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Comparison Between Food Security in Indonesia and Thailand: Rice Export and Import

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ABSTRACT

This paper examines the food security of Indonesia and Thailand, focusing on rice production, consumption, population, exports, and imports. Despite rice being a staple food in both countries, Thailand has achieved a surplus in rice production and serves as a major exporter, while Indonesia faces challenges in meeting its rice demand due to high population growth and inefficient production systems. Thailand's success is attributed to its advanced agricultural infrastructure, strict quality control, and robust government support. Conversely, Indonesia, although having a larger arable land area, struggles with inefficient farming practices and high rice consumption, leading to a reliance on rice imports, primarily from Thailand. This study uses a comparative analytic design, relying on secondary data from government reports, academic journals, and trade databases. The findings suggest that Indonesia can improve its food security and move toward self-sufficiency by adopting Thailand's practices, including modernization of farming techniques, policy support, and infrastructure development. The paper emphasizes the need for strategic investments in agricultural modernization and policy adaptation to bridge the production-consumption gap in Indonesia.

Keywords: Export; Food Security; Import; International Trade; Rice Consumption; Rice Production

INTRODUCTION

Since rice is a staple food for a large percentage of the population in many nations, particularly in Asia, it will continue to be important and strategically significant as a commodity indefinitely (Arifin, 2020). In terms of both output and administration, Indonesia's agricultural industry can be seen as falling behind Thailand, which is known as Southeast Asia's "rice king." For this reason, Indonesia must enhance and model its management practices after Thailand. With around 60% of Thailand's workforce employed in agriculture, including the contributions from imports and exports, the country's economy is heavily dependent on the export industry (Chapakiya, 2019), which is a beneficial condition.

Building and improving food security is a difficult task for a nation. Because it is regulated by consistent living standards for both the entire nation and each individual subject separately, food security in an area is intimately related to each other (Zhichkin et al., 2021). Rice needs to be the main focus of growing domestic production in a nation where 97% of the people view it as the main staple meal. Given the current global food crisis, Indonesia should also have a larger rice reserve in terms of food security and population size. Indonesia currently imports a large amount of rice, and to address food security and lessen the effects of global food crises, a greater domestic rice reserve is required.

On the other hand, Thailand has dominated the global rice trade and achieved self-sufficiency by effectively utilizing its agricultural sectors. Thailand is currently Southeast Asia's top exporter of rice, which in some ways emphasizes the two countries' disparities. This subtly encourages Indonesia to implement all-encompassing plans that might be modeled after Thailand's methods in order to boost its agricultural output and guarantee long-term food security. Therefore, this research will explain a comparative study between Indonesia and Thailand in the case of rice production, consumption, export, and import. Indonesia is the largest rice importer in Southeast Asia, while, in contrast, Thailand is a crucial actor and the number one exporter of rice in Southeast Asia. Hence, this paper will provide perspectives on the conditions in both countries and how to maintain the balance to fulfill both national and international rice demand.

As a staple food in most Southeast Asian countries, rice has become a crucial factor in food security. By contrasting two important rice actors in Southeast Asia, Thailand, and Indonesia, this research sheds light on Thailand's successful strategies in achieving self-sufficiency and export dominance while identifying Indonesia's areas for improvement through its rice production, consumption, exports, and imports. The significance of this research are, first, to provide strategic implementations for policymakers, such as agricultural modernization and infrastructure development, to strengthen food security. Second, it emphasizes the importance of regional cooperation to address food crises and maintain balance in international trade. Third, this study discusses how developing nations can optimize resource use to achieve self-sufficiency and reduce dependence on imports.

Different from previous studies, which often address separately the challenges to Indonesia’s food security and the strengths of Thailand's rice production and export, this research stands out by offering strategic insights and implementations that Indonesia can integrally adopt from Thailand, such as modernized farming techniques and the establishment of an agricultural bank. By comparing both countries, this research explains why Thailand can produce a surplus of rice while Indonesia continues to struggle with a deficit, even though both countries share the common condition of having large arable land.

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LITERATURE REVIEW

International Trade and Rice Security

International trade is the process of exchanging goods and services between countries through international markets, agreements, or policies. To gain profit through this mechanism, countries are compelled to specialize in producing and selling the products and services they can create most efficiently while purchasing those they are less efficient at producing. Hence, each country involved in international trade determines its own competitive advantage, which is the ability to produce goods or services at a lower cost or with higher value than its competitors.

Because different nations have varying capacities and specialize in creating different goods, there is always a demand for international trade. Countries must engage in commerce with others to compensate for what they do not produce. In the modern world, no nation is entirely self-sufficient. Even the wealthiest nations purchase raw materials for manufacturing from the poorest countries. For this reason, international trade is crucial for every nation. The significance of global trade lies in the appropriate distribution and effective use of limited resources, which are key focuses of economics (Vijayasri, 2013).

A basic principle of international trade is to purchase goods and services from nations offering the lowest prices and sell them to those willing to pay the highest prices. This benefits both buyers and sellers. If each nation produced only what it needed, the production and consumption of goods would be constrained, hampering economic advancement. Additionally, such a situation would offer no opportunity for improving the global standard of living. International trade enables individuals to access goods and services unavailable in their home countries, optimizing customer satisfaction and contributing to global economic progress (Vijayasri, 2013).

Comparative Advantages

It may be advantageous for a country to import commodities from another country where the production costs of those commodities are higher than domestic costs. A shift in manufacturing skills in one country can lead to a new distribution of precious metals—both are novel propositions of significant importance, as fully proven by Ricardo (1955). Importing such goods, although costly, benefits a country by increasing the amount and variety of goods available for revenue expenditure. Moreover, it fosters savings and capital accumulation through the abundance and affordability of commodities (Ricardo, 1955). According to Ricardo's theory of comparative advantage, if each nation has the lowest comparative cost, then international trade will occur. According to this idea, the reason for international trade is variations in production characteristics, specifically productivity and efficiency, which affect how much equivalent commodities cost in two different nations. Goods that would cost more to make domestically will be imported by a nation.

