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Food Business Opportunities in ASEAN: Responding to Rising Demand from a Growing Population

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Abstract. Population growth occurs every year in ASEAN countries. This research aims to determine food business opportunities in response to rising food demand in the increasing population of ASEAN countries. Descriptive methods were used in this research with secondary data from 2017 to 2021. Secondary data came from relevant sources, namely the Global Food Security Index and several others. The data analysis used in this research is contribution analysis and forecasting population growth rates using a logarithmic model. Contribution analysis is obtained by dividing the population of each country in ASEAN (people) by the total population of ASEAN or the world. Meanwhile, the logarithmic growth rate is calculated using this model, assuming that at a certain point in time, the population will approach an equilibrium point. The results of the study show that the population growth rate in most ASEAN countries is at a positive level. With the highest level in Cambodia at 1.6%, followed by the Philippines at 1.4% and Laos at 1.1%. The largest contribution to the population in ASEAN countries is Indonesia, with 40.87 percent. Based on the research results, it was also found that the development of the GFSI value was the highest for Singapore, with an achievement of 83.21. The existence of a growing population creates opportunities for countries with abundant natural resources. This potential exists to fulfil food requirements for countries where food production faces domestic difficulties. Each country can try to maintain its staple food reserves in accordance with the population growth rate so as not to experience food shortages.

Keywords: ASEAN, Contribution, Food Business

1. Introduction

One step in fulfilling the necessities of life for human survival can be done by fulfilling food. Food availability in a region is critical for anticipating the increase in food demand that comes with population growth. Therefore, food availability is a critical factor that must be satisfied. Food security is also a facet of national development that helps to build an affluent, self-sufficient, high-quality, and skilled society. Food availability is an important pillar of national development since it directly affects economic and social stability, as well as national resilience. Sufficient and cheap food boosts human productivity, alleviates poverty, and serves as the foundation for long-term economic progress and national sovereignty. Unsurprisingly, these attributes can be attained by providing the community with adequate, safe, high-quality, nutritious, varied, equally distributed, and reasonably priced food. Food availability needs to be planned to ensure food stability, availability, and affordability for the entire population sustainably, while simultaneously addressing the challenges of population growth. (Budiyanti et al., 2018).

The global population is expected to reach 9.7 billion by 2050. Developing countries are seeing quicker growth rates, which can help with economic expansion but also present issues in providing food resources (United Nations, 2019). Khairul et al. (2018) stated that one of the most important problems in the world today is the massive population growth in developing countries. A significant problem in several countries in the World is population projection. Trends in projected

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population numbers, growth rates, population age, urbanization, and migration are determining factors for future interdisciplinary global change studies. In this way, farmers as food providers must also be able to provide continuous food availability (Mulyani et al., 2024). Provision of processed food ingredients is also an important strategic step for the region in accommodating limited food supplies (Dewati et al., 2025).

Mondol (2018) said population is the World's most vital element besides population projection, which has become one of the most severe problems in the World. The size and growth of the population in a country directly influence that country's economic, policy, cultural, educational, and environmental situation and determine the cost of natural resources. Every government and collective sector needs a precise idea about the future size of various subsistence, such as population, resources, demands, and consumption, for their future activities. To get this information, the behavior of connected variables is analyzed based on previous data by statisticians and mathematicians, and using inferences drawn from the analysis, they make future projections aimed at the variables. There is enormous concern about the consequences of human population growth on social, environmental, and economic development, exacerbating all these problems in population growth. Food system management is needed to meet the demand for food due to the projected global population continuing to increase until 2050. The role of farmers is crucial in determining food fulfilment strategies so that the use of precision agriculture is important to meet the projected increase in food demand of up to 70% (Simane et al., 2025).

Food demand has a faster rate of increase than the rate of production. According to FAO (2014), limited food production is caused by several things, such as the continued conversion of agricultural land to non-agricultural use and the decline in land quality and fertility due to environmental damage. Logarithmic projections for measuring food needs are used to simulate exponential population growth and food consumption. This method forecasts future demands by calculating growth rates using the natural logarithm, which is critical for maintaining a balanced food supply (Weaver et al., 2025).

According to the World Bank Group (2015), food demand challenges in the next few years will increase by around 20% from 2015 to 2030. This increase will also impact the demand for cereals, which will increase by up to 16%. The change in food demand opens up opportunities for food-producing countries to increase access to their local food markets to meet the increase in global and national food demand. FAO revealed that the proportion of crop losses remains quite high. Food losses due to improper handling, from harvest to processing, are believed to be around 13 percent (Capone et al., 2016).

East Asia and Southeast Asia are still regions experiencing progressive food insecurity. This is shown by the GHI score reaching 7.6 in 2014. Indonesia is in 22nd place, while Thailand is still in first place out of 76 countries. Malaysia and Vietnam still score below the mentioned countries (Speranza et al., 2014). According to the Global Hunger Index 2022, the hunger index values for eight Southeast Asian countries begin with Timor-Leste (30.6 points) and end with Laos (19.2 points). Meanwhile, Indonesia scored 17.9 points, followed by Cambodia (17.1) and Myanmar (15.6 points). Malaysia, Thailand, and Vietnam performed substantially better, each scoring fewer than 12.5 points. An index of less than 9.9 suggests low hunger, 10-19.9 indicates moderate hunger, and 20-34.9 indicates severe hunger. Furthermore, an index of 35-49.9 is concerning, and an index greater than 50 is exceedingly troubling (Putu & Devi, 2026). Gillson and Fouad (2015) stated that high food prices will be proportional to a decrease in people's purchasing power, especially for poor consumers. The spike in

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food prices, which is predicted to increase in the next few years, will also impact producers, namely farmers. However, access to food will also decrease as food prices rise, leading to chronic food insecurity on the part of people experiencing poverty.

