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Literature Review on Malaysia National Food Security: Challenge and Strategy in Meeting Population Rise

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Abstract

This research examines Malaysia's national food security, focusing on the challenges posed by rising population, global disruptions, and the need for sustainable strategies. The primary objective is to analyze the effectiveness of Malaysia's current food security measures in light of the growing population and increasing demand for food. Through qualitative methodologies, including document analysis and case studies, the study investigates the role of government policies, agricultural productivity, and technological adoption in ensuring food sustainability. The findings highlight Malaysia's dependency on food imports, aging farmer demographics, and the lack of investment in agricultural research and development as key factors threatening food security. Additionally, disruptions such as the COVID-19 pandemic and geopolitical conflicts, such as the Russia-Ukraine war, exacerbate vulnerabilities. The research emphasizes the need for comprehensive policies, enhanced private investment, and technological advancements to build resilience in the nation's food systems.

Keywords: *Food Security, Malaysia, Population Growth.*

Introduction

Food security may become a significant issue that governments all over the world, as well as international organisations, need to address in light of the world's issue of overpopulation. Every nation is essentially engaged in a battle to maintain a steady supply of food to meet all of its citizens' demands, and this battle appears to be particularly difficult in developing and less developed countries. Based to a World Bank (2022) study carried out in 2021, 17 percent of low-income households were exposed to food insecurity since food inflation has placed pressure on their disposable income.

Food security is defined by the United Nations Statistics Division Development Data and Outreach Branch (2022) as "all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meet their food preference and dietary needs for an active and healthy life". A nation is considered to have a high level of food security when it is able to obtain sufficient food and adequate food supply at affordable prices in order to meet its consumption needs and nutritional requirements.

According to a Malthus (1798) in his publication entitled An Essay on the Principle of Population, there are concerns over the ability of each nation to be able to match its food supply with every increase in demand, especially due to the rise in human population. As to the author's prediction, there will come a period in time when the growth rate of the population, which follows an exponential pattern, will exceed the capacity of the food supply to keep up with this rise. Although recent observations revealed that Malthus' theory is technically unreliable as the world's current population growth is not expotential and food is still constantly supplied to match every demand, the food security issue is however still vital and governments all over the world should ensure the sustainability of food for its nation (Paul, 2013; Abramitzky, Braggion, 2004).

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As food security is vital to every country, several government agencies provide the public with updates on the state of food security in relation to commodities, alongside policies adopted by the government to ensure food sustainability. The information is usually accessible at the relevant agencies' websites. Malaysia, for instance, published *"The National Food Security Action Plan 2021 – 2025"* in 2021 to concentrate on efforts aimed at creating a sustainable food system. However, a majority of the reports released only project the results of food security to the actual population of the nation, and do not take other factors into consideration. For instance, these reports do not factor in variables such as immigrants, refugees, and stateless people which are important in determining the nation's food security. If these groups are included in the analysis, there is ambiguity as to whether their input will change the food security of the nation.

Based on data in Table 1.1 from United Nations (2023), Malaysia's current population is 34.3 million, about 12.3 percent higher than the total population recorded in 2013 which was 30.1 million. According to CEIC Data (2021), Malaysia's population is expected to grow to 43 million by 2050, raising the issue of whether Malaysia's present national food security strategy can accommodate the growing population.

Malaysia - Historical Population Growth Rate Data		
Year	Population Growth Rate	Growth Rate
2023	34,308,525	1.09%
2022	33,938,221	1.09%
2021	33,573,874	1.13%
2020	33,199,993	1.21%
2019	32,804,020	1.25%
2018	32,399,271	1.32%
2017	31,975,806	1.43%
2016	31,526,418	1.47%
2015	31,068,833	1.51%
2014	30,606,459	1.57%
2013	30,134,807	1.60%

Table 1. Malaysia's Historical Population Growth Data

Source: United Nations (2023)

From the statistics provided, approximately 92 percent of the Malaysian population are citizens, while another 8 percent are non-citizens including registered foreigners, refugees and stateless people seeking asylum. In this country, the United Nations High Commissioner for Refugees (UNHCR) had registered 183,430 refugees and asylum claimants as of the end of September 2022.

Considering the ever-increasing population growth, the consumption of food is predicted to rise by 70 percent to 100 percent by 2050. Moreover, international organisations such as the Food and Agriculture Organization of the United State (FEO) and the Organisation for Economic Co-operation and Development (OECD) have also predicted that the global food consumption is predicted to rise by 1.4 percent each year (Sundaram, Gen, & Khalidi, 2019). Food security in low and middle-income nations is seriously threatened by the population growth, including Malaysia. Hence, it is essential to emphasise the

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establishment of food security in Malaysia to ensure the sustainability of its economic development and address the nutritional requirements of a significant population suffering from hunger.

According to a report published by The Economist Intelligence Unit (2022), Malaysia is currently ranked at 46th place among 113 countries under the 2020 Global Food Security Index (GFSI) in terms of food security performance. This index was measured based on the daily per capita dietary energy supply, or in other words, the comprehensive food system providing the people with appropriate dietary energy (Mohammad, Mazalan, & Hayani, 2020). Although the ranking shows an improvement from the previous year, Malaysia still needs to improve its performance so that we can be on par with other leading Asian countries such as Singapore and Japan.

	Southeast Asia				Asia (Others)		
	Malaysia	Singapore	Thailand	Indonesia	Japan	South Korea	China
2021 Global Food Security Index rank[1]	39th	15th	51st	69th	8th	32nd	34th
Quality and Food Safety Index rank[2]	46th	43rd	73rd	95th	30th	44th	56th
Within quality and food safety, Malaysia is behind in two key nutrition-related components:							
Micronutrient availability score[3]	79.7	96.8	54.1	54.3	80.5	86.5	84.2
Protein quality score[3]	79.5	85.3	56.6	45.1	87.3	91.1	80.6

Table 2. Global Food Security Index

Source: Chiew, Dobberstein, & Peyyeti (2022)

Problem Statement

Even though Malaysia is self-sufficient for staple food such as fisheries, eggs and poultry meat, We continue to rely significantly on imports of a variety of food products such as beef fruits, dairy milk and rice. Although Malaysians are proud of their diverse cuisine, many are unaware that the majority of its ingredients are imported. According to the Malaysian Department of Statistics (2022), only 24 of 50 agricultural basic crops are self-sufficient (a measure of food security), less than the 100 percent reported in 2021. According to Mohammad, Mazalan, and Hayani (2020), the expenditure on imported food in the country amounted to RM 34.2 billion as of August 2019. This indicates a growing reliance on food imports.