The Heckscher-Ohlin model reinterpreted the idea of comparative advantage to accommodate more than one fundamental element, whereas Ricardo only acknowledged labor as a factor of production. This reformulation aimed to demonstrate that variations in the factor intensities of relevant industries could lead to disparities in comparative costs across industries. Additionally, variations in the factor endowments of different nations could result in differences in the structure of comparative advantage (comparative costs) across industries. In the Heckscher-Ohlin framework, there were no disparities in the production functions of different nations, whereas in Ricardo's analysis, the sources of comparative advantage were inequalities in labor productivity between industries and between nations. According to their study, a country's comparative

advantage will typically be found in industries that heavily utilize the specific resources that the nation possesses in comparison to its trading partners. These industries will be the nation's export sectors, assuming all else is equal (Warr, 1994).

Although the global prices of traded commodities will be similar for all nations, their internal cost structures will differ. Countries with the best endowments of production factors will typically have comparatively lower prices than those with opposite endowments, and vice versa. The industries that employ scarce factors the least and abundant factors the most will therefore be able to earn a unit of foreign exchange through exports (or save it through import substitution) at the lowest social cost, as measured by the output of other products that is lost (Warr, 1994). Consequently, international trade is conducted to meet demand and stabilize the price of commodities. In Indonesia's case, the decision to import rice is driven by its productivity, which does not meet domestic demand, and its relative inefficiency in rice production.

Competitive Advantage

In the literature on marketing and strategic management, Porter's (1980) model of unique generic business-level strategies is widely recognized as the dominant paradigm. Porter (1980) asserts that a company can only attain above-average performance if it is dedicated to at least one generic approach (low cost, distinctiveness, and focus). The connection between international trade and competitive advantage refers to the condition of a country, company, or industry in producing a good or service at a lower cost or higher quality and value compared to other competitors. By using this competitive advantage approach, a country can leverage its benefits, ranging from increased exports and productivity to overall economic growth.

According to the concept of Competitive Advantage of Nations, a company's or an industry's success will be determined by two factors: first, the cost-based advantage in producing comparatively standardized goods, and second, the development of a product-based advantage focused on creating unique products. Porter downplays the importance of the cost-based advantage in his explanation of the competitive advantage principle, but he does not completely reject it. However, it is clear where this conclusion came from. Examining the development of specific businesses operating in the US and other developed economies, such as Switzerland, Sweden, Germany, Japan, the UK, and Italy, provides the majority of the empirical evidence Porter takes into consideration, as well as what appears to be the majority of his real-world experience. Porter's closest approximation of a less-developed economy is Korea (Warr, 1994).

Hence, if a country wants to export in international trade, it should specialize and focus on certain goods or services, producing them at a low cost. Thailand also implements this model in rice production because its production is categorized as cheaper yet has higher quality. This specialization and focus have made Thailand a leader in rice exports worldwide.

Comparative and Competitive Advantages

According to the above explanation, it seems clear that comparative advantage focuses on national resource allocation efficiency, while competitive advantage focuses on industry and firm-level success. Both concepts are essential, with comparative advantage emphasizing what to produce and competitive advantage focusing on how to compete. The two concepts answer different levels and should be considered as complementary rather than interchangeable. The differences between both advantages are detailed in Table 1.

Table 1. The Difference Between Comparative and Competitive Advantage

Aspect	Comparative Advantage	Competitive Advantage
Definition	Focuses on the efficient allocation of resources at the national level, primarily based on opportunity costs and resource endowments.	Focuses on factors enabling individual firms or industries to outperform competitors in the marketplace.
Relevance	Stresses free trade and efficient resource allocation to determine which goods a nation should produce and trade.	Emphasizes achieving market dominance through product differentiation or technological innovation.
Policy Implications	Encourages specialization in industries where nations have the lowest opportunity costs.	Advocates investment in infrastructure, education, and technology to support firm-level competitiveness.
Scope	Applied to nations and their overall trade relations and economic structures.	Applied to individual firms or industries aiming to outperform rivals.
Basis	Relies on cost-based advantages, rooted in classical theories by economists like Ricardo and Heckscher-Ohlin.	Developed by Michael Porter, focusing on high-tech production and differentiated markets.
Key Application	Explains why nations benefit from free trade and specialization.	Explains how firms or industries can create a unique market position.
Relationship	Focused on national-level economic efficiency.	Focused on firm-level strategies for gaining competitive superiority.

Source: Authors Computation from Warr (1994)

Rice Security

Rice security is intricately linked to multiple factors: production, consumption, population dynamics, exports, and imports. Together, these elements shape the food security landscape and influence a country's role in the global rice trade.

Rice Production

As the basis of rice security, rice production determines the level of rice security; higher rice production will better support the rice supply, domestic consumption, and the possibility of a surplus for export. Hence, it is necessary to explore efficient production systems in rice by leveraging technologies, infrastructure, and government support to meet rice demand and participate in the international competitive market (Zhichkin et al., 2021). In Thailand, for instance, modernized farming practices and strong infrastructure have driven consistent surpluses, solidifying its role as a leading exporter.

Rice Consumption

Another factor in rice security is the data on rice demand, which is derived from rice consumption. Rice consumption itself is determined by cultural preferences and population size. Most studies explain that population size is positively related to consumption demand and, consequently, also impacts domestic production. In Indonesia, it is evident that per capita rice consumption is high, which exerts pressure on rice production. When there is a deficit in the rice supply, the country often turns to the international market, seeking a comparative advantage from which it can benefit by exporting rice (Arifin, 2020).

Population

In line with the previous explanation, population growth directly impacts rice demand. With a large and growing population like Indonesia, it is clear that a higher population intensifies the supply and demand gap, which, in turn, increases the need for imports. In contrast, Thailand's smaller and more stable population enables the country to experience a rice surplus, which is then directed toward exports, strengthening Thailand's role in the global rice market (Worldometer, 2024a; 2024b).

