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Integration of National Resources in the Context of Realizing Food Security

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Abstract
This study highlights Indonesia's dependence on the food sector, especially rice. Despite diversification efforts, dependence on rice remains high. The availability of clean water and energy diversification are also crucial. In order to achieve sustainable food security, diversification of land and food commodities is needed, as well as wise management of water resources. This research uses a qualitative focused group discussion (FGD) method to explore the integration of national resources in an effort to realize food security in Indonesia. The results show that efforts to diversify food, manage clean water, and diversify energy sources are key in ensuring national food and energy security. The National Strategic Logistics Reserve Agency (BCLSN) has an important role in managing strategic food stocks and building a strong foundation for Indonesia's food security.

Keywords: Food, Water, Energy, Food Security, National Strategic Logistics Reserve Agency.

INTRODUCTION

Food security is a crucial aspect in ensuring the sustainability of a country or society. This refers to the ability to meet the food needs of the population in a sustainable manner. According to FAO (2008) Food security is the availability of food in adequate, safe and nutritious quantities to support an active and healthy life. At the global level, food security is becoming increasingly important considering challenges such as climate change, urbanization and increasing population growth. With increasing awareness of the importance of food security, many countries and organizations are working together to develop strategies and policies that can increase access and availability of sufficient, quality food for the entire global population.

In line with the FAO definition of resilience, Government Regulation No. 68/2002 concerning food security issued by the Indonesian Government emphasizes that food security has great significance in forming quality, independent and prosperous Indonesian human resources. This can be achieved through the availability of adequate, safe, good quality, nutritious and diverse food that is distributed evenly throughout Indonesia at affordable prices (Mutiah & Istiqomah, 2017). In Indonesia, food security is a national priority. Even though Indonesia has large natural and agricultural resource potential, there are still challenges in achieving optimal food security. Some of these challenges include unequal food distribution, lack of access to modern agricultural technology, and lack of coordination and integration between relevant sectors and institutions in managing national resources.

In Indonesia, there are several serious challenges in achieving food security. High population growth is the main factor. Analysis shows that Indonesia's population growth from year to year continues to increase at an extraordinary rate. This has resulted in a significant increase in consumption levels, especially food availability. According to data BPS (2023) Indonesia's population will reach 276 million people in 2022, with the fourth largest population in the world. Indonesia faces serious challenges in meeting sustainable food needs. Then, apart from population, agricultural land also influences national food security. The increasing reduction in agricultural land due to land conversion or land conversion from agricultural to non-agricultural use results in limited resources for sustainable food production. Apart from that,

dependence on imports to meet the needs of several strategic food commodities is also an issue that needs attention. Furthermore, the adoption of technology in an effort to increase agricultural productivity is still experiencing obstacles. One of the causes is the low level of technology transfer from formal research institutions to farmers (Chaireni *et al*., 2020).

Challenges in food security do not only originate from internal factors in a country, but are also influenced by global dynamics and events that require precise coordination and strategies to deal with these problems. The current global geopolitical situation, especially the conflict between Russia-Ukraine and the Israel-Palestine conflict, has an indirect impact on the availability of food and energy commodities throughout the world. The war between Israel and Hamas Palestine is predicted to affect the increase in world oil prices and will also indirectly affect the disruption of global food supplies because at the same time the war between Russia and Ukraine is still ongoing, resulting in the distribution of 207 tons of wheat being stopped (Antara News, 2023).

Furthermore, the Russia-Ukraine conflict also affects global fertilizer supplies because Russia is one of the main producers and exporters of fertilizer. Russia's cessation of natural gas supplies to Europe also had an impact on the agricultural sector, especially which is heavily dependent on fertilizer as an important input in crop production. Rising fertilizer prices and reduced availability due to conflict and the energy crisis have made it difficult for farmers to obtain the materials needed to increase crop yields. Data from FAO (2022) shows that a number of countries, including Indonesia, will get at least 20 percent of their fertilizer imports from Russia in 2021. This dependence can be seen in various parts of the world, such as Europe, Latin America, Africa and Asia. This phenomenon resulted in an almost fourfold increase in fertilizer prices by the end of 2022 when compared to 2020. This increase was triggered by a spike in energy prices and transportation costs which were affected by the impact of the pandemic and the Russian-Ukrainian conflict.