Economic development in the ASEAN region will undoubtedly help reduce poverty rates, but the Southeast Asia region remains a disaster-prone area that will cause acute food access problems (Sawada, 2014). The many disasters that hit Southeast Asia, such as earthquakes, landslides, floods, hurricanes, and even tsunamis, will claim hundreds of thousands of lives. This disaster will also impact the agricultural sector, especially causing damage to agricultural land, increasing livestock casualties, damage to facilities and infrastructure, and other objects. All of this will cause transient food insecurity in the region. Member countries' commitment to ASEAN in managing regional rice stocks is still very lacking (Mat & Othman, 2014). This is considered an aspect of deficiencies in efforts and hopes to maintain food stability. The dominance of political interest factors between countries is one of the obstacles. APTERR is still an effective system for handling food problems during a disaster (Maunder, 2013).

According to data compiled by the Economist Intelligence Unit (2015), the consumption diversity index in 8 (eight) ASEAN member countries (Cambodia, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam) varies between 28% and 56%. The same data source shows that protein availability (as a proxy for protein consumption) in eight ASEAN member countries ranges from 36.4 grams/capita/day to 89.3 grams/capita/day. Meanwhile, the consumption diversity index in Indonesia is 31%, and protein availability is 38.7 grams/capita/day. These conditions indicate that Indonesia has a low consumption diversity index and lacks protein availability/consumption in the region. This research aims to determine the projected population growth in ASEAN countries and to see the contribution of their population to the world population and ASEAN. Apart from that, this research will also review the food business opportunities that can be provided due to the increase in population in ASEAN countries. This research will contribute to answering the projections of the population growth rate in ASEAN countries so that these countries can take preparatory steps to meet food needs in the future.

2. Materials and Methods

This study employs descriptive analytic methodologies. Secondary data used in this study includes time series data from 2017 to 2021. The secondary data is relevant to study from several sources, including the Global Food Security Index. I used contribution analysis to solve the first aim, which was about population increase in ASEAN countries. This contribution analysis divides the total population of each ASEAN country by ASEAN's total population. To determine the proportion of ASEAN's population to the global population, the contribution of each ASEAN country's population to the world's population must also be known. The data required in this research is the total population data in each country in ASEAN. Mathematically, this calculation can be seen in Equation 1 (Saputro et al., 2021).

$$Z = \frac{A}{B}\ x\ 100\% \ldots\ldots 1)$$

Note: Z = Population Contribution (percent), A = Number of Population of Each Country in ASEAN (people), B = Total Population of ASEAN or World (people).

To answer questions regarding population growth, a logistic model is used with the following calculations (Pagalay, 2009):

$$\frac{dN}{dt} = N\ (a - bN) \ldots\ldots\ldots\ldots 2)$$

$$N(t)\ \frac{aN_0e^{a(t1-t0)}}{a-bN_0+bN_0e^{a(t1-t0)}} \ldots\ldots 3)$$

$$N(t)\ \frac{N_0K}{N_0+(K-N_0)e^{a(t1-t0)}} \ldots\ldots\ldots 4)$$

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Where: $\frac{dN}{dt}$ = The rate of population change over time, N = The population size at a specific time, a = Intrinsic growth rate (maximum unimpeded reproductive potential), b = The coefficient of competition or environmental constraints due to population growth.

From equation 2, the second equation is obtained by analyzing it integrally, followed by a logarithmic process. Equation 3 is also accepted for each t_1 element times T and N (t_0) = N_0. The population growth in equation 4 is obtained from the development of time, so it requires a and b concerning the birth and death rates. The population will stop growing (dN/dt = 0) when the population size N reaches a/b. At this point, the resources are considered to be maximally utilized by the existing population.

3. Results And Discussion

Population growth is likely to increase over time. Population growth also occurs in every country, even in ASEAN. Most countries in ASEAN are developing countries where population growth is usually higher than the death rate. The absence of policies to control population growth is one of the factors causing the number of countries in ASEAN to increase. Population development can be seen in Table 1

Table 1. Population Growth in ASEAN Countries (a Thousand)

Country	2017	2018	2019	2020	2021
Indonesia	261,355	264,160	270,626	273,524	275,774
Thailand	66,189	67,790	69,626	69,800	66,171
Vietnam	94,286	94,580	96,462	97,339	98,054
Brunei Darussalam	417	430	433	437	445
Malaysia	32,023	32,390	31,950	32,366	33,519
Singapore	5,607	5,640	5,804	5,850	5,454
Myanmar	53,383	52,830	54,045	54,410	57,069
Philippines	105,172	106,600	108,117	109,581	114,793
Laos	6,787	6,780	7,169	7,276	7,338
Cambodia	15,552	16,250	16,487	16,719	16,800
Timor Leste	1,243	1,262	1,280	1,365	1,413
Total Population in ASEAN	640,772	647,451	660,720	667,303	675,419
Total Population in the World	7,509,000	7,592,000	7,673,000	7,753,000	7,874,966

Source: UN Data processed 2025

Based on Table 1, it can be seen that the population in ASEAN countries from 2017 to 2021 has increased quite significantly in each country. Indonesia's highest population growth was from 2018 to 2019, with an increase of 6,466 thousand people. Meanwhile, Thailand's population growth also experienced the highest growth, reaching 1,836 thousand people in the same year, as did Vietnam, with an increase of 1,882 thousand people from 2018 to 2019. Brunei Darussalam had the highest increase, which occurred from 2017 to 2018, amounting to 13,000 residents. Malaysia had the highest population increase from 2020 to 2021, reaching 1,153 thousand residents. Singapore, Cambodia, Laos, and Timor Leste experienced stagnant population growth, in contrast to Myanmar and the Philippines, which experienced the highest population increases in 2021, recorded at 2,659 thousand and 5,212 thousand residents for each country, respectively.