Export and Import

As a solution and exit strategy for surplus and deficit conditions, export and import activities are carried out by most countries worldwide. Export policies are always linked to the efficiency and surplus production of rice, while, on the other hand, import policies highlight the challenges a country faces in fulfilling domestic demand. In this context, Thailand dominates rice exports, demonstrating its ability to produce rice efficiently. Conversely, Indonesia, despite its relatively high production, still relies on imports, underscoring its inefficiency in addressing the gap between the supply and demand of rice (Jiacheng, 2018; Yusuf et al., 2024).

The Relationship Between Rice Security and International Trade

Global rice security is rooted in international trade because it allows a surplus country to supply the country that faces a deficit. This trade, hence, ensures stability and security in the global rice market. International trade also works in fostering economic growth due to its ability to make the countries specialize based on their comparative and competitive advantages. This research highlights that Thailand manifested its competitive advantage in rice production to dominate the global rice export, while at the same time, Indonesia in several years depended on imports which highlights its comparative disadvantage in meeting domestic demand (Vijayasri, 2013; Warr, 1994). The interaction between these factors highlights the important role of international trade in tackling the challenges and problems that the countries face to meet the need for food security. By maximizing rice production, balancing rice consumption, and expanding trade opportunities, a country can reach a more balanced and secure food system. This theoretical framework underpins the comparative analysis of Indonesia and Thailand presented in this paper.

RESEARCH METHOD

Research Design

With an emphasis on the dynamics of food security, rice import, and export, this study uses a comparative analytic design to examine the similarities and contrasts between rice supply and demand in Thailand and Indonesia. Comparative analysis is an appropriate technique for spotting patterns, trends, and differences between two entities. The comparative method consists of logical reasoning in the absence of a sufficient number of cases for systematic tests via partial correlations. It attempts to develop explanations through the systematic adjustment of parameters and operative variables (Smelser, 2013). It aims to establish general, empirical relations between two variables while controlling them by keeping all other variables constant (Lijphart, 1971).

Data Collection

The data collection in this research relies on secondary data sources, such as government reports from Indonesian and Thai ministries of agriculture, trade, and statistics agencies. Additional sources include reports from international organizations, academic journals and articles, and trade databases.

RESULTS

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Rice Production and Consumption in Indonesia and Thailand

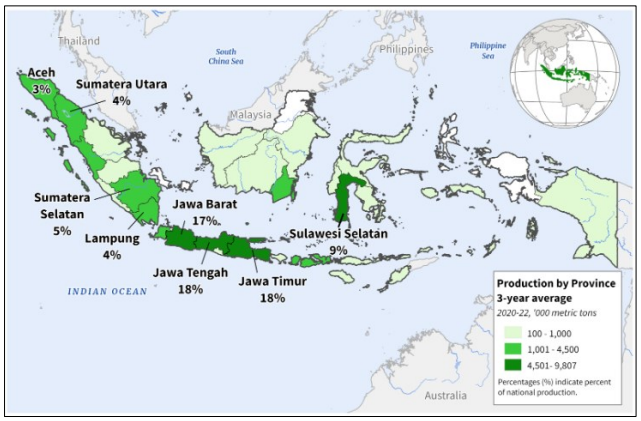
Indonesia

Table 2. Rice Harvested Area in Indonesia

Market (Year)	Area (1000 Ha)	Milled Production (1000 Tons)	Rough Production (1000 Tons)	Yield (T/Ha)
2014/2015	11,830	35,560	56,000	4.73
2015/2016	12,100	36,200	57,008	4.71
2016/2017	12,240	36,858	58,505	4.78
2017/2018	12,250	37,000	58,268	4.76
2018/2019	11,500	34,200	53,858	4.68
2019/2020	11,600	34,700	54,646	4.71
2020/2021	11,400	34,500	54,331	4.77
2021/2022	11,600	34,400	54,173	4.67
2022/2023	11,300	34,900	53,386	4.72
2023/2024	11,000	33,020	52,000	4.73
2024/2025	11,200	34,000	53,543	4.78

Source: International Production Assessment Division (IPAD, 2024a)

Figure 1. Rice Harvested Area in Indonesia



Source: IPAD (2024a)

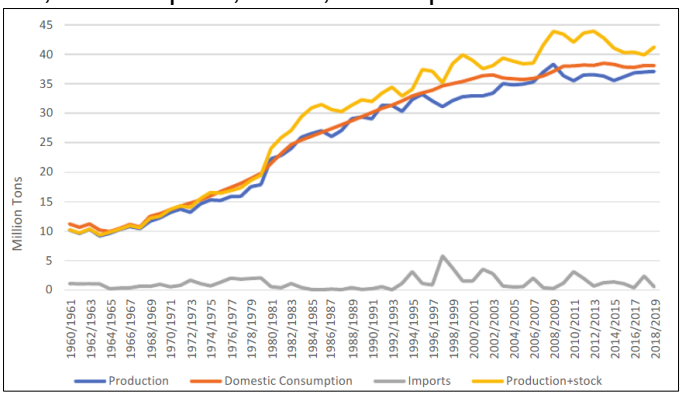
According to Table 2 and Figure 1 on Rice Harvested Area in Indonesia, the country has 11,200 million hectares of land area, which remains relatively consistent across the period, except between 2015 and 2018. During this time, the land area increased by approximately 1,000 million hectares, reaching a total of 12,000 million hectares. However, from 2018 to 2019, the land area decreased significantly to 11,500 million hectares. This reduction was caused by land being repurposed for non-agricultural purposes. Over half of the paddy fields owned by landowners were sold or converted, which significantly impacted agricultural production and revenue (Susilo, 2023).