Facing a potential food crisis in the future, achieving food self-sufficiency becomes increasingly vital, especially with Indonesia's heavy reliance on rice as the main food commodity. To mitigate risks, implementing strategies like food commodity diversification, including downstream processing of corn, cassava, wheat, and sago, is crucial. This diversification helps reduce the crisis risk associated with production issues in any single commodity (Lanamana & Supardi, 2020). Even though food is considered a priority sector that must exist in all regions, in reality, the agricultural sector, which is the main source of food, does not always receive the same priority. Indonesia's dependence on food imports could be a side effect of regulations that pay little attention to strengthening the agricultural sector. Therefore, to achieve sustainable food self-sufficiency, it is important to synergize the gap between policy and implementation. Priority needs to be given to the agricultural sector within the food regulatory framework. By encouraging local agriculture and encouraging diversification of food crops, Indonesia can reduce dependence on imports and increase food security (Hutabarat, 2022). Integration of national resources is key in efforts to increase food security. National resources, including agricultural land, water, infrastructure, human resources and various related policies, must be managed in an integrated and sustainable manner. However, until now, there are still obstacles in implementing national resource integration in Indonesia. Some of these obstacles include a lack of coordination between government agencies, uncoordinated policies, and limited access to information and technology needed to support this integration.

By understanding this background, research on the integration of national resources in the context of food security becomes very relevant and important. Through this research, it is hoped that potential and obstacles can be identified in efforts to integrate national resources to achieve sustainable food security in Indonesia. Apart from that, it is also hoped that the research

results can provide concrete policy recommendations that can be implemented by the government and related stakeholders in an effort to increase food security in Indonesia.

RESEARCH METHODS

This research aims to explore the integration of national resources in an effort to achieve food security in Indonesia. In order to achieve this goal, the research method used was Focus Group Discussion (FGD) involving resource persons from the Ministry of Agriculture (KEMENTAN), Ministry of ministry of public affairs (PUPR), and Ministry of Energy and Mineral Resources (ESDM). The initial stage of the research involved selecting resource persons who were related to resources related to food security, followed by setting a schedule and technical preparations for conducting online FGDs. During the FGDs, structural question guides were used to guide discussions, allowing interviewees to interact and share their views regarding national resource integration and food security. The results of the FGD were then analyzed in detail, with transcription of the discussion results and identification of the main findings. Furthermore, these findings are interpreted in the context of national resource integration, revealing the contributions and perspectives of the Ministry of Agriculture, Ministry of PUPR, and Ministry of ESDM in supporting food security. It is hoped that the results of this research can make a significant contribution to efforts to strengthen food security in Indonesia, especially through the integration of national resources.

RESULT AND DISCUSSION

Dependence of the National Food Sector on Rice

Food consumption is the process of utilizing food and the household's ability to absorb nutrients efficiently. It is important to ensure that household food consumption is balanced, by consuming foods that are diverse, nutritious, balanced and safe (B2SA)(Putri et al., 2022). Adequate nutritional intake is very important for health and improving the immune system. Therefore, adopting the B2SA food menu in a sustainable manner is considered crucial in improving household welfare. However, there are challenges in the field, especially among households, where there are still several types of food that have not been met properly.

Apart from that, there is a tendency to continue to rely on rice as a staple food source, resulting in the lack of comprehensive B2SA food consumption among households. Therefore, further efforts are needed to educate and encourage diversification of food consumption, as well as ensuring the availability of food that meets the B2SA criteria. Thus, this will have a positive impact on the overall welfare and health of the household. The level of rice consumption in Indonesia, which reaches 139kg/capita per year, far exceeds Malaysia and Thailand which only range between 65kg - 70kg per capita per year. This reflects the importance of rice in the food consumption patterns of Indonesian society. Since 1950, rice has been the main staple food, although efforts to diversify food consumption have been made. Even so, dependence on rice remains high, with consumption of rice as a source of carbohydrates reaching around 95% since 2011(Dewi, 2018).

