Agri-environmental policies in Indonesian and Thailand: a comparison

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Abstract. After introducing the Green Revolution in Indonesia and the Sustainable Farming System in Thailand, environmental issues in the agricultural sector became an interesting topic. This article discusses the efforts of the Governments of Indonesia and Thailand in implementing Agri-environmental policies (AEPs). The implementation of AEPs has become a discourse that in the last few decades has played an increasingly vital role for the government to encourage the Environmental Performance Index (EPI) and the Sustainable Nitrogen Management Index (SNMI). Indonesia and Thailand are two developing countries in the Asia Pacific that have great attention in implementing AEPs. Therefore, this research has two main objectives: 1) Analyzing the determinants of successful implementation of AEPs in the two countries, and 2) Analyzing the role of AEPs in each country for improving the EPI and SNMI. The method used in this research is comparative descriptive with a qualitative approach. Meanwhile, the data collection technique was carried out by studying documentation from various sources related to AEPs. The results show that Indonesia's AEPs, the Green Revolution, improve the SNMI indicators. Meanwhile, the determinant of the success of the AEPs, namely the Sustainable Farming System in Thailand, is in optimizing the EPI.

1. Introduction
Agriculture was seen as a source of contributions that helped induce industrial growth and a structural transformation of the economy. However, globalization, integrated value chains, rapid technological and institutional innovations, and environmental constraints have rapidly changed the context for agriculture's role [1]. The same thing happened in ASEAN countries. Agriculture is seen as a source of contribution that helps encourage industrial growth and structural transformation of the economy [2]. Moreover, on average, ASEAN countries are agricultural countries, including Indonesia and Thailand. These two countries have many similarities. Apart from being both ASEAN members and experiencing a relatively high population growth rate, Indonesia and Thailand are also countries with tropical climates that have superior natural resources in agriculture.

This research has two main objectives: 1) Analyzing the determinants of successful implementation of AEPs in the two countries, and 2) Analyzing the role of AEPs in each country for improving the Environmental Performance Index and Sustainable Nitrogen Management Index. Besides that, this study wants to compare Agri-environmental policies in Indonesia and Thailand.
2. Methods
This study uses a comparative descriptive method with a qualitative approach. At the beginning of the results and discussion, the general description and urgency of Agri-environmental policies will be described. Furthermore, there is a discussion regarding the comparison of the efforts of the Governments of Indonesia and Thailand in the application of Agri-environmental policies, and then specify an analysis is carried out on 1) Determinants of the implementation of Agri-environmental policies in the two countries; 2) the role of each country’s Agri-environmental policies in improving the Environmental Performance Index (EPI) and the Sustainable Nitrogen Management Index (SNMI). Meanwhile, the data used in this study are secondary. The data referred to are articles in Indonesian or English originating from scientific journal articles, parts of books, or web pages from trusted sources relevant to research topics related to the efforts of the Governments of Indonesia and Thailand in implementing Agri-environmental policies. The year of publication of the data used is not limited.

The data analysis in this study uses an interactive model [3], which divides the stages into data analysis activities with the following strategies: data collection, data presentation, data condensation, conclusion: data verification.

3. Results and discussion

3.1. Agri-environmental policies in Indonesia
Indonesia's central agricultural policies are framed in the 2012 Food Law, which establishes food sovereignty and self-reliance objectives. In practice, these objectives have led to programs to achieve self-sufficiency in several staple products (rice, maize, soybean, sugar, and beef). Consequently, the most critical component of agricultural support in Indonesia is market price support to producers, including some negative support to palm oil.

One of the efforts of the Government of Indonesia in implementing agricultural, environmental policies is the Green Revolution. The plant of the green revolution originated from the research and writings of Thomas Robert Malthus (1766 – 1834), who argued that the problem of poverty and destitution is a problem that humans cannot avoid. Poverty and destitution occur because population growth and increased food production are not balanced. Population growth is running faster than the increase in agricultural (food) production [4]. The implementation of the Green Revolution in Indonesia occurred during the New Order era. From 1970 to 1980, the New Order government invested heavily in the agricultural sector. In addition, the New Order government developed and developed agricultural modernization programs to increase Indonesian agricultural production.

Four primary efforts can be made to increase agricultural production in Indonesia through the Green Revolution policy [4], namely: 1) Agricultural intensification, increasing the quality and quantity of agricultural production by increasing work productivity; 2) Agricultural extensification, increasing the quality and quantity of agricultural production by adding agricultural production factors; 3) Agricultural diversification, increasing the quality and quantity of agricultural production by developing the diversity of agricultural products; and 4) Agricultural rehabilitation, improving the quality and quantity of agricultural production by restoring critical land and agricultural resources.

The Green Revolution in Indonesia during the Soeharto era succeeded in making Indonesia the world’s largest food self-sufficient country in the 1980s. However, the green revolution not only has a positive impact but also has a negative impact. The positive impacts of the Green Revolution in Indonesia, namely: 1) Increasing the welfare of farmers; 2) Strengthening the rural economy; 3) Improving national food security; and 4) Raising awareness of rural communities on the importance of technological adaptation. The following negative impacts of the green revolution in Indonesia include 1) Farmers’ dependence on chemical fertilizers and pesticides that are not environmentally friendly; 2) The uneven use of modern technology in farming creates gaps; 3) The emergence of capitalization in the agricultural sector [4,5].
3.2. Agri-environmental policies in Thailand

Thailand is currently the world's largest exporter of agricultural products. Thailand's economy is export-dependent, with exports accounting for about 60% of GDP, and about 60% of Thailand's entire workforce is employed in agriculture. Agricultural commodities produced are rice with super quality, tapioca, rubber, grains, sugar, fish, and other fishery products. The Thai government adopts Agri-environmental policies called the Sustainable agriculture system, which protects agricultural products by providing incentives and subsidies to farmers. This policy has encouraged people to use vacant and unproductive land to plant crops with export prospects.

