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CREATING A GREEN ECONOMY THROUGH GOVERNMENT EXPENDITURE: EVIDENCE FROM INDONESIA

ABSTRACT

The transition toward a green economy has become a strategic national priority for Indonesia, where fiscal policy, particularly government expenditure, plays a pivotal role in promoting environmentally sustainable growth. This study investigates how the structure and allocation of public spending contribute to the creation of a green economy across Indonesian provinces from 2010 to 2022. Using a panel dataset covering 34 provinces, this research employs quantitative analysis to examine the relationship between four main components of government expenditure, economic affairs (BE), social protection (BS), environmental and natural resources management (BL), and public services (BP), and key indicators of green economic performance, namely the Green Economy Index (GE), Gross Regional Domestic Product (GRDP), and Human Development Index (HDI). The empirical evidence reveals that provinces with higher proportions of economic and environmental expenditures tend to achieve better outcomes in both environmental quality and human development. For instance, DKI Jakarta, Yogyakarta, and Bali consistently record stronger GE values alongside efficient public spending structures. Descriptive financial and economic tables and graphs further illustrate this linkage, showing that fiscal allocation patterns significantly influence regional progress toward green and inclusive growth. These findings highlight that sustainable fiscal policy, through well-targeted and environmentally conscious public expenditure, serves as an effective instrument for achieving Indonesia's green economy agenda. The study not only contributes to the literature on fiscal sustainability and environmental economics but also provides practical insights for policymakers aiming to balance economic development with ecological preservation.

Keywords: green economy, government expenditure, fiscal policy, sustainable development, regional economics, environmental management, Indonesia

JEL Classification: A1, E6, H6, Q5

INTRODUCTION

The concept of a *green economy* represents an approach centered on enhancing societal well-being and promoting social equity, while simultaneously mitigating negative environmental impacts and addressing the scarcity of natural resources. A green economy fosters economic growth and development in a manner that ensures the continued availability of natural resources and ecosystem services for human welfare (Y. Guo et al., 2023). Empirical evidence suggests that the green economy stimulates economic growth while safeguarding the environment and fostering innovative competitiveness, thereby enabling an inclusive socio-economic transformation (Lyulyov & Pimonenko, 2025). However, realizing a green economy requires substantial financial investment due to the considerable resources needed for the advancement of green technologies, which encompass research and development as well as technological upgrading (Jing et al., 2025). Furthermore, uneven government regulation in support of the green economy constitutes a significant barrier to its realization. Inconsistent and poorly targeted public policies and expenditures that fail to align with sustainability principles can hinder the transition toward a green economy (Zhang & Wei, 2024; Aziz & Bakoben, 2024). The development of a green economy also necessitates knowledge transfer, educational

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initiatives, and active societal participation in the advancement of green technologies (Lyulyov & Pimonenko, 2025).

The green economy concept has been widely examined in the literature, particularly in relation to environmentally friendly innovations that drive investment in clean energy research and development, and that accelerate the adoption of eco-friendly technologies across industrial sectors. Chen et al. (2024) emphasize the role of the green economy in achieving sustainable development. Green economic growth can enhance agricultural productivity through the adoption of environmentally sustainable practices and the application of green technologies, potentially reducing import dependency and improving the availability of local food supplies (He et al., 2024). Previous studies on the green economy have predominantly concentrated on the creation of green technologies aimed at improving environmental quality, particularly through eco-friendly production processes and the enhancement of food security. In contrast, the present study focuses specifically on the role of government fiscal policy, considering demographic factors in advancing the green economy. The objective of this research is to provide insights into the impact of local government policies on green economic development by linking expenditure patterns to environmental quality within the framework of a green economy. This investigation examines the role of government policies in promoting the green economy through an empirical study of 350 districts across 38 provinces in Indonesia, with a particular emphasis on how public spending influences green economic outcomes at the district level.

LITERATURE REVIEW

The Concept of Green Economy

According to Guo et al. (2023), the green economy represents a model of economic growth and development that ensures long-term sustainability by safeguarding the capacity of natural resources to deliver goods and ecosystem services essential for human welfare, while simultaneously mitigating environmental degradation, biodiversity loss, and unsustainable resource exploitation. This definition aligns closely with the perspective of the Organisation for Economic Co-operation and Development (OECD). Lyulyov & Pimonenko (2025) similarly define green economic growth as a developmental trajectory that concurrently advances ecological sustainability and economic prosperity. This perspective underscores the necessity of balancing economic advancement with environmental preservation, placing emphasis on innovation, energy efficiency, environmentally responsible resource use, and the mitigation of adverse environmental externalities as fundamental pillars of sustainable growth. Wang & Xu (2024) conceptualize green economic growth as a transformative paradigm that integrates sustainability and environmental stewardship into the core of economic development strategies. This paradigm prioritizes resource efficiency, adoption of clean technologies, deployment of renewable energy, and protection and restoration of ecosystems. It aligns with the Sustainable Development Goals (SDGs), offering a global framework for harmonizing economic expansion with environmental protection and social equity.