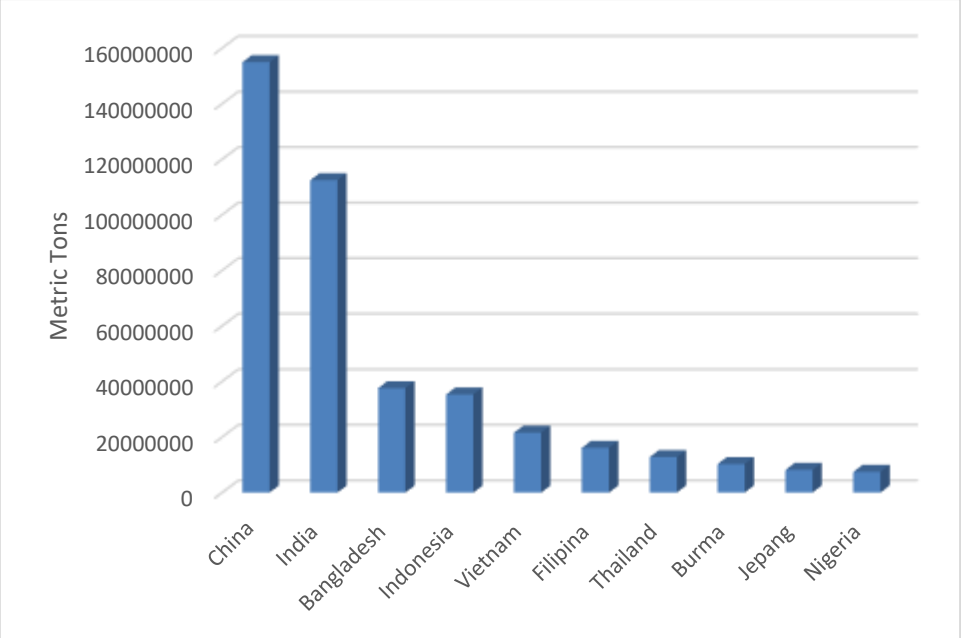

Figure 1. Global Rice Consumption
(Source : Kata Data, 2023)

Figure 1 shows that rice consumption at the global level is dominated by countries in Asia. Of the ten countries with the highest rice consumption, all come from the Asian continent. In particular, China is the leader in terms of rice consumption, with the amount reaching 154.94 million metric tons. China also stands out as the world's largest rice producer, with production of around 145.94 million metric tons in 2022/2023. Furthermore, India and Bangladesh rank second and third in global rice consumption, with 112.5 million metric tons and 37.6 million metric tons respectively. Data shows that Asian countries are closely related to rice production and consumption at the global level. This reflects the importance of rice in the region's staple diet and shows that the rice sector is an integral part of the Asian food system. In this context, it is important to consider the food security, production and distribution of rice in Asia in an effort to meet growing food needs worldwide.

Furthermore, Indonesia is ranked fourth as the country with the largest rice consumption in the world, with consumption reaching 35.3 million metric tons in the last year. This figure shows that rice plays a central role in the food consumption patterns of Indonesian society and has become a consistent characteristic of Indonesian society's habits in recent periods. However, apart from information on consumption levels, this fact illustrates the high dependence on rice as a staple food. Almost all Indonesian people consume rice, which has pushed Indonesia to become one of the largest countries in the world consuming rice. This is the background why Indonesia, even though it is known as a rice producing country, still imports rice to other countries.

The high level of rice consumption, supported by continuing population growth, is the main factor why national rice imports are still high. Relying on domestic rice production alone is not enough to meet needs. Therefore, rice import activities are important to ensure price stability, overcome emergency conditions, help the poor, and anticipate potential food crises that may occur (Hasanah, 2022). Over the last two decades, there has been an increase in agricultural land area globally, while forest area has decreased significantly. This shows that production growth is more influenced by agricultural land expansion than by increasing productivity or production efficiency. Even though the agricultural sector has a strategic role in providing food and raw materials, it must be remembered that its management must also pay attention to environmental sustainability and reducing deforestation (Dobermann et al., 2022).

Rice, in its various forms, is a staple food derived from rice, and is a plant that is generally found in rice fields. The agricultural sector in Indonesia plays an important role in the economy and national sustainability. Apart from providing food and industrial raw materials, this sector also acts as a significant contributor to gross domestic product (GDP) and earns the country's foreign exchange. More than that, agriculture also functions as an absorber of labor, especially in rural areas, thus providing an important contribution to the source of income for people in the region. Apart from that, the agricultural sector plays a role in providing feed and energy, which are important aspects in meeting national food and energy needs. In addition to economic benefits, the agricultural sector also has a strategic role in mitigating climate change, with the potential to reduce greenhouse gas emissions through sustainable agricultural practices (Konyep, 2020).

This high dependence shows that rice plays a strategic role in the national economy, and price stability and rice availability have a big impact on the socio-economic stability of society. However, it should be remembered that high dependence also carries potential risks related to rice availability and prices, especially if there is disruption to production or distribution. Therefore, managing the food sector, including rice production and distribution, is very important in the context of national sustainability. Although dependence on rice is still high, continuous efforts to diversify food consumption are essential to reduce the risks associated with dependence on just one type of food and strengthen national food security. Thus, the food sector plays a strategic role in achieving national sustainability, and investment in agricultural innovation and production technology will be a key factor in ensuring adequate food availability for the Indonesian people.

The Importance of Water Resources in Food Security

The availability of clean water is a major necessity for life because it has a very vital function in human life. Clean water is needed for various purposes, including meeting the need for food. Plants and livestock also need clean water to grow and develop well. In the agricultural context, clean water is very important for irrigation, namely the planned provision of water to plants. Good irrigation can increase agricultural productivity and produce better harvests. On the other hand, lack of access to clean water can inhibit plant growth and reduce agricultural production.

