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TECHNICAL REPORT ON GLOBAL AND NATIONAL ISSUES ON FOOD SECURITY: INSIGHTS AND RECOMMENDATIONS FROM COSAFS2024

July 10th–13th, 2024

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CONGRESS ON SUSTAINABLE AGRICULTURE AND FOOD SECURITY (COSAFS2024)

Technical Report on Global and National Issues on Food Security: Insights and Recommendations from COSAFS2024

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FOREWORD

Food security is a critical pillar of national stability and development, especially in the face of global challenges such as climate change, geopolitical conflicts, and economic volatility. These issues, combined with Malaysia's unique agricultural landscape, require a collaborative and strategic approach to ensure a resilient and sustainable food system.

The COSAFS2024 roundtable discussion on "Global and National Issues on Food Security" brought together experts, policymakers, and industry leaders to address these challenges. This technical report consolidates the key outcomes of the discussion, offering a roadmap for strengthening Malaysia's food security through short-term stabilization, medium-term modernization, and long-term transformation.

The recommendations in this report highlight actionable solutions, from diversifying animal feed sources and modernizing agricultural practices to fostering innovation and promoting regional cooperation. It is a call to action for all stakeholders—government, industry, academia, and communities—to work together in building a resilient and inclusive food system.

On behalf of the COSAFS2024 organizing committee, I thank all participants and contributors for their invaluable input. It is my hope that this report will guide policymakers, researchers, and practitioners in advancing Malaysia's food security and contributing to global efforts.

Ts. Dr. Tan Toh Hii
Chief Editor

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Date : 11th July 2024 (Thursday)

Time : 9.00 am – 12.00 noon

Venue : Parkcity Everly Hotel Bintulu, Sarawak

Topic : Global and National Issues on Food Security

Chairman

Professor Dr. Amin Bin Ismail (Universiti Putra Malaysia)

Participants:

1) Associate Professor Dr. Lim Po Teen (University of Malaya)
2) Senior Assistant Professor Dr. Merlin F. Franco (Universiti Brunei Darussalam)
3) Dr. Saifullizam Bin Abd. Kadir (Department of Veterinary Services, Malaysia)
4) Dr. Margaret Abat (Agriculture Research Centre, Sarawak)
5) Ms. Michelle Mejin (Sarawak Biodiversity Centre)
6) Mr. William Hu (NEX EcoVentures Sdn. Bhd.)
7) Mr. Johnson Ting (TBS Agromill Sdn. Bhd.)
8) Mr. Radzi (Sarawak Economic Development Corporation)
9) Mr. Azizi Fikri Bin Mat Fauzi (Lembaga Kenaf dan Tembakau Negara)
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1 INTRODUCTION

The roundtable discussion on "Global and National Issues on Food Security" was organized as part of the COSAFS2024 initiative to address critical challenges and opportunities in ensuring food security for Malaysia and beyond. This report, titled "Technical Report on Global and National Issues on Food Security: Insights and Recommendations from COSAFS2024", summarizes the key outcomes, insights, and proposed solutions from the discussion. It serves as a valuable reference for stakeholders committed to advancing food security.

Food security has become a pressing global and national priority due to challenges such as climate change, geopolitical instability, population growth, and resource scarcity. In Malaysia, these challenges are further compounded by unique geographical, cultural, and economic factors that shape the agricultural sector. Recent global events, including the COVID-19 pandemic and geopolitical conflicts, have exposed vulnerabilities in food supply chains, emphasizing the urgent need for resilient and sustainable food systems. Malaysia faces dual challenges: addressing global disruptions while tackling domestic issues such as heavy reliance on food imports, low self-sufficiency in key commodities, an aging farming population, and limited youth participation in agriculture. These factors threaten the nation’s ability to provide consistent, safe, and affordable food for all.

The roundtable discussion aimed to identify key challenges affecting food security, explore innovative strategies to overcome these issues, and foster collaboration among government agencies, private industries, and academic institutions. Discussions covered a wide range of topics, including the rising costs of animal feed, the impact of zoonotic diseases, the potential of aquaculture and deep-sea fishing, and the cultivation of alternative crops like kenaf. The importance of research and development (R&D), infrastructure development, and knowledge transfer was also emphasized to bridge the gap between policy and practice.

This report consolidates the insights, recommendations, and action plans derived from the discussion. It provides a detailed analysis of global and national issues impacting food security, explores sector-specific challenges and opportunities, and outlines a way forward for building a sustainable, resilient, and secure food system.

By addressing these challenges collaboratively, Malaysia can strengthen its food sovereignty and contribute to global food security efforts.