Data on national spending on imported food proves the urgency for Malaysia to address food security as a top item in the national agenda as overdependence on imported foods can possess threats to the national food security. One of the potential threats is through the implementation of food protectionism by other countries. An example is a recent case in 2022 where India which is accountable for 40 percent of worldwide rice exports imposed a 20 percent duty on rice exports and banned exports of broken rice as part of the country's food protectionism strategy. This had caused a huge impact to the countries relying on rice imports from the country (Jacob, 2022). With this new tax, Indian rice shipments became uncompetitive in the world market, thus the country was able to protect their resources as part of the country's food security strategy.

The issue escalated more seriously as a consequence of the COVID-19 pandemic, trade war, and the ongoing Russia-Ukraine conflict, which all caused disruptions to the global supply chain. These events indicate Malaysia's vulnerability in terms of food security when trade activities are disrupted, as the country heavily relies on imports for its staple food. Malaysia's transition from a predominantly agricultural economy to an industrialised economy has been impeded. Political risk and unpredictability have decreased investors'

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trust in the country since 2020. Despite a 60 percent drop of foreign direct investment (FDI) to RM 13.3 billion in 2020, the total net inflow of FDI into Malaysia has recovered to pre-pandemic levels at RM 48.1 billion in 2021, but investments recorded for the agriculture sector are very low at RM 0.7 billion in 2021, or only 1.5 percent of the total FDI net inflow (Chiew, Dobberstein, & Peyyeti, 2022).

Chiew, Dobberstein, & Peyyeti (2022) also add that the inability to increase Malaysia's agricultural productivity in support of the national food security strategy is due to lack of funding for research and development (R&D) and innovation within the agricultural sector, such as through the adoption of new technologies to increase food output. In contrast, other Asian countries such as Indonesia and Vietnam are attracting more funding support towards its agricultural sector. Hence, Malaysia needs to build its domestic food resilience as the world is facing major global supply chain disruptions and geopolitical conflicts, making the need to secure food sources a major challenge for every nation.

Research Methodology

There is a requirement for a methodical research strategy. The purpose is to collect accurate and valuable information. Depending on the kind of analysis, different data gathering strategies may be used to achieve various study objectives. By choosing the best strategy, the coordination of the three key principles of research design—epistemology, research methodology, and research methods—will guarantee that the entire research process and discovery is sufficiently justified. To focus on these three goals, researchers employ qualitative methodologies including the process of deconstruction, historical analysis, and case studies.

This study is based on qualitative research on the factors that can affect food security in Malaysia. Qualitative research is a type of research that aims to gather and analyse non- numerical (descriptive) data to gain an understanding of individuals' social reality, including understanding their attitudes, beliefs, and motivation (St. Clair, 2023). According to Maxwell (2005), qualitative research is used to obtain research results that help to understand a small but known phenomenon or to obtain more in-depth data that is difficult to explain if the study is done using quantitative methods, as well as to obtain a new perspective on something that has been generally known. This is because qualitative research methods are more prevalent in the field of social science. Qualitative methods are frequently employed in the disciplines of anthropology, culture, linguistics, sociology, and history, and can also be used to establish a goal to support the hypotheses, enhance understanding, elaborate assertions, list natural occurrences, as well as support analyses.

Qualitative methods include a set of research approaches that aim to gather and provide non-numerical observations and information, even in cases when statistical data is available. Most research in this discipline give information, interpretation, or meaning in the context of a communication process. This method is also more of an effort to provide information about human nature and condition by using a general view of any social action. Therefore, qualitative research focuses on obtaining quality information by concentrating on a small sample rather than collecting a lot of information (Azizah, 2010). The qualitative method to data analysis looks at data in-depth, over a lengthy period of time, and in private. Because of this, the researcher thinks that qualitative rather than quantitative research methodologies are more appropriate for this study.

Research Methods

Three research methodologies were applied to collect data and information which comprise of data sources, data analysis process and analysis of materials.

Data Sources

To produce distinct results in the field of social science, it is important to have numerous sources of data and information as the information provides various values to the setting of the study. Information for this study was gathered from two sources of data which secondary data., secondary sources comprising

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information gathered after an event at which the researcher was not present were also obtained. The sources include a variety of scholarly materials, such as magazines, books, and journals, as well as archival records, case studies, library books, and online resources. In this situation, secondary data may enable a more thorough examination of the available information, with current conclusions may be differing from those of earlier studies.

Data Analysis Process

When it comes to data gathering methods, document analysis techniques are one of the most often used procedures in social research, and this methodology is particularly popular in social science research. This is because the great majority of social and information is written down. In qualitative research, the three most used types of data sources are people, records, and photographs.

Qualitative data gathering methods include several techniques, such as the use of transcripts, interviews, observations, and content analysis. Using this method, data is assessed while also preserving its integrity. This can be accomplished because the goal of qualitative research is to understand phenomena from the perspectives of participants, as well as from social and institutional backgrounds. Inductive techniques are frequently used in qualitative research. Additionally, there are conventional data collection techniques used in qualitative analysis including fieldwork and library research. Looking at written sources such as records, yearly reports, and legal requirements by doing a library search is also one way to gather data. Data collection through field study is connected to the environment, for example through the conduct of interviews or focus group discussions. This study focuses on policies related to national food security that have been implemented and announced by the government.

Analysis of Materials

Content analysis is a methodology often used by researchers for the purpose of data analysis. In contrast to qualitative content analysis, quantitative content analysis priorities numerical data, objectively measures counts, and only evaluates explicit elements. In contrast to quantitative content analysis, qualitative content analysis examines textual material from an internal and external perspective to evaluate its meaning.

In the media and communications sector, it is common practice to study written materials like newspapers, television programs, and even films using content research, whether it be qualitative or quantitative. In qualitative research, content analysis is often utilized to investigate trends from previous studies. scholars such as Berg (2001), Mayring (2000), Hsieh, and Shannon (2005) have identified content analysis (qualitative) as a valuable approach for examining media material in terms of its significance and methodological framework. While context can be comprehended through a detailed and repeating process of text interpretation, the process is seen through latent material.

According to Zhang and Wildermuth (2009), the eight crucial stages in the process of analysing qualitative content through data acquisition and analysis are defining analytical units, preparing the data, constructing categories and coding schemes, testing these schemes using sample texts, encoding the texts, evaluating the consistency of the encoding, drawing conclusions from the coded data, and finally, presenting the methodology and results. The interpretation of qualitative content analysis involves theme analysis, coding, and categorization. Data processing methods are always nonlinear and continuous.