Apart from that, clean water is also needed in the food processing and preparation process. Good for washing food, cooking, or cleaning kitchen utensils. Therefore, the availability of adequate clean water is very important to support the sustainability of food production and consumption. In the context of meeting water needs for agriculture, it is important to consider how to manage water resources in a sustainable manner. This includes ensuring that water withdrawals do not exceed the natural capacity of water sources, and paying attention to the ecological impacts of water use.

Choosing a water source to meet the need for clean water is very important. Surface water such as rivers, springs and swamps is prone to contamination with various pollutants because it can be directly exposed to human and industrial activities in the vicinity. Therefore, processing and purifying water from surface water sources often requires more intensive processes to ensure its safety and quality before being used for human consumption or agriculture.

On the other hand, groundwater has the advantage of being protected from various pollutants because its source is in the soil layer (Primandani et al., 2022). However, it is important to remember that although it is better protected from surface pollution, ground water can also be threatened by pollutants from above-ground activities which can seep into the soil layers and pollute the water within. Therefore, management and monitoring of groundwater quality is also still necessary (Subariswanti et al., 2021). In the context of meeting water needs for agriculture and human consumption, it is important to consider the water sources available in a particular

area. In coastal areas, surface water availability may be more limited and prone to pollution, so it is necessary to look for alternative solutions such as the use of desalination technology or rainwater management.

Figure 2. Indonesian Ministry of Defense and Republic Indonesia Defense University Inaugurates Clean Water Point in Banyumas, Central Java
(Source: Ministry of Defense, 2023)

Based on instructions from the Minister of Defense of the Republic of Indonesia to the Defense University of the Republic of Indonesia (RIDU) to focus community service programs on water security issues in Indonesia throughout 2023. In an effort to encourage this program, the Indonesian Defense University has collaborated with foreign companies such as Osmosun and Ellipse Projects from France, as well as Blue Water from Sweden through the signing of a Memorandum of Understanding (MoU). This collaboration was carried out because the water-related technology developed by these companies was considered advanced and effective in overcoming a potential future water crisis in Indonesia.

The French Ambassador to Indonesia, highlighted that cooperation between the French and Indonesian governments could contribute to increasing water security, as well as having the potential to develop in other sectors. Companies such as Osmosun and Ellipse Projects are bringing innovation in water desalination solutions through solar energy and osmosis, while Sweden's Blue Water offers emergency water solutions for emergency situations such as natural disasters (Nindita, 2023). Previous service programs from the Indonesian Defense University have provided real benefits for around 9,700 heads of families or around 50,000 people in various regions in Indonesia. The hope is that this collaboration will help achieve water resource resilience in Indonesia through the application of the latest technology (Ministry of Defense, 2023).

Apart from being related to food, water is also closely related to energy. Food, energy and water are three important aspects in human life. Water, food and energy play a vital role in the sustainability and well-being of society. Water is needed for food production and daily needs, while energy is needed in all aspects from food production to consumption. This close relationship underscores the importance of wise management of these resources to support sustainable human life.

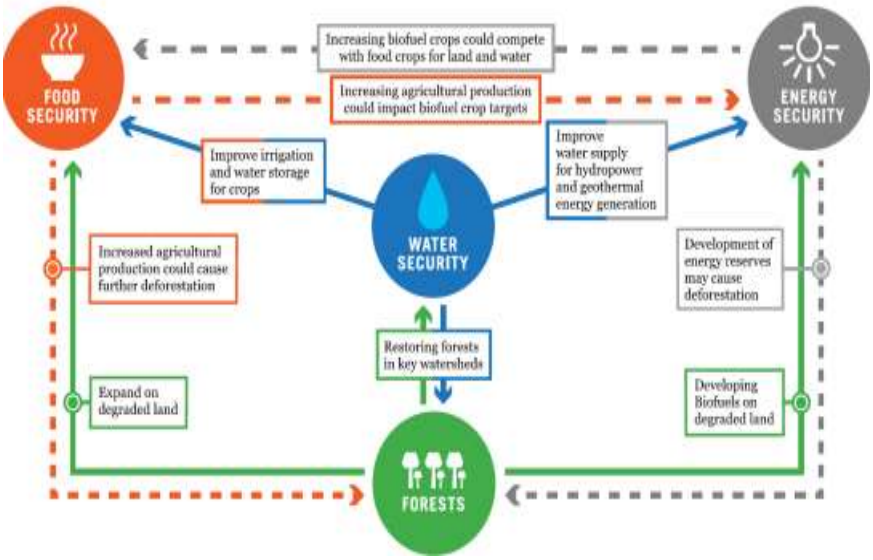

Figure 3. Interrelationship of Water, Energy, Food and Environment
(Source :Widyoko, 2023)

