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Green Economy Implementation in Medan: Policy Analysis and Challenges Towards Sustainable Development

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Airin Zhafirwan[1], Nazla Asyifa Luthfiah[2], Herlan Maulana Situmeang[3]

[1,2]Department of Development Economics, Faculty of Universitas Sumatera Utara, Medan, Indonesia
[3]Department of Mechanical Engineering. Faculty Engineering of Universitas Sumatera Utara, Medan, Indonesia

airinzahfirwan98@gmail.com, nazlaasyifaluthfiah25@gmail.com, hrlnmln2@gmail.com

Abstract

The implementation of green economy in Medan City is part of the effort to realize sustainable development, especially as the economic center of North Sumatra. However, the city faces challenges in managing natural resources efficiently and environmentally friendly. This study aims to assess the impact of green economy implementation on environmental and economic aspects, and identify the challenges faced. Using a qualitative approach with secondary data, this study found that the implementation of the green economy has brought positive impacts such as energy efficiency, waste management, and increased environmental awareness. However, challenges such as the absence of incentive regulations for businesses and the limited adoption of green technology in the industrial sector remain. Implementation that has not been integrated across all sectors also hinders the achievement of sustainable development. Therefore, collaboration between the government, private sector, and the community needs to be improved to formulate more effective and integrated policies. Human resource capacity building and public education on green economy are also important to strengthen policy implementation. Overall, despite the barriers, the green economy in Medan has great potential to drive sustainable growth if supported by all relevant parties.

Keywords: Green Economy; Sustainable Development; Medan City; Environmental Policy; Green Technology

1. Introduction

Sustainable development is now the main focus of many countries, including Indonesia, in facing global challenges such as climate change and environmental degradation. One of the approaches being implemented is the green economy concept, which links economic growth with environmental protection and social welfare. This approach has been incorporated into the framework of the National Long-Term Development Plan (RPJPN) 2025-2045, which emphasizes sustainable economic transformation and low- carbon development [1].

Indonesia demonstrates its commitment to a green economy through a series of strategic policies and programs. One of them is the integration of low carbon development strategies into the RPJMN 2020-2024, which aims to reduce greenhouse gas emissions and encourage environmentally friendly investments, as stated in the Low Carbon Development document: A Paradigm Shift Toward a Green Economy in Indonesia [2]. In addition, Indonesia is also developing a carbon trading system and encouraging incentive policies for industry players who adopt environmentally friendly technologies.

As the economic center of North Sumatra Province, Medan City plays an important role in implementing the green economy concept. With a growing population of 2,530,493 people by 2023, the city faces a major challenge in maintaining a balance between economic growth and environmental sustainability [3]. The rapid increase in the industrial and transportation sectors has the potential to cause overexploitation of natural resources, air pollution, and reduced green open spaces.

Based on the Medan City in Figures report [3], the number of motor vehicles and economic activities that increase from year to year also put pressure on the air quality and availability of green open spaces in the city. On the other hand, the persistence of social and economic disparities reinforces the importance of implementing a more inclusive and sustainable development approach.

The implementation of green economy in Medan City can be a solution to address the existing environmental and social challenges. A number of programs such as Medan Zero Plastic, Car Free Day, and the revitalization of city parks show the local government's initial steps in supporting environmentally friendly development. If extended to the transportation, energy, and spatial planning sectors, green economy policies have the potential to improve environmental quality while promoting local

economic growth.

This study aims to analyze the implementation of green economy policy in Medan City, identify the challenges faced, and formulate strategies that can be applied to improve the effectiveness of the policy. By understanding the factors that influence green economy implementation, it is hoped that this research can contribute to the formulation of more effective and sustainable policies.

2. Literature Review

2.1 Green Economy Concept

A green economy focuses on the balance between economic growth and environmental conservation, with an emphasis on efficient resource utilization and reduced carbon emissions. According to [4], a green economy is a development system capable of improving human well-being and social equality, while significantly reducing environmental risks. In Indonesia, this concept is increasingly relevant through policies on the use of renewable energy, energy efficiency, and more responsible resource management. Meanwhile, in Medan City, the implementation of green economy is starting to be directed at strategic sectors such as energy, transportation, and waste management. This initiative is also supported by green financing that encourages MSME players to develop environmentally friendly products in a sustainable manner.

2.2 Green Economy Policy in Indonesia

Indonesia integrates green economy in sustainable development through policies such as the RPJMN 2020-2024, which emphasizes resource efficiency, renewable energy, and carbon emission reduction [5]. Green energy development and circular economy principles are also encouraged, while the Environmental Protection and Management Act regulates the utilization of natural resources. In Medan, programs such as green open space and sustainable transportation were launched [6]. International cooperation with the Green Climate Fund supports the funding of sustainable projects. Challenges include limited technology, funding, and public awareness, but opportunities lie in innovation and cross-sector collaboration [7].

2.3 Implementation of Green Economy in Medan

The implementation of green economy in Medan City includes energy efficiency efforts, wastemanagement, and adoption of environmentally friendly technologies by the industrial sector. The Medan City Government has replaced street lights with energy-efficient LED lights, which aims to lower electricity consumption and reduce greenhouse gas emissions. This program is expected to be the first step in building a more energy-efficient city and supporting the transition to a lowcarbon economy. Electrical energy consumption in the household and industrial sectors shows a significant increase from year to year, indicating the importance of energy saving efforts [8]

In addition, waste management is a priority in implementing green economy in Medan. The Medan City Government has developed Integrated Waste Management Sites (TPST) in several subdistricts, as well as expanded the waste segregation program from households. The program is strengthened by the "Medan Bebas Sampah" campaign and cooperation with local communities through waste banks. shows that the amount of household waste generation in Medan City in 2022 will reach 1,602 tons per day, which requires a more integrated and sustainable waste management system [9].

