



**INTERNATIONAL
CONFERENCE ON
ASIAN FOOD SECURITY
(ICAFS) 2014
TOWARDS ASIA 2025:
POLICY AND TECHNOLOGY
IMPERATIVES**

Conference Report
21-22 August 2014

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**INTERNATIONAL CONFERENCE ON ASIAN FOOD SECURITY
(ICAFS) 2014.**

TOWARDS ASIA 2025:

POLICY AND TECHNOLOGY IMPERATIVES

ORGANISED BY:

**S. RAJARATNAM SCHOOL OF INTERNATIONAL STUDIES (RSIS),
NANYANG TECHNOLOGICAL UNIVERSITY (NTU), SINGAPORE**

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ABBREVIATION

ADB:	Asian Development Bank	IFPRI:	International Food Policy Research Institute
AEC:	ASEAN Economic Community	MDGs:	Millennium Development Goals
ASEAN:	Association of Southeast Asian Nations	MFI:	Multilateral Financial Institutions
BIMP-EAGA:	Brunei, Indonesia, Malaysia and Philippines East-ASEAN Growth Area	NFSA:	National Food Security Act
DSSAT:	Decision Support System for Agrotechnology Transfer	NGO:	Non-Governmental Organisation
FAO:	Food and Agriculture Organisation	NTM:	Non-Tariff Measures
GDP:	Gross Domestic Product	ODA:	Official Development Assistance
GMO:	Genetically Modified Organism	OWG:	Open Working Group
ICAFS:	International Conference on Asian Food Security	PDS:	Public Distribution System
IMT-GT:	Indonesia, Malaysia and Thailand- Growth Triangle	R&D:	Research and Development
IRRI:	International Rice Research Institute	SDGs:	Sustainable Development Goals

EXECUTIVE SUMMARY

The International Conference on Asian Food Security (ICAFS) took place from 21–22 August 2014 at the Grand Copthorne Waterfront Hotel in Singapore. ICAFS 2014, themed '**Towards Asia 2025: Policy and Technology Imperatives**' was aimed at understanding the mid-to-long term trends and challenges that affect Asian food security within the horizon of 2025 and beyond as the region faces significant challenges posed by changes in demography and consumption patterns, performance decline in agriculture, environmental degradation, natural resource depletion and climate change. This conference sought to address questions relating to the future of food policy and technology that contribute to food security in Asia.

The choice of the time-horizon of 2025 was specifically earmarked for a number of reasons. The first session is dedicated to highlighting the identified trends and challenges to food security in 2025. From a national planning standpoint, a decade usually represents a good medium-run timeframe for policies to be formulated and enacted. On a regional level ASEAN's post 2015 agenda will also be looking into a 10-year timeframe. The International Food Policy research Institute (IFPRI), the world's leading food policy research centre, has also chosen 2025 as the time period by when the world should aim to eradicate hunger and malnutrition. Hence there seems to be a good convergence on this particular timeframe; one we should all as institutions and individuals commit to make the region and world more food secure.

Session 2 highlights the food security challenges and opportunities in the context of Post 2015 Millennium

Development Goals (MDGs). This session addresses issues such as how to increase productivity and supply chains; challenges and opportunities for policy, science and technology interventions as well as how to modernize food supply chains. Session 3 presents the topic of market integration and trade facility. The idea is to promote regional integration and food trade as means for sustaining food security by increasing economic access to food. This is relevant to the ASEAN Economic Community 2015 agenda, which includes tariff reduction, enhanced trade facilitation, reduction in barriers to trade among others, and aims to accelerate economic growth and development. Benefits and challenges are also discussed based on the context of the region's two biggest economies, China and India, anticipating 2025.