Water availability plays a crucial role in the food sector, including in agriculture and biofuel production. An efficient irrigation system is an important element in ensuring plants receive an adequate supply of water to grow and develop properly. When water supplies are limited, agriculture can experience difficulty in meeting crop water needs, potentially hampering optimal growth and crop yields. Apart from that, biofuel production is also closely related to water availability. Plants used as raw materials for biofuels, such as corn or sugar cane, require an adequate water supply for growth and quality biomass production. Disruption or limited water supply can have a negative impact on the production of biofuel raw materials. In the energy sector, water availability is the key to generating renewable energy through hydroelectric power plants (PLTA). Hydroelectric power converts the potential energy of water into electricity, so it requires a stable flow of water (Rahayu & Windarta, 2022). Disruption or reduction in water supply can affect the energy production capacity of hydropower. Therefore, the sustainability of hydropower operations is highly dependent on the availability of adequate water.

Then, water availability plays a central role in the Nexus cycle, and is recognized as the main element that supports food production through the agricultural and fisheries sectors, as well as energy production through hydropower, bioenergy, and even as a heat transfer system in the thermal energy industry (Alabed et al., 2021). With its geographical conditions which are rich in forests and rain catchment areas, the quality and quantity of water is closely related to ecosystem sustainability. Indonesia's forests function as natural filters and water catchments, playing a vital role in maintaining sustainable water resources. Therefore, managing and protecting forest ecosystems is an important step in maintaining adequate water availability to meet the needs of agriculture, fisheries and energy production in Indonesia.

Contribution of energy resources to the Food Security sector.

Currently, the challenge of meeting energy availability is the main focus of attention. Population growth which continues to increase will be directly proportional to the increase in energy consumption which is dominated by petroleum. In Indonesia, data shows that oil consumption has reached a significant figure, 1,585,000 barrels per day, while oil production capacity is only around 612,300 barrels per day in 2022 (ESDM, 2022a). The increase in consumption of petroleum, which is fossil energy, is not balanced by domestic production which has decreased from year to year, so the import policy was chosen to overcome this problem. The challenge of limited fossil energy faced by Indonesia also has an impact on many sectors, including the food sector.

Indonesia's dependence on energy imports has resulted in a trade balance deficit and increased the risk of an energy crisis. To overcome this, Indonesia has taken concrete steps in reducing greenhouse gas (GHG) emissions through the Enhanced NDC 2030. In this effort, the energy sector has a key role with a target of reducing emissions of 358 million tons of CO2e or 31.89%, with the ability to alone, and 43.20% with international support. The first step is to ensure energy security by paying attention to the supply chain of energy sources, both domestic and foreign, in line with increasing demand. In addition, efforts to ensure energy access and affordability for everyone are also a focus in achieving energy equity. In addition, environmental sustainability is also a priority, with the development of infrastructure based on renewable energy and low-carbon energy sources, as well as increasing energy efficiency from the supply and demand side. In 2022, the energy sector will succeed in reducing GHG emissions by 91.5 million tons of CO_{2e}, with energy efficiency contributing 22%. Concrete measures such as electrification (use of electric cars, induction cookers and electrification in agriculture) have also been taken. Apart from that, strategic steps such as a moratorium on the construction of Steam Power Plants (PLTU) and early retirement of existing PLTU, as well as the implementation of Carbon Capture and Storage/Utilization (CCS/CCUS) are also part of the strategy to reduce emissions. Providing new energy sources such as hydrogen and ammonia is also a focus in energy diversification (Kusdiana, 2023).

Then, energy conditions in Indonesia are related to global geopolitical dynamics, especially in the context of the Russia-Ukraine war and the Israel-Palestine conflict. Dependence on energy imports can make Indonesia vulnerable to fluctuations in energy prices and availability on the global market, which can be influenced by major events such as war or conflict in major energy producing regions. A Russia-Ukraine war, for example, could affect the stability of natural gas and oil supplies from the region, potentially impacting global energy prices (Bramastya & Puspitarini, 2022). On the other hand, the Israeli-Palestinian conflict also has implications for stability in the Middle East, which is a key area for world oil supplies. Disruptions or tensions in the region could affect crude oil prices and global energy supplies. Therefore, in managing energy security, Indonesia needs to consider global geopolitical dynamics and strive to mitigate the risk of fluctuations in energy prices and availability that may arise due to major events such as war or conflict in major energy producing areas.