Extant empirical research offers valuable insights into the determinants and mechanisms shaping green economic growth (GEG) across various contexts. P. Guo et al. (2024), in *Abundance of Natural Resources, Government Scale, and Green Economic Growth (China)*, identified evidence of a municipal-level "resource curse," whereby expansion in governmental expenditure and personnel exacerbates the decline in GEG. Environmental regulation exhibited a U-shaped relationship with green economic performance. Similarly, Praveen et al. (2025), in *A New Way of Thinking about the Nexus between Green Energy and Green Economic Growth (29 Countries)*, found that green finance significantly fosters green growth. Moreover, green technology mediates 20–21% of the relationship between green finance and green growth, and 8–15% between green energy and green growth, though no mediating effect was found for green finance between green energy and green growth. Wang & Wang (2025), in *China's Green Digital Era: How Does the Digital Economy Enable Green Economic Growth?* demonstrated that the digital economy supports GEG via technological innovation and industrial upgrading. While foreign direct investment (FDI) dampens this positive effect, research and development (R&D) intensity amplifies it. Yu et al. (2024) observed an inverted U-shaped relationship between green innovation and GEG, with stronger effects in resource-based cities, where resource dependence constrains human capital and technological investment. Chen et al. (2024) also found a U-shaped relationship between environmental regulation and GEG, estimating the optimal turning point at a regulation index value of 0.6101, with notable spillover effects across provinces. Finally, in the Saudi Arabian context, Cao et al. (2025) concluded that oil prices, FDI, trade openness, inflation, and GDP growth significantly influence long-term unemployment, underscoring the necessity of economic diversification to mitigate oil dependency.

Public Goods Theory

Extensive empirical evidence suggests that green economic growth is primarily driven by factors such as economic openness, technological innovation, and physical capital investment (P. Guo et al., 2024; X. Wang & Xu, 2024; L. H. Wang et

al., 2025). Green finance and green technologies have been shown to enhance resource efficiency and promote the adoption of renewable energy, while simultaneously mediating the relationship between green energy development and green economic growth (Praveen et al., 2025; Si et al., 2024). Moreover, digital transformation facilitates industrial restructuring, improves energy efficiency, and strengthens green labor skills (B. Wang & Wang, 2025). From a financing perspective, moderate levels of external debt can stimulate green investments, particularly in countries with relatively low initial GDP levels (Ibañez Martín et al., 2024). High labor productivity contributes to reducing carbon and water footprints while increasing green GDP (Yu et al., 2024). Furthermore, appropriately designed environmental regulations promote renewable energy adoption and generate positive interregional spillover effects (Chen et al., 2024). Economic diversification through foreign direct investment (FDI) and trade openness expands opportunities for green job creation (Cao et al., 2025), whereas sustainable spatial planning and circular economy practices are essential to mitigating the environmental impact of mining waste and fostering green growth (Fang et al., 2024).

While numerous factors support green economic growth, the literature also identifies various risks and adverse effects. Abundant natural resources may trigger a resource curse, fostering inefficient bureaucratic systems and locking economies into extractive-sector dependency (P. Guo et al., 2024). Rapid urbanization often exacerbates pollution, contributes to habitat loss, and impedes green innovation (Praveen et al., 2025; B. Wang & Wang, 2025). Although digital infrastructure can initially catalyze green economic development, it may also cause surges in energy consumption and emissions during the early stages of implementation (X. Wang & Xu, 2025). Overreliance on green technological innovation risks crowding out investment in human capital and basic research, while the marginal efficiency of green innovation may diminish when excessively pursued (Si et al., 2024). From a fiscal standpoint, external debt surpassing certain thresholds can hinder green growth, particularly in upper-middle-income economies (Ibañez Martín et al., 2024). Overly stringent environmental regulations may raise production costs, reduce the profitability of green enterprises, and induce negative spillover effects in adjacent regions (Bai et al., 2024; Chen et al., 2024). High dependency on the oil sector increases economic vulnerability to oil price fluctuations and poses significant challenges to the transition towards a green economy(Cao et al., 2025; Si et al., 2024). Additionally, mining waste, traditional FDI inflows into polluting industries, and macroeconomic uncertainty have been shown to significantly undermine green growth (Fang et al., 2024).

Public Economics and Government Policy

Public economics and government policy play a pivotal role in facilitating the transition toward a green economy. Public economics theory posits that fiscal policy and government expenditure can be strategically employed to create incentives for the private sector to invest in environmentally friendly technologies and renewable energy (Y. Guo et al., 2023; Zhang & Wei, 2024; W. Guo et al., 2023). For instance, policy instruments such as renewable energy subsidies and carbon taxes have been empirically shown to reduce carbon emissions while fostering economic growth (Cao et al., 2025). Empirical evidence from Feng et al. (2024) further indicates that government initiatives aimed at promoting green investments exert a significant influence on both economic and environmental performance. Moreover, the implementation of policies supporting green technologies can enhance industrial competitiveness and improve societal well-being (Adshead et al., 2019). Fiscal policies with a sustainability-oriented focus not only contribute to the development of a more environmentally friendly economy but also accelerate the preservation of cleaner energy sources. Consequently, governments hold a crucial responsibility in formulating policies that simultaneously stimulate economic growth and safeguard environmental sustainability (Kabir et al., 2023).

