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ANALYSIS OF GREEN ECONOMY POLICIES IN PROMOTING ENVIRONMENTALLY FRIENDLY AGRICULTURAL PRACTICES AS A RESPONSE TO CLIMATE CHANGE

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Abstract

Increasingly evident climate change demands a strategic shift in agricultural practices to maintain environmental sustainability and food security. This article analyses green economy policies in promoting environmentally friendly agricultural practices as a response to climate change. The main focus lies on the application of environmentally friendly technologies, efficient resource management, and the integration of sustainable agricultural practices such as agroforestry and the use of organic inputs. The aim of this policy is to sustainably increase productivity while minimising negative impacts on the environment. In addition, this article highlights the importance of cross-sectoral collaboration between the government, research institutions, private organisations and farmers in achieving this goal. Through the support of this policy, it is expected to create an agricultural system that is more resilient to the challenges of climate change, while contributing to environmental conservation.

Keywords: Analysis, Green Economy Policy, Environmentally Friendly Agricultural Practices, Response to Climate Change.

Introduction

Climate change has become an increasingly global issue, with significant impacts on various sectors, especially agriculture. Increasing global temperatures, changing rainfall patterns and the frequency of extreme weather events affect food production, the sustainability of natural resources and the welfare of farming communities. Extreme weather, such as droughts, floods, hurricanes and erratic temperatures, have a direct impact on food production (Kuhlman & Farrington, 2010) . Prolonged drought can lead to reduced water availability for irrigation, hindering crop productivity. Conversely, flooding can damage farmland, destroy crops and reduce yields. Unpredictable weather conditions also affect the cropping cycle, making it difficult for farmers to determine the optimal time for planting and harvesting. As a result, national food security is compromised with an increased risk of food shortages and spikes in food prices (United Nations Environment Programme, 2011) .

Besides affecting food production, extreme weather also contributes to the degradation of natural resources and affects the well-being of farming communities. For example, droughts can accelerate soil degradation processes such as desertification and reduced soil nutrients, while floods can bring chemical runoff into water sources that pollute the environment. For smallholder farmers who depend entirely on agricultural produce for their survival, extreme weather can cause huge economic

losses due to loss of income (UNEP (United Nations Environment Programme), 2011) . Weather instability also further exacerbates poverty in the agricultural sector, as farmers often do not have access to adaptation technologies or insurance coverage to mitigate the impacts of extreme weather. This raises the need to implement sustainable approaches in the agricultural sector to protect farmers and natural resources from the threats of climate change. This calls for a paradigm shift in agricultural practices to ensure ecosystem sustainability as well as future food security (Barbier, 2011) .

At the same time, the development of the green economy concept offers an integrated approach to promoting sustainable economic development. Green economy is a concept of economic development that focuses on the sustainable management of natural resources to minimise environmental impacts, while creating a balance between economic growth, ecosystem sustainability, and human well-being (Altieri & Nicholls, 2017) . In a green economy, economic activities are directed at reducing greenhouse gas emissions, preventing environmental degradation, improving energy efficiency, encouraging the use of renewable energy sources, and supporting environmentally friendly production and consumption practices. This concept aims to ensure that economic development is not only financially beneficial, but also has a positive environmental and social impact (Zhu et al., 2004) .

The adoption of a green economy is essential in the face of global challenges, such as climate change, biodiversity loss, and depletion of natural resources. By adopting a green economy, countries can create a more sustainable and inclusive development model, where economic benefits can be evenly distributed without harming the environment for future generations (Pretty, 2008) . In addition, a green economy also encourages innovation in the green technology sector, creates new jobs, and increases the competitiveness of industries in the face of globalisation. Thus, the transition to a green economy is key to addressing the needs of the present without compromising the ability of future generations to meet their own needs (Zhang et al., 2010) .

Therefore, the green economy not only provides opportunities for economic growth, but also encourages the transformation of production structures to be more environmentally friendly, including in the agricultural sector. Green economy policies focus on resource efficiency, carbon emission mitigation, and technological innovations that support sustainable agricultural practices. However, the implementation of green economy policies in the agricultural sector often faces various challenges (Lal, 2004) . In Indonesia, for example, most farmers still rely on traditional methods or intensive practices that can accelerate environmental degradation, such as the overuse of pesticides and chemical fertilisers. In addition, lack of understanding and adequate funding are barriers in encouraging the adoption of environmentally friendly farming techniques (Jacobson, 2009) .

Amidst the urgency of dealing with climate change, it is important to analyse the effectiveness of green economy policies in promoting sustainable agricultural practices. Through this approach, it is hoped that solutions can be found that not only address environmental challenges, but also pay attention to the economic welfare of the community, especially small farmers. Research on this policy is relevant as a strategic step to find a balance between the needs of economic development, environmental sustainability, and adaptation to climate change.