The construction of a Nuclear Power Plant (PLTN) is one of the energy generation technology options that can contribute to the target of using New Renewable Energy (EBT) in the national energy mix. So far, the achievement of this target is still below expectations, namely only reaching 14.11% in 2022 from the target of 23% in 2025 (ESDM, 2022b). Therefore, the construction of a nuclear power plant is important to achieve the set targets. According to research conducted by Suparman et al., (2020) states that the construction of nuclear power plants has a significant positive impact on GDP and employment. In various scenarios in the l EMPOWER model (An Extended Input-Output Model for Impact Assessment of Nuclear Power Plants), an increase in GDP and employment can be seen which has a positive impact on the national economy.

The construction of a Nuclear Power Plant (PLTN) has a major impact not only on the national economy, but also on the environment and public acceptance. One crucial aspect is handling nuclear waste. Nuclear power plants produce radioactive waste which requires special and safe handling to prevent potential negative impacts on the environment and human health. Therefore, management and storage of nuclear waste must be carried out with great care and in accordance with international standards (Dehner et al., 2023)

Apart from that, public acceptance is also an important factor in building a nuclear power plant. The public needs to be provided with transparent and accurate information about nuclear power plants, including the potential benefits and associated risks. Active participation and

involvement of the community in the decision-making process and monitoring of NPP operations is very important. The public also needs to be confident that the government and nuclear power plant operators have the capability and commitment to handle risks and ensure safety (Ngatijo et al., 2016). Thus, the development of nuclear power plants must include a comprehensive strategy for handling nuclear waste and actively involve the community. This will help minimize negative environmental impacts and ensure public acceptance of the construction and operation of nuclear power plants.

Then, the role of energy in the food and agricultural sectors is closely related to biofuels, namely bioethanol and biodiesel. Biodiesel production often uses oil crops, such as palm oil or soybeans, which can compete with agricultural land for food. This can affect the availability of land for food production and the potential for food prices to rise due to high demand for oil crops (Pramudiyanto & Suedy, 2020). On the other hand, bioethanol is produced from plants that contain sugar or starch, such as sugar cane or corn. However, bioethanol production can also compete with food agricultural land, although several types of bioethanol plants can be grown on marginal land (Hendrawati et al., 2019). Production of raw materials for biodiesel and bioethanol also requires an adequate water supply, and the production process requires significant water use.

High demand for crops used in biodiesel and bioethanol production can compete with land previously used for food agriculture. This has the potential to affect the availability of land for food production and increase food prices. In addition, the production of raw materials for biodiesel and bioethanol requires an adequate water supply, and the production process also uses significant amounts of water. Therefore, an integrated approach to water and land management in the agricultural sector is very important. In the context of Indonesia's dependence on rice, food diversification is also key. If biodiesel and bioethanol production results in land diversion from food agriculture, it could affect rice production. To reduce the level of dependence on rice, it is important to promote diversified agriculture by producing various other types of food. Food diversification will help reduce the risk of high dependence on one commodity, such as rice, and increase national food security. All these measures not only impact energy security, but are also closely linked to water and food security, ensuring that these resources are safeguarded for future sustainability.

Food Security Strategy Through National Resource Management

Global and national perspectives regarding the current food security situation show several important issues that need attention. The main indicators from a global perspective are the fulfillment of food, energy and water security. The main factors triggering this challenge include population growth, limited fossil energy, and climate change associated with global warming. Some countries, such as China, with a large population, have very large food commodities reaching 3 billion tons, while Indonesia, which also has a large population, still depends on rice production which reaches 50 million tons (Siagian, 2023).

The issue of population growth which continues to increase along with land loss due to conversion is a challenge that continues to be faced. From a production point of view, optimizing land resources is an important step. However, if land availability is limited, the quickest solution is to open the tap for importing food commodities. However, as a country with abundant land resources, this phenomenon is unique. The process of land transfer for housing is often faster than land use for the agricultural sector, which often takes a long time and triggers various debates. Ultimately, the worst thing that can happen is that the land use program comes to a halt. To overcome this problem, an alternative solution is to utilize and optimize dry land, especially converted rice fields. It is interesting to note that many people tend to build houses on rice fields, while dry land is often left unutilized. Land diversification is a necessity by utilizing mountainous land, which is generally dry land, to become new agricultural land.

Then, food diversification is also needed by including commodities such as cassava, corn and other carbohydrate sources besides rice. A paradigm shift is needed in looking at food security to encourage production policies in the food sector. Adaptive acceleration is very necessary in a situation where when prices rise, one should not only seek profits from exports, and when prices fall, farmers must not lose enthusiasm for farming. This is important to maintain national food balance and security. the development of food diversification needs to be encouraged. Therefore, to examine the effect of food diversification on food security. To achieve this goal, information and data are needed, including identifying substitutes for staple foods, identifying the main reasons for choosing substitutes for staple foods, and assessing the effect of food diversification on food security (Yuniarti et al., 2022).