Session 4 discusses options for financing and investing in agricultural development and technological innovation. With global reduction in public spending on research and development (R&D) in agriculture, options should be diversified where it allows private sectors and other alternative financing such as insurance and micro financing to help poor and vulnerable farmers. Session 5 suggests an integrated approach for Asia towards 2025. This session looks at the role of science and R&D in further boosting agricultural production and the need for systematic surveillance of food security through different monitoring systems using different types of indexing and benchmarking tools. These monitoring systems should be able to be responsive to potential calamities and mitigate shocks of natural disasters.

ASIA 2025 – TRENDS AND CHALLENGES TO FOOD SECURITY

- Ending Hunger and Undernourishment in Asia by 2025: What Will It Take?** Asia had about 60 per cent of the world's hungry during the period of 2011 to 2013. The social costs associated with hunger and malnutrition come in the form of declining human development and dignity. Therefore, eradication of hunger and malnutrition in Asia must be made a top priority by 2025. A more ambitious target must be set and the rates of hunger and stunting must drop by, respectively, four per cent and nine per cent annually. One way of doing this is for Asia to emulate existing initiatives practised in other regions such as the Zero Hunger Challenge, End Hunger in Africa, and Rio+20. The opportunities for Asia to liberate itself from hunger and malnutrition come from its rapid economic growth, relatively high crop productivity, agriculture expansion, and transformation of Asia's agrifood system. The latter is influenced by rapid urbanisation, diet change, food market transformation, rise of rural non-farm labour markets, and agricultural technology and farm size change.
- Financing Agricultural Innovation and Technology – Farmers' Perspective: Towards Improved Security in Asia by 2025.** On the food supply side, Asia is facing natural resource constraints that result from competitive use of land and water, land conversion, increase in degraded soil and polluted water, and rising costs of land and water. Global climate change may modify the frequency and/or cycle of adverse weather and very likely lead to the reduction of crop yields as a whole, affecting food access, utilisation and price stability. Uneven ownership of land and natural capital, technology, and unequal food production and availability across regions and countries further exacerbate the stability of food supply. Established knowledge suggests that high costs of labour, fertilisers, and chemicals, as well as corruption in the government, further jeopardise small farmers' enterprises. In addition, agricultural investment is needed to support small farmers, enhance their income and productivity, and increase food availability and accessibility in the market. Furthermore, safeguarding soil from erosion, preserving water, and conserving land and biodiversity, will also help farmers to increase and maintain productivity.
- Food Security Challenges Faced by Developing Asian Countries and Responses towards 2025: The Case of Indonesia.** In the case of Indonesia, malnourishment among children needs more attention as it still stood at 19.6 per cent in 2013 compared to 24.5 per cent in 2005, 18.4 per cent in 2007, and 17.9 per cent in 2010. High demand for food is attributed to the large population size of 252 million (in 2014). Consistent increase in population growth rate combined with rapid urbanisation (estimated to be at 60 per cent of total population in 2025) will further increase demand for food and also for different types of food. Women participation in the labour force, that stands at 36.4 per cent of total employment, escalates the "eat-out" rate and heightens demand for processed food. On the food demand side, transformation in food consumption patterns has resulted in increasing demands for certain types of food such as those with higher protein and vitamin sources. A change in demographic structure and urbanisation influence people's preferences for foods as they are increasingly aware of food variety, quality, nutrition, and safety. City lifestyles that come with urbanisation increase demands for processed food. New forms of malnutrition such as child obesity will likely emerge. Therefore, food policies need to take into account the shift from food consumption based on quantity toward diverse, nutritious, balanced, and safe consumption by promoting food processing technology, nutrition, and food safety standards.
- Food Security in Asia: The Role of the Private Sector.** Recent history has shown that technology has an important role to play in food security as it creates better inputs that increase productivity consistently. In the future, the potential of genetically modified organism (GMO) technology should be explored to ensure and increase food production. In this regard the private sector, as technology developers and providers, connects people, land and technology, and may offer better solutions, support rural economies, and resource efficiency. Using technology over a span of a decade since 1990, Vietnam has doubled its rice production, exported seven times as much, and has become the world's largest rice exporter in recent years. In the Philippines, hybrid corn (and now GM corn) has resulted in lower production costs, higher productivity, and a safer environment, and has enabled the Philippines to become self-sufficient in corn and even export a small surplus. Private sector players in the food industry should continue their commitment to making crops more efficient by significantly increasing the average productivity of the world's major crops without using more land, water or other inputs, rescuing more farmland by improving the fertility of millions of hectares of farmland on the brink of degradation, helping natural environments flourish by enhancing biodiversity of farmland, empowering smallholders and enabling farmers to increase agricultural productivity.