2 GLOBAL ISSUES ON FOOD SECURITY AFFECTING MALAYSIA

Malaysia's food security is deeply influenced by global challenges that disrupt the stability and sustainability of its food systems. These challenges, driven by geopolitical, economic, and environmental factors, have significant implications for the nation's agricultural and aquaculture sectors.

One of the most critical global issues is the rising cost and fluctuation of raw materials for animal feed. Geopolitical conflicts, such as the war in Ukraine and tensions in the Middle East, along with seasonal factors, heavily influence these price changes. Malaysia's dependence on imported raw materials like corn and soybean from countries such as Brazil and Argentina further increases its vulnerability to global market volatility and supply chain disruptions. This dependency not only raises the cost of animal feed but also impacts livestock production, leading to higher food prices.

The high global demand for Malaysian agricultural by-products, such as Palm Kernel Expeller (PKE) and Palm Kernel Cake (PKC), adds another layer of complexity. With 90% of PKE being exported for animal feed, the limited availability of these materials for local use contributes to price instability and affects the sustainability of domestic feed production. Additionally, concerns about the safety and quality of imported animal feed persist, as Malaysia relies heavily on overseas suppliers, raising questions about the consistency and standards of these imports.

Cross-border animal movement and smuggling also pose significant risks. These activities increase the likelihood of introducing and spreading economically important diseases, such as Foot and Mouth Disease (FMD), and zoonotic diseases that can transfer from animals to humans through raw milk and meat. Strengthening regulations and enforcement is essential to mitigate these risks and safeguard Malaysia's livestock sector.

Global market demands and sustainability pressures further shape Malaysia's food security landscape. For example, international markets, particularly in Europe, impose strict sustainability criteria on Malaysian oil palm products. Failure to meet these standards could result in reduced market access, underscoring the influence of global consumer preferences and environmental standards on local industries.

Environmental phenomena, such as harmful algal blooms (HABs), represent another global issue with direct implications for Malaysia's aquaculture sector. These events, often linked to climate change and global pollution, can cause significant economic losses, as seen in past incidents where losses reached RM100 million. HABs also raise serious public health concerns related to seafood safety, highlighting the need for continuous monitoring and proactive measures to protect both the aquaculture industry and consumers.

Finally, competition for marine resources and challenges in enforcing Malaysia's Exclusive Economic Zone (EEZ) further complicate the nation's food security. Despite Malaysia's long coastline, insufficient vessels and equipment for deep-sea fishing limit its ability to fully utilize marine resources. Additionally, concerns about illegal fishing activities and the safety of the EEZ highlight potential threats from international fishing fleets, which undermine the sustainability of Malaysia's fisheries.

3 NATIONAL ISSUES ON FOOD SECURITY

Malaysia faces a range of domestic challenges that undermine its ability to provide consistent, safe, and affordable food for its population. These challenges branch from structural, environmental, economic, and social factors that affect the entire agri-food value chain, from production to distribution and consumption.

One of the most pressing issues is Malaysia's heavy reliance on food imports, particularly for staples such as rice, corn, and soybean. This dependency exposes the country to global price fluctuations and supply chain disruptions, making it vulnerable to external shocks. Low self-sufficiency levels in key food commodities further worsen this issue, limiting the nation's capacity to meet its own food demands.

The agricultural sector is also constrained by an aging farming population and limited youth participation. Many young people view agriculture as an unattractive career due to its labour-intensive nature, low profitability, and lack of modernization. This demographic shift threatens the sustainability of the sector, as older farmers retire without successors to continue their work.

Land-use competition and environmental challenges further complicate food production. Arable land is limited and often subject to competing demands from urbanization, industrial development, and other economic activities. Additionally, climate variability, water scarcity, and soil degradation reduce the resilience and

productivity of agricultural systems. These challenges are particularly pronounced in regions like Sarawak, where hilly terrain and rain-fed infrastructure limit the potential for large-scale mechanized farming.

In the livestock sector, zoonotic diseases and the safety of animal feed are major concerns. Diseases such as FMD and other zoonotic infections pose risks to both public health and the livestock industry. The quality and safety of imported animal feed also remain critical issues, as they directly impact livestock health, productivity, and the safety of meat and dairy products consumed by humans.

The aquaculture sector faces its own set of challenges, including HABs, which threaten seafood safety and cause significant economic losses. Insufficient monitoring and disease control mechanisms further intensify these risks, emphasizing the need for stronger regulations and proactive measures to protect the industry.