To overcome the dynamics of this food problem, collaboration and elaboration between agencies in Indonesia is needed. Even though Indonesia does not have much legitimacy in controlling one commodity, diversifying the production of other food commodities such as corn, cassava, wheat and sago could be a solution in strengthening national food security. However, corn commodity production in Indonesia, which is only 17 million tons, looks relatively small compared to Argentina's corn production which reached 26 million tons, even though Argentina's population is smaller than Indonesia. Therefore, it is important for the Ministry of Agriculture and the Ministry of Defense to conduct studies and become leading sectors in building global power in the food sector. This aligns with the principles outlined in Law Number 18 of 2012 (UU Nomor 18 Tahun 2012). The law defines Food Security as the condition of fulfilling food needs from the country to individuals, encompassing the availability of sufficient, safe, diverse, nutritious, equitable, and affordable food. These principles must be consistently maintained without conflicting with the values of religion, beliefs, and cultural practices, ensuring that all layers of society can live healthy, active, and sustainable lives. Importantly, this principle emphasizes that ensuring food safety should not conflict with the values of religion, beliefs, and cultural practices. Crucial elements in achieving food security include Food Production, Food Availability, and National Food Reserves. Food production activities encompass various processes such as producing, preparing, processing, making, preserving, packaging, repackaging, and/or transforming food. Additionally, food availability includes domestic production, National Food Reserves, and imports as a supplementary source if domestic production falls short. Government-managed food reserves at different levels, from national to village, as well as those controlled by the community, serve as essential instruments to address food shortages, supply disruptions, price fluctuations, and emergency situations.

Price considerations are also vital in developing national food security. If the price margins of food commodities are excessively high, countries tend to resort to importing food to meet their needs. Therefore, diversification, including the consideration of using agricultural commodities as an energy source, as seen in Brazil with ethanol as a gasoline fuel, should be part of the strategies (Quintino et al., 2022). However, it's crucial to acknowledge Indonesia's limited potential in this aspect due to constraints such as land clearing. Careful management of food commodity exports and imports is essential to navigate dynamic global market conditions and anticipate shortages of strategic commodity reserves during crises, as seen in the Russia-Ukraine war. Regulations and policies related to the food sector demand serious attention, with a particular focus on prioritizing the agricultural sector in every region. The absence of a robust agricultural sector can weaken national food security and foster dependence on imports. Promoting the diversification of food commodities, including analog rice, becomes imperative to reduce reliance on a single type of food.

Another problem that needs to be addressed is the rationality of importing food commodities. Imports must be managed by considering the number of commodities traded to meet national food needs. It is necessary to control commodity prices so that they are always at

a competitive and stable level, so that they can control the national food commodity trade balance. In this context, diversification of food crops is important and one should not depend on just one type of food, such as rice. Corn, wheat, sweet potatoes, potatoes and others must also be utilized as best as possible. In facing food security challenges, coordination and collaboration between related institutions, such as the Ministry of Agriculture and the Ministry of PUPR, is key. Management of sediment in reservoirs and use of water for irrigation must be prioritized to avoid water crises which could have a negative impact on food production. The efficiency of food commodity production must also be increased through product and technological innovation. Accelerated industrial automation and artificial intelligence need to be implemented to strengthen the competitiveness of agricultural products.

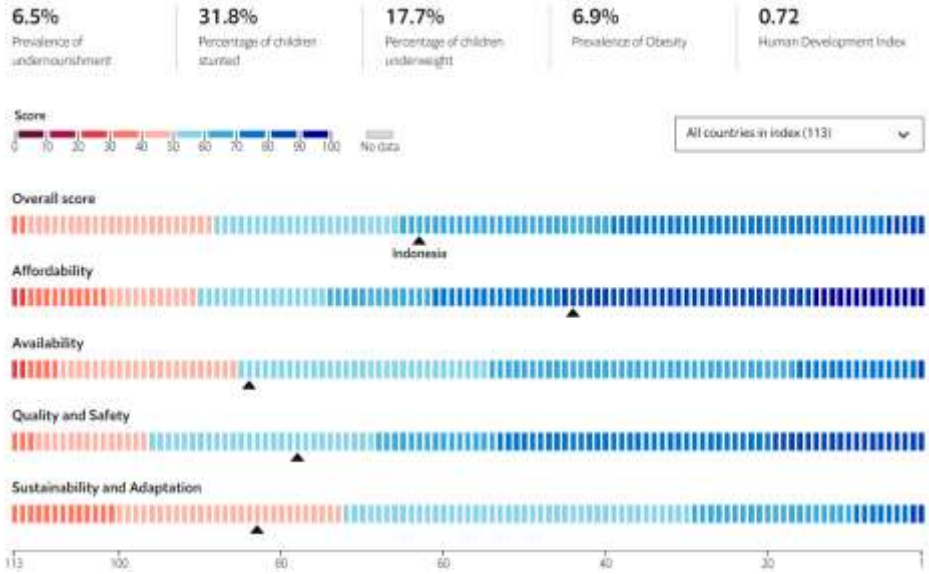

Figure 4. Dimensions of Food Security
(Source : Global Food Security Index, 2022)

