THE ROLE OF LAW AND GOVERNMENT POLICY IN SUPPORTING GREEN TECHNOLOGY: CHALLENGES AND SOLUTIONS

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Abstract: Green technology, or "green technology," is a scientific and technical approach aimed at enhancing resource efficiency, reducing environmental impact, and supporting ecosystem sustainability. The primary focus of green technology is to decrease carbon emissions and pollution, as well as to minimize negative impacts on the environment and human health. Global environmental issues such as climate change, biodiversity loss, air and water pollution, and water resource crises require mitigation and adaptation efforts involving international cooperation and commitment from various sectors.

In Indonesia, the implementation of green technology faces significant challenges, including bureaucracy, regulatory complexity, and a lack of coordination among government agencies. Policies and regulations such as the Energy Law and the Environmental Protection Law, as well as various presidential and ministerial decrees, provide a legal framework to support green technology. However, issues related to licensing, inadequate incentives, and ineffective coordination remain barriers to the adoption of green technology.

This research aims to explore the role of law and government policy in Indonesia in supporting the development and implementation of green technology. The research method used is normative legal research with a descriptive-analytical approach and qualitative data analysis. The findings indicate that a clear and measurable legal and policy framework, adequate incentives, and efficient inter-agency coordination are crucial for supporting green technology. Enhanced compliance and law enforcement are also key factors in ensuring the success of green technology and achieving national sustainability goals.

With detailed policies, adequate incentives, and improved inter-agency coordination, it is hoped that the development of green technology can be accelerated and optimized. This research provides insights into how legal and policy frameworks can influence the success of green technology in Indonesia and contribute to achieving national environmental sustainability goals.

INTRODUCTION

Green Technology, often referred to as green technology, pertains to scientific and technical applications designed to enhance efficiency, reduce negative environmental impacts, and support ecosystem sustainability. This technology includes innovations, processes, products, and services that use resources more efficiently, reduce pollution,

and minimize adverse effects on the environment and human health, thereby supporting eco-friendly sustainable practices (Dustin Mulvanney: 2011).

Green Technology aims to be environmentally friendly and low-carbon by reducing carbon emissions that contribute to climate change. This phenomenon has led to extreme weather conditions, such as the current trend of rising temperatures. Additionally, natural disasters like storms, melting ice caps in the Arctic and Antarctic, and the extinction of species are also consequences of ongoing climate changes (Bushra Limuna Ismail, 2020).

Publications and reports from UNEP address various global environmental issues, indicating that current environmental problems include a range of interconnected issues affecting the health of the planet and human life, such as Climate Change, Biodiversity Loss, Air Pollution, Water Pollution, Deforestation, Soil Degradation, Waste Management, and Water Resource Crisis (UNEP Annual Report, 2023). These problems have not only local impacts but also global effects that can influence social stability, economic development, and public health worldwide. Effective mitigation and adaptation efforts require international cooperation and commitment from various sectors to address these urgent environmental challenges.

Environmental issues are significant not only in scale but also in their broad impacts on various aspects of life on the planet. For instance, climate change not only causes extreme weather and rising sea levels but also affects food security, human health, and the global economy. Deforestation and biodiversity loss threaten the stability of ecosystems that provide essential services such as carbon sequestration, water filtration, and habitat for species dependent on these environments.

Air and water pollution, on the other hand, have direct consequences on public health, increasing the prevalence of respiratory, cardiovascular, and various infections caused by pollution. Moreover, pollution damages ecosystems, reduces soil quality, and affects agricultural productivity. Plastic waste and other pollutants contaminating oceans harm marine life and threaten the sustainability of marine ecosystems vital for biodiversity and the economy, such as fisheries.

Deep mitigation and adaptation efforts are necessary to address these challenges

effectively. This includes implementing policies that support greenhouse gas emission reductions, preserving and rehabilitating natural habitats, and managing resources sustainably. Green technology innovations and science-based approaches are also crucial for reducing negative impacts and enhancing resilience to environmental changes. Global and local collaboration, community involvement, and support for research and development are key to tackling these complex issues and ensuring environmental sustainability for future generations.

Research and Development (R&D) play a crucial role in driving green technology innovation, which is essential for addressing global environmental challenges and creating sustainable solutions. R&D helps identify and develop more efficient and eco-friendly technologies, such as renewable energy, waste management technologies, and resource conservation methods (M Philippe, 2012).

In Indonesia, many areas still face limitations in infrastructure and access to advanced technology. Infrastructure constraints can hinder the implementation of green technologies that can reduce environmental impacts, such as renewable energy and waste management systems. Without adequate infrastructure, it is challenging to implement solutions that can reduce pollution or improve energy efficiency.