Paddy cultivation, a cornerstone of Malaysia's food security, is plagued by low productivity and outdated practices. Many farmers rely on traditional methods, planting only once per year and depending heavily on government subsidies for inputs such as fertilizers, pesticides, and seeds. The lack of mechanization, particularly in hilly areas, and the absence of a proper gene bank for traditional rice varieties further limit the sector's potential. Persistent pest and disease issues, such as golden apple snails, have compounded the challenges faced by paddy farmers for decades.

Downstream processing and market access also present significant barriers. Post-harvest facilities are insufficient, and farmers often face logistical challenges in transporting their produce to markets. Low prices for agricultural products discourage farmers from harvesting, leading to food waste and reduced incomes. Additionally, the short shelf life of produce and limited storage facilities magnify these issues, particularly in rural areas.

Cross-cutting issues, such as dependency on government subsidies, lack of mechanization, and insufficient R&D, further hinder the agricultural sector's growth. Many farmers and industry players rely on subsidies and are reluctant to invest in higher-quality inputs or adopt new technologies. This "subsidy mentality" stifles innovation and limits the sector's ability to adapt to changing conditions. Furthermore, while R&D exists, there is often a disconnect between academic research and its practical application, leaving farmers without access to the latest innovations and technologies.

3.1 Animal Feed and Livestock Management

Animal feed and livestock management are vital to Malaysia's food security, yet the sector faces numerous challenges that threaten its sustainability and productivity. One of the most pressing issues is the rising cost of raw materials for animal feed, driven by geopolitical conflicts such as the war in Ukraine, tensions in the Middle East, and seasonal factors. Malaysia's heavy reliance on imported feed ingredients, such as corn and soybean from Brazil and Argentina, further increases vulnerability. This dependency exposes the local industry to global market volatility and supply chain disruptions, making feed production costly and unpredictable. Additionally, the safety and quality of imported animal feed remain a concern, as questions about the standards of these materials directly impact livestock health, productivity, and the safety of meat and dairy products consumed by humans. The high global demand for local by-products like Palm Kernel Expeller (PKE) and Palm Kernel Cake (PKC)—90% of which are exported—further limits their availability for domestic feed production, contributing to price instability.

The scarcity of local feed ingredients is another significant challenge. While alternatives such as Black Soldier Fly (BSF) larvae, sago silage, and kenaf leaves are being explored, these options face cost and scalability barriers. For instance, the cost of insect protein remains higher than traditional soybean meal, making it less accessible to farmers. Compounding this issue is the prevalent "subsidy mentality" among farmers, where reliance on government support discourages investment in higher-quality feed. Many farmers prioritize cost-saving measures over quality, often opting for cheaper feed options that merely prevent weight loss in livestock rather than promoting optimal growth. This mindset limits the adoption of innovative feed solutions and hinders the sector's progress.

Livestock management is also plagued by the prevalence of diseases and the lack of suitable breeds for local conditions. Economically significant diseases, such as FMD, and zoonotic diseases that can transfer from animals to humans through raw milk and meat, pose serious risks to public health and the livestock industry. Smuggling and uncontrolled animal movement across borders further exacerbate these risks, highlighting the need for stronger regulations and enforcement. Additionally, identifying and recommending livestock breeds that are well-suited to Malaysia's climate and feed conditions remains a challenge. Breeds such as Brahman and "Lembu Sado" have

shown promise, but further research and trials are needed to ensure their suitability. The shortage of trained technical personnel to advise farmers and industry players further limits the sector's ability to address these issues effectively.

To address these challenges, several solutions have been proposed. Developing and promoting local feed ingredients, such as BSF larvae, sago silage, and kenaf leaves, can reduce reliance on imports and stabilize feed prices. Education and awareness campaigns are needed to shift the mindset of farmers and industry players towards investing in higher-quality feed, emphasizing the long-term benefits of improved livestock productivity and profitability.

The government should provide incentives to attract new players into the feed production industry and encourage farmers to grow and supply raw materials to local feed mills. Stronger regulations for animal movement, including import licenses and disease monitoring, are essential to prevent the spread of zoonotic and economically significant diseases. Collaboration between academia and industry should be mandated to drive research into alternative feed sources and disease-resistant livestock breeds, with a specific focus on replacing soybean meal with locally available alternatives. Integrating livestock farming with oil palm plantations offers a sustainable approach to land use, while research into climate-resilient crops, such as hill paddy, can provide more sustainable feed options, particularly in regions like Sarawak.

By reducing dependency on imports, promoting local alternatives, and fostering collaboration among stakeholders, Malaysia's livestock sector can become more resilient and sustainable. These efforts, combined with strong regulations, targeted R&D, and talent development, will ensure the long-term productivity and health of the livestock industry, strengthening Malaysia's overall food security.