In ranking ASEAN Food Security based on the Global Food Security Index, Indonesia shows superiority in the dimensions of Affordability and Availability compared to other ASEAN countries such as Vietnam and the Philippines. However, there are still challenges in the dimensions of Quality and Safety and Sustainability. This causes Indonesia to rank sixth in ASEAN. The Ministry of Agriculture has made efforts to improve the dimensions of Quality and Safety and Sustainability in an effort to improve Indonesia's Food Security ranking.

One of the obstacles faced is increasing Quality and Safety standards for rice through SNI (Indonesian National Standards). Although the Ministry of Agriculture has been working to develop these standards over the past three years, progress is still relatively slow. The main challenge lies in internal views where many parties believe that implementing this standard could harm small farmers. This obstacle has resulted in rice not having received SNI certification, in contrast to other countries which have implemented standardization on their rice products.

Apart from that, the food industry is also experiencing delays in product variety. The Ministry of Agriculture, especially the Processing Directorate, is developing 11 innovative prototypes for processed food products. This step is expected to increase product variety and provide added value in terms of nutritional information. Thus, these steps are expected to bring improvements in the dimensions of Quality and Safety and Sustainability, so that Indonesia can achieve a better ranking in the Global Food Security Index.

In the marketing context, downstream is important to improve quality, regulations, public stock and promotion of food products. Increasing added value through processing must also be sought to support the agricultural industry of the future. In order to face a paradigm-changing future of food security, a shift from dependence on rice as the main food ingredient to the use of

wheat processed into flour and pasta needs to be encouraged. Overall, overcoming the challenge of food security requires joint efforts from various parties and the development of a comprehensive strategy to ensure national food availability that is sustainable and competitive in the global market.

In the face of limited resources such as energy, water and food, innovation is the key to maximizing the use of existing resources. The government has provided opportunities for stakeholders to contribute in this matter. Several superior products have also been identified as good alternatives for health and the environment. However, there are plans from the Ministry of Defense regarding the National Strategic Logistics Reserve Agency (BCLSN) to anticipate emergencies in this country. Then, to overcome obstacles in the field, such as land problems that have not been properly optimized. One solution is to consider the rules and regulations related to land management, especially protected forests. There needs to be a wise approach, where protected forests which have an essential role in preserving nature should not be opened for land use. However, if the protected forest does not have an essential role, then clearing land for the agricultural sector could be a good recommendation.

Integration and synergy between ministries, such as the Ministry of Defense, Ministry of Environment and Forestry, and Ministry of Agriculture. This collaboration can encourage the development of product innovation and ensure that the National Strategic Logistics Reserve Agency for food can be managed effectively. With a directed approach and good coordination between relevant stakeholders, Defense University can also make a significant contribution to advancing national food security. This is an important step in ensuring food security and the welfare of the Indonesian people in the future.

CONCLUSION

Indonesia faces significant challenges in achieving sustainable food security. High dependence on the food sector, particularly rice, underscores the need for food diversification and investment in agricultural innovation. In this context, Law Number 18 of 2012 serves as relevant legal groundwork, defining food security as the condition of fulfilling food needs from the national level down to individuals. Diversification of the food supply is a crucial step in addressing uncertainty, as demonstrated by an overreliance on a single type of food commodity. Investments in agricultural innovation are also required to enhance productivity, efficiency, and the overall sustainability of the agricultural sector, aligning with the spirit of the aforementioned law.

The availability of clean water and efficient management of water resources are key factors in ensuring an adequate food supply. Law Number 18 of 2012 highlights the principles of food security, including aspects such as water availability and sustainable natural resource management. Concerning, the interconnectedness of the food and energy sectors, this regulation provides a legal basis for developing policies that support the diversification of energy sources and the use of renewable energy technologies. This aligns with the principles of food security, covering various aspects to achieve the condition of sufficient, safe, diverse, nutritious, equitable, and affordable food. Government involvement, active community participation, and the adoption of technological innovations are crucial to overcoming these challenges. The National Strategic Logistics Reserve Agency (BCLSN), in this context, plays a vital role in managing the national strategic food stock and collaborating with other relevant sectors. Thus, Indonesia has the potential to achieve adequate food security, ensuring a sufficient, high-quality, and affordable food supply for the welfare of its people.

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