In fact, from the data presented, not a single country in ASEAN experienced a decline in population in the following year, except for Thailand in 2021. Indonesia still occupies the largest population in ASEAN, with the country in the first place, reaching 275 million people in 2021. The country with

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the second-highest population gain is the Philippines, with a recorded population of more than 114 million people in 2021. The third position with the largest population is Vietnam, with a record of more than 98 million people, followed by Thailand with more than 66 million people. The lowest population ranking in ASEAN countries is Timor-Leste, with a record of more than 1.4 million residents; in the previous place is Brunei Darussalam, with more than 445 thousand residents. It is essential to calculate the contribution of the population of countries in ASEAN to the total population to see which population has the most significant contribution to ASEAN. Each ASEAN country has distinct natural resource strengths that serve as the foundation of its exports. Agriculture and other natural resource-based sectors continue to play an important role in international trade. Indonesia and Malaysia are both major producers and exporters of palm oil (CPO). Meanwhile, Thailand has a higher agricultural potential, including essential commodities such as rice, natural rubber, sugar, and cassava. Vietnam's staple foods include Robusta coffee, rice, and shrimp. Cambodia can optimize its rubber output, whereas the Philippines concentrates on pineapple production (Muhammad and Sukarniati, 2024). The following is a picture that shows countries' contribution to ASEAN compared to the total population in ASEAN. Indonesia, Vietnam, Malaysia, and the Philippines are the ASEAN countries with the greatest potential for demand development.

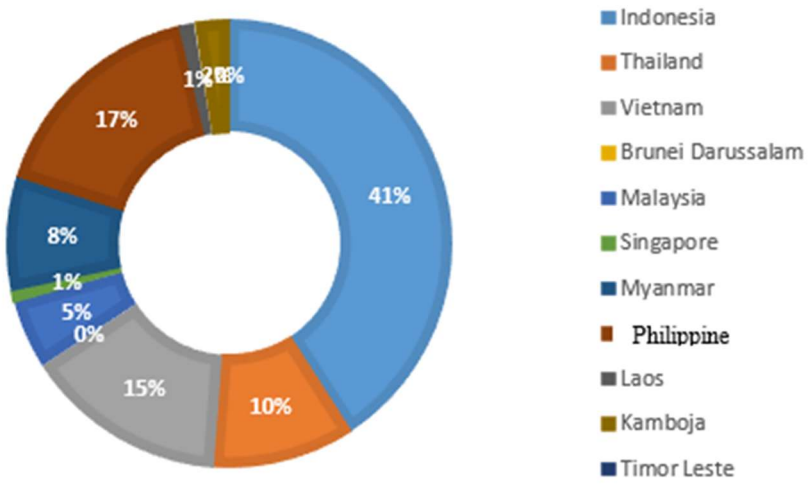


Figure 1. Average contribution of ASEAN countries' population to the total ASEAN population 2017-2021

Based on Figure 1, it can be observed which country contributes the most significant population. Indonesia remains in first place regarding its contribution to the largest population. The area of Indonesia is 1.905 million km² and consists of many islands, resulting in a large and dispersed population across various regions. The government has implemented numerous programs to manage the existing population, such as the transmigration program. This program successfully increased the agricultural sector, but it also increased the current population (Sitorus, 2019). The Philippines remains in second place with a contribution of 17 percent, followed by Vietnam and Thailand with contributions of 15% and 10%, respectively. The population in the Philippines is spread over 63% in urban areas, while the rest is in rural areas. Meanwhile, Vietnam is one of the developing countries in ASEAN, which can reduce its population growth rate quite well compared to other countries.

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The average woman in Vietnam gave birth to four children in the 90s, but the country has managed to control its population growth with a family planning consultation program. This program provides contraceptive facilities to reduce the population's birth rate. This program is also one of the priority programs. Thailand is next in line with a record contribution of 10% (Rizkianti et al., 2024). However, if it is related to the population growth rate in Table 1, Thailand will experience a decline in 2021. The Thai government is concerned about a population crisis because many citizens are reluctant to have children or offspring. In the last six decades, Thailand has only had 544,000 births, while the death rate reached 563,000, and what was even worse was due to the presence of COVID-19 in the past. This phenomenon caused the Ministry of Health to respond to the slowing trend in population decline. State policy also budgets total health funding for childbirths in Thailand as a priority to address the population problem, which has begun to decline in recent years.

The contribution of the population in ASEAN countries also needs to be compared with the population throughout the World. This is to see to what extent the percentage of the population in ASEAN influences the world population, as seen in the following table. Comparing ASEAN's share of the global population is crucial for food demand and business opportunities, especially given the potential for ASEAN to dominate the global market. Pressure on food supplies, rising energy prices, high fertilizer prices, land and water scarcity, climate change, and stringent food standards present opportunities that ASEAN countries can effectively manage. Transforming the food supply chain in ASEAN also presents an opportunity to increase income and prosperity in the region (Nugraheni & Sabilla, 2024).

Table 2. Contribution of the population of ASEAN countries to the total population in the world in 2017-2021 (percent)

Country	2017	2018	2019	2020	2021	Average Contribution
Indonesia	3.481	3.479	3.527	3.528	3.502	3.503
Thailand	0.881	0.893	0.907	0.900	0.840	0.884
Vietnam	1.256	1.246	1.257	1.255	1.245	1.252
Brunei Darussalam	0.006	0.006	0.006	0.006	0.005	0.006
Malaysia	0.426	0.427	0.416	0.417	0.426	0.422
Singapore	0.075	0.074	0.076	0.075	0.069	0.073
Myanmar	0.711	0.696	0.704	0.702	0.725	0.707
Philippines	1.401	1.404	1.409	1.413	1.458	1.417
Laos	0.090	0.089	0.093	0.094	0.093	0.091
Cambodia	0.207	0.214	0.215	0.216	0.213	0.216
Timor Leste	0.001	0.001	0.001	0.001	0.001	0.001

Based on Table 2, it is known that Indonesia's population contributes more than 3 percent of the total world population. Indonesia's population ranks fourth in the world after China, India, and the United States. Meanwhile, the total population contribution of the Philippines reaches 1.4 percent, followed by Vietnam at 1.2 percent. The total population contribution of all three (Indonesia, the Philippines, and Vietnam) is relatively high in ASEAN, but still minimal compared to the global population. Other ASEAN countries, such as Thailand and Myanmar have a total population contribution of less than 1 percent to the world population. For example, Thailand contributes only 0.8 percent, followed by Myanmar at 0.7 percent.