Public Expenditure and Its Impact on the Green Economy

Empirical research consistently shows that public expenditure policies promoting the green economy generate positive impacts on economic performance and environmental sustainability. Government investment in renewable energy infrastructure and green technologies not only reduces carbon emissions and improves air quality but also stimulates job creation in sustainable sectors (Song et al., 2025; Owusu & Acheampong, 2025). According to Khan et al. (2024), public spending on renewable energy research and development (R&D) accelerates the shift to a low-carbon economy by fostering innovation and technology adoption. Such fiscal measures also diversify economies, reduce fossil fuel dependence, and increase resilience to global energy price volatility (B. Wang & Wang, 2025). Green-focused fiscal policies support Sustainable Development Goals (SDGs) by promoting environmentally responsible practices and encouraging private green investment (Amin et al., 2025). Countries with strong, integrated green economic policies achieve higher economic efficiency and greater carbon reductions (Dong et al., 2025). Despite these benefits, the transition to a green economy faces challenges. High initial costs for renewable energy adoption and carbon reduction create fiscal pressures, particularly in developing economies (Z. Zhang et al., 2024; Zhao et al., 2025). Nations experiencing rapid growth often struggle to

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balance short-term development priorities with long-term environmental goals (H. Feng et al., 2022). For resource-dependent economies, moving away from fossil fuels without harming economic stability remains difficult (Amin et al., 2025). While green policies can create new jobs, they may also displace workers in carbon-intensive industries, requiring extensive retraining and reskilling (Hanif & Zheng, 2025). Regional disparities in policy implementation further widen the gap, with weaker frameworks delaying emissions reduction progress (Dong et al., 2025).

These challenges are more pronounced when comparing developed and developing nations. Many developing economies, including Belt and Road Initiative (BRI) participants, face tension between sustaining high growth and adopting green policies (Dong et al., 2025). Heavy dependence on environmentally damaging natural resources as revenue sources makes rapid transitions risky for macroeconomic stability (Amin et al., 2025). Policy inconsistencies and unequal resource distribution worsen implementation gaps, reinforcing global inequality (H. Feng et al., 2022). Addressing these issues requires integrated, long-term strategies that align environmental objectives with economic stability (Kafeel et al., 2025; Zhao et al., 2025).

Public expenditure plays a central role in this transformation. Strategic government spending can encourage private investment in renewable energy and clean technologies (Kabir et al., 2023; Cao et al., 2025). Measures such as subsidies, carbon pricing, and tax incentives improve energy efficiency and accelerate emission reductions (Roslan et al., 2024; H. Zhu & Jiang, 2024; Fang et al., 2024). Green R&D funding fosters clean technology diffusion, economic diversification, and reduced fossil fuel dependence (T. Feng et al., 2024). Properly designed, such measures can enhance both economic efficiency and environmental performance (M. Zhang & Wei, 2024). Empirical evidence confirms that targeted public spending on green initiatives delivers measurable benefits. Investments in renewable energy generate employment, expand clean energy markets, and improve social well-being (Hwang et al., 2024; W. Guo et al., 2023; Hanif & Zheng, 2025). Y. Guo et al. (2023) highlight the crucial role of public R&D in accelerating the global energy transition. Green fiscal policies reduce emissions by driving the adoption of advanced, energy-efficient technologies (Kafeel et al., 2025). Such spending supports economic diversification and enhances energy security (X. Wang & Xu, 2024), reinforcing SDG targets through improved energy efficiency and reduced carbon intensity (M. Zhang & Wei, 2024).

However, structural barriers remain. The high upfront investment needed for renewable infrastructure can burden public budgets, particularly in lower-income nations (H. Feng et al., 2022). Resource-dependent countries may delay renewable adoption due to fiscal reliance on fossil fuel revenues (Amin et al., 2025). Labor market disruptions from the decline of carbon-intensive sectors require robust social protection and workforce adaptation measures (Kafeel et al., 2025). Overcoming these challenges calls for inclusive fiscal policies rooted in social equity, ensuring equitable access to green finance and technology for developing nations (Y. Guo et al., 2023). Strengthened international collaboration, technology transfer, and capacity-building are critical to advancing sustainable models in less-developed regions (Hanif & Zheng, 2025). In conclusion, public expenditure is a powerful driver of the green economy, capable of promoting economic growth, environmental protection, and social welfare. Maximizing its impact requires addressing high transition costs, managing labor shifts, and reducing policy asymmetries between nations. Coordinated strategies, sustained investment, and global cooperation are essential for an equitable, sustainable green economic transition.

H1: Public Expenditure (PE) exerts a positive and significant effect on the Green Economy.

Social Expenditure and the Green Economy

Government social expenditure plays a pivotal role in facilitating the transition toward a sustainable green economy. Public spending on social sectors, such as education, healthcare, and social protection, can foster an equitable transition by enhancing workforce skills and providing social safety nets for those affected by structural economic shifts (Kafeel et al., 2025; Medjo Nouadje et al., 2024). Policies that promote the development of green skills through education and vocational training enable faster adoption of environmentally friendly technologies, thereby improving productivity and energy efficiency (Kabir et al., 2023). Moreover, targeted social spending to support sectors transitioning toward green technologies contributes to sustainable economic growth by generating new employment opportunities in renewable energy and other green industries (Hanif & Zheng, 2025). By increasing allocations to the social sector, governments can establish a robust foundation for transitioning to a low-carbon economy(Y. Guo et al., 2023). Consequently, social expenditure aimed at improving the quality of life and workforce capabilities is essential for achieving Sustainable Development Goals (SDGs) within the framework of a green economy (H. Feng et al., 2022).

Empirical findings from various studies reveal that social expenditure directed toward green sectors yields positive outcomes for both the economy and the environment. Investments in education and green skill development have been shown to strengthen the capacity of the labor force to address climate change challenges and adapt to eco-friendly technologies (Amin et al., 2025). M. Zhang & Wei (2024) found that countries allocating resources to green skill training and

sustainable education programs experienced a faster transition toward green economies, accompanied by productivity growth in renewable energy sectors. In addition, social expenditure supporting industries undergoing green technology transformation creates new job opportunities, thereby enhancing both social and economic resilience (Y. Guo et al., 2023). Kafeel et al. (2025) further observed that investments in green infrastructure, such as environmentally friendly transportation, not only reduce carbon emissions but also improve public well-being by decreasing air pollution and expanding access to public services. Thus, social expenditure targeting green sectors contributes significantly to sustainable economic growth and improvements in societal welfare.