Farmers sell rice through three methods: slashing, selling harvested dry unhulled rice (GKP) immediately, and selling milled dry grain (GKG) both after harvest and after drying (Nurpalina et al., 2022). Regarding the marketing mechanism, most rice is transported from rural areas to cities via two channels. The first channel involves farmers selling to traders, then to collectors, then to wholesalers or hullers, then to inter-district traders, and finally to consumer retailers. The second channel bypasses traders, with rice moving directly from farmers to collectors, then to wholesalers or hullers, and finally to consumer retailers (Noer & Unteawati, 2022).

Despite the condition of rice cultivation areas and marketing in Indonesia, rice production has experienced fluctuations. In the first period, 2014–2018, production gradually

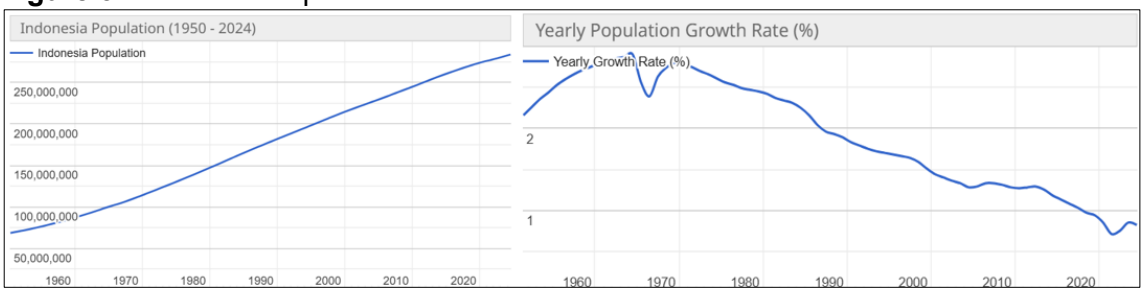
escalated from 35,000 to 37,000 million tons but then dropped to 33,000 million tons in 2023. However, in 2024, Indonesia successfully increased its production by 1,000 million tons, bringing the total production for that year to 34,000 million tons.

Figure 2. Production, Consumption, Stock, and Import of Rice in Indonesia



Source: United States Department of Agriculture (USDA) in Rifin (2022)

Figure 3. Indonesia Population



Source: Worldometer (2024a)

The statistic in Figure 2 highlights four important factors in this research: data on rice production, domestic consumption, imports, and stocks in Indonesia over nearly 60 years, from 1960 to 2019. This extensive observation period provides a comprehensive understanding of Indonesia's rice supply and demand trends. Rice production, represented by the blue line, has shown a steady increase, particularly after the 1970s, indicating improved productivity driven by technological advancements, government initiatives, and policies like the Green Revolution initiated by Suharto (1967–1998). These measures boosted farmland utilization, but challenges such as land constraints and resource limitations caused production to plateau slightly. Domestic consumption, represented by the orange line, rose steadily until the mid-2000s, aligning with population growth (see Figure 3) and Indonesians' reliance on rice as a staple food. Around the 2010s, consumption levels nearly matched production, which could strain the domestic rice supply.

Import activities, represented by the grey line, have fluctuated across periods, with peaks in the late 1970s, mid-1990s, and early 2000s, illustrating times of insufficient domestic production or heightened demand. Imports served as a backup to bridge production gaps during these years. The accumulation of production and stock, represented by the yellow line, reflects the overall rice availability in the country. This line consistently surpasses both production and consumption, emphasizing Indonesia’s efforts to maintain a buffer stock to safeguard food security. Divergences from production during certain years highlight the role of imports in contributing to stocks.

Based on these patterns, several conclusions emerge. Despite consistent expansion in rice production, Indonesia struggles with rice sufficiency as production often fails to meet

consumption needs. While Indonesian rice mills produce significant quantities of rice for both resale and household use, consumption has steadily increased, reaching above 36,000 million tons (Figure 3). This has led to food shortages, with production and demand closely aligned. Contributing factors include land-use limitations and climate change, which exacerbate the issue. The total amount of rice produced by Indonesian rice mills, known as rice production, is utilized for both reselling and household consumption (Kurniawan, 2014). To address this, the government must play a critical role in stabilizing rice production during shortages to ensure food security and control prices.

Imports have served as a vital safety net during crises, with Indonesia relying on the global rice market during shortages. High consumption levels are driven by the country's large population of 284.4 million people (Figure 3), with a population growth rate of 0.8% projected to sustain demand. Consequently, Indonesia remains vulnerable to global rice price volatility and supply chain disruptions. Moreover, sustainability challenges, including limited agricultural land, water resources, and technological adoption, have contributed to the production plateau. This situation underscores the need for improved productivity, enhanced supply chain efficiency, and advancements in technology and policy to ensure food security.

Thailand

Table 3. Rice Harvested Area in Thailand

Market (Year)	Area (1000 Ha)	Milled Production (1000 Tons)	Rough Production (1000 Tons)	Yield (T/Ha)
2014/2015	10,270	18,750	28,409	2.8
2015/2016	9,444	15,800	23,939	2.5
2016/2017	10,247	19,200	29,091	2.8
2017/2018	10,756	20,577	31,177	2.9
2018/2019	10,830	20,340	30,818	2.8
2019/2020	9,890	17,655	26,750	2.7
2020/2021	10,509	18,863	28,580	2.7
2021/2022	10,702	19,878	30,118	2.8
2022/2023	11,072	20,909	31,680	2.9
2023/2024	10,650	20,000	30,303	2.8
2024/2025	10,700	20,100	30,455	2.8

Source: IPAD (2024b)

