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Implementing Green Economy Concepts to Realise IKN's Vision as a Green City

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Abstract

Purpose: To analyse the challenges and strategies for implementing the green economy concept in the development of Indonesia's new capital (IKN) in East Kalimantan, focusing on environmental, social, and economic risks while formulating policy recommendations to support IKN's vision as a Green City.

Design/Methodology/Approach: A qualitative approach is applied, combining policy analysis and literature reviews from academic publications, journals, regulations, and government reports on sustainable development. The descriptive-critical method evaluates the implementation of green economy policies.

Findings: IKN's development faces critical challenges, including environmental degradation, social inequality, limited green infrastructure, and economic dependence on extractive industries. Key strategies include enhancing stakeholder coordination, optimising green incentive policies, and leveraging sustainable technologies.

Originality/Value: Provides fresh insights into the importance of a green economy approach in new urban development. Data-driven policy recommendations are offered to guide the government and stakeholders in designing sustainable development strategies for IKN.

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INTRODUCTION

The government has designated parts of North Penajam Paser Regency as the site for Indonesia's new capital, Nusantara (IKN), as stipulated in Law No. 3 of 2022 on IKN. This decision has sparked varied reactions, particularly from environmental activists and experts, who argue that development in previously undisturbed primary forests could have adverse effects on the ecosystem. Moreover, the planned relocation of thousands of civil servants and their families to the new capital is expected to further intensify environmental pressures. Although the government has revised several provisions within Law No. 3 of 2022 through Law No. 21 of 2023, these amendments have not sufficiently alleviated concerns over potential ecological impacts.

In light of sustainable development theory, as outlined in Indonesia's SDGs Roadmap, a proportional balance between economic, social, and environmental dimensions is essential to ensure that the needs of the present do not compromise future generations (Doktoralina et al., 2024). This concept gained significant attention following the publication of the Our Common Future report by the Brundtland Commission in 1987, and was further reinforced through various global forums, including the Johannesburg Declaration of 2002, which emphasised the importance of harmonising economic growth with environmental preservation (Nababan et al., 2014). However, in practice, development initiatives often face conflicts between economic interests and environmental conservation, as articulated in the Environmental Kuznets Curve (EKC) hypothesis. This hypothesis suggests that environmental degradation tends to escalate in the early stages of economic development before eventually declining as prosperity increases.

Meanwhile, IKN's vision of becoming a Green City, as outlined in Presidential Regulation No. 63 of 2022 on the IKN Master Plan, reflects the government's commitment to sustainable urban development. The Green City concept emphasises holistic environmental management, the adoption of green technologies (Sukendar, 2013), and the prudent use of natural resources to create eco-friendly urban spaces. Nevertheless, implementing this concept faces significant challenges, particularly due to East Kalimantan's dependence on extractive industries and fossil-based energy. As of 2021, renewable energy usage in the region accounted for only 6.5 per cent, far below the 12 per cent target set under East Kalimantan Provincial Regulation No. 8 on the Regional Energy Master Plan (news.prokal.co, 2022). This reliance on fossil fuels not only hinders the transition to a green economy but also contradicts the sustainable development goals outlined in the Green City framework.

Additionally, the agriculture and plantation sectors in East Kalimantan contribute to greenhouse gas emissions through unsustainable practices, such as deforestation, land burning, and excessive use of chemical fertilisers. Although data from the Forest Fire Monitoring System (SiPongi) indicates that the area of forest fires in the region decreased from 5,222 hectares in 2021 to 373 hectares in 2022, it surged again in 2023, reaching 39,494.41 hectares (see Figure 1).

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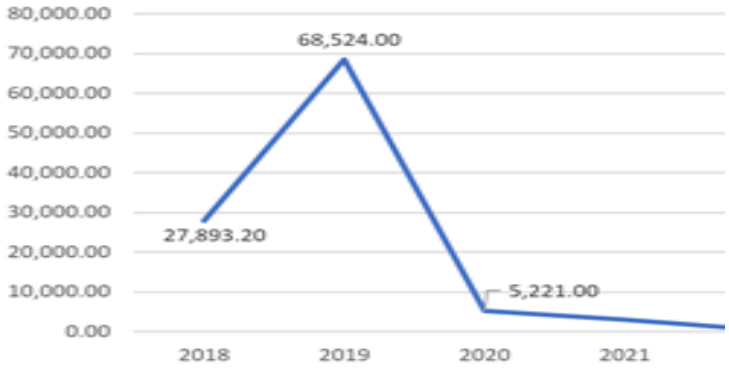