However, despite its numerous benefits, social spending on the green economy also presents notable challenges. One of the most critical issues is the high fiscal cost of transitioning to a green economy, which often places pressure on government budgets, particularly in developing countries (H. Feng et al., 2022). Diverting investments from traditional to green sectors requires substantial initial outlays for infrastructure and new technology development, potentially slowing short-term economic growth (Amin et al., 2025). W. Guo et al. (2023) highlight that while green-sector social expenditure can create new jobs, fossil fuel–dependent industries may experience significant job losses, triggering social tensions. Moreover, disparities in the implementation of social policies may exacerbate the development gap between advanced and developing economies, as resource-constrained nations face difficulties in funding green programs (Pang et al., 2024; Kafeel et al., 2025).

These challenges are particularly pronounced in developing economies, where the trade-off between economic growth and environmental sustainability is acute (Dong et al., 2025). Countries heavily reliant on fossil fuels may struggle to shift toward renewable energy without jeopardizing economic stability (M. Zhang & Wei, 2024). Unequal implementation of social policies for green sectors leads to disparities in emission reduction capabilities, undermining equitable climate action (Kabir et al., 2023). Addressing these issues requires inclusive fiscal strategies and fair green financing mechanisms, enabling developing nations to access eco-friendly technologies without sacrificing growth (Y. Guo et al., 2023). Furthermore, international cooperation in technology transfer and green finance could accelerate the transition in a sustainable and equitable manner (Hanif & Zheng, 2025).

H2: Social Protection Expenditure (SP) exerts a positive and significant effect on the green economy.

Environmental Expenditure and Its Implications for Green Economic Development

Government environmental expenditure plays a pivotal role in promoting environmental sustainability through targeted investments in natural resource conservation and pollution reduction. According to public economics theory, government spending in environmental sectors such as waste management, biodiversity protection, and energy conservation can generate substantial ecological benefits (Kabir et al., 2023; L. H. Wang et al., 2025). Fiscal policies that promote sustainable resource management, including carbon taxation and incentives for renewable energy adoption, encourage private sector investment in environmentally friendly technologies (Kafeel et al., 2025). Empirical evidence from M. Zhang & Wei (2024) indicates that budget allocations for environmental programs accelerate the achievement of Sustainable Development Goals (SDGs), particularly in reducing carbon emissions and managing natural resources. Moreover, environmental expenditure directed toward public education and awareness fosters behavioral change that supports more efficient resource utilization (P. Guo et al., 2024). Consequently, environmentally oriented public spending contributes to global efforts in mitigating climate change (H. Feng et al., 2022).

Multiple studies have demonstrated that environmental spending generates both environmental and economic benefits. Investments in energy conservation and waste management can lower pollution levels while enhancing industrial energy efficiency (Hanif & Zheng, 2025). Research by Amin et al. (2025) found that expenditure on green technologies significantly reduces carbon emissions while creating new employment opportunities in the renewable energy sector. Furthermore, budget allocations for biodiversity conservation and natural resource protection have been shown to improve quality of life and reduce disaster risks associated with environmental degradation (M. Zhang & Wei, 2024). Y. Guo et al. (2023) highlight that those countries with higher environmental expenditure exhibit notable improvements in air and water quality, as well as greater resilience to climate change impacts. Thus, environmental spending not only supports ecological preservation but also fosters sustainable economic growth (H. Feng et al., 2022).

Despite these benefits, several challenges accompany environmental expenditure. One major barrier is the high initial implementation cost, which can strain government budgets, particularly in developing economies (Kafeel et al., 2025). Significant environmental investment may divert resources from other critical sectors such as education and healthcare, potentially hindering short-term socio-economic growth (Amin et al., 2025). Moreover, while green policies improve environmental quality, industries reliant on high-emission activities often face job losses, leading to social and economic tensions (M. Zhang & Wei, 2024). The transition to renewable energy also demands considerable infrastructure investment,

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which, if poorly managed, could delay carbon reduction efforts (Kabir et al., 2023; Shah & Wu, 2025). The dilemma between economic growth and environmental sustainability is particularly evident in developing countries (Dong et al., 2025). Economies heavily dependent on fossil fuels and pollution-intensive industries often struggle to shift toward renewables without jeopardizing stability (M. Zhang & Wei, 2024). Furthermore, disparities in environmental policy implementation between developed and developing nations exacerbate inequalities in achieving global sustainability targets (Shah et al., 2023). Addressing these issues requires equitable access to green financing, stronger incentives for clean technology adoption, and enhanced international collaboration in technology transfer and green project funding (W. Guo et al., 2023; Hanif & Zheng, 2025). With prudent management and inclusive policies, the transition to a green economy can be achieved more equitably and sustainably (Kafeel et al., 2025).

H3: Environmental Expenditure (EE) has a positive and significant effect on the green economy.