SUPPLY AND DEMAND – IMPROVING PRODUCTIVITY GROWTH AND SUPPLY CHAINS

- **The Post 2015 Agenda on Hunger and Malnutrition.**

As we are approaching the end of the target year for the Millennium Development Goals (MDGs) to be met in 2015, countries are seeking to intensify efforts aimed at ending poverty. There are two successive processes that countries are negotiating for the post-2015 development agenda, and these include the Open Working Group (OWG) on Sustainable Development Goals (SDGs) and the Post-2015 UN Agenda negotiations. Food security has been regarded as an important goal in both processes. However, in the draft report of the OWG, 'food security' is replaced by 'ending hunger'. This may not be conducive for the fight against hunger and malnutrition as food security would be a more inclusive discourse. It is important that the food security language is brought back to the final report of the OWG and gaps in policy implementation be reduced.

- **Food Supply and Demand in Asia: Challenges and Opportunities for Policy and Technology Interventions.**

Food demand will be driven by population growth, urbanization, income growth, expansion of biofuels and mitigation of greenhouse gas emission. On the other hand, food supply will be influenced by water and land scarcity, climate change, investment in agricultural research and science and technology policies. Given that technologies can significantly improve food production, countries should accelerate investments in research and development in agricultural technologies, promote complementary policies and investment and reform economic policies. With regard to investment in research and development, it is important to pay attention to technologies for crop and livestock breeding that increase yields and enhance the ability of crops and livestock to resist diseases, drought, heat and salinity. Policy reforms in domestic regulation and trade are also essential to facilitate the application of new agricultural technologies and encourage free and open trade.

- **Modernizing Food Supply Chains as an Integral Necessity to Assure Food Security.**

Southeast Asian countries are active in food trade. Thailand is a major exporter of rice; the Philippines dominates the supply of banana; Indonesia exports shrimp and prawns. However, current supply chains in Southeast Asia for commodities such as rice, fruits and seafood have not been efficient enough. Some Southeast Asian countries have big surpluses of rice supply and there are potentials for rice trade within the region as well as across regions. Regional

supply chains are constrained by lack of efficiency and lack of effectiveness. Efficient border management ensures timeliness of delivery and this is crucial for commodities such as meat and seafood. Infrastructure also has a critical role in logistics. For instance, congestion may increase delivery costs and cause delay. Tracking and tracing of commodities are also important aspects of the supply chains. To improve the effectiveness of regional supply chains, it is necessary to simplify the procedures for port handling and border control, reduce the costs in domestic transport and cold chains, ensure food safety, enhance infrastructure and review legislations to facilitate the flow of commodities. In this regard, the implementation of new procedures under the ASEAN Economic Community (AEC) initiative could contribute to improving intra-regional trade.