Secondary data for this study were acquired via library research of printed resources such as books and articles on international relations, international contact periodicals such as those published by the United Nations, World Bank, International Security, International Studies Review, and the Asian Survey, along with government policies such as the National Agro-food Policy (NAP) 2021-2030, the National Food Security Action Plan 2021 – 2025 and the Webinar Sekuriti Makanan Negara 2021. The analysis also used statistics and material from scholarly publications like the Department of Statistics Malaysia, Dewan Bahasa dan Pustaka, research from universities such as Universiti Pertanian Malaysia, Universiti Kebangsaan Malaysia, and Universiti Malaya, and other leading national newspapers. These sources helped with the research and gathering of up-to-date news.

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Literature Review

Productivity due to Ageing Farmers

According to studies conducted by Ahmad Sarji Abd Hamid (1975), Van Thean Kee (1975), Tan (1986), Wan Ibrahim Wan Daud (1988) and Ang (1986), Malaysian farmers have challenges producing enough food, which results in food shortages throughout the nation. It is challenging for Malaysia to achieve its goal of self-sufficiency because the country cannot grow enough of its staple food, rice. Inefficient farming practises, farmers' lack of agricultural expertise and policy implementation challenges are all factors affecting the nation's rice production. Despite so, according to Van Thean Kee (1975), Malaysia produced the most rice per acre in Asia at the time, but there was still not enough for internal consumption, necessitating imports. All of these studies contend that the country's rice production has issues resulting from lack of farmers due to ageing, therefore contributing to a food supply shortage (Azrul Azlan Abd Rahman et al., 2022).

In addition to that, Chamhuri Siwar (1998), Mohd Nasir Sukani (2004) and Jamal Ali (2003) also concluded that the ageing workforce in the nation—21.4 percent of whom are above the age of 55—remains one of the sector's many concerns and in extension, an obstacle to the nation's agricultural sector. Due to the manpower deficit in the agricultural industry, the nation is forced to rely on immigrant labour from other nations. Many farmers do not engage in full-time agricultural activities, and their cultivated land is often characterised by small sizes and lower profitability. Specifically, over 65 percent of rice farmers own paddy fields that are less than one hectare in size.

Global Challenges in Achieving Food Security

The challenge of food security across the globe is complex and encompasses multiple dimensions, collectively shaped by global policies and initiatives aimed at ensuring sufficient food availability for the world's populace. The imperative for enhancing food production and advancing food security necessitates collaborative efforts among all nations, irrespective of their economic status. It is imperative for international organisations such as the FAO to formulate prospective scenarios to proactively address potential challenges and threats, including but not limited to exacerbating climate change, geopolitical frictions, and disruptions in the global supply chain. The present crisis is attributed to three major factors which are COVID-19 which has caused disruptions to supply chains and led to an escalation in logistical and marketing expenses; conflict as exemplified by the tensions between Russia and Ukraine that have resulted in an upsurge in fuel and fertiliser prices (Al-Saadi, 2023); and climate change, which presents persistent obstacles to food production and sustainability. The convergence of these three factors has resulted in a multifaceted and urgent crisis that necessitates the attention of the international community to guarantee a dependable and secure food supply in the present and the future.

COVID-19 Pandemic

The emergence of the COVID-19 pandemic has become a significant contributing element to the worldwide crisis of food security due to a multitude of reasons. First, the enforcement of lockdown measures and border restrictions disrupted the flow of goods and services, impeding trade and access to essential food items (FAO, 2022). Second, labour shortages caused by the pandemic resulted in reduced agricultural production, processing, and distribution capacities, which directly impacted food availability (Bank T. W., 2022). The labour shortages were caused by governments' lock down of critical or high-risk areas as part of government strategy to curb the number of infected patients. This includes national borders, thus prohibiting incoming movement from other countries. The lock downs and closure of national borders led to high labour shortages. Additionally, panic buying and stockpiling behaviours have also led to shortages in retail stores and in turn, increased prices of goods (Franklin Amuakwa-Mensah, 2022). Additionally, the pandemic exacerbated the already existing economic and social vulnerabilities such as poverty and inequality, which in turn affected food access for millions of people worldwide.

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The implementation of China's zero COVID-19 policy has adversely affected productivity and trade as demonstrated by the significant number of vessels queuing at ports for the purpose of distributing and receiving grains. The confluence of transportation disruptions and heightened demand consequent to the relaxation of COVID-19 lockdowns engendered an ideal scenario for worldwide food insecurity. Although the FAO has reported that overall food production exceeds demand, the primary obstacles lie in the areas of transportation, distribution, and the increasing demand for food products. The Ukrainian conflict has extensive implications that transcend national boundaries. These implications have a bearing on the worldwide food security landscape and underscore the pressing necessity for efficacious measures to tackle the underlying causes of these predicaments (Husain, 2022).

Increased transportation costs and currency fluctuations during the pandemic contributed to price volatility and uncertainty in food markets. Furthermore, COVID-19 has significantly intensified the global food security challenge, necessitating urgent and coordinated action from governments, businesses, and international organizations.

Conflicts and Tensions Caused by Ukraine and Russia

The ongoing conflict between Ukraine and Russia is exerting an important impact on global food security as they impede not only the cultivation of essential agricultural commodities but also their conveyance and delivery, as cited by Juergen Voegele, the Vice President for Sustainable Development at the World Bank during an interview pertaining to this matter. Collectively, these two nations account for approximately 30 percent of worldwide grain output and 80 percent of specific vegetable oils, namely sunflower oil (Bank W., 2022). Therefore, the productivity of these items has been compromised due to the conflict. Infrastructure and agriculture in the area have been significantly impacted by the Russia-Ukraine conflict. Roads, bridges, power plants, and communication networks have all been destroyed as a result of the war. As a result, the impacted areas' transit systems have been interrupted, goods and services have been difficult to transfer, and economic activity has been restricted.

In addition to that, natural gas imports from Russia are essential for Ukraine, thus the conflict has affected gas supplies. The targeting of gas pipelines and infrastructure has led to energy shortages and higher energy costs. Several industries have been directly impacted by this, notably agriculture which depend on energy for irrigation, processing, and transportation (Welsh, 2023). Ukraine is known as the "breadbasket of Europe" due to its fertile soil and large agricultural sector. The war has affected agriculture in multiple ways such as displacement of farmers, disrupted supply chains, as well as trade disruptions. In terms of farmers' displacement, the fighting has driven many farmers to give up their farms and crops, thus reducing agricultural output. Moreover, supply chains have been interrupted by the fighting, making it challenging to convey agricultural products from farms to markets or processing facilities. Perishable commodities have been spoiled as a result, and logistical issues have grown. Trade interruptions also hamper Ukraine's capacity to export agricultural goods. Access to international markets has been hampered by economic sanctions, embargoes, and disrupted transportation lines, which has reduced trade and cost the farmers money.