This article aims to explore the role of Indonesian laws and government policies in supporting the development and application of green technology. With the increasing urgency to address environmental challenges, public policy and regulation play a crucial role in creating an environment that supports eco-friendly technological innovations. The ultimate goal of this article is to provide in-depth insights into how the legal and policy framework can impact the success of green technology in Indonesia and accelerate the achievement of national sustainability goals.

RESEARCH METHODS

The research method used in normative legal research is a study in the field of law aimed at seeking legal justice, norms, and is complemented by research on legal values that evolve and develop within society. The focus is to discover theories about the

processes of law formation and its functioning in society (Bambang: 2002). The type of research is descriptive-analytical, and the approach used is the statutory approach.

To evaluate this research, data collected is analyzed using qualitative analysis methods (Milles & Hubberman: 1992). Qualitative data analysis involves explaining and outlining theories, doctrines, principles, and legal norms related to the key and relevant articles in legislation pertinent to this study.

RESULTS AND DISCUSSION

A. The Role of Law and Government Policy in Indonesia in Supporting the Development and Implementation of Green Technology.

The Indonesian government has introduced various regulations and policies to support green technology, but their implementation is often hindered by bureaucracy and regulatory complexity. The convoluted and frequently uncoordinated licensing processes between different government agencies can obstruct the development and application of green technology. For example, entrepreneurs and researchers often face difficulties in obtaining the necessary permits due to differing rules among ministries or authorities. This not only slows down project implementation but also increases costs and risks for the parties involved. Additionally, a lack of simplification and harmonization in regulations can create confusion and legal uncertainty, potentially delaying investments in green technology.

Despite the existence of supportive policies and regulations, the incentives provided are often considered inadequate to attract the necessary investment. Incentive programs, such as tax breaks or subsidies, may not be substantial enough to cover the high initial costs of green technology or to make it more competitive compared to cheaper but less eco-friendly alternatives. Moreover, some incentives may not be well communicated to industry players or small and medium-sized enterprises, resulting in underutilization of available opportunities. With suboptimal incentives, the private sector may be reluctant to invest in green technology, thus hindering widespread adoption and innovation in this field.

Poor coordination among various ministries and government agencies also poses a significant challenge in implementing green technology policies in Indonesia. Green

technology projects often require cooperation between the energy, environment, industry, and finance sectors, yet a lack of coordination can lead to inefficiencies and overlaps in policy execution. For instance, policies issued by the Ministry of Energy and Mineral Resources may not always align with environmental regulations set by the Ministry of Environment and Forestry or fiscal incentives issued by the Ministry of Finance. This misalignment can hinder overall policy effectiveness and complicate the implementation of green technology programs on the ground. To address this issue, more coordinated and integrated efforts among agencies are needed to create more comprehensive and consistent policies.

The regulations and policies supporting the development and implementation of green technology in Indonesia include:

1. **Law No. 30 of 2007 on Energy** This law regulates the management and utilization of energy in Indonesia, including incentives for renewable energy and green technology. **Relation to Green Technology**: Provides a legal foundation for the development of renewable energy sources such as solar, wind, and biomass.
2. **Law No. 32 of 2009 on Environmental Protection and Management** This law governs environmental protection and management, including the responsibility of businesses to reduce environmental impacts from their activities. **Relation to Green Technology**: Encourages the use of eco-friendly technology and waste management, providing a basis for regulations related to green technology.
3. **Presidential Regulation No. 22 of 2017 on the National Energy General Plan (RUEN)** is a strategic document that sets the direction and national energy policies, including targets for renewable energy use. **Relation to Green Technology**: Establishes long-term targets for increasing the share of renewable energy in the national energy mix, supporting the development of green technology in the energy sector.
4. **Presidential Regulation No. 91 of 2017 on the Acceleration of Business Implementation.**This regulation aims to simplify the licensing and business processes in Indonesia. **Relation to Green Technology**: Facilitates permits for green technology projects, including renewable energy and environmental initiatives.
5. **Minister of Energy and Mineral Resources Regulation No. 12 of 2017 on New Renewable Energy Power Plants .** This regulation governs the development of power plants based on new renewable energy sources. **Relation to Green Technology**:

Provides a legal framework and incentives for the development and use of renewable energy.