2.4 Challenges in Green Economy Implementation

Challenges in Green Economy Implementation The implementation of green economy in Medan City faces several challenges, especially in the industrial sector, where the adoption of environmentally friendly technology is still low [10]. The use of renewable energy in the household and industrial sectors is also minimal, with the dominance of electricity and fuel oil. Lack of incentives from local governments hinders the energy transition. In addition, 3R-based waste management is less effective due to low community participation, and most waste still ends up in landfill. Limited policy integration and human resource capacity exacerbate green economy implementation. Therefore, collaboration between the government, private sector, and communities is needed to overcome these barriers.

3. Research Method

3.1 Research Approach

This research uses a qualitative approach with the aim of providing a comprehensive picture of green economy implementation in Medan City. The main focus of this approach is to analyze the policies that have been implemented, identify the challenges faced, and evaluate their impact on environmental and economic aspects. The qualitative approach was chosen because it is able to descriptively describe complex social phenomena and public policies, including the integration of green economy principles in urban development policies.

This research relies entirely on secondary data obtained online, without conducting direct data collection in the field. Data were collected from reliable sources such as the Central Bureau of Statistics (BPS), National Development Planning Agency (Bappenas), Medan City Government (Pemko Medan), as well as accredited or peer-reviewed scientific journals.

3.2 Data Collection Technique

Data collection was conducted by accessing documents and secondary information sources available online. The main sources included official publications from BPS and Bappenas that provided statistical data and national policy directions, and documents from Medan City Government that contained environmental policies and programs. In addition, relevant scientific journals on green

economy issues were also used to strengthen the theoretical and empirical analysis.

The data collected included information on the green economy policies that have been implemented, environmental and economic indicators, implementation strategies, and barriers that emerged during the implementation process. All sources were selected based on the relevance, credibility and currency of the information.

3.3 Data Analysis Technique

The data obtained was analyzed using qualitative descriptive analysis techniques. The analysis process was carried out through the stages of reading, understanding, sorting, and interpreting the contents of documents from various sources. Information from each source was reviewed thematically to identify patterns, relationships and emerging trends related to the implementation of green economy in Medan City.

This research focused the analysis on three main aspects: policies that have been implemented by the government, challenges in implementation across sectors, and the economic and environmental impacts. Comparisons were also made with best practices from other cities through a literature study, to assess the extent to which green economy implementation in Medan is aligned with sustainable development principles.

4. Results and Discussion

4.1 Analysis of Green Economy Policies in Medan

The Medan City Government has implemented various green economy policies to support sustainable development, such as the development of green open spaces through the revitalization of Merdeka Square [13], in accordance with Medan City Local Regulation No. 13/2011 on RTRW. In addition, a circular economy-based waste management program is also promoted through the development of waste banks involving the private sector. In transportation, Medan City has started to develop a sustainable transportation system to reduce emissions and support low-carbon mobility [10]. However, the effectiveness of this policy is still constrained by budget limitations, low public awareness, and regulatory barriers.

4.2 Evaluation of Green Economy Impacts on Environment and Economy

The implementation of green economy in Medan City shows positive impacts on the environment and economic growth. In 2023, economic growth reached 5.04%, supported by sectors such as accommodation and food and beverages (12.65%), and transportation (11.16%) that began to adopt environmentally friendly practices. Greening and waste management programs, such as in Medan Petisah, also provide environmental benefits while opening up recycling-based business opportunities. Even so, the challenges of program sustainability and expansion still need to be addressed.

4.3 Challenges in Green Economy Implementation in Medan City

The main challenges include budget constraints, low public awareness, and pressure on green open spaces. The environmental protection budget in the 2023 APBD is still minimal compared to the needs. Green spaces have also not reached 30%, threatening the ecological capacity of the city. In addition, the unemployment rate of 8.81% shows that labor adaptation to green jobs is still low. Limited environmental data and indicators also hamper policy evaluation.

4.4 Strategies for Improving Green Economy Implementation

Collaboration between the government, private sector and communities needs to be strengthened. Incentives for green businesses, human resource training, and policy socialization can encourage this transition. The RPJPN 2025-2045 also emphasizes low-carbon growth as a national priority. The use of technology such as air quality monitoring systems and digitalization of waste management can strengthen effectiveness and public participation. With this strategy, the green economy in Medan can develop in a more structured and sustainable manner

5. Conclusions

This study concludes that the green economy policy in Medan City is implemented through several strategic programs, including the development of green open spaces (RTH), circular economy-based waste management, and the development of a sustainable transportation system. The policy aims to achieve a balance between economic growth and environmental preservation, and address urban environmental problems such as air pollution and reduced green open spaces.

However, in its implementation, there are a number of challenges that must be faced. The main challenges include budget constraints, low public awareness of the importance of the green economy, and potential changes in the function of green open spaces that could threaten the sustainability of these areas. In addition, although this policy has had a positive impact on the environment and economy, there are still constraints in terms of long-term maintenance and sustainable management of green open spaces.

The impact of green economy on Medan City's environment can be seen from the improvement of air quality, decrease in air temperature, and reduced flood risk as a result of the increase in green open space area. In terms of the economy, the revitalization of Merdeka Square has boosted the MSME and tourism sectors, although some community groups, such as street vendors, have to

adjust to the spatial changes. A key challenge related to economic impact is how to manage this transition to be more inclusive and equitable for all affected parties.

Overall, although the implementation of green economy in Medan City has shown positive impacts on both the environment and the economy, challenges must be overcome to ensure the sustainability of this policy. Therefore, it is necessary to conduct continuous evaluation and strengthen regulations to support the maintenance of green spaces and strengthen public awareness and involvement in maintaining the sustainability of the green economy in the future.

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