed by the sheer scale of economic activities.

Furthermore, the RCI results (Table 3) reveal a structural barrier to sustainability. Porter's Hypothesis suggests that regulation triggers innovation and competitiveness; however, the persistent concentration of competitiveness in Java suggests that "green innovation" is not yet being distributed equitably. Theoretically, this implies that Indonesia's sustainability transition risks becoming a "two-tier" system, where natural-resource-rich regions outside Java may remain trapped in extractive models to compensate for their lack of innovative competitiveness, thereby undermining the national EQI targets.

The Gap Between Policy Narratives and Biophysical Reality

While the GEI shows improvements in the composite score, a closer analysis of the Environmental Impact Assessment components reveals vulnerabilities. KLHK (2024) data shows volatility in the Marine Water Quality Index, which declined sharply in 2023 before recovering slightly in 2024. This result aligns with the findings of Podungge et al. (Podungge et al., 2025) regarding the impact of land-based pollution on marine ecosystems. This misalignment indicates that the increase in the green economy score (efficiency) has not fully translated into improvements in ecosystem quality (effectiveness).

Competitiveness Disparities and the Challenge of Equity

The 2024 IDSD Report from BRIN confirms Java's dominance in competitiveness and innovation scores. Basunari and Suardana (Basunari et al., 2025)emphasize that without affirmative policy interventions to increase innovation capacity outside Java, the green economy transition risks widening regional disparities. Natural resource-rich regions outside Java tend to be trapped in extractive economic models that lower their IKLH scores, as found in a study by Sihombing et al. (Sihombing et al., 2025).

E. CONCLUSION

This literature review concludes that Indonesia has successfully built a sophisticated and multifaceted index ecosystem to monitor its transition towards sustainable development, demonstrating a serious commitment to making this agenda measurable. However, a holistic analysis of the GEI, IBEI, EQI, and RCI reveals a complex and challenging narrative. There has been real progress on the socio-economic dimension, as reflected in the positive trend in GEI scores. However, this progress is overshadowed by persistent weaknesses in the environmental pillar, volatility in marine ecosystem health, and exacerbated by deep regional competitiveness gaps. The journey towards sustainable development is underway, but progress remains partial, uneven, and faces significant structural obstacles. Therefore, further research is urgently needed, for example, through econometric studies to test the causal relationship between specific policy interventions and changes in the indicators within these indices, as well as qualitative case studies at the sub-national level to bridge the gap between macro data and the reality of implementation in the field. From a policy perspective, these findings imply the urgency of forming a cross-ministerial task force to address the volatility of MWQ scores, using RCI results as a strategic instrument to channel green investment evenly, and conducting a policy review focused on strengthening the environmental pillar of the GEI, particularly accelerating the transition to renewable energy. This synergy is crucial because the sustainability transition requires more than just policy ambition; it requires coherence, synergy, and practicality.

In conclusion, the journey toward sustainability is underway, but the "implementation gap" between economic indices (GEI/IBEI) and environmental health (EQI) must be bridged by utilizing

ISSN : 3046-689X (ONLINE)

RCI as a diagnostic tool for equitable investment. Future policy must shift from narrative-based reporting to a synergetic framework where biophysical limits dictate economic targets.

This study has significant limitations related to its reliance on aggregated secondary data published by government institutions, which may contain administrative bias and lack the capture of specific dynamics at the micro-level. In addition, there is a gap in the availability of historical (time-series) data, especially for new indices such as IBEI, which limits the ability to conduct long-term trend analysis and robust causality tests compared to more established indices such as GEI or IKLH. The focus of analysis at the provincial level also has the potential to obscure the more extreme variations in inequality that occur at the district/city level.

To overcome these limitations, future research agendas need to prioritize empirical validation studies (ground-truthing) using primary data to verify the alignment between policy index scores and biophysical realities in the field. It is also necessary to develop advanced econometric models to test the causality relationship between specific policy interventions (such as carbon taxes) and changes in index scores. Furthermore, integrative research that is able to juxtapose regional capacity data (IDSD) with environmental impact data (IKLH) in a single "meta-index" framework will be invaluable to help with more precise and evidence-based policy formulation.

F. REFERENCES

Bapenas. (2022). *DATA: Indeks Pembangunan Ekonomi Inklusif*. http://inklusif.bappenas.go.id/indeks

Basunari, A. A. S., Suardana, I. R., & Suardana, I. R. (2025). Strategy To Improve Regional Competitiveness Index Through Regional Innovation. *Eduvest - Journal of Universal Studies*, *5*(9), 11115–11124. https://doi.org/10.59188/eduvest.v5i9.52061

Elkington. (1998). *Cannibals with forks: The Triple Bottom Line of 21st Century Businesses* (Gabriola I). New Society.