6. **Minister of Environment and Forestry Regulation No. P.15/Menlhk/Setjen/Kum. 1/3/2019 on Environmental Impact Assessment Guidelines.** This regulation governs environmental impact assessments (AMDAL) required for large projects. **Relation to Green Technology**: Mandates environmental impact assessments to ensure that green technology projects also consider sustainability and environmental impacts.
7. **Minister of Industry Regulation No. 8 of 2019 on the National Action Plan for Greenhouse Gas Emission Reduction.** This regulation supports greenhouse gas emission reduction efforts through the development of eco-friendly technologies and practices. **Relation to Green Technology**: Encourages the adoption of technologies that can reduce carbon emissions and supports national climate change targets.
8. **Government Regulation No. 70 of 2009 on Energy Conservation** Regulates energy conservation and efficiency efforts across various sectors. **Relation to Green Technology**: Provides regulations for the application of energy efficiency technologies that can reduce energy consumption and environmental impact.
9. **Presidential Decree No. 61 of 2011 on the National Action Plan for Climate Change Adaptation.** A strategic document identifying measures to adapt to climate change. **Relation to Green Technology**: Focuses on technologies and solutions that can help adapt to the impacts of climate change.
10. **Minister of Finance Regulation No. 160/PMK.010/2015 on Income Tax for Domestic Investment in Research and Development.** This regulation covers tax incentives for research and development activities. **Relation to Green Technology**: Provides tax incentives for investments in research and development of green technology.

B. The Success of Green Technology in Indonesia and Achieving National Sustainability Goals

The success of green technology in Indonesia represents significant progress toward achieving national sustainability goals. By continuously developing and implementing green solutions, Indonesia is not only addressing environmental challenges but also creating a more sustainable future for future generations. Indonesia

has demonstrated a strong commitment to sustainability and environmental preservation through the adoption of green technology. Green technology, which includes innovations that reduce environmental impact and promote resource efficiency, has become an integral part of the national strategy to achieve sustainability goals. This adoption focuses not only on environmental protection but also on sustainable economic development (JISDeP, Vol 4 No 3: 2023).

One example of green technology success in Indonesia is the use of renewable energy. The Indonesian government has launched various initiatives to increase renewable energy capacity, such as solar and wind power plants. Programs like the National Energy General Plan (RUEN) aim to boost the contribution of renewable energy to the national energy mix. These efforts not only reduce dependence on fossil fuels but also contribute to greenhouse gas emission reduction (M. M. S. Yusof, E. M. H. Ismail, and A. A. Mohamed: Vol. 112, 2019).

Green technology is also applied in the agricultural sector through sustainable farming methods. The use of technologies such as water-saving irrigation systems and organic fertilizers helps improve agricultural yields while maintaining soil quality and reducing pollution. Programs like Sustainable Agricultural Development (PPB) provide training to farmers on eco-friendly techniques, positively impacting the sustainability of Indonesia's agricultural sector (A. S. Sudrajat, R. H. Arifin, and E. S. Prasetyo: 2020).

In the industrial sector, the adoption of green technology has also seen significant progress. More companies in Indonesia are embracing circular economy principles, which prioritize recycling and reusing materials. Initiatives such as large companies' Corporate Social Responsibility (CSR) programs often include green projects, such as waste processing and carbon footprint reduction. This shows that the private sector is also actively contributing to sustainability goals.

The application of green technology in the transportation sector is also noteworthy. The Indonesian government has promoted the use of electric vehicles as an environmentally friendly alternative to fossil fuel-powered vehicles. Incentive programs for electric vehicles and the development of charging infrastructure are concrete steps supporting the transition to cleaner and more efficient transportation.

In terms of natural resource management, Indonesia has taken significant steps in forest preservation and conservation area management. Satellite-based monitoring technology helps track deforestation and illegal activities in forest areas. The REDD (Reducing Emissions from Deforestation and Forest Degradation) program also plays a role in reducing carbon emissions resulting from forest damage.

Challenges remain, particularly concerning funding and public awareness. To ensure long-term success, greater support from various stakeholders, including the government, private sector, and the public, is needed. Education and training on green technology should be expanded to enable more individuals and organizations to participate in sustainability initiatives.

CONCLUSION

1. The implementation of green technology in Indonesia has shown significant progress in achieving national sustainability goals, although challenges related to bureaucracy, coordination, and adequate incentives remain. Government policies and regulations are in place but are often not optimally implemented due to administrative hurdles and a lack of harmonization between agencies.
2. To enhance the effectiveness of green technology implementation, there is a need for streamlining the permitting process, harmonizing regulations across agencies, and increasing more substantial incentives. Additionally, efforts to strengthen coordination between the government, the private sector, and the public should be reinforced to ensure that sustainability initiatives are more widely accepted and implemented.

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