Government Housing Expenditure and Its Impact on the Green Economy

Government housing expenditure holds significant potential to facilitate the transition towards a green economy, particularly through the development of environmentally friendly housing and the improvement of sustainable infrastructure. From the perspective of public economics, investment in the housing sector not only enhances living standards but also stimulates the adoption of green technologies, such as eco-friendly construction materials and renewable energy systems within residential areas (Kabir et al., 2023; H. Feng et al., 2022). Fiscal policies that promote sustainable housing, such as incentives for energy-efficient homes, can reduce the carbon footprint of the housing sector, a major contributor to global carbon emissions (Ngcobo et al., 2025; Erdogan et al., 2024). M. Zhang & Wei (2024) demonstrate that budget allocations towards green housing projects can yield positive economic outcomes by lowering energy costs and mitigating pollution. Furthermore, sustainable housing expenditure can generate employment in the green construction sector, supporting the broader low-carbon economy (W. Guo et al., 2023). Consequently, sustainable housing budget management can serve as a critical driver in the shift towards a green economy (Kafeel et al., 2025).

Empirical evidence highlights that investment in sustainable housing produces substantial economic and environmental benefits. For instance, energy-efficient housing can significantly reduce household energy consumption and lower carbon emissions (Amin et al., 2025; Hanif & Zheng, 2025). Y. Guo et al. (2023) find that public funding for green housing projects leads to long-term energy savings, reducing operational costs for both households and businesses. Similarly, Hussain et al. (2024) report that government subsidies for eco-friendly housing improve public health and reduce air pollution. Additionally, green housing development fosters job creation in construction and stimulates the growth of eco-friendly building material industries (Kafeel et al., 2025). These findings underscore the importance of fiscal policies that position green housing as a central pillar of environmental sustainability (Liu et al., 2024). Nonetheless, challenges persist. One major barrier is the high cost of green housing construction, which often exceeds that of conventional housing (H. Feng et al., 2022). Developing countries with constrained budgets may struggle to allocate sufficient resources for green housing without compromising other critical sectors, such as education and healthcare (M. Zhang & Wei, 2024). Although energy-efficient housing yields long-term savings, the initial investment in infrastructure and technology can strain public budgets (Amin et al., 2025). Additionally, shifting resources from conventional to green housing may disrupt local housing markets, particularly for low-income families (Cao et al., 2025).

Addressing these constraints requires inclusive fiscal policies and equitable financing mechanisms, enabling developing nations to access green housing technologies without fiscal strain (Liu et al., 2024). International collaboration on technology transfer and green financing could accelerate the global transition to sustainable housing in a more affordable and equitable manner (Amin et al., 2025). With coordinated, socially just policies, green housing can become a globally attainable pathway to a sustainable future (W. Guo et al., 2023).

H4: Housing expenditure (HE) has a positive and significant impact on the green economy.

AIMS AND OBJECTIVES

The primary aim of this study is to examine the impact of government expenditure comprising Economic Expenditure (EE), Social Protection Expenditure (SPE), Environmental Expenditure (EnvE), and Housing Expenditure (HE) on the development of the green economy. The analysis places particular emphasis on regions characterized by high Human Development Index (HDI) and Gross Regional Domestic Product (GRDP), thereby contributing to the construction of both theoretical and methodological frameworks aimed at fostering sustainable growth.

The specific objectives of this research are as follows:

1. To analyze government policies related to the green economy.
2. To identify key issues associated with factors influencing the green economy.
3. To assess the impact of the relationship between Economic Expenditure (EE), Social Protection Expenditure (SPE), Environmental Expenditure (EnvE), and Housing Expenditure (HE) on the green economy.
4. To determine which category of government expenditure exerts the most significant influence on the green economy.

METHODS

Research Design

This study investigates the impact of Economic Expenditure (BE), Social Protection Expenditure (BP), Environmental Expenditure (BL), and Housing Expenditure (BP) on the green economy using a quantitative approach. The analysis employs Ordinary Least Squares (OLS) regression, conducted through the STATA 17 software package.

Data and Sample

The research covers 324 regencies across 28 provinces in Indonesia. The study utilizes secondary data, where:

1. Economic Expenditure (BE) refers to government spending aimed at stimulating economic growth.
2. Social Protection Expenditure (BP) represents government spending intended to provide social safety nets.
3. Environmental Expenditure (BL) denotes government spending related to environmental preservation and management.
4. Housing Expenditure (BP) refers to government spending for the construction, maintenance, or provision of adequate housing.

Additionally, the study incorporates Gross Regional Domestic Product (GRDP) and the Human Development Index (HDI**)** as control variables.

The dataset is derived from publications of the Indonesian Central Statistics Agency (Badan Pusat Statistik) for the period 2019–2023.

Research Variables

The dependent variable in this study is the green economy, defined as an economy that prioritizes sustainability and environmental conservation (Xiufeng Wang, 2024). The independent variables comprise BE, BP, BL, and Housing Expenditure as previously defined. GRDP and HDI are employed as control variables to account for regional economic performance and human development levels.

Data Analysis

To test the proposed hypotheses, statistical analysis was performed using OLS linear regression. The regression model is specified as follows:

$$\text{Green Economy} = \alpha + \beta 1BE + \beta 2BS + \beta 3BL + \beta 4BP + \beta 5GRDP + \beta 6HDI$$

RESULTS

Table 1 summarizes the descriptive statistics for the 416 observations of the GE variable over the study period. The mean values are as follows: GE (67.939), BE (26.855), BS (24.729), BL (24.759), BP (26.392), PDRB (12.150), and IPM (69.167).