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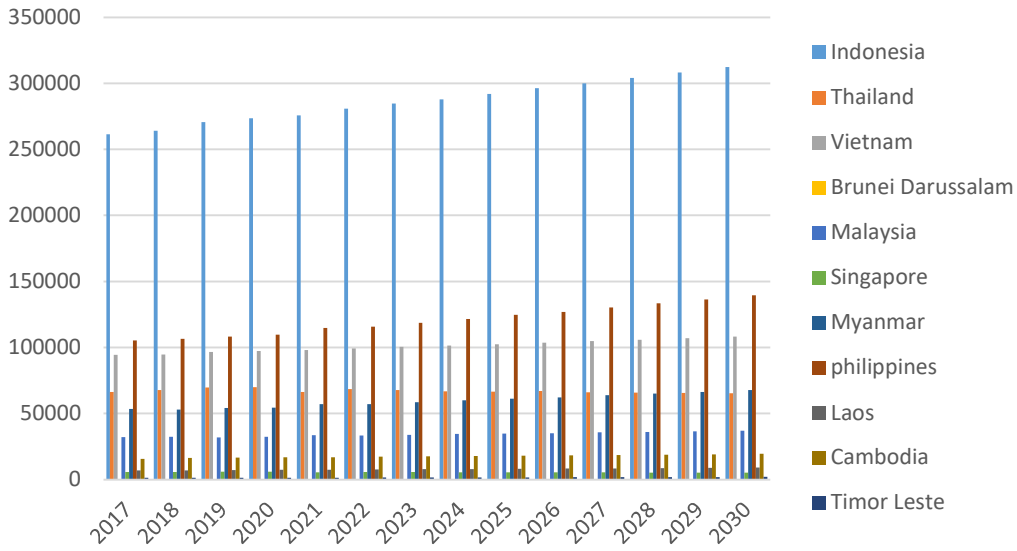


Figure 2. Projections of population growth rates for ASEAN countries

Looking at the average growth in the percentage of population contribution in ASEAN countries over the past five years, Indonesia has recorded a population contribution to the world population of 3.503%. This achievement is followed by the Philippines and Vietnam, which have recorded population contributions to the world population of more than 1 percent, specifically 1.417% and 1.252% over the past five years. Other countries in ASEAN, such as Thailand and Myanmar, rank fourth and fifth with recorded population contributions to the world population of 0.884% and 0.707%. Meanwhile, countries such as Malaysia, Cambodia, Brunei Darussalam, and Timor Leste have population contributions to the world population of less than 0.5% and have tended to stagnate over the past five years. Meanwhile, Malaysia and Cambodia each have population contributions of 0.4 percent and 0.2 percent. Singapore, Brunei Darussalam, and Timor Leste occupy the bottom three rankings regarding population contribution. Population growth projections are significant for knowing population developments and anticipating if the population increase is quite extreme. The development of the population of ASEAN countries can be seen in the following picture.

Based on Figure 2, it can be seen that most of the countries in ASEAN have a positive population growth rate. Predictions state that by 2030, Indonesia will have more than 312,33 million people. If this is not controlled correctly, population growth will gradually harm the country's development. However, the demographic bonus has a positive impact if the capacity and quality of human resources are also good. The demographic bonus can be used to mobilize a productive youthful workforce through agricultural modernization, foster youth entrepreneurship, and increase food security to sustain the nutrition of working-age people. These actions improve efficiency, production, and national food security (Meilia, 2025). According to the target, the population growth rate in Indonesia must be reduced to the ideal point where annual growth is one to two million per year. The policy of equalizing employment opportunities in various regions is also one of the strategic steps being taken by Indonesia so that population concentration does not only occur on the island of Java. The policy targets within the national plan for population equality are achieved by controlling concentration in densely populated areas and encouraging economic development and growth outside Java, thus establishing new

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growth centers. Equally important is the development of medium-sized and small cities to reduce existing inequality and provide equitable infrastructure. The ideal policy direction regarding strengthening new growth centers must also be integrated with industrial development, strengthening food security, and developing strategic areas to create a sound foundation for quality of life. Moving the country's capital from Jakarta to Kalimantan Island is also essential for equalizing the population on several islands in Indonesia.

Philippines also has a reasonably high population growth rate; it is estimated that by 2030, the population will reach more than 120 million people. This position is followed by Thailand and Vietnam, the two highest countries in ASEAN. The increasing population in various ASEAN countries means that each region must be able to provide its food needs, either by producing it or importing it from other countries. Constraints occur in several countries with low production and not too high income, so increasing the amount of food becomes a problem. Still, for countries with high production and low food consumption, it will be very profitable and become a profitable business for that country. Population expansion directly affects total food demand since more people require food. The projected total food demand is calculated by multiplying the population by per capita consumption. However, it is critical to understand that population growth is exactly proportional to overall food demand. In addition to quantity, higher wages improve per capita consumption (quality/ diversification), but age structure (particularly among productive age groups) increases consumption volume and type. For example, with a predicted population of more than 300 million people by 2030, Indonesia's rice demand will rise to 90-100 million tons per year. Problems regarding food consumption can be seen in the global food security index score in the table below.