3.2 Livestock Diseases and Breed Suitability

Livestock diseases and breed suitability are critical factors that influence the sustainability and productivity of Malaysia's livestock sector. Economically significant diseases, such as FMD, pose substantial challenges to the industry. While these diseases may not always result in immediate animal deaths, they can lead to significant economic losses and reduced productivity. Zoonotic diseases, which can transfer from animals to humans through raw milk and meat, are another major concern, posing risks to public health and food safety. The spread of these diseases

is often caused by smuggling and uncontrolled animal movement across borders, highlighting the urgent need for robust regulations and enforcement mechanisms to monitor and control livestock movement.

Effective disease control and prevention are essential to safeguarding the livestock sector. Stronger regulations for the import and movement of animals, including the requirement for import licenses and disease monitoring, are necessary to mitigate the risks of disease outbreaks. Clear legislation governing animal movement must also be established to ensure compliance and reduce the likelihood of smuggling. Proactive disease management strategies, such as vaccination programs and regular health monitoring, are critical to maintaining the health of livestock and ensuring the safety of the food supply chain.

Breed suitability is another key challenge for the livestock sector. Identifying and recommending breeds that can adapt to Malaysia's unique climate and feed conditions is essential for improving productivity and sustainability. Breeds such as Brahman and "Lembu Sado" have shown promise due to their adaptability and resilience. Additionally, integrating livestock farming with oil palm plantations offers a sustainable approach to land use, allowing for the efficient utilization of resources while supporting livestock production. However, further research and trials are needed to ensure these breeds are well-suited to local conditions and can meet the demands of the industry.

The shortage of trained technical personnel further complicates efforts to address livestock diseases and breed suitability. There is a pressing need for skilled professionals who can advise farmers and industry players on best practices in disease management, breed selection, and overall livestock care. Training programs and capacity-building initiatives should be prioritized to ensure the availability of technical expertise across the sector. Collaboration between government agencies, academia, and private industry is also essential to drive R&D in disease-resistant breeds and innovative disease control measures.

By addressing these challenges through stronger regulations, targeted R&D, and capacity building, Malaysia's livestock sector can achieve greater resilience and productivity. These efforts will not only enhance food security but also contribute to the overall sustainability of the agricultural sector.

3.3 Fisheries and Marine Resources

Fisheries and marine resources are vital to Malaysia's food security, yet the sector faces numerous challenges that threaten its sustainability and productivity. One of the key issues is the strong consumer preference for wild-caught fish over aquaculture products, which limits the growth of the aquaculture industry. This preference is further compounded by the lack of advanced technology in the fisheries sector, which continues to rely heavily on traditional fishing methods. The limited availability of modern vessels and equipment for deep-sea fishing restricts Malaysia's ability to fully utilize its marine resources. Additionally, enforcement within Malaysia's EEZ remains a challenge, with illegal fishing activities and insufficient monitoring undermining the protection of the country's marine resources.

The aquaculture sector, a critical component of Malaysia's fisheries industry, also faces significant hurdles. Feed availability and cost are persistent concerns, as the sector depends on other industries to supply sufficient and affordable feed. Freshwater aquaculture production often falls short of demand, and the availability of high-quality broodstock remains a major challenge. Furthermore, there is a gap in the transfer of R&D findings and technology to farmers, which limits the adoption of innovative practices. The high cost of consultancy services for technology transfer further discourages farmers from accessing advancements, leaving many reliant on outdated methods.

Harmful algal blooms represent a major threat to aquaculture, causing significant economic losses and raising serious public health concerns. A single HAB event can result in losses of up to RM100 million, while contaminated seafood poses risks to consumer safety. The sentiment, "Don't let humans be the indicator for seafood safety," underscores the importance of proactive monitoring and preventive measures to protect both the aquaculture industry and public health. Insufficient monitoring and disease control mechanisms exacerbate these risks, emphasizing the need for continuous surveillance and stronger regulations to safeguard the sector.

Despite these challenges, there are significant opportunities to enhance Malaysia's fisheries and aquaculture industries. Deep-sea fishing remains largely untapped, with Malaysia's long coastline offering substantial potential for resource exploration. Expanding freshwater aquaculture, particularly by increasing the production of high-value species like Empurau, presents another avenue for growth.

Inter-industry collaboration can also support the marine sector by ensuring a stable supply of feed and other resources. Government incentives, such as tax exemptions and funding for R&D, can encourage industry participation and innovation. Establishing a dedicated entity under the ministry to facilitate knowledge transfer, technology commercialization, and farmer support could further strengthen the sector.