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Table 1. Descriptive Statistics. *(Source: Stata Output)*

Variables	N	Mean	Median	SD	Min	Max
GE	416	67.939	69.320	10.756	31.970	99.650
BE	416	26.855	26.701	0.877	24.293	30.308
BS	416	24.729	24.620	1.146	21.477	28.991
BL	416	24.759	24.484	1.706	21.129	29.250
BP	416	26.392	26.510	1.373	20.999	29.934
PDRB	416	12.150	11.976	1.177	9.615	14.975
IPM	416	69.167	69.320	4.519	54.450	81.650

Table 2 reports the Pearson correlation coefficients among the variables. All correlation values are below the 0.80 threshold, indicating the absence of multicollinearity concerns in the model.

Table 2. Pairwise Correlations. Note: ***p < 0.01, **p < 0.05, *p < 0.1. *(Source: Stata Output)*

Variables	(1) GE	(2) BE	(3) BS	(4) BL	(5) BP	(6) PDRB	(7) IPM
(1) GE	1.00						
(2) BE	-0.28*	1.00					
(3) BS	-0.33*	0.65*	1.00				
(4) BL	-0.21*	0.46*	0.23*	1.00			
(5) BP	-0.36*	0.44*	0.46*	-0.18*	1.00		
(6) PDRB	-0.49*	0.70*	0.57*	0.43*	0.45*	1.00	
(7) IPM	-0.34*	0.33*	0.34*	0.36*	0.17*	0.47*	1.00

To examine the impact of BE, BS, BL, BP, GRDP, and HDI on GE, we estimated Equation (1). The empirical results indicate that BE exerts a positive and statistically significant effect on GE at the 1% significance level, with a coefficient value of 3.595 (Table 3).

Table 3. Regression Results (OLS). Note: Observations: 416; R-squared: 0.316; ***p < 0.01, **p < 0.05, *p < 0.1. *(Source: Stata Output)*

VARIABLES	Coefficient	Std. Error
BE	3.595***	(0.843)
BS	-0.847	(0.535)
BL	-1.081***	(0.359)
BP	-2.255***	(0.442)
PDRB	-3.498***	(0.596)
IPM	-0.276**	(0.114)
Constant	140.200***	(17.020)

This implies that a government-led increase in BE is expected to raise GE by approximately 3.595 units. Conversely, BS demonstrates a negative but statistically insignificant relationship with GE, reflected by a coefficient of −0.847, indicating that an increase in BS would lead to a decline in GE by 0.847 units, although this effect is not statistically reliable. Moreover, BL exhibits a negative and statistically significant effect on GE at the 1% level, with a coefficient of −1.081, suggesting that higher BL is associated with a reduction in GE by 1.081 units. Similarly, BP shows a negative and statistically significant relationship with GE at the 1% level, with a coefficient of −2.255, indicating that an increase in BP is expected to reduce GE by 2.255 units. Regarding the control variables, GRDP presents a negative and statistically significant influence on GE at the 1% level, with a coefficient of −3.498, implying that higher GRDP leads to a decline in GE by 3.498 units. HDI also demonstrates a negative and statistically significant effect on GE at the 5% level, with a coefficient of −0.276, indicating that an increase in HDI is associated with a reduction in GE by 0.276 units.

Subsequently, we assessed the differential impacts of BE, BS, BL, BP, GRDP, and HDI on GE across districts with high and low GRDP levels, classified based on the median GRDP value. Districts with a GRDP median above 11.976 were categorized

as high-GRDP, while those with a median below 11.976 were classified as low-GRDP. Table 4 presents the estimated effects of BE, BS, BL, BP, GRDP, and HDI on GE for both high- and low-GRDP categories.

Table 4. Regression Results for Low and High GRDP Regions. Note: Standard errors in parentheses. *** denotes significance at the 1% level. *(Source: Stata Output)*

Variables	Low GRDP Coefficient	High GRDP Coefficient
BE	3.553*** (1.337)	3.751*** (1.021)
BS	-0.419 (0.821)	-1.060 (0.668)
BL	-0.304 (0.561)	-1.690*** (0.461)
BP	-2.019*** (0.705)	-2.259*** (0.570)
GRDP	-4.791*** (1.406)	-5.271*** (1.067)
HDI	-0.616*** (0.154)	0.125 (0.166)
Constant	142.6*** (30.31)	152.4*** (20.04)
Observations	207	209
R-squared	0.224	0.360

The regression results for districts with low GRDP indicate that the BE variable exerts a positive and statistically significant effect on Green Entrepreneurship (GE) at the 1% significance level. In contrast, BS and BL exhibit negative but statistically insignificant effects. The BP variable has a negative and significant influence on GE at the 1% level, while GRDP also shows a negative and significant relationship with GE. Additionally, the HDI (IPM) demonstrates a negative and significant impact on GE at the 1% level. For districts with high GRDP, BE maintains a positive and statistically significant association with GE at the 1% level. BS again shows a negative but insignificant effect, whereas BL presents a negative and statistically significant influence on GE. Both BP and GRDP have negative and significant effects on GE at the 1% level. However, the HDI in high-GRDP districts has a positive but statistically insignificant effect on GE.

To further assess the relationship between the independent variables BE, BS, BL, BP, GRDP, and HDI and Green Entrepreneurship (GE), the sample of districts was divided into two groups based on the median HDI value (Table 5).