Research Methods

The study in this research uses the literature method. The literature research method is a research approach carried out by collecting, analysing, and synthesising various written sources of information, such as books, journal articles, research reports, official documents, or other publications, which are relevant to the topic under study (Green et al., 2006) ; (Galvan & Galvan, 2017) . This research aims to understand theories, concepts, and previous findings that have been expressed by experts, so that they can become the basis for answering research questions or developing a stronger theoretical framework. In this method, researchers conduct an in-depth review of existing material, then identify research gaps or develop arguments based on available evidence. This method does not involve direct data collection from the field, but relies entirely on reliable secondary sources (Torraco, 2005) .

Results and Discussion

Forms of Green Economy Policies Relevant to the Agricultural Sector

Green economy policies relevant to the agricultural sector involve efforts to encourage sustainable agricultural practices, reduce environmental impacts, and ensure farmers' welfare. The first step is to change agricultural subsidy policies to be greener, by providing incentives for farmers who adopt sustainable methods, such as the use of organic fertilisers, agroforestry techniques and wise water management. This policy not only supports environmentally friendly farming, but also helps farmers to reduce production costs, thereby increasing efficiency (Nelson et al., 2007) .

Another important policy is the development of research and technology orientated towards green agriculture. The government can fund research on naturally pest-resistant seeds, emission-free farming techniques, and low-carbon technology tools. Through these innovations, the agricultural sector can operate more productively while minimising land degradation and ecosystem damage. In addition, technology transfer to farmers also needs to be considered so that they can access more environmentally friendly work practically and economically (Xu et al., 2020) .

Strengthening the education and training system for farmers is also fundamental. The government and private sector can organise training on sustainable techniques, such as natural pest control methods, crop rotation, and integrated water

resource management. By providing thorough education, farmers will have better capacity to implement green farming. Environmental awareness can also be improved, ultimately contributing to the sustainability of the sector (IPCC Climate Change Report, 2021)

Agricultural waste reduction and organic waste management are also relevant policies. Crop waste can be converted into value-added products, such as organic compost or bioenergy. The government can encourage this practice by subsidising waste treatment equipment or integrating the technology into the farming system. In addition to improving soil quality as a result of organic waste management, this policy helps reduce methane emissions resulting from waste decomposition (Hossain et al., 2018) .

Developing renewable energy supply in the agricultural sector is another strategic step. Many farmers depend on fossil fuels to run farm tools and irrigation systems. The government can incentivise farmers to switch to renewable energy sources, such as solar panels or windmills. With this energy transition, farmers not only reduce their carbon footprint, but also gain access to more cost-effective and sustainable energy (Smith et al., 2007) .

In addition, green economy policies in the agricultural sector should include strengthening trade systems that support environmentally friendly products. The government can facilitate organic product certification and ecolabelling systems, so that these products can have a higher market value. This incentivises farmers to switch to green farming methods and increases the competitiveness of local products in domestic and international markets (Swarnakar et al., 2021) .

It is also important to build infrastructure that supports sustainable agriculture, such as water-efficient irrigation systems, organic fertiliser distribution centres and modern post-harvest storage facilities. This infrastructure helps farmers utilise natural resources more efficiently, thereby increasing the efficiency of sustainable agricultural production. The government needs to address these needs through funding green infrastructure development programmes (Zomer et al., 2017) .

Policies to protect agricultural land from conversion to industry or housing should also be implemented, given the increasing pressure on land. The government can set strict zoning for agricultural land to prevent it from being converted, and incentivise landowners to maintain agricultural land. This step is important to ensure the continuity of the food production chain while maintaining ecosystem balance (Foley et al., 2005) .

Cross-sector cooperation is also highly relevant to support green economy policies in agriculture. The government can collaborate with the private sector, non-governmental organisations and academia to expand the reach of green economy programmes. With strong collaboration, various parties can complement each other in

supporting innovation, funding, and educating farmers about the importance of sustainable agriculture (Godfray et al., 2010) .

Finally, wise water management policies should be prioritised in a green agriculture sector. Governments need to ensure access to clean water and efficient management of water resources, including utilising recycled water use techniques or drip irrigation. This step is crucial to address the challenge of water scarcity, especially considering that the agricultural sector is one of the main users of water resources (Bai et al., 2011) . With proper management, the agricultural sector can create a balance between productivity and sustainability in the long term.

Evaluation of Policy Implementation in Support of Environmentally Friendly Agricultural Practices

Environmentally friendly agriculture is one of the important development directions to ensure the sustainability of natural resources and the balance of ecosystems. In supporting this practice, the government through various policies has attempted to facilitate a paradigm shift in the agricultural sector, from a mere productivity approach to a more holistic approach that considers environmental aspects. Evaluation of the implementation of this policy is crucial to ensure that the formulated policy is truly able to have a positive impact as expected (Zahra et al., 2021) .