To address these challenges, the adoption of advanced technology is essential. Data-driven fishing, leveraging remote sensing data to identify optimal fishing grounds, can improve efficiency and productivity. Protecting aquaculture for public health requires continuous monitoring and the implementation of "fireproof" technologies to mitigate the impacts of climate change. Effective technology and knowledge transfer mechanisms must be established to ensure that farmers have access to the latest innovations. Additionally, the commercialization of research findings, such as improved broodstock and fry strains, is critical to enhancing aquaculture productivity. Infrastructure development, including post-harvest facilities and cold chain systems, can reduce losses and improve market access for fish farmers.

By addressing these challenges and leveraging opportunities, Malaysia's fisheries and aquaculture sectors can become more resilient and sustainable. These efforts will not only strengthen food security but also contribute to the economic growth and environmental sustainability of the nation.

3.4 Paddy Cultivation

Paddy cultivation is a cornerstone of Malaysia's food security, yet the sector faces numerous challenges that hinder its productivity, sustainability, and commercial viability. One of the most pressing issues is the aging farming population, with many farmers engaged in subsistence farming rather than commercial-scale production. Younger generations are reluctant to participate in paddy farming due to its labour-intensive nature, low profitability, and reliance on traditional practices. This demographic shift threatens the long-term sustainability of the sector, as older farmers retire without successors to continue their work. Compounding this issue is the widespread reliance on government subsidies for inputs such as fertilizers, pesticides, and seeds. Many farmers cease cultivation once subsidies are withdrawn, reflecting a "subsidy mentality" that discourages innovation and investment in improved practices.

Cultivation practices in the paddy sector remain largely outdated, with most farmers planting traditional varieties that allow for only one planting season per year. The lack of mechanization, particularly in hilly areas, further limits productivity, as the challenging terrain makes it difficult to adopt modern farming techniques. Paddy cultivation in Malaysia is also heavily dependent on rain-fed systems, making it vulnerable to weather fluctuations and climate variability. This issue is particularly pronounced in regions such as Sarawak, where poor irrigation systems and inadequate infrastructure, such as limited access to proper farm roads, drainage networks, and water storage facilities, significantly hinder the potential for large-scale paddy cultivation. Additionally, the quality of paddy seeds is often inconsistent, with no proper gene bank for traditional rice varieties to ensure seed purity and availability. Pest and disease issues, such as golden apple snails and rats, have persisted for decades, further reducing yields and discouraging farmers from expanding their operations.

Downstream processing and market access present additional barriers to the growth of the paddy sector. Post-harvest facilities are insufficient, and farmers often face logistical challenges in transporting their produce to markets. Low prices for paddy discourage farmers from harvesting, leading to significant food waste and reduced incomes. Accessibility issues in rural areas, combined with the short shelf life of produce and limited storage facilities, exacerbate these challenges. Farmers are also reluctant to use collection and packaging centres, preferring to let their produce rot rather than sell it at unprofitable prices.

To address these challenges, several solutions have been proposed. More R&D should focus on hill paddy, which is better suited to Sarawak's dry land conditions and is considered more climate-resilient than wetland paddy. The establishment of a proper gene bank for traditional rice varieties is essential to preserve genetic diversity and improve seed quality. Mechanization should be prioritized, with government support to overcome terrain challenges and enable modern farming practices. Consolidating small plots into larger, community-managed farms can achieve economies of scale and improve resource utilization. Additionally, the government should invest in infrastructure, such as post-harvest facilities, storage systems, and transportation networks, to reduce food waste and improve market access.

Private sector involvement is also critical to the sector's transformation. Companies can play a key role in identifying high-yield, disease-resistant rice varieties

and engaging in R&D to improve productivity. Collaboration between industry, academia, and government can bridge the gap between research and practical application, ensuring that farmers benefit from the latest innovations. Incentives, such as tax breaks and funding for R&D, can encourage private sector participation and foster innovation in the paddy sector. Furthermore, sustained support for the adoption of modern technologies, such as the Internet of Things (IoT), can enhance productivity and efficiency, provided that farmers are given the necessary training and resources to use these technologies effectively.

By addressing these challenges and implementing these solutions, Malaysia's paddy sector can become more productive, sustainable, and resilient. These efforts will not only strengthen the nation's food security but also improve the livelihoods of farmers and contribute to the overall growth of the agricultural sector.