Source: SiPongi, Ministry of Environment and Forestry, 2024

Figure 1. Total Area of Forest Fires in East Kalimantan, 2018–2023

On the other hand, the rate of deforestation in East Kalimantan (KALTIM) has been a pressing concern even before the region was designated as the site for Nusantara's new capital. Data from the Ministry of Environment and Forestry reveals that between 2009 and 2019, KALTIM experienced an average loss of 1.1 million hectares of primary forest cover annually (Nurbaya et al., 2022), making it one of the provinces with the highest deforestation rates in Indonesia. Reports from Global Forest Watch rank KALTIM among the top three provinces with the highest land cover loss in Indonesia since 2001, amounting to 3.79 million hectares. Satellite imagery analysis by NASA further indicates accelerated deforestation since IKN's construction began in 2022, highlighting substantial challenges to achieving sustainability goals.

Deforestation in KALTIM not only affects the environment but also leads to the loss of habitats for endemic species such as the Bornean orangutan, proboscis monkey, and Mahakam dolphin. According to the International Union for Conservation of Nature (IUCN), the Bornean orangutan (Pongo pygmaeus) has been classified as Critically Endangered, with its population declining from 27,000 individuals in 2016 to 23,000 in 2022. Other species, including the hornbill and white-bearded gibbon, have also faced population declines due to forest conversion for industrial and agricultural purposes. Additionally, some native plant species, such as the Kasturi mango (Mangifera casturi), have been declared extinct in their natural habitat.

Deforestation also contributes to increased greenhouse gas emissions, exacerbating global warming. Although Indonesia ratified the Paris Agreement through Law No. 16 of 2016, on-ground efforts to reduce emissions continue to face significant obstacles. Data from the European Commission (2023) indicates that greenhouse gas emissions in Indonesia have continued to rise since 2021, driven primarily by the expansion of extractive industries and uncontrolled deforestation (Ahdiat, 2023; tempo.co, 2024). Forest fires, which have become increasingly frequent, further degrade the environment. During May–August 2023, fires in Kutai Kartanegara Regency consumed 184.4 hectares of forest, producing haze that affected neighbouring countries such as Malaysia and Singapore.

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The concept of a green economy closely aligns with the Green City initiative, as both aim to integrate economic, social, and environmental aspects into development. However, while the green economy prioritises sustainable economic growth, the Green City framework focuses on optimising urban resource management and environmental governance. Despite this alignment, East Kalimantan faces significant barriers to implementing a green economy. These include insufficient incentives for green investment, a limited pool of skilled human resources in renewable energy, and substantial financial requirements for energy transition. The Centre of Economic and Law Studies (Celios) reports that Indonesia's transition to green energy demands an investment of at least IDR 1,500 trillion (Rosseno & Nugroho, 2023), posing a major challenge for the government amid fiscal constraints.

Given these challenges, this study will examine strategies for implementing a green economy in IKN's development. The analysis will focus on key obstacles, potential negative impacts, and policy-based solutions that can ensure sustainable development in the region.

Literature Review

The green economy and sustainable development have become central to global development agendas (Anwar, 2022; Ruckelshaus, 2003), as emphasised in the Our Common Future report by the Brundtland Commission (1987), which highlights the balance between economic growth and environmental preservation. The Environmental Kuznets Curve (EKC) posits that environmental degradation tends to increase during the early stages of development before declining as welfare and green technology adoption improve. However, the key challenges in developing Indonesia's new capital, Nusantara (IKN), are linked to East Kalimantan's high deforestation rate and its dependency on fossil-based energy. The Politics, Economics, Social, Technology, Law, and Environment (PESTLE) approach (Sammut-Bonnici & Galea, 2015) offers a relevant framework for analysing factors influencing IKN's sustainability as a Green City, including environmental policies, social dynamics, and technological readiness. Furthermore, the trade-off theory of development underscores the dilemma between natural resource exploitation and ecosystem conservation, a major challenge for Indonesia in optimising the green economy. At the international level, environmental geopolitics shapes sustainability policies, with commitments under the Paris Agreement demanding more environmentally friendly development strategies.