Figure 4. Rice Harvested Area in Thailand

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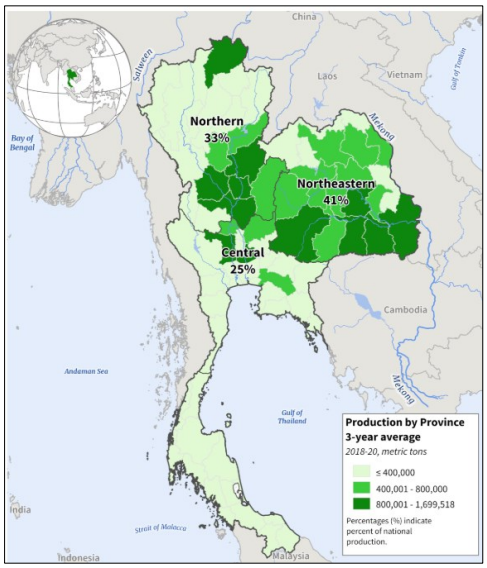
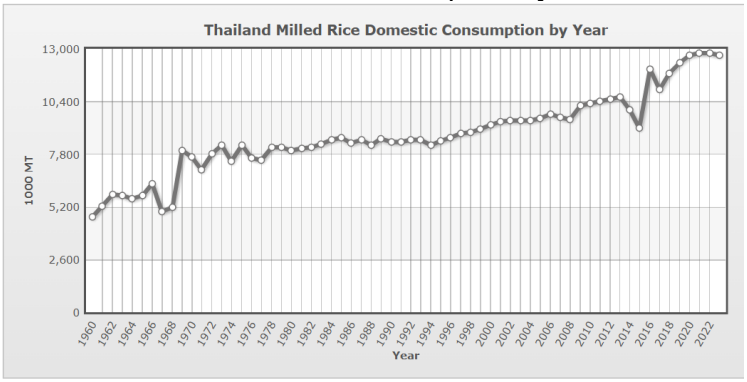


Source: IPAD (2024b)

The land area for cultivating rice in Thailand is approximately 10,000 million hectares, although in 2016 and 2019 it experienced a slight decline. However, by 2022, Thailand had 11.00 million hectares dedicated to rice production (Table 3 and Figure 4). This figure is slightly below Indonesia's total, by around 1,000 million hectares, as Indonesia has 11,200 million hectares for harvesting paddy. This advantageous position in natural resources is further strengthened by Thailand's lower rice consumption and smaller population compared to Indonesia. The significant land area in Thailand contributes to its rice production, which reached 20,100 million tons by the end of 2024. Production increased steadily over the past six years (2019–2024), whereas earlier, production fluctuated but still remained above 15,000 million tons.

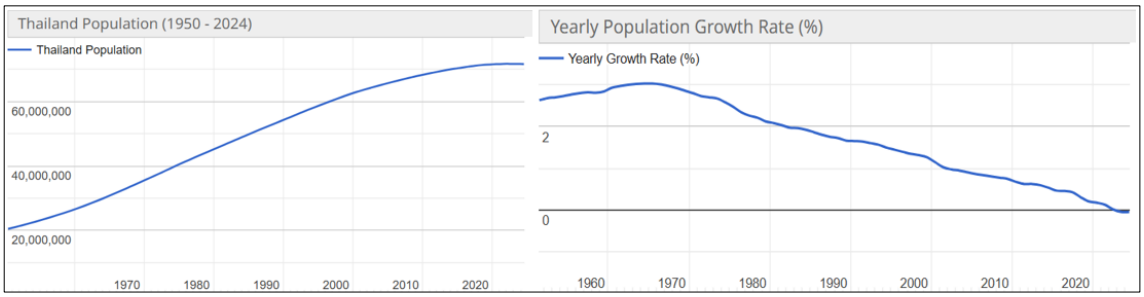
Figure 5. Thailand Milled Rice Domestic Consumption by Year



Source: IndexMundi (2024)

On the other hand, Thailand's domestic rice consumption only reached below 13,000 million tons in 2024, as shown in Figure 5, resulting in a surplus. In 2015, during a period when the cultivated area was at its lowest point, consumption was also at its lowest, at only 8,000 million tons of rice. This was the lowest consumption level recorded over the observed period.

Figure 6. Thailand's Population and Population Growth Rate Over the Period (1900s-2024)



Source: Worldometer (2024b)

Unlike Indonesia, Thailand's smaller population enables it to export rice in significant quantities (Hermawan, 2013). According to Figure 6, Thailand's population is only 71,647,993. This total population decreased annually until it stabilized at around 70 million in 2020 and has remained unchanged since then. Population projections indicate a stagnant condition due to the declining annual growth rate, which hit its minimum point of -0.05%. This demographic trend suggests a prolonged surplus in Thailand's rice supply.

Rice Exports and Imports: Indonesia vs. Thailand
Indonesia
Table 4. Imported Rice in Indonesia Based on Its Origin

Country of Origin	2017	2018	2019	2020	2021	2022	2023
Net Weight: Ton							
India	32,209.7	337,999.0	7,973.3	10,594.4	215,386.5	178,533.6	69,715.7
Thailand	108,944.8	795,600.1	53,278.0	88,593.1	69,360.0	80,182.5	1,381,921.2
Vietnam	16,599.9	767,180.9	33,133.1	88,716.4	65,692.9	81,828.0	1,147,705.3
Pakistan	87,500.0	310,990.0	182,564.9	110,516.5	52,479.0	84,407.0	309,309.7
Myanmar	57,475.0	41,820.0	166,700.6	57,841.4	3,790.0	3,830.0	141,204.0
Japan	72.1	0.2	90.0	0.3	230.3	56.1	61.5
China	2,419.0	227.7	24.3	23.8	42.6	6.0	7.0
Others	54.3	6.5	744.60.3	0.3	760.1	364.1	12,933.3
Total	305,274.8	2,253,824.4	444,508.8	356,741.4	407,741.4	429,207.3	3,062,857.6

Source: Central Agency of Statistics Indonesia (BPS Indonesia, 2024)