As a result of the war, many individuals have been uprooted from their homes and means of support. Food insecurity and malnutrition have grown because of the displaced inhabitants' frequent struggles to get needs like food and clean water. Overall, Ukraine's infrastructure and agriculture have suffered because of the Russia-Ukraine war. Significant economic losses and difficulties in the agricultural sector have been created by a variety of circumstances, including the disruptions in energy sources, destruction of vital infrastructure, disturbances in supply chains, eviction of farmers and trade disruptions.

Climate Change

The impact of climate change on food security is a significant challenge because it affects all four primary components of food security, that is, stability, utilisation, accessibility, and availability. In the context of food, availability pertains to the tangible existence of food items, whereas access pertains to the capability of individuals to obtain food. Meanwhile, utilisation refers to the evaluation of the nutritional value and safety of food, whereas stability refers to the consistency of food supply over a specified time period.

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Climate change's complex and interconnected processes have the potential to threaten global agricultural systems (MBOW Cheikh, 2023).

The impacts of climate change on these components reflect a wide range of variations. The phenomenon causes changes in crop production patterns, resulting in disturbances in the availability of food. Climate change exacerbates socio-economic disparities, leading to reduced food access for vulnerable populations. Furthermore, there has been empirical evidence indicating the effects of climate change on the quality and safety of food, leading to potential consequences for its consumption. Climate change is a contributing factor to instability in food supply. This is due to an increase in the probability of severe weather conditions, which generate changes in the production of food and prices. Climate change concerns need to prompt the immediate implementation of adaptation and mitigation strategies to ensure food security.

Global organizations play a crucial role in tackling food security concerns via diverse initiatives and programs. International groups, particularly the World Bank and other international financial organizations, have built comprehensive food aid platforms. The programs can be categorized into two categories which are direct aid to communities through international non-governmental organizations, schools, or villages, and assistance provided to governments to establish their own cash aid programs. Several nations are engaged in the reconstruction of transportation networks in conflict zones or areas with limited transportation infrastructure to enhance food accessibility.

However, for countries that are not affected by war issues, long-term solutions to tackle food insecurity are deemed as the best approaches. The long-term solutions can be addressed by handling structural issues involved in food production such as ageing populations, land use optimization, and sustainable resource management. Factors like marginal lands and water irrigation must be considered to maximize resources without depleting them. In short, by highlighting these issues, we can recognize that change occurs at different rates in different countries, and that even the best plans can be jeopardized by factors such as lack of resources, governance issues, and competing interests among stakeholders such as farmers, investors, and government officials. The point also emphasizes the importance of community engagement and collaboration among different levels of government, as well as with other stakeholders to achieve sustainable and effective solutions for global food security. The implementation of structural modifications requires significant financial resources, but most governments have inadequate internal funding to facilitate these efforts. Therefore, it is crucial to implement global measures and aid in addressing these matters.

One long-term effort materialized on 19 May 2022 when the Global Alliance for Food Security (GAFS), jointly convened by the Group of Seven (G7) Presidency and the World Bank Group promptly initiated a coordinated and expeditious reaction to address the continuing world hunger issues by consolidating financial resources to tackle the issue of food security. Numerous entities including the United Nations (UN), International Monetary Fund (IMF), World Bank and diverse donors were part of this initiative. The aim of GAFS is to strengthen the accessibility of food, fertilizers, and fuel, while also addressing trade barriers and providing temporary financial aid to the most vulnerable nations facing food insecurity. This is achieved through a collaboration of financial resources and the use of expertise in the field (World Bank, 2022). Furthermore, the alliance attempts to assist countries in enhancing their food systems, strengthen their capacity to face risks and obstacles such as climate change, and evolve towards sustainable agricultural practices.

To guarantee worldwide food security, it is imperative to concentrate on elements that can enhance the capacity for food production. For example, Africa has been found to possess approximately 60 percent of the world's arable land which can be utilized for food production. However, it has been observed that less than 20 percent of this land is currently being utilized, indicating the potential for Africa to significantly contribute to the global food supply. Likewise, it is possible for Asian countries, such as ASEAN member states including Malaysia to enhance their food production capacities. It is imperative for the global community to accord priority to research and development efforts aimed at enhancing sustainable food production capacities. The significance of food sustainability, resiliency, and equity for all was underscored by the United Nations and FAO in 2021. This guiding principle is deemed crucial in ensuring a future that is abundant in food for all individuals across the globe.

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Malaysia's Challenges in Securing Food Security

All the above discussions also apply to Malaysia, as the nation also faces significant challenges in ensuring food security due to supply chain disruptions, conflict-related issues, transportation and distribution problems, and climate change. This study will also discuss other challenges faced by Malaysia such as population growth and increasing food demand, lack of private investment and development (R&D), technology adoption and mechanization, climate change and resiliency of natural resources, as well as low productivity and ageing farmers' population in meeting food security. Addressing these issues requires international cooperation, investment in structural changes, and innovative approaches to manage resources and land use. Therefore, Malaysia should now focus more on "food first" policies. With declines in rubber and cocoa as well as the expected implementation of ceiling price for oil palm by 2023, the government should prioritize food security and shift its focus to producing more food for the nation. This would potentially address some of the structural issues affecting food security in Malaysia and contribute to a more sustainable and resilient food system (Arshad, 2023).

Malaysia's National Agriculture and Agrofood Policies

Malaysia addresses food security concerns primarily through its National Agriculture Policies (NAP) which aim to ensure the availability and sustainability of the nation's food system. The first National Agriculture Policy (NAP1), implemented in 1984, aimed to address rural poverty and economic disparities between commercial and traditional farmers. The second policy (NAP2) placed significant emphasis on many aspects including competitiveness, productivity, research and development, human capital development, and private sector engagement. In following years of the Asian Financial Crisis of 1997-1998, the third policy, known as NAP3, was implemented with the aim of bolstering food supply, productivity, intersectoral connections, and sustainable development. The primary focus of the first three policies was the expansion of the agricultural sector in Malaysia (Dardak, 2019).

Meanwhile, the National Agrofood Policy 2011-2020 (NAP4) was introduced in 2010 as a replacement of NAP3. NAP4 focused explicitly on agrifood commodities and sought to address food security and safety in order to guarantee the affordability, availability, and accessibility of food for the Malaysian populace. This shift in focus towards agrifood commodities and food security distinguishes NAP4 from the previous NAPs. The blueprint outlines a strategic plan for the transformation of the agricultural industry towards more flexibility, progressiveness, and sustainability. The initiative pertains to addressing issues and challenges endured by all industries operating within the agrifood domain while simultaneously enhancing value-added procedures and increasing agricultural export earnings (Agriculture, 2010).