Table 3. Development of global food security index scores for several ASEAN countries in 2017-2021

Year	Country								
	Indonesia	Thailand	Vietnam	Malaysia	Singapore	Myanmar	Philippines	Laos	Cambodia
2017	51.3	58.3	54.0	66.2	84.0	44.8	47.3	33.1	43.3
2018	54.8	58.9	56.0	68.4	85.9	45.7	51.5	38.3	42.3
2019	62.6	65.1	64.6	73.8	87.4	57.0	61.0	49.1	49.4
2020	59.5	64.0	60.3	75.7	75.7	56.6	55.7	46.4	51.5
2021	59.2	64.5	61.1	70.1	77.4	56.7	60.0	46.4	53.0

Based on Table 3 regarding the development of the global food security index value, the food security value of each country is known. Two countries with food security scores have not been identified, namely Brunei Darussalam and Timor-Leste. This problem is due to data constraints, economies of scale, or methodological capacity limitations in the comprehensive ranking surveys that have been submitted by GSFI. The GFSI (Global Food Security Index) score is obtained from a combination of four aspects of food security: affordability, availability, quality and safety, and natural resources and resilience. Based on Table 3, it can be seen that Singapore's GFSI score for the last five years is the best compared to other countries in ASEAN. Singapore's average GFSI score reached 83.21. Singapore has a high score in terms of affordability, availability, quality and safety, but is very low in terms of natural resources and resilience. This is due to the lack of available land for the food supply sector in Singapore. Singapore has a good food security score despite its low natural resources, thanks to

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varied imports (more than 90% of its food supply), strong purchasing power, and intensive farming technology (vertical and indoor). Singapore prioritizes affordability and availability, aided by a national stockpiling plan and a diverse supplier base from other nations to limit the risk of dependence. The second place in the country with the highest GFSI is Malaysia, with an average score of 70.31. The third and fourth places are occupied by Thailand and Vietnam, with average scores of 61.47 and 58.06, respectively.

Meanwhile, Indonesia is in fifth place, with an average GFSI score over the last five years of 54.96. Indonesia ensures affordable food for the consumer. However, there is a fundamental gap in the country's ability to create a forward-thinking environment and ensure food security.

One of the strategic factors in development comes from the population. Population growth will affect the implementation of development carried out by the government. However, population growth in developing countries will add to the complexity of development problems. Population problems in developing countries are closely related to the unequal distribution of the population, suboptimal education and health service systems, and less productive young people. Population growth influences many phenomena, such as the age structure of a country's population, international migration, economic inequality, and the size of a country's workforce (Peterson, 2017).

Empirically, population growth must be reconsidered so that it has a positive impact on economic growth. Population changes will have a substantial effect on economic growth in particular. The dynamics of population growth are based on three aspects: fertility, mortality, and migration. The increase in population is closely related to the quality of the people in the area in terms of the degree of public health, which will also influence the quality of the population or community as a development subject (Rosado et al., 2017).

The economic growth rate has been 7-12% in the last two decades. Significant changes have occurred, for example regarding people's food purchasing behavior and consumption patterns. Every country certainly has a very high demand for food for certain products compared to other products, but the food supply often does not keep up with the demand. Population fluctuations in ASEAN have a substantial impact on food demand and GDP per capita. High population growth immediately increases food demand, although a big population frequently has the opposite effect on GDP per capita (lowering it). If not accompanied by strong economic growth, it may have an impact on regional food security. (Gandhi and Zhou, 2014).

Several city centers in ASEAN countries, such as Ho Chi Minh, located in Vietnam, have social distancing policies to suppress the spread of the COVID-19 virus. The consequence of a situation like this is unprecedented panic buying of food. Many people cannot control their panic behavior when purchasing food. Excessive food exploitation combined with natural disasters has caused food prices to experience shocks along with the demand for food, which has increased sharply. As a result, high demand for food causes a shortage of goods. People are willing to hoard and do not follow instructions from the government (Long & Khoi, 2020). Exploitation of distribution channels also occurs due to the public's excessive purchasing of food ingredients. Buying and selling food has a severe impact, apart from the pandemic, as well as fulfilling food requirements. This creates adverse effects on society when it requires easily damaged food. However, purchasing excess food also wastes a lot of food because it is not consumed, so some people think about giving it to other consumers (Zhang & Xue, 2015). Efficient resource allocation will lead to a loss of social weight and potential inventory that will be detrimental to society (Anh et al., 2021).

The government can control food needs and assure consumers that there will be no

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shortage of goods. These efforts can handle a large number of consumer requests at one time. In addition, the government must provide people with clear and timely information about food supplies and household goods that must be prepared before a disaster occurs. The government should adopt targeted policies to reduce mindless panic buying. Food stability can be threatened by short-term shocks and structural supply issues, both of which need to be properly anticipated by ASEAN countries (Nguyen et al., 2022).

Malthus' theory states that food growth is like an arithmetic series, and population growth is like a geometric series, showing that as the number and development of the population increase, the need for food also increases. This makes studies regarding the influence of population dynamics on food conditions necessary as input to achieve food security. The population dynamics referred to are changes in population growth trends, structure, and distribution or can be concluded as changes in the number of individuals in a larger population community over time. Modern occurrences, such as developments in agricultural technology, the green revolution, and birth control, predict Malthus' theory (that population outpaces food). Genetic engineering, tractors, and modern fertilizers have increased food output tremendously, outpacing Malthus' arithmetic progression. (Unat, 2020).

Adaptation to various things that may occur, such as the sudden appearance of a disaster, is essential, especially in preparing food stocks. Different countries have implemented policies to provide food reserves so that excess food allowances can be given to citizens. Distribution support policies are also important in handling various cases, such as providing delivery systems and nutrition checks during emergencies (Shanks et al., 2020). The effectiveness of food reserves for ASEAN countries like Indonesia is in the form of rice (paddy) as the main staple food, supported by reserves of grains (corn, soybeans) and other staple food commodities for price stability and emergency assistance. These reserves are managed by the central and regional governments to address disasters, inflation, and food insecurity.

Food preparation can be done in two stages: long-term and short-term. In the long term, this can be done by preparing manufacturing companies, especially consumer goods or food industries, in a system so that they can project increases in food production for many reasons. In the short term, this can be done by implementing food sector regulators and increasing rice milling and food businesses so that the wheels of the economy continue to run as they should. According to Shahbaz et al. (2020), several things must be done in preparing food, namely, food management, monitoring food delivery, and receiving good goods. The systematic review model is a reference for agencies or governments to make the food systems used more effective.