Impact of Deforestation and Ecological Changes Resulting from IKN Development

Deforestation presents a serious environmental challenge in East Kalimantan (KALTIM), particularly since the region was designated as the site of the IKN project. Between 2009 and 2019, the province lost an average of 1.1 million hectares of primary forest cover annually, making it one of the provinces with the highest deforestation rates in Indonesia. Large-scale infrastructure development—including roads, government complexes, and supporting facilities—has further increased pressure on natural ecosystems. As a result, endemic species such as the Bornean orangutan (Pongo pygmaeus) and Mahakam dolphin (Orcaella brevirostris) face severe threats to their

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survival. The International Union for Conservation of Nature (IUCN) has classified these species as Critically Endangered due to habitat loss caused by forest conversion for urban and industrial development.

In addition to threatening biodiversity, ecological changes caused by deforestation around IKN disrupt ecosystem balance. Poorly managed urbanisation can lead to reduced soil absorption, increased flood risks, and accelerated local warming due to the loss of green vegetation. Therefore, achieving a balance between development needs and environmental conservation is crucial. Strategies such as the Green Belt concept, land rehabilitation, and the protection of remaining conservation areas are necessary for sustainable development.

Challenges in Implementing a Green Economy in East Kalimantan

East Kalimantan faces significant challenges in transitioning to a green economy due to its heavy reliance on extractive industries. As of 2021, fossil-based energy accounted for 93.5 per cent of the region's energy consumption, while renewable energy utilisation stood at only 6.5 per cent (Ministry of National Development Planning, 2022). This dependence hinders the realisation of IKN's vision as an eco-friendly Green City. The lack of investment incentives for renewable energy, both in terms of fiscal policies and regulations that encourage private sector participation, further delays green technology adoption. Additionally, the limited availability of skilled human resources in green technology poses another obstacle.

Transitioning from a resource-exploitation-based economy to a green economy requires stronger policy support. Currently, no specific regulations exist to accelerate the green energy transition in East Kalimantan, causing delays in the implementation of the Green City concept. Progressive policies, such as tax incentives for renewable energy investments, enhanced research and innovation in green technology, and regulatory harmonisation between central and regional governments, are crucial to fostering sustainable economic development.

Socio-Economic Impacts of IKN Development

The relocation of Indonesia's administrative capital to IKN will have significant socio-economic impacts on the local population in East Kalimantan. One major challenge is the social restructuring that will occur as thousands of civil servants and workers migrate to the region. The large influx of newcomers could create social inequalities, particularly regarding access to land and job opportunities. Previous studies, such as those by Liu, H., Tan, K. Y. A. M., & Lim, G. (2021) indicate that rapid urbanisation can exacerbate land conflicts if not properly managed. Land ownership disputes, especially involving indigenous communities who rely on forests for their livelihoods, also present serious concerns.

Economic changes due to IKN's development may further widen the gap between formal and informal sectors. While the new capital is expected to boost local economic growth, not all community groups will equally benefit. Therefore, this study will examine the development's impact on local welfare and propose adaptive strategies to ensure

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inclusive and equitable socio-economic transformation. Recommendations include policies on economic redistribution, job training programmes, and community engagement in development planning (UNDP, 2019).

The Role of ASEAN and Regional Collaboration in Promoting a Green Economy

As part of the regional community, Indonesia can leverage ASEAN cooperation to accelerate the green energy transition and sustainable development in IKN. The ASEAN Plan of Action for Energy Cooperation (APAEC) 2016–2025 provides a framework for member states to improve energy efficiency, expand renewable energy use, and develop low-carbon infrastructure. Additionally, initiatives such as the ASEAN Smart Cities Network (ASCN) offer models for integrating smart technologies to enhance energy efficiency and sustainable mobility in urban development.

However, Indonesia lags behind other ASEAN nations, such as Singapore and Malaysia, in implementing green economy policies. According to Liu, H., Tan, K. Y. A. M., & Lim, G. (2021), developing countries in ASEAN face challenges related to green financing and technology transfer. This study will compare strategies employed by these countries to identify opportunities for more effective policy adoption in managing energy and environmental resources in IKN. Cross-border collaboration is also essential to ensure regulatory alignment that supports regional sustainability goals.