With the aim of prioritizing food security, Malaysia must deal with several challenges that have put the country's food system resilience to the test. Doing so requires a review of the government's strategic planning to face these challenges, specifically through the launch of the National Food Security Policy 2021-2025. It is important that initiatives towards stabilizing food prices and promoting foreign direct investment in research and development are proposed in this edition of the NAP.

Compared to its colonial past, Malaysia has become more food secure by international standards, with sufficient food available to meet market demands. The attempts to increase the incomes of the poor through smallholder agriculture and improve job opportunities in many sectors following independence are attributed to this accomplishment in eliminating poverty and hunger. However, Malaysia presently confronts the problem of improving food safety and nutrition due to a lack of coordination across various ministries, government agencies, and stakeholders such as food producers, suppliers, and consumers. Furthermore, recent global supply chain disruptions caused by trade wars, pandemic lockdowns and geopolitical tensions like the Russia-Ukraine conflict have led to increased challenges in trade, supply chains, and food prices.

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Based on statistical data obtained from the Department of Statistics Malaysia (2023), Malaysia's population is expected to reach 33.2 million people in Quarter 1 2023, increasing 1.6 percent from the same quarter the previous year. Studies conducted by the Malaysia Population Research Hub (2020) anticipates that as a consequence of population growth, the demand for food would rise by 70 to 100% by 2050. Food security is under grave threat due to population growth. Therefore, creating food security is crucial to maintain Malaysia's economic growth. Despite being self-sufficient in fish, poultry, and eggs, Malaysia nevertheless depends on imports for several other food staples, such as cattle, grains, fruits, and dairy goods. According to newly released official data, as of August 2019, the nation spent RM 34.2 billion on food imports, indicating great reliance on food purchases.

In the past few years, Malaysia has faced significant challenges, particularly due to prolonged pandemic lockdowns that have adversely affected the country's economic performance. National policies aimed at transitioning the country from an agricultural economy to an industrialized economy faced challenges, resulting in an unsuccessful attempt to fully achieve the intended goals. Political instability and uncertainty since 2020 have eroded investor confidence. Although Malaysia's total foreign direct investment (FDI) net inflow have returned to pre-pandemic levels, reaching RM 48.1 billion in 2021 after a 60 percent drop to RM 13.3 billion in 2020, the agricultural sector's investment remains restricted. In 2021, the sector only received RM 0.7 billion, representing a mere 1.5 percent of the total FDI net inflow as shown in figure 2.1 (Razak, 2022).

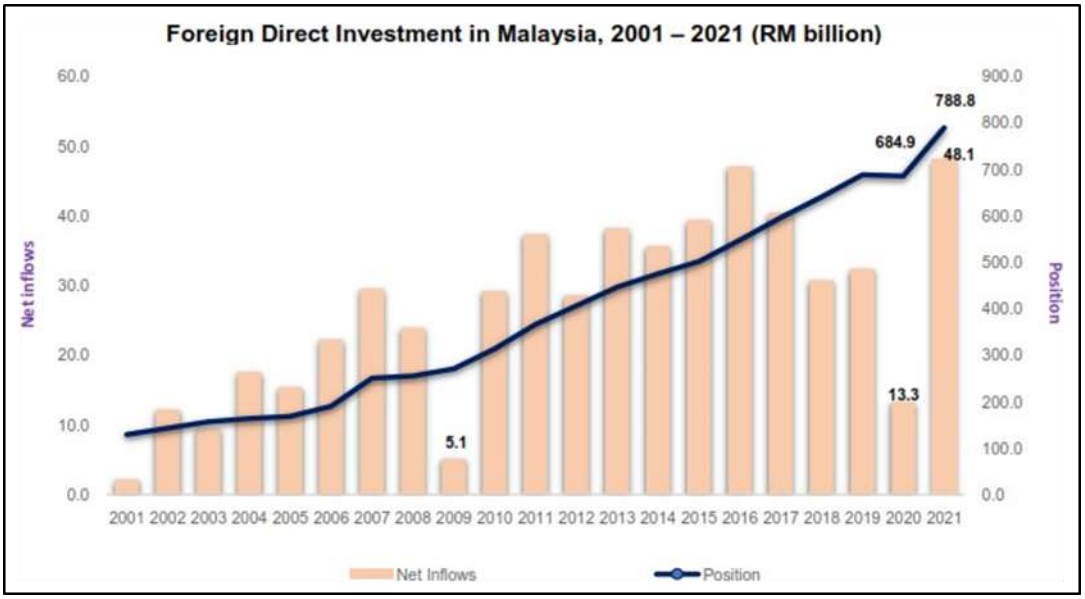

Figure 1. Foreign Direct Investment in Malaysia, year 2001 until 2021

Source: Razak (2022)

Malaysia's food security challenges are worsened by limited self-sufficiency in key food items and expected rises in population growth, resulting in higher demand for food and a dependence on imported food. As of 2021, it has been reported that a total of 26 agricultural commodities have attained Self-Sufficiency Ratios (SSRs) exceeding 100 percent. Approximately 65 percent of the 26 items under consideration are comprised of fruits and vegetables, whereas only chicken and duck eggs in the protein category exceeded the 100 percent SSR.

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From the trends shown in statistical data listed in Table 2.1 below which have been extracted from the Supply and Utilization Account Selected Agricultural Commodities of the Department of Statistics Malaysia (2022), Malaysia's self-sufficiency in essential food commodities such as beef and fresh milk has been on a decline, resulting in an increasing reliance on imports. Malaysia did not achieve the SSR targets for certain food items such as rice, fresh milk, beef, and coconuts in the year 2021. Furthermore, there was a decrease in the SSR of many food items from 2020 to 2021. Consequently, it is anticipated that the escalation in imports will lead to a surge in the cost of food as the Import Dependency Ratio is projected to increase for many food products. The decreasing food self-sufficiency and increasing dependence on imports is not exclusive to Malaysia as several of Southeast Asian nations also face comparable challenges in response to supply chain disruptions caused by the pandemic.