Indicators of food availability can be seen from the food security value. This is to see whether individuals can access food easily. The access in question also indicates that individuals can obtain food according to their preferences based on safety, quality, and nutritional needs (Hasselberg et al., 2020). The main dimensions in measuring food security can be seen from the first aspect of food availability, from production, maintained stock levels, and the difference in the value of food exports and imports. The second dimension is the individual's financial value to reach sufficient food. Economic measurements in the food sector look at whether consumers have enough purchasing power or not to access food so that food insecurity decreases. The third aspect is food utilization, a nutritional adequacy dimension, and a food safety dimension. Fourth is stability, from the first to third dimensions over time (Kimani-murage et al., 2010).

The existing health situation has recently influenced the food system. This effect can be seen in the decline in domestic agricultural labor (Devereux, 2020). Imports from several

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countries are projected to fall in the short term, but an increase follows this in prices. This component triggers food price inflation that has the potential to occur, which will result in increased poverty and malnutrition due to the difficulty of meeting basic needs. Managing food security is critical to ensure that the population is not vulnerable (Akrasi et al., 2020).

The population growth in ASEAN countries opens up opportunities for countries with good natural resources to produce maximum food. This can also be used as a new business opportunity to provide food for several countries that do not have good agricultural resources. The response to increased demand for food will be in line with the increasing population growth rate from time to time, especially for several countries in ASEAN. If, for example, one person or individual needs more than 2000, then this is an ample opportunity for countries with promising agricultural sectors to import food to countries with populations that increase yearly. For example, Indonesia still has several food ingredients that are not optimal, so its needs are met by importing food ingredients from several countries in ASEAN, such as Thailand, Vietnam, and Myanmar, for rice in 2021. Indonesia still imports several goods, such as chillies from Malaysia, sugar from Thailand, and other food commodities. Malaysia also imports several commodities and exports rubber and palm oil to Thailand and Singapore. Population growth at a positive rate will significantly benefit countries with a robust agricultural sector. For example, with an agricultural land area of 7.46 million hectares (ha), Indonesia will benefit greatly from this condition. Apart from Indonesia, several countries have excellent agricultural areas, such as Thailand with 9 million hectares, Malaysia with 7.60 million hectares, and 7.82 million hectares of agricultural land. Of course, optimizing agricultural land to produce food is an important reason to take advantage of business opportunities to provide food for countries with production shortages. This response must also be aligned with government policies to support increased food production by improving existing agricultural infrastructure. This optimization will increase food production so that countries with superior agricultural areas can maximize meeting other countries' food demands by exporting food supplies. This is in accordance with the GFSI indicators that assess a country's food security using indicators, namely affordability, availability, sustainability and adaptation.

Small regions in ASEAN countries have to face the fact that their control of natural resources does not allow them to produce as much food as domestic communities need. Therefore, society or the existing population must be able to optimize income and economic status as much as possible. Countries with limited natural resources must import far more varied products to meet domestic needs. Countries such as Singapore, Brunei Darussalam, and Timor Leste, which have limited land and clean water, certainly do not have advantages in the field of food production, so alternative food fulfillment comes from producing food from commodities that do not require a lot of land, water or labor or can be fulfilled by importing food ingredients from other countries in ASEAN (Hossain, 2020).

Growing food in a country like Singapore is undoubtedly a dilemma, so economic activity in other sectors must be more substantial, such as tourism, which can generate foreign exchange for the country. Investment in the form of a development plan is a strategic step for countries with limited agricultural sectors, so government governance support must be carried out transparently. Several countries also have to think about how to ensure food security is achieved in the long term. Of course, countries like Singapore and Brunei must have good economic growth, so long-term systematic plans are needed so that food buffers can be met quickly and there is no shortage of food supplies (Caballero-anthony et al., 2020). Good agricultural policy

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decisions must support the contribution of the agricultural sector to small countries because the focus on land work must be replaced by economic activities that are more productive and have a workforce that is more qualified and highly capable. Usually, countries with limited agricultural sectors will divert to other sectors, such as service and manufacturing industries, so their gross domestic product per capita is relatively high and is considered in the World. Obstacles such as price increases and food supply difficulties, such as those that occurred during the pandemic, have become problems again in the agricultural sector in this country. However, Singapore has still had a high GFSI score in recent years. The focus on urban agriculture is a supporting program held by Singapore Food Story, which also focuses on aquaculture and food science. The three program focuses are carried out to overcome when import activities are challenging to carry out and food supplies are scarce (Teng & Darvin, 2019).

One of the critical dimensions of food security is food affordability. This dimension is essential to control people's purchasing power and food prices. Policies regarding food tariffs and logistics must be carried out efficiently as a strategic step taken by a country to guarantee domestic food production. If these two factors are done well, prices will stabilize. Empowering domestic citizens to buy domestic products and increasing purchasing power is good economic access to available food. The average number of existing households certainly differs between countries such as Singapore and Indonesia. Of course, households or per capita in Singapore have relatively high incomes, so they don't have problems accessing food. For households that are food secure, food expenditure is usually relatively small from the existing household budget. However, in developing countries, food is a top priority, so the average need for food is still significant compared to the proportion of other non-food expenditures. Overall, ASEAN countries have good access to food, even though imports and household G.D.P. are still low.

4. Limitations and Future Directions

This study's limitations lie in the incomplete data, particularly those describing food security scores in ASEAN countries, which are not all available because they are based on a single data source. The findings of this study are also projections for the future, so they must be aligned with the facts that will occur in the next few years. The weakness of the latest data is also a limitation of this study because the data used is secondary. Strategic recommendations for further research require primary data disclosure to reveal the micro-conditions that occur in society. Further, broader research recommendations include calculating the actual needs for grains, tubers, animal foods, oils/fats, oily fruits/seeds, nuts, sugar, and vegetables/fruits so that each ASEAN country can calculate the food reserves that must be collected in anticipation of a surge in population growth.