3.5 Kenaf Cultivation

Kenaf cultivation is emerging as a promising agricultural initiative in Malaysia, particularly in Sarawak, due to its versatility and potential to address various challenges in the agricultural sector. Recent trials in Bintulu and Betong, conducted in collaboration with the Institute of Ecosystem Science Borneo (IEB) and UPM Bintulu Sarawak Campus (Recently rebranded to Universiti Putra Malaysia Sarawak), have shown that kenaf seeds from Perlis and Kedah adapt well to local conditions. This adaptability highlights the crop's potential for wider cultivation in Sarawak. Kenaf offers diverse applications, making it valuable for both agriculture and industry. Its leaves, which contain 26-30% protein, can serve as high-quality animal feed and a substitute for Napier grass, with a short growth cycle of just 30-55 days. Beyond its agricultural uses, kenaf is also in demand for the biocomposite and natural fibre industries, with plans underway to establish a dedicated office for this industry in Sarawak and Sabah. Additionally, kenaf cultivation provides an opportunity to utilize Native Customary Right (NCR) land, with 400 hectares in Ulu Sebauh already allocated for this purpose.

Despite its potential, several challenges must be addressed to ensure the success of kenaf cultivation. One major issue is the availability and logistics of kenaf seeds, which are currently produced in Perlis and Kedah. Transporting these seeds to Sarawak is costly and inefficient. Furthermore, the hilly terrain of allocated land, such as in Ulu Sebauh, complicates cultivation and mechanization efforts. Another

challenge is the potential competition between using kenaf as animal feed and as a raw material for the biocomposite industry, which could create resource allocation conflicts. Additionally, local research on kenaf planting techniques and its suitability for Sarawak's conditions remains limited, further hindering its widespread adoption.

To overcome these challenges, targeted interventions are needed. Establishing local seed production facilities in Sarawak would reduce logistical costs and ensure a steady supply of seeds for farmers. Investments in infrastructure and mechanization are essential to address the challenges posed by hilly terrain, enabling more efficient cultivation and harvesting. Clear policies and strategies should also be developed to balance the competing demands for kenaf as animal feed and as a raw material for the biocomposite industry, ensuring that both sectors can benefit from its cultivation. Enhanced R&D efforts are critical to optimize kenaf planting techniques, improve yields, and explore its full potential in various applications. Collaboration between government agencies, industry players, and research institutions can drive innovation and provide farmers with the knowledge and resources needed to adopt kenaf cultivation successfully.

Kenaf's versatility and adaptability make it a valuable crop for Malaysia's agricultural and industrial sectors. By addressing the challenges and implementing these solutions, kenaf cultivation can contribute to the nation's food security, economic growth, and sustainable development.

3.6 Cross-Cutting Issues and Collaboration Ecosystem

Agricultural development in Malaysia, particularly in Sarawak, faces several cross-cutting challenges that go beyond individual crops or livestock types. These issues require a holistic and collaborative approach involving all stakeholders, including government agencies, private industry, academia, and local communities. One of the most pervasive challenges is the "subsidy mentality" among farmers, where reliance on government support discourages investment in higher-quality inputs and modern technologies. Many farmers cease operations once subsidies are withdrawn, limiting the sector's ability to innovate and adapt to changing conditions. This mindset is further compounded by a lack of mechanization and modernization, particularly in regions with challenging topography, where traditional practices still dominate. Additionally, the high dependency on imported raw materials, such as corn and soybean for animal

feed, exposes the agricultural sector to global price fluctuations and supply chain disruptions, further emphasizing the need for local alternatives.

Another critical issue is the disconnect between R&D and its practical application. While significant research is conducted in universities and research institutions, the findings are often not commercialized or effectively transferred to farmers and industry players. This gap leaves many stakeholders without access to the latest innovations and technologies that could improve productivity and sustainability. Waste management is another underutilized opportunity, as agricultural by-products such as sago silage and BSF larvae have the potential to serve as alternative feed sources. Disease control also remains a pressing concern, with zoonotic diseases and crop pests requiring stronger regulations and monitoring to protect both public health and agricultural productivity.

A fundamental shift in mindset is essential to address these challenges. Government agencies often operate in silos, with internal Key Performance Indicators (KPIs) that hinder unified progress. There is a strong need for agencies to set aside individual objectives and work collaboratively towards common goals, such as improving the availability of animal feed and enhancing agricultural productivity. The Sarawak Economic Development Corporation (SEDC) has expressed willingness to act as a coordinator to accelerate this process. Additionally, government agencies must adopt a more risk-tolerant approach, embracing calculated risks to foster innovation and support new initiatives. Farmers, too, need support to shift their mindset towards adopting better practices and investing in higher-quality inputs, with sustained government incentives and training programs to facilitate this transition.