		Self-Sufficiency Ratio (SSR)[1]			Import Dependency Ratio (IDR)2		
	Food item	2020 SSR (%)	2021 SSR (%)	SSR Change (%)	2020 IDR (%)	2021 IDR (%)	IDR Change (%)
Fruits	**Mango**	20.2	16.2	–19.8	86.2	92.6	7.4
	Coconut	66.6	69.6	4.5	34.0	31.8	–6.5
	Mangosteen	93.1	93.8	0.8	16.1	13.9	–13.7
	Rambutan	98.1	99.4	1.3	3.4	3.8	11.8
Vegetables	**Chili**	30.9	29.3	–5.2	72.4	75.1	3.7
	Round cabbage	37.5	40.3	7.5	63.6	61.3	–3.6
	Mustard	97.6	97.0	–0.6	7.0	7.0	—
Livestock	**Mutton**	9.6	10.7	11.5	90.4	89.4	–1.1
	Beef	22.2	18.9	–14.9	78.1	81.6	4.5
	Fresh milk	65.0	56.7	–12.8	53.5	62.9	17.6
	Pork	94.9	93.4	–1.6	5.8	7.1	22.4
	Chicken meat	98.2	99.9	1.7	4.2	6.1	45.2
Fisheries	**Sardine**	80.7	74.9	–7.2	19.7	25.5	29.4
	Cuttlefish	96.6	80.0	–17.2	52.2	65.3	25.1
	Torpedo scad	96.7	93.8	–3.0	4.0	8.3	107.5
	Stingray	N.A.	96.7	N.A.	N.A.	6.9	N.A.
	Seabass	N.A.	97.3	N.A.	N.A.	3.1	N.A.
	Tuna	108.1	98.8	–8.6	2.4	5.8	141.7
	Tilapia	99.9	99.0	–0.9	1.4	2.5	78.6
	Threadfin Bream	N.A.	99.7	N.A.	N.A.	0.9	N.A.
Others	**Ginger**	18.9	14.6	–22.8	81.5	86.5	6.1
	Sweet potato	75.6	78.1	3.3	26.3	25.2	–4.2
	Lime	91.1	82.4	–9.5	16.8	27.9	66.1
	Rice	63.0	65.0	3.2	N.A.	N.A.	N.A.

Table 3. Malaysia Agriculture Self-Sufficiency Ratios (SSRs) for year 2021

Source: Supply and Utilization Account Selected Agricultural Commodities, Department of Statistics Malaysia (2022)

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Lack of Private Investment and Research & Development (R&D)

Technological developments in agriculture are largely driven by private investment and R&D. They contribute to the creation and advancement of post-harvest technology, crop types, irrigation systems, and agricultural practices. Furthermore, research and development (R&D) plays a critical role in encouraging crop diversification, i.e. creating novel crop varieties that are resistant to pests, diseases, and shifting climatic circumstances. Improved crop varieties with higher yields, better nutritional value, and increased tolerance to environmental pressures can be developed with the help of private investment in R&D. Lack of funding for this kind of research could lead to a lack of crop diversification and diminished food security. Without enough funding for R&D, the agricultural industry could find it difficult to embrace cutting- edge techniques and face diminished output and efficiency. According to Ronald Kiandee (2021), the former minister of Agriculture and Food Industries in his speech pertaining to National Food Security: Realizing Rakyat's Need in 2021, lack of private investment and R&D are part of the security challenges faced by Malaysia.

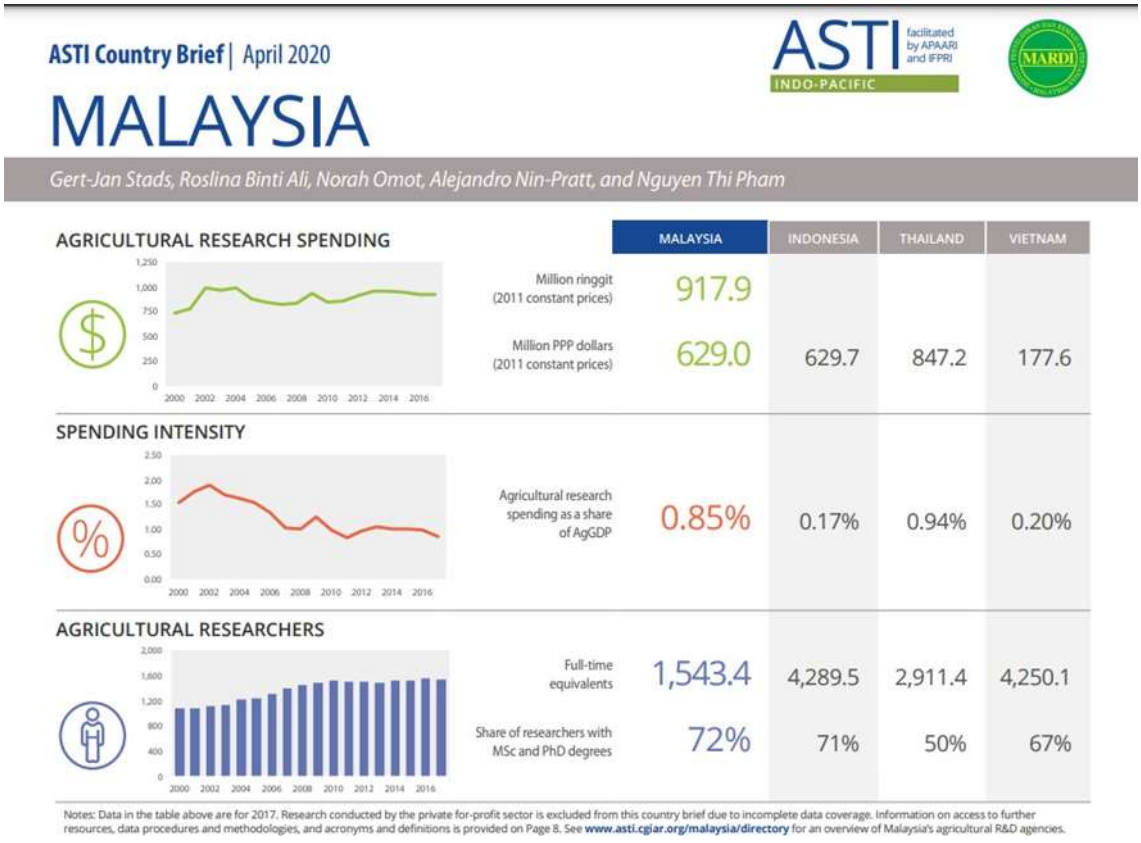

Figure 2. Malaysia's Agricultural Science and Technology Indicators

Source: Stads et al. (2020)

From the statistical data shown in Figure 2.2, in the ten years preceding up to 2017, Malaysia's total agricultural research expenditure averaged between 0.9 and 1.0 billion Ringgit annually at constant 2011 prices, therefore remaining stable. In contrast, agricultural research spending as a percentage of AgGDP fell sharply from about 1.9 percent in 2002 to barely 0.85 percent in 2017. However, Malaysia continues to have some of the highest agricultural R&D expenditures relative to AgGDP in Southeast Asia. The report also highlighted concern over a significant loss of knowledge and experience as a result of recent retirements of a huge number of researchers at the main agricultural R&D organization in Malaysia, i.e. the Malaysia Agricultural Research and Development Institute (MARDI). Due to financial restrictions, many retirees have not been replaced, and significant capacity gaps are developing, especially among breeders and pathologists. Between 2014 and 2017, MARDI's overall number of researchers decreased by

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10 percent. Given the differences in pay scales and benefits provided by the public and private sectors, it can be difficult to draw in and keep young scientists. In recent years, the Malaysian government has implemented ambitious food security and agricultural development policies, but these have not yet contributed to an increase in agricultural R&D capacity. It is essential that funding be made available for staff recruitment so that inexperienced scientists can receive the training and mentoring they need to conduct effective research, and that appropriate conditions and incentives be created to encourage their long-term commitment to MARDI (Stads et al., 2020).