Policy and Regulatory Analysis for IKN's Environmental Sustainability

Environmental regulations play a crucial role in determining the sustainability of IKN's development. Since ratifying the Paris Agreement through Law No. 16 of 2016, Indonesia has set carbon emission reduction targets but continues to face implementation challenges. This study will evaluate how national regulations—including green energy policies and environmental governance—support the transformation of IKN into a Green City.

It is also crucial to assess the alignment of IKN's development policies with national climate change mitigation targets. If existing regulations are insufficient to ensure project sustainability, additional policies must be designed to integrate environmental considerations at all stages of development. Examples include green tax incentives and stricter monitoring of industrial activities within the development zone.

Geopolitical and Security Considerations in IKN Development

The strategic location of Nusantara (IKN), bordering the Makassar Strait and Indonesia's Archipelagic Sea Lane II (ALKI II), has significant national security implications. Increasing economic activity and urbanisation in this area may heighten potential threats to social stability. A primary risk involves social tensions arising from the capital relocation, which could lead to conflicts between local communities and incoming groups.

Energy security also plays a critical role within the geopolitical context. Indonesia's reliance on fossil fuel imports raises its vulnerability to global market volatility, especially during periods of international energy instability. Consequently, IKN's development

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requires a robust energy security strategy that ensures long-term availability of renewable energy resources. The government must formulate an energy diversification strategy that leverages the renewable energy potential in Kalimantan.

Strategies for Implementing the Green City Concept in IKN

Achieving IKN's vision as a Green City demands a technology-driven and innovation-focused approach. One viable strategy involves environmentally integrated management through green technology applications, such as smart grids for energy efficiency, electric vehicle development, and optimised water and waste management. Implementing the circular economy concept can also enhance resource efficiency and sustainability (Aminah, 2022).

In addition, policies supporting the green economy must take priority in IKN's development planning. The government should design regulations that incentivise investments in green technology and foster partnerships with the private sector to develop innovative solutions for sustainable urbanisation. Experiences from countries like Denmark and Sweden highlight the importance of integrating environmental policies with technology to achieve green city objectives (Jensen & Olsen, 2018). This study will offer policy recommendations aimed at accelerating IKN's transformation into an eco-friendly, efficient, and sustainable city.

METHODS

This study employs a qualitative descriptive method to provide an objective and comprehensive depiction of phenomena based on available data (Nana, 2012; Sugiyono, 2019). This approach emphasises the analysis of characteristics, interrelated activities, and the socio-economic and environmental dynamics influencing the development of Nusantara (IKN). The research uses the PESTLE (Political, Economic, Social, Technological, Legal, Environmental) framework, as described by Perera (2018) and Sammut-Bonnici and Galea (2015), to identify the multidimensional factors affecting green economy implementation in East Kalimantan (KALTIM). These include environmental policies, economic conditions, social dynamics, technological readiness, and regulatory frameworks.

Data for this study are drawn from secondary sources, including official publications by the Central Bureau of Statistics (BPS), the National Development Planning Agency (Bappenas), regional development agencies (Bappeda), and social services departments in relevant areas. Additionally, academic journals and other official reports related to IKN development serve as key references for analysis. The data are verified through source triangulation to ensure the validity and reliability of the information used.

The study focuses on East Kalimantan, encompassing seven regencies and three cities, to analyse socio-economic conditions, environmental policies, and the challenges of implementing the Green City concept. The analysis integrates multidisciplinary perspectives, including sustainable development theory, environmental geopolitics, and

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energy transition strategies. It also considers national interests in developing policy strategies that support sustainability in IKN's development area. Through this approach, the study aims to provide comprehensive recommendations for effective and sustainable green economy implementation strategies.

RESULT AND DISCUSSION

Implementation of the Green Economy Concept in Development in East Kalimantan

This study reveals that implementing the green economy concept in the development of Indonesia's new capital (IKN) in East Kalimantan presents both significant challenges and opportunities. One of the primary challenges is the region's dependence on extractive resources, such as coal and petroleum, which contribute to greenhouse gas emissions and environmental degradation. Implementing a green economy requires balancing economic, social, and environmental dimensions through a multi-sectoral approach. This involves energy efficiency, resource conservation, waste reduction, and the increased use of renewable energy (Doktoralina et al., 2024). The findings underscore the need for a holistic approach to achieve synergy between public and private sectors in realising low-carbon development (Bappenas, 2022).

