OASE
Proceeding the Overseas Academic Study Exchange Program
ISSN 2686-4312 □ ISBN 978-xxx □ 2025 □ Volume 7(1), 175–177. □ DOI: 10.22219

# Agricultural Technology Innovation and Its Implications for Achieving Zero Hunger: A Comparative Study of Developing Countries (Thailand and Indonesia)

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**ABSTRACT**
The study analyzes the role of agricultural technology innovations in achieving Zero Hunger in developing countries, with a comparative focus on Thailand and Indonesia. Through a literature review, this study identified that the adoption of precision technology and integrated agricultural systems in Thailand, as well as the development of superior varieties in Indonesia, contribute significantly to increased productivity and food security. However, the implementation of these innovations faces challenges related to accessibility, cost, farmer knowledge, infrastructure, policies, and post-harvest food losses. The study concludes the need for comprehensive efforts to address these challenges so that the potential for agricultural technology innovation can be optimized in realizing the Zero Hunger goal.

**Keywords:** Agricultural Technology Innovation, Zero Hunger

## 1 Introduction

In the midst of the global challenges of achieving the SDGs, especially Zero Hunger, sustainable agricultural development plays an important role as a key pillar in overcoming hunger and malnutrition. In 2019, about 820 million people worldwide experienced hunger, with the majority of them in developing countries [1]. Developing countries are the most vulnerable and continue to grapple with serious food security issues, with the majority of their populations still suffering from chronic hunger as a direct result of the food crisis and prolonged poverty [2]. Agricultural technology innovation is one of the keys to improving food security in developing countries, especially in Southeast Asia. Countries such as Thailand and Indonesia have implemented various agricultural technology innovations to address food security issues. The use of modern technologies, such as superior seeds, efficient irrigation systems, and the use of analytical data, has been shown to significantly increase crop yields [3].

## 2 Literature Review

### A. Agricultural Technology Innovation in Developing Countries

The adoption of technological innovation in developing countries is often influenced by factors such as accessibility, cost, farmer knowledge, infrastructure, and government policies [4], [5], [6].

### B. Implications of Agricultural Technology Innovation on Zero Hunger

A number of studies have examined the relationship between agricultural technology innovation and food security, but the impact on Zero Hunger is not automatic and equitable due to access gaps, gender inequality, and inappropriate policies [7, 8, 9].

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# 3 Research Methods

This study uses a qualitative approach with a comparative analysis of agricultural technology innovations in two developing countries: Thailand and Indonesia. Data was collected through literature review from scientific journals and reports of international organizations. The two countries were analyzed based on the type of innovation applied, their impact on agricultural productivity, and their contribution to achieving Zero Hunger.

# 4 Results and Discussion

## A. Agricultural Technology Innovation in Thailand

One of the innovations that stands out in Thailand is the use of precision agriculture technology. This technology offers the dual benefits of resource efficiency and quality of life, which support sustainable development goals [7]. In a study in Thailand, it was found that there was an influence of technology development (through the consumption of fertilizers and pesticides) and information and communication technology (ICT) on cereal production from 1991 to 2018 [8].

With this improved yield, Thailand can meet domestic food needs while exploring export opportunities, contributing to national food security. In addition, Thailand has adopted an integrated farming system that combines a variety of crops and animals, increasing incomes by up to 30% in the past two years [9]. With higher incomes, farmers can more easily access nutritious food, thus contributing to the achievement of Zero Hunger.

## B. Agricultural Technology Innovation in Indonesia

Innovation in the development of superior varieties has become a major focus in improving food security in Indonesia. The research program conducted by Balai Penelitian Tanaman Padi (Balitbangtan) produces rice varieties that are resistant to pests and diseases, and have resistance to climate change. According to a report from the Ministry of Agriculture, this superior variety is able to increase crop yields by up to 30% compared to commonly used local varieties [10]. In Indonesia, technological innovations have contributed to increasing rice yields from 3 t/ha before 1961 to 5.46 t/ha in 2017 [11]. This shows that investment in research and development of superior varieties is essential in achieving the goal of Zero Hunger. C. Challenges of Agricultural Innovation in Developing Countries Although agricultural technology innovations have great potential to improve food security, there are still a number of challenges faced by developing countries. Smallholders in developing countries face significant challenges, including limited access to capital, modern technology, and data-driven agriculture [12]. In its 2015 report entitled "Global Food Losses and Food Waste", FAO estimated that developing countries experienced more than 40% of food losses in the post-harvest and processing stages, with losses for fruits, vegetables, and tubers reaching 40-50

# 5 Conclusion

Sustainable agricultural development plays a crucial role in realizing Zero Hunger amid the challenges of the SDGs. Agricultural technology innovations in developing countries, such as Thailand and Indonesia, have great potential to increase productivity and food security through precision technology, integrated systems, and superior varieties. Thailand has succeeded in increasing farmers' efficiency and income, while Indonesia has increased rice production. However, the adoption of innovation is constrained by access, cost, knowledge, infrastructure, policies, and post-harvest losses. Comprehensive efforts are needed to optimize the potential of agricultural technology innovation to achieve Zero Hunger.

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## CITATION:

Eko Triawan (2025). Agricultural Technology Innovation and Its Implications for Achieving Zero Hunger: A Comparative Study of Developing Countries (Thailand and Indonesia). *OASE, 7*(1), 175–177.