Collaboration between government, academia, and the private sector is critical to overcoming these cross-cutting issues. The private sector, driven by business opportunities, can play a key role in identifying high-yield seeds, developing niche markets, and investing in R&D. Government incentives, such as tax exemptions and funding for industry-driven research, can encourage private sector participation and foster innovation. A co-ownership model for intellectual property (IP), where patents are shared between government, universities, and industry, could provide an income stream for all parties while incentivizing collaboration. Enhanced R&D efforts should focus on locally suitable crops, such as hill paddy, and alternatives to imported feed ingredients, such as BSF larvae and sago silage. These efforts must be supported by

effective technology transfer mechanisms to ensure that farmers and industry players can adopt the latest innovations.

Infrastructure and talent development are also critical to addressing cross-cutting issues. Investments in post-harvest facilities, storage systems, and transportation networks are essential to reduce food waste and improve market access, particularly in rural areas. Mechanization and land management strategies, such as consolidating small plots into larger, community-managed farms, can improve resource utilization and enable economies of scale. Additionally, training programs are needed to develop a skilled workforce capable of advising farmers and industry players on best practices. Ensuring the availability of trained technical personnel in every sector is vital to bridging the gap between research and practical application.

By addressing these cross-cutting issues through collaboration, innovation, and targeted investments, Malaysia's agricultural sector can achieve greater resilience and sustainability. These efforts will not only strengthen food security but also contribute to the economic and social development of the nation.

4 PROPOSED SOLUTIONS AND THE WAY FORWARD

Addressing Malaysia's food security challenges requires a comprehensive and multi-faceted approach that integrates modern agricultural practices, targeted investments, and collaborative efforts across all sectors. Strengthening local food production is a critical priority, with a focus on reducing dependency on imports by cultivating key staples such as rice, corn, and soybean, while also developing alternative feed sources like insect protein and agricultural by-products. To achieve this, the government must prioritize R&D to create locally adapted crop varieties, disease-resistant livestock breeds, and sustainable aquaculture practices. Collaboration between government agencies, academia, and private industries is essential to co-develop innovative solutions, commercialize research outputs, and ensure effective knowledge transfer to farmers and industry players.

In the short term (1–2 years), priority should be given to stabilize supply chains and address the most pressing vulnerabilities. Malaysia's heavy reliance on imported feed ingredients and staple foods makes it highly sensitive to global market shocks and supply chain disruptions. Immediate emphasis should be placed on diversifying animal feed sources using locally available alternatives such as insect protein, crop

residues, and kenaf by-products. Simultaneously, the veterinary and food safety systems must be reinforced by tightening border controls, strengthening animal health surveillance, and expanding vaccination programs to prevent the entry and spread of transboundary diseases like FMD. Another urgent area concerns weaknesses in logistics and post-harvest handling. Short-term investments in rural storage centres, cold chain facilities, and transport networks will reduce food losses, stabilize farmer incomes, and ensure consumer access to affordable and safe food. Expanding post-harvest facilities, storage systems, and cold chain infrastructure will also improve market access and enhance the profitability of local produce. Better rural connectivity and downstream value-added industries, such as processing centres, can further improve viability while reducing waste.

In the medium term (3–5 years), Malaysia should focus on modernization and productivity improvements across key food sectors. Paddy cultivation remains constrained by traditional practices and fragmented landholdings, which limit efficiency and profitability. Introducing mechanization including small-scale machinery for hilly terrains and drone-assisted farming can significantly boost yields while reducing labour dependency. Consolidating small plots into larger, community-managed farms will enable economies of scale and better resource utilization. Beyond paddy, diversification into alternative crops such as kenaf offers dual benefits: its protein-rich leaves can serve as high-quality animal feed while its fibre supports the biocomposite industry, strengthening the circular economy.

In the aquaculture and fisheries sectors the adoption of modern technologies is essential. Digital water quality monitoring, broodstock improvement, and stronger enforcement against illegal fishing are critical to secure marine resources. Enhancing aquaculture productivity will reduce reliance on wild-caught fish and build consumer confidence in locally farmed seafood. Another medium-term priority is attracting and equipping youth with modern agricultural skills. Financial incentives, agro-innovation hubs, and agripreneurship programs can reposition agriculture as a technology-driven and rewarding career. Comprehensive training and capacity building in areas such as disease management, mechanization, and sustainable practices will ensure a skilled workforce to drive sectoral transformation.