5. Conclusion

According to the findings of previous studies, the population growth rate in the majority of ASEAN countries is favorable. Indonesia contributes the most to ASEAN's population, followed by the Philippines, Vietnam, and Thailand. Indonesia has a population contribution of 40.87 percent to ASEAN. According to the research findings, Singapore had the greatest achievement in developing the GFSI value, with an achievement of 83.21, followed by Malaysia, with an achievement of 70.31, and Thailand, with a GFSI achievement of 61.47. The existence of a growing population creates opportunities for countries with abundant natural resources. This possibility exists to meet the food requirements of countries experiencing domestic food shortages. Indonesia, Thailand, Vietnam, and Malaysia can optimize production by having great agricultural land. Of course, government support is essential for optimizing this plan through improved agricultural infrastructure.

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ASEAN countries must also be able to use their annual staple food stocks to anticipate the spike in population growth each year.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

The author used AI-based tools like Grammarly, QuillBot, and ChatGPT for evaluation and proofreading while putting this work together. Therefore, the use of AI in the preparation of this work was limited, and the author conducted reviews and edits as needed. The author also takes full responsibility for the content of the publication and assumes full accountability.

Authorship Contribution Statement

Every author on this manuscript maintained accountability, transparency, and adherence to ethical publishing norms while actively participating in the research and transcript preparation. Conceptualization, methodology, software, validation, data analysis, investigation, data curation, and original draft writing are all covered by Wahyu Adhi Saputro. Octaviana Helbawanti: Writing, Editing, Data Curation, and Data Search. Ulfah Nurdiani: Writing, Formal Analysis, Methodology, and Manuscript Review. Fitri Amalinda Harahap: Data Interpretation, Writing, and Editing. Amalia Nadifta Ulfa: Writing, review, editing, formal analysis, investigation, and validation. Each author has made a substantial contribution to the transcript's overall quality.

Declaration of Competing Interest

The authors affirm that the work described in this publication was not influenced by any known competing financial interests or personal relationships.

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References

Akrasi, R. O., Eddico, P. N., & Adarkwah, R. (2020). *Income Diversification Strategies and Household Food Security among Rice Farmers : Pointers to Note in the North Tongu District of Ghana*. *8*(3), 77–88. https://doi.org/10.12691/jfs-8-3-1

Anh, T., Thi, B., Nguyen, C., Thi, D., Marks, G. B., & Fox, G. J. (2021). *The Lancet Regional Health - Western Pacific Experience in responding to COVID-19 outbreaks from Vietnam*. *7*, 2020–2021. https://doi.org/10.1016/j.lanwpc.2020.100077

Budiyanti, H., Pintor, S., & Patiro, S. (2018). *Perceived Fairness , Emotions , and Intention of Fast Food Chain Restaurants Customers in Indonesia*. *20*(2), 229–253.

Caballero-anthony, B. M., Teng, P., Ma, J., & Montesclaros, L. (2020). *COVID-19 and Food Security in Asia : How Prepared are We ? June*.

Capone, R., Bennett, A., Debs, P., Bucatariu, C. A., El Bilali, H., Smolak, J., ... & Toppe, J. (2016). Food losses and waste: global overview from a Mediterranean perspective. *Zero Waste in the Mediterranean: Natural Resources, Food and Knowledge". CIHEAM and FAO*, *1*(1), 193–242.

Devereux, S. (2020). *Conceptualising COVID-19 ' s impacts on household food security*. 769–772.

Dewati, R., Setyarini, A., Harinta, Y. W., & Arianti, Y. S. (2025). *Strengthening the Porang Creative Economy through Value-Added Production and a Communal Integration Business Model*. *8*(3), 1125–1137.

Economist Intelligence Unit. (2015). *Global Food Security Index*. Dupont.

FAO. (2014). *The State of Food Insecurity in the World. Strengthening the Enabling Environment for Food Security And Nutrition*. Food and Agriculture Organization of the United Nation.

Gandhi, V. P., & Zhou, Z. (2014). Food demand and the food security challenge with rapid economic growth in the emerging economies of India and China. *Food Research International*, *63*(1).

Agro Bali : Agricultural Journal
Vol. 9 No. 1: 229-243, March 2026
e-ISSN 2655-853X
https://doi.org/10.37637/ab.v9i1.2590

Gillson, I. and A. F. (2015). *Trade Policy and Food Security: Improving Access to Food in Developing Country in the Wake of High World Prices*. World Bank.

Hasselberg, A. E., Aakre, I., Scholtens, J., Overå, R., Kolding, J., Bank, M. S., Atter, A., & Kjellevold, M. (2020). Fish for food and nutrition security in Ghana : Challenges and opportunities. *Global Food Security*, *26*(September 2019), 100380. https://doi.org/10.1016/j.gfs.2020.100380

Hossain, S. T. (2020). *Impacts of COVID-19 on the Agri-food Sector : Food Security Policies of Asian Productivity Organization Members*. *15*(2), 116–132.

Khairul, M., Kamarudin, A., Wahab, N. A., Mohamad, M., Shakir, A., Saudi, M., Samsurijan, M. S., Saad, M. H., Yusri, S. N., & Ah-, N. A. (2018). *Population Growth and Economic Development in Developing and Developed Countries*. *7*, 123–127.

Kimani-murage, E. W., Holding, P. A., Fotso, J., Ezeh, A. C., Madise, N. J., Kahurani, E. N., & Zulu, E. M. (2010). Food Security and Nutritional Outcomes among Urban Poor Orphans in Nairobi , Kenya. *Journal of Urban Health*, *88*(7139065), 282–297. https://doi.org/10.1007/s11524-010-9491-z

Long, N. N., & Khoi, B. H. (2020). *An Empirical Study about the Intention to Hoard Food during COVID-19 Pandemic*. *16*(7).

Mat, B., & Othman, Z. (2014). *Regional cooperation in addressing food security issues in Southeast Asia : Malaysian perspectives*. *6*(6), 37–47.

Maunder, N. (2013). What is known about the impact of emergency and stabilization reserves on resilient food systems? *Deutsche Gesellschaft Fur Internationale Zusammenarbeit*, *March*.