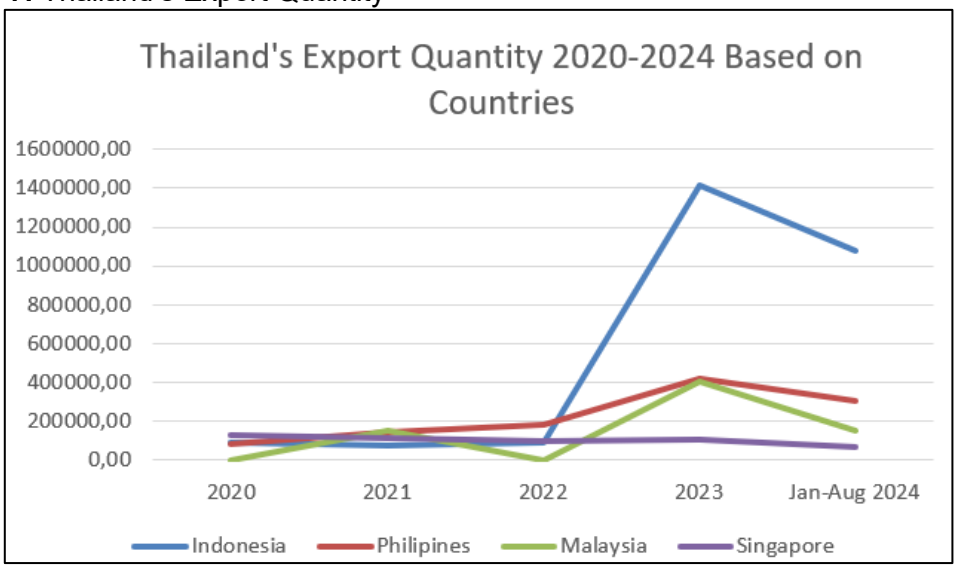
Due to differences in population size and consumption, Indonesia continues to face a shortage in domestic rice supply, unlike Thailand (Hermawan, 2013). The positive correlation between rice imports and production arises because, as Indonesia's population grows, rice output also increases (Kusmiati & Bowo, 2024). A food import policy is implemented as needed when domestic production and national food stocks are insufficient to meet supply demands. In 1984, with a rice yield of 25.8 million tons, Indonesia achieved rice self-sufficiency (Hasanah, 2022). However, Sari (2014) asserts a negative correlation between rice imports and production, suggesting that rice imports will not occur if domestic production meets the population's needs. Conversely, the government imports rice when the local supply fails to satisfy community demands. The development of rice imports in Indonesia has exhibited significant fluctuations. Notably, Indonesia was recorded as the fourth-largest rice importer in Southeast Asia in 2021.

Hence, in order to fill the gap and make some stockpiles of rice, Indonesia's government agree to import some rice from different countries. It seems clear from Table 4, most of its imported rice comes from Thailand, except in 2020 and 2021. There is almost 1.381.921 million tons of rice that have been exported by Thailand to Indonesia. Below Thailand, there is Vietnam production of rice that has been imported. Even though there is notable ups and downs in the growth of rice imports in Indonesia, Indonesia was the fourth-largest importer of rice in Southeast Asia in 2021. According to Febriaty (2016),

the country's enormous population and the highest rice consumption in the world are the reasons for Indonesia's food imports.

Thailand

Figure 7. Thailand's Export Quantity



Source: Data Processed from Thai Rice Exporters Association (TREA, 2024)

Table 5. Thailand's Export Quantity

	2020	2021	2022	2023	Jan-Aug 2024
Indonesia	89,406	75,369	91,714	1,411,407	1,077,328
Philippines	79,608	146,239	185,714	420,084	301,954
Malaysia	73,400	154,295	2,135	402,481	154,809
Singapore	127,296	109,561	95,941	104,341	69,734

Source: Data Processed from TREA (2024)

Thailand's vast areas dedicated to rice cultivation and its relatively lower rice consumption have been proven to create a surplus, enabling the country to boost its exports. Thailand is widely regarded as the leading exporter of rice. Based on Figure 7 and Table 5, several Southeast Asian countries import rice in significant quantities, including Indonesia, the Philippines, Malaysia, and Singapore. The highest import volume recorded by the Indonesian government was in 2023, amounting to 1,411,407 metric tons. This was followed by 2024, during which Indonesia imported 1,077,328 metric tons, a figure recorded only until August 2024, leaving room for further increases by the end of the year.

Indonesia's total rice imports from Thailand are the highest among Southeast Asian countries. Philippines ranks second, with a consumption of 420,084 metric tons, followed by Malaysia and Singapore, with 154,809 metric tons and 69,734 metric tons, respectively, in 2024.

According to Jiacheng (2018) and Yusuf et al. (2024), Thailand's position as a leading rice exporter is attributed to its strengths in infrastructure, the implementation of strict quality standards, government-provided technical support, and its highly competitive standing in the global rice market.

Strong Infrastructure

The development of agricultural infrastructure in Thailand has benefited from hundreds of billions of baht in government investment, with a focus on improving rural

transportation and farming water conservation. Thailand possesses superior rural transportation systems and water conservation facilities compared to other Southeast Asian nations. These advancements have significantly enhanced the production and distribution of agricultural goods. Among rice-producing nations, Thailand enforces the most stringent and comprehensive rice quality standards, ensuring the safeguarding of Thai rice exports' quality (Jiacheng, 2018).

Strict Quality Standards
Over the past 50 years, Thailand's rice quality standards have undergone numerous updates to meet the intense competition in the global market. Established on May 20, 1957, the initial Thailand rice standard has been consistently improved to ensure the quality of Thai rice. Thailand's rice standard is recognized as the most intricate and comprehensive among rice-producing nations. It not only ensures the quality of exported rice but also serves as a benchmark that bolsters the global market presence of Thailand's top-selling rice varieties (Jiacheng, 2018).