Aside from R&D initiatives, transportation networks, storage facilities and infrastructure including irrigation systems are frequently developed with private investment. Increased production decreased post-harvest losses, and timely delivery of agricultural products to markets are all benefits of these infrastructure improvements. By limiting access to markets and increasing wastage, inadequate investment may impede the development of infrastructure and therefore, adversely impact food security (Lybbert & Sumner, 2010). Modern, productive agriculture methods can be implemented successfully with the assistance of private investment. This covers expenditures on farm equipment, machinery, and training courses. Without such investments, the agricultural industry could be forced to rely on antiquated methods which could result in poorer yields, more post-harvest losses, and reduced ability to provide food to the world's population.

In the 2023 budget, the government designated RM 5.32 billion for the Ministry of Agriculture and Food Security, marking a 10.4 percent growth compared to 2022. The allocation encompasses subsidies and assistance for farmers and fishermen, as well as distinct initiatives aimed at agro-tech start-ups and eco-friendly agriculture (Bernama, 2023). While this constitutes a positive move, it remains to be seen whether it will be sufficient to effect significant change. Being a net food importer, Malaysia is particularly susceptible to disturbances in the international supply chain.

The growth of agro-processing enterprises that add value to agricultural goods depends heavily on private investment. Investing in processing facilities, food preservation methods and packaging can increase the market value of agricultural products while extending their shelf life and lowering post-harvest losses. Because there is little private investment in these regions, the growth of a strong agro-processing industry may be hampered and may have an impact on food security by limiting value addition and reducing the availability of processed food products.

To address these problems, the private and public sectors must collaborate to prioritize and fund agricultural R&D, promote public-private partnerships, and foster an environment that encourages private investment in the agricultural industry. By increasing agricultural production, diversifying crops, lowering post-harvest losses, and guaranteeing a sustainable and effective food supply chain, Malaysia may increase its food security.

Low Adoption of Technology and Mechanization

Agricultural production and efficiency might be considerably increased through technology and mechanization. Operations can be streamlined, labour requirements reduced, and resource utilization optimized with the use of automated equipment, precision agricultural technologies, and digital tools. Low adoption of these technologies may restrict the industry's capacity to increase yields and save costs. Malaysia's agriculture industry depends heavily on physical labour which can be expensive and vulnerable to labour shortages. Many jobs, including planting, harvesting, and post-harvest procedures are still done by hand due to the limited acceptance of mechanization. Higher labour expenses and difficulty ramping up production could result from this (Ayaz et al., 2019). This is also supported by research conducted by Engku Eline Engku Ariff et al. (2023) on the application of modern mechanization technologies in Malaysia's four big agricultural industries which are oil palm, pineapple, rubber and paddy. The study shows that Malaysia's use of contemporary mechanization technologies in agriculture is only moderate. Before planting crops, almost all farmers in these four sectors use modern farm mechanization. Paddy production is entirely automated, from the preparation of the field through the collection of the yield. On the other hand, there is little use of mechanization technology in smallholder oil palm and rubber farming. Most tasks in farming operations are either manually performed or partially automated.

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One of the contributing factors to the limited adoption of technology in Malaysia may be attributed to the small-scale and scattered character of Malaysia's agricultural land which make it difficult to implement technology and mechanization. Farmers find it economically more difficult to buy expensive gear and equipment when they have small landholdings. Furthermore, the installation of mechanized operations may be hampered by fragmentation of the terrain. On top of that, for farmers, especially smallholders, the high upfront expenses of technology and mechanization might be a barrier because they may find it difficult to obtain funding for investments in machinery and equipment. The implementation of technology in the agriculture sector may be hampered by the lack of credit facilities and limited access to reasonable financing choices.

Adequate infrastructure and support services are essential for the successful deployment of technology and mechanization. These measures also cover having access to dependable transportation networks, power supplies, and maintenance and repair services. The adoption and efficient application of agricultural technology might be hampered by lack of necessary infrastructure and support services. A multifaceted strategy is needed to address the poor adoption of technology and mechanization in Malaysia's agricultural sector. This entails educating farmers about the advantages of technology, offering training and extension services to advance their knowledge and abilities, easing access to cost-effective financing choices, and enhancing infrastructure and support services in rural regions. To encourage the adoption of technology, develop specialized solutions for smallholders, and foster the mechanization of Malaysian agriculture, cooperation between the government, research institutes, private sector businesses, and farmers' organizations is essential.

Climate Change and Resilience of Natural Resources

The effects of climate change on natural resources could have a significant impact on food security in Malaysia. Climate change has contributed to a change of weather patterns, leading to changes in precipitation patterns and an increase in the occurrence and intensity of severe weather phenomena such as droughts and floods. Crop yields and livestock output may be impacted by these changes, which could disrupt agricultural production. Based on a study conducted by Md Mahmudul Alam (2011) examines the effects of climate change on agricultural practices and food security in the Northwest Selangor region. Research findings indicate that climate change events, such as natural catastrophes, droughts, floods, insect infestations, plant diseases, and alterations in crop cycle timings, have an adverse impact on the productivity and profitability of agriculture in Malaysia. The rice cultivation region is seeing a reduction in size despite the continuous rise in governmental subsidies and regulations on paddy output. This may be attributed to the adverse impacts of climatic variability on agricultural producers.

Furthermore, Md Mahmudul Alam et al. (2011) also revealed that overall, macro-level analyses of national data spanning from 1980 to 2008 in Malaysia indicated that rice yields may experience a reduction ranging from 43 percent to 61 percent in response to a temperature rise of 1°C and a rainfall increase of 1 millimeter (mm). This result is derived from an analysis of the smallest and biggest yield recorded during a 28-year period. The rapid economic growth of Malaysia in recent decades has led to significant changes in land use patterns, mostly due to the adoption of large-scale agricultural practices such as oil palm, rubber, and rice production. The previous few decades have also seen a warming trend in Malaysia. Climate variability and extreme weather would increase as temperatures rise. The country as a whole experiences annual mean surface temperatures that range from 26 to 28°C. According to 40 years of records (1969–2009), it was found that Malaysia's mean surface temperature increased at a pace of 0.6 – 1.2°C per 50 years (Siwar, Ahmed, & Begum, 2013). Hence, fluctuations in rainy seasons and increases in temperature will affect the production of rice significantly.