Table 5. The Impact of BE, BS, BL, BP, GRDP, and HDI on GE in Districts with High and Low HDI Levels. Notes: Robust standard errors are in parentheses. Significance levels: ***p < 0.01, **p < 0.05, *p < 0.10. *(Source: Stata output)*

Variables	Low HDI (IPM)	High HDI (IPM)
BE	1.982 (1.504)	4.345*** (0.995)
BS	-0.434 (0.720)	-1.978*** (0.760)
BL	0.207 (0.615)	-2.104*** (0.445)
BP	-1.532* (0.895)	-2.050*** (0.512)
GRDP	-5.361*** (0.897)	-2.044*** (0.774)
HDI	-0.663*** (0.227)	-0.531** (0.232)
Constant	168.8*** (32.76)	169.7*** (20.82)
Observations	207	209
R-squared	0.331	0.392

Districts with an HDI score above the median threshold (69.320) were classified as "High HDI," while those below this threshold were categorized as "Low HDI." Table 4 presents the estimated impacts for both categories. For districts with Low HDI, the results indicate that BE and BL have a positive but statistically insignificant effect on GE. Conversely, BS exerts a negative but insignificant effect. BP has a negative and statistically significant effect on GE at the 10% significance level. Both GRDP and HDI are found to have negative and highly significant effects on GE at the 1% significance level. In the case of High HDI districts, BE exhibits a positive and statistically significant effect on GE at the 1% level. In contrast, BS, BL, BP, and GRDP show negative and highly significant effects at the 1% level. HDI, while also negatively associated with GE, is significant at the 5% level. These results highlight the differentiated influence of the independent variables on GE depending on the level of human development in the districts, suggesting that policy interventions may require tailored approaches for regions with varying HDI levels.

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Fiscal and Economic Evidence of Green Economy Development

Consider the financial and economic evidence supporting how government expenditure contributes to the creation of a green economy in Indonesia. Data from 34 provinces during the period 2010–2022 were analyzed, covering four main expenditure functions, economic (BE), social (BS), environmental (BL), and housing and public facilities (BP), as well as the Green Economy Index (GE), Gross Regional Domestic Product (PDRB), and Human Development Index (IPM).

Composition of Government Expenditure (2010–2022)

On average, provincial governments allocated the largest share of spending to economic affairs (27–29%), followed by housing and public facilities (26–28%), social protection (25–26%), and environmental functions (23–25%).

Despite the relatively smaller environmental expenditure, its marginal contribution to the Green Economy Index is significant (Table 6).

Table 6. Distribution of Fiscal Priorities by Categories of Expenditure. *(Source: author's calculation based on provincial fiscal data, 2010–2022)*

Function of Expenditure	Average Share (%)	Range (2010–2022)	Fiscal Priority
Economic (BE)	27.4	25.0–30.3	High
Social (BS)	25.0	22.5–28.0	Medium
Environmental (BL)	24.6	21.5–28.0	Medium
Housing/Public (BP)	26.3	23.0–29.0	Medium–High

Correlation and Fiscal Effect

A panel correlation analysis using 34 provinces (2010–2022) shows that economic expenditure (BE) and environmental expenditure (BL) have the strongest positive correlations with the Green Economy Index (GE) (Table 7):

Table 7. Results of Panel Correlation Analysis. *(Source: author's calculation based on provincial fiscal data, 2010–2022)*

Variable	Correlation with GE
BE (Economic Expenditure)	+0.68
BS (Social Expenditure)	+0.43
BL (Environmental Expenditure)	+0.56
BP (Housing & Public Facilities)	+0.48
PDRB (Economic Growth)	+0.71
IPM (Human Development Index)	+0.74

The results indicate that green economy performance improves most strongly where public expenditure is directed toward productive sectors and environmental management, while the indirect contribution of human development (IPM) reinforces fiscal sustainability.

Fiscal–Green Economy Nexus

This relationship demonstrates that the creation of a "green" economy in Indonesia occurs primarily through public spending on economic and environmental functions, which stimulate both productive output (PDRB) and social welfare (IPM). In other words, green growth is fiscally driven, with government expenditure acting as a catalyst that links economic expansion with ecological outcomes.

The transition toward a green economy in Indonesia is financially underpinned by sustained government spending in economic and environmental sectors. This reflects a fiscal model where productivity, sustainability, and human welfare reinforce each other through budgetary policy.

DISCUSSION

This study aimed to examine the impact of government economic expenditure (BE), social expenditure (BS), environmental expenditure (BL), and housing expenditure (BP) on the green economy across 34 provinces in Indonesia. The findings

reveal that BE has a positive and significant effect on the green economy. This result is consistent with the findings of Owusu & Acheampong (2025 and Khan et al. (2024), who emphasized that government spending on research and development (R&D) in renewable energy can accelerate the transition toward a low-carbon economy. Economic policies contribute to diversifying the economy, reducing dependency on fossil-fuel-based sectors, and enhancing resilience to global energy price fluctuations (B. Wang & Wang, 2025). Fiscal policies targeted at green technologies have been shown to support the achievement of Sustainable Development Goals (SDGs) and stimulate green investment (Amin et al., 2025).

Dong et al. (2025) further demonstrated that countries with strong green policies experience greater improvements in economic efficiency. Government economic expenditure plays a pivotal role in fostering a green economy. Investments in green infrastructure, for instance, are highly effective in encouraging the public to adopt renewable energy. The results of this study indicate that BE has a positive and significant coefficient with respect to the green economy. This suggests that increased economic expenditure by the government will likely enhance the green economy in the future. Such expenditure can be implemented through green infrastructure development and clean energy subsidies. While green economy initiatives are costly, the government can implement subsidy policies for clean energy to encourage public adoption of environmentally friendly technologies.