A sustainable agricultural system is defined as an agricultural system that utilizes renewable resources and non-renewable resources in a series of agricultural production processes by minimizing negative impacts on the environment. Sustainability in question includes the use of resources, quality, the quantity of production, and the environment. Sustainable agricultural production processes will lead to environmentally friendly biological products [6–8]. This agricultural system became widely known among farmers in the 1970s and positively impacted a significant increase in agricultural production.

Thailand has developed five patterns of sustainable farming systems, namely integrated farming systems, organic farming, natural farming, agroforestry, and New Theory Farming. Of the five patterns of sustainable farming systems, organic farming is growing more rapidly due to the full support of the Thai Government, and they even have a plan to promote Thailand as a "Kitchen of the world" and "Organic producer" [9]. The aspiration to make Thailand a producer of organic agricultural products is closely related to building a sustainable agricultural system. In addition, the development of organic farming also aims to meet the increasing global demand for chemical-free agricultural products.

Organic farming in Thailand, which was developed in the 1990s, has entered a stage of growth. The public and private sectors are interested in getting involved and promoting organic agriculture because they see the benefits of organic farming for food security and its contribution to ecological sustainability. Apart from rice and fresh vegetables, organic products in Thailand have also penetrated other commodities such as tea, spices, and fruits. In various places, restaurants are also developing that specialize in dishes made from organic agricultural products. Developing sustainable farming systems, especially organic farming in Thailand, involves various parties, including farmers, entrepreneurs, government, NGOs, and academics. Their goals are varied, among others, to protect the environment, improve health, and seek profit. However, the cooperation between stakeholders is based on the same desire, namely ecological sustainability and awareness to maintain health [9, 10].

3.3. Analyzing the determinants of successful implementation of AEPs in Indonesia and Thailand

The determinants of the success of implementing Agri-environmental policies in Indonesia are 1) Increased farmer welfare, increased rice and wheat production, so food (carbohydrate) fulfillment increases. For example, as a rice importer, Indonesia can be self-sufficient and export rice to India. In addition, the green revolution can increase the productivity and income of farmers; 2) The strengthening of the rural economy, the Green Revolution also affects the economic system. Some of the agricultural products are traded to earn money. The money flowing into the countryside then revives the economy at the local level; 3) Improving national food security, the Green Revolution, which in Indonesia is known as the Bimas movement (public guidance), is a national program to increase food production, especially rice self-sufficiency; and 4) Opening awareness of rural communities on the importance of technological adaptation, the Green Revolution is an effort to increase agricultural production by replacing traditional agricultural technology with modern agricultural technology so that they will try to adapt to the times.

While the determinants of the success of implementing Agri-environmental policies in Thailand are: 1) Integrated Agricultural System, which combines agricultural activities, animal husbandry, fisheries, forestry, and other sciences related to agriculture in one land, so that it can be an alternative solution for increasing land productivity, environmental development and conservation programs; 2) Organic Agriculture, has a positive impact on the environment and humans; 3) Natural Agriculture, can prevent environmental damage and maintain ecological sustainability; 4) Agroforestry, assisting the optimal use
of land so that it can improve the needs of people's lives; and 5) The New Agricultural Theory, has a positive impact on a significant increase in agricultural production. Of the five patterns of sustainable farming systems, organic farming is growing more rapidly.

3.4. Analyzing the role of AEPs in Indonesia and Thailand for improving the EPI and SNMI

The Environmental Performance Index (EPI) quantifies and numerically marks the environmental performance of a state’s policies. This index was developed from the Pilot Environmental Performance Index, first published in 2002, and designed to supplement the United Nations Millennium Development Goals [11]. On the other side, The Sustainable Nitrogen Management Index (SNMI) is a one-dimensional ranking score that combines two efficiency measures in crop production: Nitrogen use efficiency (NUE) and land-use efficiency (crop yield) [12].

| Country  | EPI Rank (World) | Env. Performance Index | Env. Health | Ecosystem Vitality | 2021 Population |
|----------|------------------|------------------------|-------------|-------------------|-----------------|
| Thailand | 121              | 49.80                  | 46.21       | 52.33             | 69,950,850      |
| Indonesia| 133              | 48.92                  | 45.44       | 47.90             | 276,361,783     |

It can be seen that the implementation of Agri-environmental policies in Thailand is quite influential in increasing the Environmental Performance Index so that Thailand can excel from Indonesia when viewed from the index (Table 1).

| Country  | SNMI Rank (World) | SNMI Rank (Asia-Pacific) | SNMI Rank (ASEAN) | 2021 Population |
|----------|-------------------|--------------------------|-------------------|-----------------|
| Indonesia| 45                | 7                        | 5                 | 276,361,783     |
| Thailand | 117               | 14                       | 8                 | 69,950,850      |

The Sustainable Nitrogen Management Index (SNMI) seeks to balance the efficient application of nitrogen fertilizer with maximum crop yields to measure the environmental performance of agricultural production. The 2020 EPI uses the SNMI as a proxy for agricultural drivers of environmental damage. It can be seen that the implementation of Agri-environmental policies in Indonesia is superior in increasing the Sustainable Nitrogen Management Index compared to Thailand (Table 2).

4. Conclusion

In conclusion, the results show that Indonesia's AEPs, in this case, the Green Revolution, are superior in improving the Sustainable Nitrogen Management Index indicators. Meanwhile, the determinant of the success of the AEPs, namely the Sustainable Farming System in Thailand, is in optimizing the Environmental Performance Index.

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