Technical Support Volume
Thailand's high-quality reputation in the competitive global rice market is maintained through the diligent efforts of its farmers and substantial financial support from the government. The government actively funds the development of superior rice varieties to introduce new and improved products every three to four years. Additionally, tight regulations are imposed on areas designated for rice cultivation, as well as on planting schedules, harvesting, storage, and processing. The use of modern agricultural science and technology is encouraged to support rice production. To raise awareness of new rice varieties among farmers, the government has implemented widespread promotional campaigns, which have simultaneously increased farmers' enthusiasm for planting. Rongli rice exemplifies the superior quality achieved through Thailand's technological support for rice production (Jiacheng, 2018).

Additionally, the decision to shift the farming mechanism that has been implemented by Thailand is crucial. A major change in agricultural practices from traditional to more advanced or contemporary ways is referred to as modernization. This covers a number of topics, such as legislation, natural resource development, agricultural technology, and agricultural organizations. A significant change in farming practices that embraces more sophisticated or contemporary techniques is known as agricultural modernization. This encompasses a variety of topics, including resource development, agricultural institutions, technology, and laws (Rifkian et al., 2017).

Financial Aid Through Agricultural Bank
Agricultural banks play a vital role in supporting farmers. One of the government's initiatives, launched in 1966 under King Chulalongkorn, was the establishment of Thailand's agricultural bank, named the Bank for Agriculture and Agricultural Co-operatives (BAAC). The Thai government recognized the agricultural sector as essential for maintaining and enhancing domestic food security, which led to the creation of this institution. Policies introduced in 1983, such as low-interest loans and the use of crops as collateral, encouraged farmers to borrow money to increase capital and boost production. This approach has significantly contributed to the success of Thailand's agricultural sector. In contrast, Indonesia does not have an agricultural bank (Yusuf et al., 2024).

So far, six agendas have been implemented in stages since the bank's inception (BAAC, n.d.). During the first decade (1966–1976), BAAC focused on reducing informal loans by extending short- and medium-term loans to farmers in a timely manner, covering as many geographic areas as possible to eliminate high-interest informal lending. In the second

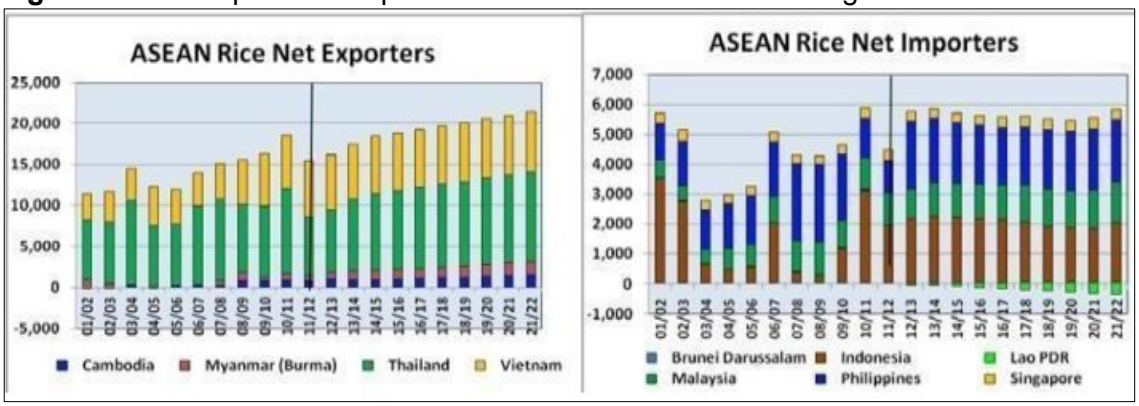
decade (1977–1986), the bank continued to provide financial products such as cash credit, quality farm inputs, agricultural infrastructure, and marketing linkages to farmers and communities. From 1987 to 1996, BAAC expanded its financial assistance to small-scale farmers and low-income individuals. The fourth decade marked an emphasis on sufficiency in the economy and modernization. During the fifth decade (2007–2016), BAAC worked on improving living standards and extending service coverage. In the most recent decade (2017–present), BAAC has primarily concentrated on becoming a hub for agriculture and rural finance.

Thai Rice Exports are Highly Competitive

An analysis of Thailand's export competitiveness indicators, compared with the world's two largest rice exporters—Vietnam and India—between 2008 and 2013 demonstrates that Thailand has consistently maintained strong export competitiveness. This is reflected in its largest market share (up to 0.09% in 2011), the highest comparative advantage in rice exports, a trend that is both high and relatively stable, and the largest net export index (Jiacheng, 2018).

Indonesia and Thailand

Figure 8. Rice Export and Import Chart in the Southeast Asia Region



Source: Fadah et al. (2024)

From Figure 8, it is evident that in the Southeast Asian region, Thailand is the largest exporter among other countries, while Indonesia is the highest importer. As explained in the previous chapter, rice imports in Indonesia are predominantly sourced from Thailand's production. Moreover, in Thailand, Indonesia is the largest market for rice exports within Southeast Asia. Hence, in international trade, Indonesia and Thailand have established bilateral export and import relations, making them interdependent and underscoring the importance of their relationship. However, for Indonesia, considering its notable strengths, such as having a vast harvestable land area—larger than Thailand's—it becomes imperative to optimize its potential resources.