In the long term (5–10 years), Malaysia must focus on establishing a resilient, sustainable, and globally competitive food system. Climate-smart agriculture should

be integrated across all sectors, emphasizing the adoption of drought-tolerant crops, sustainable farming systems, efficient water management, renewable energy, and sustainable fisheries management. These measures will not only mitigate the impacts of climate change impacts but also enhance Malaysia's competitiveness in global markets, where environmental, social and governance (ESG) standards is increasingly demanded.

Institutional reforms are equally important, where the establishment of commodity-specific boards, such as a Sarawak Paddy Board or a National Aquaculture Board, will provide dedicated leadership, coordinate sectoral development, and align resources with national priorities. Policy reforms must also streamline inter-agencies coordination, enforce stricter regulations on food safety and animal movement, and redirect subsidies toward high-impact areas such as alternative feed production and climate-resilient crops, rather than perpetuating dependency on traditional subsidies.

Long-term resilience depends on developing a robust innovation ecosystem. Accelerating the commercialization of research outputs, coupled with co-ownership of intellectual property between government, universities, and industry, can drive the delivery of practical solutions. This approach will incentivize private sector participation, stimulate R&D, and create new income streams. Malaysia should also leverage its strategic position in Borneo and ASEAN to promote regional cooperation, joint R&D initiatives, and cross-border food security efforts. By positioning Sarawak as a regional hub, Malaysia can enhance knowledge exchange, foster collaborative innovation, and strengthen its role in global food systems.

This phased roadmap of short-term stabilization, medium-term modernization, and long-term transformation provides a structured pathway for Malaysia to transition from vulnerability to resilience. The short-term agenda focuses on immediate challenges such as feed imports, disease control, and logistics. The medium-term priorities focus on modernization through mechanization, crop diversification, aquaculture technology, and youth engagement. Lastly, the long-term strategy consolidates reforms, embeds sustainability, and builds global competitiveness. By aligning infrastructure development, sustainability commitments, governance reforms, and talent capacity-building with regional cooperation, Malaysia can decisively advance toward a resilient, sustainable, and competitive food system capable of ensuring long-term food security for its population.

6 CONCLUSIONS

The roundtable discussion on “Global and National Issues on Food Security” highlighted the complexity and interconnectedness of challenges that threaten Malaysia’s ability to ensure a safe, sustainable, and resilient food system. Global disruptions such as geopolitical conflicts, climate change, and market volatility, coupled with national issues like heavy reliance on imports, an aging farming population, weak mechanization, and gaps in R&D application. The discussion underscored the urgent need for a comprehensive, phased, and collaborative strategy.

The insights gathered provide a clear roadmap that structured around three interconnected horizons: stabilizing immediate vulnerabilities, modernizing systems in the medium term, and embedding long-term resilience and competitiveness. Immediate priorities include strengthening local food production, diversifying animal feed and crop sources, and reducing reliance on imports, alongside investments in post-harvest infrastructure, cold chain systems, and logistics to reduce waste and enhance market access. In the medium term, modernization through mechanization, crop diversification, aquaculture technology, and the active involvement of youth and agripreneurs will be critical to revitalizing the sector. Over the long term, climate-smart agriculture, governance reforms, institutional strengthening, and stronger regional and global integration must form the foundation of Malaysia’s efforts to build a sustainable and competitive food ecosystem.

Equally important is addressing cross-cutting issues such as the persistence of subsidy dependency, limited technology adoption, and weak knowledge transfer. Addressing these barriers through extension services, innovation ecosystems, commercialization of research outputs, and sustained capacity building will unlock the full potential of Malaysia’s agriculture, aquaculture, and livestock sectors. Stronger collaboration among government agencies, academia, private industries, and local communities must replace siloed approaches, while policy reforms should strategically direct resources toward high-impact areas such as alternative feed production, climate-resilient crops, and sustainable aquaculture practices.

Moving forward, Malaysia must adopt a forward-looking strategy that integrates environmental sustainability, economic viability, and social equity. Building a resilient food system will require not only modernized production and improved farmer incomes but also alignment with international sustainability standards, regional cooperation

under ASEAN and BIMP-EAGA, and proactive innovation in green technologies. Collaboration and innovation will remain the drivers of success, ensuring that policies, resources, and expertise are aligned toward shared goals.

By leveraging its strengths, addressing its vulnerabilities, and implementing the phased roadmap outlined in this discussion, Malaysia and Sarawak specifically can transform its food system into one that not only satisfy the needs of its population but also contributes meaningfully to global food security. The way forward demands qualities such as courage, coordination, and commitment that will determine whether Malaysia emerges as a resilient, sustainable, and globally competitive leader in food security in the decades to come.

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