Fadlilah, D. N., Nurmandi, A., & Fridayani, H. D. (2024). TREN PENELITIAN DALAM PEMBANGUNAN BERKELANJUTAN Perkembangan Mobilitas Cerdas Dan Transportasi Cerdas. *Moderat Jurnal Ilmiah Ilmu Pemerintahan*, *10*(4), 749–771. https://doi.org/10.25157/moderat.v10i4.3967

Kementrian Lingkungan Hidup dan Kehutanan. (2022). SLHI_2022_upload_final_77f9948571. In *Laporan Status Lingkungan Hidup Indonesia 2022 olh Kementrian Lingkungan Hidup dan Kehutanan Republik Indonesia* .

Kusumadewi, D. A., & Kristanto, B. Y. (2025). Analysis of Factors Affecting the Environmental Quality Index (EQI) and Its Implications for Sustainable Development. *Journal of Sustainability, Society, and Eco-Welfare*, *2*(2), 124–140. https://doi.org/10.61511/jssew.v2i2.2025.1452

Lumbanraja, P. C., & Lumbanraja, P. L. (2023). Analisis Variabel Ekonomi Hijau (Green Economy Variable) Terhadap Pendapatan Indonesia (Tahun 2011-2020) dengan Metode SEM-PLS. *Cendekia Niaga*, *7*(1), 61–73. https://doi.org/10.52391/jcn.v7i1.836

Mol, A. P. J. (2000). The environmental movement in an era of ecological modernisation. *Geoforum*, *31*(1), 45–56. https://doi.org/10.1016/S0016-7185(99)00043-3

Nurkarim, W. (2024). Development of Green Economy Index (GEI) with Remote Sensing to Support Sustainable Economy in East Java. *East Java Economic Journal*, *8*(2), 215–243. https://doi.org/10.53572/ejavec.v8i2.124

Nurlaeli, R., & Koerniawan, R. (2025). Kritik Terhadap Green Economy dalam Praktik Pembangunan di Negara. *Trends in Applied Sciences, Social Sciences, and Education* |, *3*(1), 51–70.

ISSN : 3046-689X (ONLINE)

Podungge, A. W., Solihin, D., Adipu, Y., & Aneta, Y. (2025). Blue Economy Policy Implementation and Its Ecological Implications in Tomini Bay. *BISNIS & BIROKRASI: Jurnal Ilmu Administrasi Dan Organisasi*, *32*(3), 1–14. https://doi.org/10.20476/jbb.v32i3.1555

Prasetio, B., Supardi, E., Waspada, I., & Istikomah, N. (2025). Exploring green entrepreneurship for global economic sustainability: A bibliometric and systematic review. *Jurnal Ekonomi Dan Bisnis*, *28*(2), 285–312. https://doi.org/10.24914/jeb.v28i2.13771

Prasetya, P., & Ali, M. M. (2024). Perkembangan Ekonomi Hijau di Indonesia Dalam Perspektif Global: Analisis Bibliometrikdan Strategi Kebijakan. *Juremi: Jurnal Riset Ekonomi*, *4*(2), 503–517.

Shi, S., & Smith, L. (2025). Decoupling growth from degradation: a CS-ARDL and MMQR panel analysis of ecological footprints and sustainable economic growth. *Frontiers in Environmental Science*, *13*(September), 1–15. https://doi.org/10.3389/fenvs.2025.1604011

Sihombing, P. R., Erfiani, Notodiputro, K. A., & Kurnia, A. (2025). *DETERMINANTS OF ENVIRONMENTAL QUALITY INDEX (EQI) IN INDONESIA IN 2018-2022*. *13*(2), 236–245.

Spaargaren, G. (2000). Ecological modernization theory and domestic consumption. *Journal of Environmental Policy & Planning*, *2*(4), 323–335. https://doi.org/10.1080/714038564

Statistik, B. P. (2022). *STATISTIK LINGKUNGAN HIDUP INDONESIA 2022*.

Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Alphabet.

Sulistyo-Basuki. (2010). *Metodologi Penelitian*. Penaku.

Wijayanti, Y. R., & Sari, I. C. (2024). Reinvigorating Sustainable Green Economics in Indonesia: Exploring the Nexus between Global Green Economy Index and SDG 8. *The Journal of Indonesia Sustainable Development Planning*, *5*(3), 203–216. https://doi.org/10.46456/jisdep.v5i3.612