Government policies often include various incentives to encourage more sustainable agricultural practices. Examples include subsidising organic seeds, training farmers on soil and water conservation techniques, and developing integrated farming systems. However, implementation often faces various obstacles at the field level. One of them is the low understanding of farmers about the essence of environmentally friendly agriculture, so the implementation of these policies has not been comprehensive (Daly & Farley, 2010) .

One of the important factors in policy evaluation is the extent to which the policy is able to increase farmers' awareness and active participation. Although the government has created training programmes, sometimes the provision of access to information is still limited. These programmes often do not reach all areas, especially remote areas. As a result, only a small percentage of farmers can truly understand and adopt environmentally friendly practices (WRI (World Resources Institute), 2021) .

In addition, policies using a top-down approach tend to encounter challenges when faced with farmers' diverse socio-economic conditions. Many smallholder farmers prioritise quick productivity to meet their daily needs over implementing environmentally friendly practices that usually take longer to show tangible results. This makes policies difficult to accept, despite their significant long-term benefits for agricultural sustainability (Liu et al., 2007) .

In order to improve, the role of local governments must also be strengthened. The central government cannot go it alone in driving major changes on the ground. Collaboration with local governments and intensive assistance to farmers are key in ensuring more effective policy implementation. Human resource capacity building at the local level can also support the distribution of information and technical assistance to farmers (Food and Agriculture Organisation, 2011) .

Not only that, it is necessary to monitor the effectiveness of policies that have been implemented. This supervision must involve various parties, ranging from civil society to non-governmental organisations. Public participation in evaluating policies will increase the transparency and accountability of the government in managing an environmentally friendly agricultural sector. That way, various parties can work together to achieve the same goal (Intergovernmental Panel on Climate Change, 2014).

Support from the private sector should not be overlooked either. Partnerships with agricultural companies can be a driving force in introducing more environmentally friendly technologies and innovations to farmers. Technology plays an important role in production efficiency without damaging the environment. The government should encourage this collaboration by providing incentives to companies willing to participate in sustainability programmes (Adger et al., 2012) .

Evaluation of policy implementation must also include aspects of economic sustainability. Environmentally friendly programmes should not only aim to protect the ecosystem but should also provide economic benefits to farmers. Therefore, the government needs to design policies that are able to address the balance between farmers' economic needs and environmental sustainability simultaneously. This can be achieved, for example, by supporting market access for organic or environmentally friendly agricultural products (Altieri & Nicholls, 2017) .

Policies should also prioritise equity of access. Smallholders, who tend to have limited resources, should be prioritised for technical and financial support. In this way, policies will not only be successfully implemented widely, but also have a positive social impact. Reducing the gap between large and small farmers is an important aspect of effective policy implementation (Pretty, 2008) .

Furthermore, the government needs to make policy adjustments based on the evaluation results. This means that if policies are found to be less effective, then revisions should be made by involving stakeholders. Participatory forums such as workshops, public discussions, or consultations with farming communities are a good way to ensure that policies really suit their needs (Tilman et al., 2011) .

Governments also need to work with research institutions to find new innovations that not only accelerate the adoption of green technologies, but also ensure that practices are relevant to specific conditions in different regions. With an evidence-based approach, policies implemented will be more measurable and targeted (Rockström et al., 2009) .

Thus, evaluating the implementation of environmentally friendly agricultural policies requires a comprehensive approach that considers various aspects, ranging from the level of farmer adoption, the effectiveness of technical and financial support, to monitoring environmental and economic impacts. The government, private sector, community organisations, and farmers need to work together to create synergies that support the success of the policy. With improvements and adjustments based on evaluation, we can expect environmentally-friendly agriculture to increasingly become a sustainable norm in the future.

Conclusion

The results of research on Green Economy Policy Analysis in Encouraging Environmentally Friendly Agricultural Practices as a Response to Climate Change, were found;

Firstly, green economy policies implemented in the agricultural sector aim to increase productivity in a sustainable manner and reduce negative impacts on the environment. The implementation of this strategy includes the use of environmentally friendly agricultural technologies, efficient management of natural resources, and the adoption of organic farming practices. The policy is also designed to support farmers in adopting new methods through various incentives and training programmes.

Second, responding to climate change is one of the main focuses in implementing green economy policies. Environmentally friendly agricultural practices such as agroforestry, crop rotation, and the use of organic fertilisers and natural pesticides, are proven to increase resilience to climate extremes and maintain soil fertility in the long term. Thus, farmers can better face the challenges of climate change and maintain stable food production.

Third, the importance of collaboration between various stakeholders in implementing this policy. The government, research institutions, NGOs and the private sector must work together to create an environment conducive to sustainable agriculture. Financial support, access to information and technology, and adequate infrastructure development are necessary. Thus, green economy policies not only improve farmers' welfare but also contribute to climate change mitigation and environmental sustainability.

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