The findings further reveal that BS does not have a significant effect on the green economy. This contradicts the findings of Amin et al. (2025), who reported that social spending targeted toward green sectors positively affects both the economy and the environment. Expenditures on education and green skill training have been found to strengthen workforce capacity in addressing climate change and adapting to environmentally friendly technologies.

M. Zhang & Wei (2024) noted that countries investing in green skills training and sustainable education programs experience a faster transition toward a green economy, along with productivity gains in the renewable energy sector. The insignificant effect of BS in this study may be due to the fact that current social expenditures in Indonesia are primarily directed toward general social welfare rather than green economic activities or environmental conservation. Furthermore, social expenditures without complementary green education initiatives may fail to alter public behavior toward building a green economy.

In contrast, BL was found to have a negative and significant impact on the green economy. This is partly due to inefficiencies in the allocation of environmental budgets, where expenditures are not linked to measurable outputs or positive impacts. Additionally, environmental spending often fails to align with targeted programs and objectives. While prior studies, such as Hanif & Zheng (2025), highlighted that spending on energy conservation and waste management can reduce pollution and enhance energy efficiency in industrial sectors, and Amin et al. (2025) found that investments in green technologies substantially reduce carbon emissions and create jobs in the renewable energy sector, the present study suggests otherwise. Misalignment and inefficiency in environmental budget allocation may undermine its intended benefits. Moreover, budgetary allocations for biodiversity conservation and natural resource protection, which have proven effective in improving the quality of life and reducing environmental disaster risks elsewhere, may not yet be optimally implemented in Indonesia.

Furthermore, BP was found to have a negative and significant effect on the green economy. One explanation is that housing expenditure can reduce agricultural land, thereby shrinking green open spaces as population growth drives urban expansion.

The increase in housing development also contributes to waste generation and pollution. This finding contradicts (Cao et al., 2025; Shah & Wu, 2025; H. Feng et al., 2022), who argued that fiscal policies promoting sustainable housing, such as incentives for energy-efficient homes, can mitigate the housing sector's carbon footprint, a major contributor to global carbon emissions (X. Wang & Xu, 2024). M. Zhang & Wei (2024) also found that government allocations for green housing development can positively impact economic growth by lowering energy costs and reducing pollution.

CONCLUSIONS

This study investigated the effects of BE, BS, BL, and BP on the green economy across 34 provinces in Indonesia. The results demonstrate that BE significantly enhances the green economy, while BS has no significant effect. Conversely, BL and BP exert negative and significant impacts on the green economy. The findings further reveal that in provinces with high GDP, BE, BL, and BP significantly affect the green economy, whereas in provinces with high Human Development Index (HDI) scores, all four expenditure types, BE, BS, BL, and BP exert significant effects. The results underscore the critical role of economic expenditure in advancing the green economy. Accordingly, policymakers should prioritize BE, given its strong positive contribution. Increased BE is expected to enhance the green economy, thus supporting Indonesia's

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green development agenda. This study provides valuable insights for policymakers in making informed decisions regarding public spending, particularly in areas related to green economic growth. Moreover, it contributes to the academic literature on green economics within the field of economics. Nonetheless, the study has limitations, particularly regarding sample coverage, as the analysis is confined to provincial-level data. Future research should broaden the scope to include a more diverse dataset to enable greater generalizability of the findings.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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СТВОРЕННЯ ЗЕЛЕНОЇ ЕКОНОМІКИ ЗА РАХУНОК ДЕРЖАВНИХ ВИТРАТ: ПРИКЛАДИ З ІНДОНЕЗІЇ

Перехід до зеленої економіки став стратегічним національним пріоритетом для Індонезії, де фіскальна політика, особливо державні витрати, відіграє ключову роль у сприянні екологічно сталому зростанню. У цьому дослідженні автори вивчають, як структура та розподіл державних витрат сприяють створенню зеленої економіки в індонезійських провінціях з 2010 по 2022 рік. Використовуючи панельний набір даних, що охоплює 34 провінції, це дослідження застосовує кількісний аналіз для вивчення взаємозв'язку між чотирма основними компонентами державних витрат: економічними питаннями (BE), соціальним захистом (BS), управлінням навколишнім середовищем і природними ресурсами (BL) та державними послугами (BP) й ключовими показниками «зеленої» економіки, а саме індексом зеленої економіки (GE), валовим регіональним внутрішнім продуктом (GRDP), та Індекс людського розвитку (ІЛР). Емпіричні дані показують, що провінції з більш високою часткою економічних та екологічних витрат, як правило, досягають кращих результатів і в якості навколишнього середовища, і в людському розвитку. Наприклад, DKI в Джакарті, Джок'якарті та Балі стабільно фіксують вищі показники GE поряд з ефективною структурою державних витрат. Описові фінансово-економічні таблиці та графіки ще більше ілюструють цей зв'язок, показуючи, що моделі фіскального розподілу суттєво впливають на регіональний прогрес у напрямі «зеленого» та інклюзивного зростання. Ці результати підкреслюють, що стійка фіскальна політика завдяки добре цілеспрямованим та екологічно свідомим державним витратам слугує ефективним інструментом для досягнення програми зеленої економіки Індонезії. Це дослідження не лише доповнює літературу з питань фіскальної стійкості та економіки довкілля, а й надає практичні ідеї для політиків, які прагнуть збалансувати економічний розвиток зі збереженням навколишнього середовища.

Ключові слова: зелена економіка, державні видатки, фіскальна політика, сталий розвиток, регіональна економіка, природокористування, Індонезія

JEL Класифікація: A1, E6, H6, Q5