Impact of Non-Implementation of the Green Economy

Without the application of the green economy concept, IKN's development risks generating negative environmental, social, and economic consequences. One of the most significant threats is environmental destruction, evidenced by large-scale deforestation in East Kalimantan, where approximately 2.4 million hectares of primary forest have been lost over the past two decades. This loss has reduced biodiversity and disrupted ecosystems that play a crucial role in maintaining natural balance (Nurbaya et al., 2022). Human ecology theory suggests that unsustainable development accelerates environmental degradation and disrupts natural ecosystems (Dyball & Newell, 2023).

Uncontrolled greenhouse gas emissions exacerbate climate change, with industrial pollution and fossil fuel use contributing to global warming. This triggers more frequent natural disasters such as floods and droughts (Dzramado et al., 2024). According to sustainable development theory, failure to implement green economy policies impedes climate change mitigation and endangers the well-being of future generations (Yu et al., 2022).

Social and economic disparities may also worsen, particularly among local communities and indigenous groups directly affected by IKN's development. Many lose access to natural resources that once sustained their livelihoods, including forests and agricultural land. Green economy theory emphasises that sustainable development must ensure equitable benefits for all societal groups (Nugraha et al., 2024). Ignoring this principle risks widening inequalities, neglecting local rights, and triggering forced migration and social conflicts that threaten regional stability (Fristikawati et al., 2022).

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Strategies for Implementing the Green Economy

Optimising the green economy approach in IKN development requires integrating environmental, economic, and technological aspects. One crucial strategy is the use of renewable energy to reduce dependence on fossil fuels. Investments in solar, wind, and biomass energy can accelerate the transition to a more sustainable energy system (Nurbaya et al., 2022). According to green economy and energy sustainability theories, energy diversification needs to be supported by policies that promote clean technology development and provide incentives for private sector investment (Bappenas, 2022)..

Incorporating renewable energy into IKN's infrastructure not only reduces carbon emissions but also strengthens national energy resilience, aligning with the low-carbon development concept (Nugraha et al., 2024). However, challenges such as limited infrastructure and high initial investment costs hinder the implementation of these strategies. Policies that promote the adoption of renewable energy technologies are essential to overcome these obstacles (Doktoralina et al., 2024).

Developing green infrastructure is another key strategy to ensure that IKN's urban planning aligns with green economy principles. Transit-oriented city design, the expansion of green spaces, and sustainable water management systems are crucial components (Fristikawati & Adipradana, 2022). The green city approach asserts that sustainable cities must integrate environmental considerations into planning, including efficient public transport systems, energy-efficient buildings, and integrated waste management mechanisms (Aminah, 2022).

Green technological innovation also plays a pivotal role in improving energy efficiency and sustainable waste management. Technological solutions, such as Internet of Things (IoT)-based monitoring systems for energy and waste processing, enhance resource management effectiveness (Handarini et al., 2022). The success of these strategies depends heavily on the synergy between government, private sector, and community stakeholders in adopting technology-driven approaches to create a more resilient and eco-friendly urban environment.

CONCLUSION

The implementation of the green economy concept in the development of IKN faces significant challenges, including threats to environmental conservation, declining biodiversity, inadequate sustainable water resource management, and insufficient infrastructure to support the Green City vision. Social inequality and limited access to information further hinder community participation in the development process. Additionally, the region's economic reliance on extractive industries, such as coal and petroleum, slows the transition towards a green economy. Without the application of green economy principles, IKN risks environmental degradation, ecosystem destruction, social disparity, and accelerated climate change due to increased greenhouse gas emissions.

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To address these challenges, policy reforms must adopt a multi-stakeholder approach involving active participation from the central and regional governments, private sector, and local communities. Strategic recommendations include strengthening adaptive regulations, enhancing coordination among stakeholders, and providing incentives for investments in green technology. The government is advised to implement data-driven policies by utilising spatial analysis to comprehensively assess policy effectiveness. Future research should expand the scope by adopting more in-depth quantitative approaches, including longitudinal data analysis, to identify long-term trends. Additionally, applying environmental governance theory, energy transition theory, and green economy perspectives can provide deeper insights into sustainable strategy implementation in urban areas.

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