Table 6. Forecasting the Basic Conditions of Indonesia's Rice Economy

No	Variable	Based Value
1	Paddy Area (AP)	16,384,243.89
2	Paddy Supply	74,540,265.14
3	Paddy Productivity	54,993.50
4	Paddy Production	86,090,811.88
5	Rice Production	5,213,693.09
6	Kehilangan Padi (KP)	53,391,029.56
7	Rice Supply (SB)	36,239,784.57
8	Labor Usage (L)	3,177,950.00
9	N Fertilizer Usage (FN)	3,910,254.88

10	P Fertilizer Usage (FP)	684,340.41
11	K Fertilizer Usage (FK)	2,537,654.06
12	Pesticide Usage (FPest)	1,597.00
13	Rice Demand (DB)	35,030,336.13
14	Rice Demand Per Capita (DBO)	131,026.00
15	Rice Import (MB)	2,408,266.04
16	Rice Price (PB)	401.72
17	Paddy Price (PB)	10,082,00
18	Domestic Price Rice (PB) (US$/ton)	683,53
19	Paddy Price (PP) (Rp/kg)	6,915.04

Source: Arifin et al. (2021)

Arifin et al. (2021) conducted research forecasting Indonesia's rice supply and demand conditions. According to his findings, the projected condition in 2045, as detailed in Table 6, indicates that with a rice harvest area of 16,384,243.89 hectares and rice productivity of 54.9335 tons per hectare, Indonesia could produce 86,090,811.88 tons of paddy. When converted, this yields 53,391,029.56 tons of rice. Meanwhile, the base year demand for rice stands at 35,030,336.13 tons. This projection suggests that Indonesia's rice needs can be fully met by domestic production, with an excess of 18,360,693.4 tons of rice potentially available for export. To achieve this favorable projection, in the short term, Indonesia should adapt and enhance its policies and mechanisms in rice production. Reflecting on Thailand’s success in rice production, which has positioned it as one of the world's largest exporters, second only to India, could serve as a valuable roadmap for Indonesia.

DISCUSSION

Analysis of Production and Consumption Trends

From the trends in rice production and consumption, it is evident that despite the advantage of having extensive arable land, Indonesia continues to face deficits in fulfilling rice demand. In contrast, Thailand, with lower rice production compared to Indonesia, consistently achieves a surplus over the same period. Both countries share the characteristic of having vast arable land, with Indonesia possessing approximately 11,200 hectares and Thailand slightly less, at 10,700 hectares. From this harvested area, Indonesia produces nearly 54,000 tons of rice, while Thailand produces around 31,000 tons. Indonesia’s average rice yield is 4.7–4.8 tons per hectare, meaning that for every hectare (10,000 square meters) of rice-cultivated land, farmers harvest approximately 4.7 to 4.8 metric tons of rice. This relatively high yield can be attributed to greater land utilization and intensive farming practices. In comparison, Thailand’s average rice yield is 2.8–2.9 tons per hectare, slightly below Indonesia’s, yet Thailand still manages to profit and export rice despite its lower yield. This significant discrepancy in rice output stems from Thailand’s ability to maintain and implement advanced agricultural practices, including mechanization, efficient irrigation systems, and robust government support through financial aid and banking, as noted by Zhichkin et al. (2021). Conversely, as observed by Arifin (2020), inefficiencies in Indonesia’s rice production are likely due to inadequate technology adoption and a fragmented farming system.

The surplus rice production in Thailand is not solely attributed to its improved technologies and practices; the population size and rice consumption in Thailand also play a significant role. The growth of population size corresponds to rice consumption patterns in both Indonesia and Thailand. Data from Worldometer (2024a; 2024b), IndexMundi (2024), and USDA in Rifin (2022) indicate that Indonesia's population is 284.4 million, with rice consumption reaching nearly 36,000 million tons annually. In contrast, Thailand’s population is only a quarter of Indonesia’s, at 71.6 million, with rice

consumption amounting to nearly a third of Indonesia's, at 13,000 million tons annually. These figures demonstrate that the higher a country's population, the greater its demand for rice consumption.

The Role of Exports and Imports in Rice Security

The dominance of rice exports from Thailand demonstrates that the country has successfully capitalized on its competitive and comparative advantages. For instance, the implementation of strict quality control has enabled Thailand to build a strong international reputation, ensuring consistent demand for its exports each year (Jiacheng, 2018). In contrast, Indonesia relies heavily on rice imports to bridge its production gaps, reflecting a comparative disadvantage (Warr, 1994). Consequently, the trade relationship between these two countries highlights the interdependence within the Southeast Asian region. Thailand's exports play a significant role in stabilizing rice security in Indonesia during periods of shortage, illustrating the balancing role of international trade in food security.

Policy Implications and Strategic Recommendations

Reflecting on Thailand's successes in exporting rice, the research suggests that Indonesia must adopt a multi-pronged approach to address its rice production challenges by drawing lessons from Thailand. Infrastructure development is paramount; the government should invest in irrigation and transportation infrastructure, as has been done in Thailand, where such investments have enhanced productivity and reduced post-harvest losses (Yusuf et al., 2024). Second, agricultural modernization can lead to improved efficiency (Rifkian et al., 2017). Third, support from financial institutions is essential to provide access to affordable credit, enabling farmers to invest in better inputs and technology, similar to the role of the agricultural bank BAAC in Thailand. Fourth, implementing strict quality control measures can improve the marketability of Indonesian rice, both domestically and internationally. These improvements should be prioritized, as Indonesia is projected to have a significant surplus in rice production, with the potential to enter the international trade market. To realize this projection, comprehensive improvements in these areas are necessary.

CONCLUSION

In conclusion, Indonesia faces a persistent gap between rice production and consumption, resulting in a deficit, whereas Thailand enjoys a surplus due to lower consumption levels. This disparity has positioned Indonesia as a major rice importer, with Thailand dominating its import supply. Conversely, Thailand has emerged as a leading exporter of rice, with Indonesia as one of its largest markets. The trade relationship between Indonesia and Thailand, as importers and exporters, is crucial to analyze, given their shared strengths, particularly in terms of harvested area and rice consumption. However, the outcomes of these strengths differ significantly.

Therefore, despite differences in population size, Indonesia should consider adopting improvements to its rice policy by reflecting on Thailand's successful strategies. Key methods that can be adopted include investing heavily in infrastructure, as demonstrated by the Thai government's expenditure of hundreds of billions of baht; implementing strict quality control measures; providing technical support to farmers; establishing a dedicated agricultural bank, such as Thailand's BAAC, which offers short-term and medium-term loans to reduce reliance on high-interest informal lending; and leveraging competitive advantages in international trade.

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