Meilia, S. (2025). DEMOGRAPHIC BONUS TO SUPPORT ECONOMIC. *Eduvest – Journal of Universal Studies*, *5*(2), 1856–1863.

Mondol, H., Mallick, U. K., & Biswas, H. A. (2018). *Mathematical modeling and predicting the current trends of human population growth in Bangladesh*. *55*(2), 62–69.

Muhammad Nadif Hafizhy, L. S. (2024). Pertumbuhan Ekonomi Negara ASEAN 2018-2022. *Socius: Jurnal Penelitian Ilmu-Ilmu Sosial*, *2*(1), 136–143.

Mulyani, A., Wijayanti, I. K. E., Saputro, W. A., Sarno, S., & Sukmaya, S. G. (2024). Farm Management and Factors Influencing Farmers' Adaptation Strategies in the Serayu Dam Area to Climate Change. *Agro Bali : Agricultural Journal*, *7*(3), 896–905. https://doi.org/10.37637/ab.v7i3.2055

Nguyen, N., Nguyen, C., Khuu, P., & Nguyen, K. (2022). *Panic Purchasing : Food Hoarding in a City under Lockdown during the COVID-19 Pandemic*. *24*(3), 310–323.

Nugraheni, R. D., & Sabilla, K. (2024). Keunggulan Kompetitif Produk Pangan-Pertanian ASEAN-5 Selama 20 Tahun: Perubahannya Melalui Krisis. *Jurnal Ekonomi Dan Pembangunan Indonesia Volume*, *24*(1), 52–78. https://doi.org/10.21002/jepi.2024.04

Pagalay, U. (2009). *Mathematical modelling*. UIN-Maliki Press.

Peterson, E. W. F. (2017). *The Role of Population in Economic Growth*. https://doi.org/10.1177/2158244017736094

Putu, N., & Devi, S. (2026). Analysis of the Country with the Fifth-Highest Hunger Index in ASEAN : Do Fraud , Food Policy , and Income Matter ? *Jurnal Manajemen Motivasi*, *22*, 1313–1321.

Rizkianti, A., Kistiana, S., Fajarningtiyas, D. N., Hutasoit, E. F., Baskoro, A. A., Maryani, H., Titisari, A. S., Sari, D. P., Naibaho, M. M. P., Melissa, M., & Muthmainnah, M. (2024). Understanding the association between family planning and fertility reduction in Southeast Asia : a scoping review. *BMJ Open*, *14*(6), 1–10. https://doi.org/10.1136/bmjopen-2023-083241

Rosado, J. A., Isabel, M., & Sánchez, A. (2017). *From Population Age Structure and Savings Rate to Economic Growth : Evidence from Ecuador*. *7*(3), 352–361.

Saputro, W. A., Purnomo, S., & Rahmawati, I. (2021). *Contribution of Agroforestry Plants to Farmers ' Income in Nglanggeran Agricultural Technology Park*. *06001*, 4–8.

Sawada, Y. (2014). *Disaster Management in ASEAN*.

Shahbaz, M., Bilal, M., Akhlaq, M., Moiz, A., Zubair, S., & Iqbal, H. M. N. (2020). *Strategic Measures for Food Processing and Manufacturing Facilities to Combat Coronavirus Pandemic (COVID-19)*. *14*(June), 1087–1094. https://doi.org/10.22207/JPAM.14.2.01

Shanks, C. B. Hingle, M. D. Parks, C. A. Yaroch,

Agro Bali : Agricultural Journal
Vol. 9 No. 1: 229-243, March 2026
e-ISSN 2655-853X
https://doi.org/10.37637/ab.v9i1.2590

A. L. (2020). The COVID-19 Pandemic : A Watershed Moment to Strengthen Food Security Across the US Food System. *Food System, American Journal of Public Health*, *110*(8), 1133–1134. https://doi.org/10.2105/AJPH.2020.305760

Simane, B., Kapwata, T., Naidoo, N., Cissé, G., Wright, C. Y., & Berhane, K. (2025). Ensuring Africa's Food Security by 2050 : The Role of Population Growth , Climate-Resilient Strategies , and Putative Pathways to Resilience. *Foods*, *14*, 1–16.

Sitorus, S. R. P. (2019). Transmigration Area Development and Its Community In Indonesia. *Sumatra Journal of Disaster, Geography and Geography Education*, *3*(1), 94–106.

Speranza, C. I., Wiesmann, U., & Rist, S. (2014). An indicator framework for assessing livelihood resilience in the context of social – ecological dynamics. *Global Environmental Change*, *28*, 109–119. https://doi.org/10.1016/j.gloenvcha.2014.06.005

Teng, P. S. & D. B. A. C. (2019). *FOOD RESERVES : Food reserves: A comparative study on food reserve management and policies in Southeast Asia*. SEARCA College.

Unat, E. (2020). *A Review of Malthusian Theory of Population Under the Scope of Human Capital*.

United Nations. (2019). *World Population Prospects 2019: Highlights*. United Nations.

Weaver, C., Armah, S., Bruno, R. S., Fletcher, A., Glahn, R., Herter-aeberli, I., Karosas, T., Loechl, C. U., Lopez-teros, V., Mcburney, M. I., Melse-boonstra, A., Novotny, R., & Reddy, M. B. (2025). Perspective : Framework for Developing Prediction Equations for Estimating the Absorption and Bioavailability of Nutrients from Foods. *Advances in Nutrition*, *16*(9), 100481. https://doi.org/10.1016/j.advnut.2025.100481

World Bank Group. (2015). *Ending Poverty and Hunger by 2030. An Agenda for The Global Food System*. An Agenda for The Global Food System.

Zhang, D., Li, X., & Xue, J. (2015). Education Inequality between Rural and Urban Areas of the People's Republic of China, Migrants' Children Education, and Some Implications. *Asian Development Review*, *32*(1), 196–224. https://doi.org/10.1162/ADEV_a_00042