On top of that, flooding and other climate change catastrophes can obliterate crops and infrastructure. The Agriculture and Food Security Minister, Mohamad Sabu in his speech cited in Singh, R. (2022) stated that

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the monsoon season in Malaysia has reportedly impacted a total of 8,166 farmers, affecting an estimated area of 13,244 hectares, with an approximate damage worth of RM 48.6 million. On the other hand, erratic rainfall can cause water scarcity which will have an impact on irrigation and crop growth. For irrigation, Malaysia mainly relies on surface water and rainfall. Hence, when rainfall decreases and its timing, distribution, and volume are altered by climate change, there may be a disruption in the supply of freshwater. This may result in water shortages for agriculture which could have an impact on agricultural production, especially in water-intensive industries like paddy cultivation.

For the purpose to effectively mitigate the impacts of climate change on food security in Malaysia, the implementation of a comprehensive and diversified approach is needed. Adopting climate-resilient agricultural techniques, supporting sustainable land and water management, improving water use effectiveness, preserving biodiversity and ecosystems, and diversifying agricultural systems to lessen reliance on sensitive crops and sectors are some of the things that fall under this category. Climate change's negative impact on food security may also be mitigated by investing in climate information systems, early warning systems, and climate-smart technologies which can assist farmers in adapting to changing climatic circumstances.

Low Productivity and Ageing Farmers' Population

Food security may be affected by Malaysia's ageing and low-productivity farmer population. The increasing average age of farmers in Malaysia indicates a shifting demographic landscape and a scarcity of young individuals engaged in farming-related activities. In Malaysia, farmers are currently 55 years old on average, and they are regarded as traditional farmers who are hesitant to adopt modern technologies. People also believe that the agri-food industry requires a 3D skill set. The definition of a 3D job is dirty, dangerous, and difficult, i.e. a profession that is not appealing, particularly to young people. According to the Department of Statistics, there were only 14 percent young employment in the agrifood sector in 2017. As the ecosystem is not compelling enough to draw graduates to this field, many are reluctant to work in it (Dardak, 2020).

Ageing farmers frequently experience physical difficulties, decreased energy, and restricted access to new information and technologies. Over time, this may lead to decreased productivity and a drop in agricultural output. Concerns concerning succession planning and the continuity of agricultural activities are also raised by the ageing farmer population. Many younger people are less inclined to pursue farming as a living compared to other job options. Smaller landholdings and fragmented agricultural land can result from this, which could limit economies of scale and prevent the adoption of productive farming techniques. The development and modernization of the agriculture sector might be hampered by lack of access to financing and support services. Access to loans, investment capital, and agricultural extension services may be difficult for ageing farmers. This may limit their capacity to invest in cutting-edge technologies, enhance infrastructure, and buy essential inputs, which could impede productivity growth.

Although labour productivity in the agricultural sector in Malaysia increased to RM 55,485 in 2016, up 3.4 percent from RM 53,676 in 2015, rubber and palm oil are two industrial commodities that significantly contributed to its rise. The sector saw an increase in productivity as a result of the adoption of technologies and efficient input utilisation. However, Malaysia still falls far short of other high-performing nations like the Australia and United States of America in terms of agricultural output. Malaysia's agricultural productivity in 2015 was just 49.3 percent of the USA and 48.3 percent of Australia. Therefore, if Malaysia wishes to be on par with the developed nations, it needs to compare itself to these two nations (Dardak, 2019).

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Lack of Unified Approach by the Government to Support Food Security

Malaysia also faces challenges in ensuring food security due to lack of a unified approach and collaboration across government agencies. Our country has yet to be able to develop a unified approach and use government-wide collaboration to drive the national food security agenda. The Ministry of Agriculture and Food Security focuses only on the agricultural aspects, not the entire farm-to-fork process from agricultural production to consumption.

Despite knowing that Malaysia has set an objective of reducing half of its food waste by 2030, efforts to increase awareness about food waste are still deficient in comparison to China which has launched a Clean Plate campaign to draw attention to the food waste crisis. Additionally, raising public awareness and promoting sustainable consumption practices are vital for tackling food waste and improving food security within the nation (FAO, 2018).

The Malaysian Government's efforts to prioritize food security can still be enhanced. Similar to Singapore's 30 by 30 initiative and China's annual rural policy blueprint, Priority should be given to a set of more specific objectives and action plans in order to enhance agricultural security and sustainability. Malaysia can considerably improve its food security and sustainability by implementing these strategies for the advantage of its citizens. A more cohesive and collaborative approach among various stakeholders, including government agencies, non-governmental organizations and private sector could lead to more effective policies and actions to address food security challenges. Public awareness campaigns and educational programs are significant in promoting responsible consumption habits and mitigating food waste, so making a valuable contribution to the nation's food security (Poon, 2019).

On top of that, the lack of clarity regarding essential food items also affects Malaysia's SSR score. The national strategy regarding focused food items in Malaysia is unclear and extends only to staple items like rice, wheat flour, chicken, eggs, and cooking oil. Although numerous food categories and items are monitored for production and consumption at the national level, there is no clear indication of which food items are essential for security. SSR targets are set for a multitude of food items; however, there is lack of planning and visibility on how to get to the SSR targets, such as enablers to push up production, growth rates to target, and available incentives. Hence, it is crucial to prioritize the most critical items to ensure food security. This prioritization will help Malaysia develop a tailored strategy for each essential food item, considering production feasibility and ease of import.

Food security can be achieved, according to the FAO, when "all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life". A possible approach for narrowing down the emphasis on crucial food products is considering the dietary guidelines established by the nation. Malaysia's National Coordinating Committee on Food and Nutrition (NCCFN) has developed the Malaysian Dietary Guidelines (MDG) in 2010 to provide dietary recommendations for the population. The MDG could serve as a basis for identifying and prioritizing essential food items.

Conclusion

Food security is undeniably a crucial pillar for the wellbeing and economic growth of any nation, and Malaysia is no exception. The nation's heavy reliance on imported food sources, coupled with various global disruptions like the COVID-19 pandemic, trade conflicts, and geopolitical tensions such as the ongoing Russia-Ukraine conflict, have accentuated the urgency of addressing food security concerns. All these disruptions have a profound effect on the international food supply chains that Malaysia relies on, hence intensifying the urgency of addressing this problem. Furthermore, complex issues pertaining to food security in Malaysia include a range of concerns, such as the decline in the farming population and insufficient agricultural expertise, as well as the possible benefits of modernization and the use of technology.

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