- **Achieving Food Security in a Growing World of Scarcity: The Role of Scientific Innovations.**

There has been a variety of scientific breakthroughs available for improving food security, such as those from genetics, molecular biology, plant physiology, and remote sensing. Innovations should contribute to food security through its three components – availability, access and consumption. Agricultural technologies enhance availability of food through higher yield and more efficient use of food. There are two ways to increase crop productivity – to close the gap between the actual yield and potential yield and to increase the potential yield. Because the yield of crops is affected by a variety of factors, such as weeds, pests, diseases, pollution and availability of water, the actual yield is always lower than the theoretical maximum yield. Closing the gap between the two will lead to higher outputs. Developing countries in Africa and Asia have huge potential to increase output through this approach. Climate change poses another problem to agricultural production and climate smart agriculture that applies technological innovations has been proposed to improve the efficiency and resilience of the agricultural system, adapt it to the changing environment and mitigate the impacts of climate change. Water management, eco-efficiency, precision agriculture, and breeding are areas open for technological innovations. Another way to improve availability is to avoid food losses and waste and create alternative protein sources. New technologies improve the structuring of food, diversify the sources of protein and prolong food preservation.

MARKET INTEGRATION, TRADE AND ECONOMIC ACCESS TO FOOD

- **Regional Integration and Economic Access to Food.**

Food trade can be one effective way to achieve food security. There is a paradox where the most food-secure richer nations are the ones with deficient food production capacity while the food-insecure poorer member states have the most abundant agricultural resources but also are most vulnerable to price shocks. This phenomenon is indicative of the fact that domestic food production to give self-sufficiency does not necessarily equate to food security. This further highlights the importance of economic access as one of the key dimensions of food security. The challenge for the region is to increase economic access to food to improve food security. Through greater regional economic integration efforts such as the ASEAN Economic Community 2015 (AEC2015), the ASEAN region stands to gain through higher growth and increase in per capita GDP. The AEC2015 agenda, which includes tariff reduction, enhanced trade facilitation, reduction in barriers to trade, among others, aims to accelerate economic growth and development. Despite significant progress that has been made in the AEC2015 front to improve food security, much remains to be done.

- **Trade Facilitation and Logistics Service Liberalisation.**

The key elements of trade facilitation include trade and customs regulation, trade documentation, custom clearance, trade enforcement, trade finance and infrastructure development. The ASEAN region aims to improve trade facilitation because it brings forth large potential savings due to reduction of transaction costs. Bureaucratic processes in the importation and exportation of agricultural and food products increases uncertainties and impedes trade across the supply chains. This is especially disadvantageous because food access requires stability and reliability across supply chains both within and between countries. Lack of automation and insignificant use of information technology, lack of inter-agency coordination and lack of cooperation among customs and other government agencies cause inefficiencies. Addressing these barriers to trade and improving trade liberalisation are included in the AEC2015 agenda. The move towards greater integration will also provide substantial improvement in the facilitation for cross-

border trade within the region, which enhances physical access to food and therefore improves food security. One specific step towards this goal is the implementation of National Single Window systems, which accelerate trade procedures and reduce corruption.

- **Key Regional Players: Benefits and Challenges to Food Security.**

- **China's** population growth rate will have limited impact on food demand. What should be the concern is the increasing mobility towards urban areas and income growth, which could influence food consumption patterns. China will also benefit from investment in farming technology and agricultural research and development. As for key commodities, projections show that China will achieve self-sufficiency in rice and wheat but demand for maize and soybean is expected to rise. Increments in demand for corn and soybean will be compensated through existing trading partners in North and South America, which eases pressure on food imports within the region. Projections also indicate that Asia will gain from the demand surge in palm oil and tropical products from China.

- **India**, on the other hand, is the only country in the region to have legislated food security but this has raised questions and increased debate as to its impact on the domestic economy and food security. India's National Food Security Act (NFSA) 2013 generally seeks to provide food and nutritional security by means of providing a sufficient amount of food at affordable prices to each household. The act aims to subsidize about 75 per cent of the rural and 50 per cent of the urban poor populations' monthly food grain needs. While the objective is greatly applauded, the act has been plagued with much criticism and politically charged debate. While NFSA addresses the country's food security and growing hunger and malnutrition problems, the act remains a directive principle and not a fundamental right.

FINANCING AND INVESTING IN AGRICULTURAL INNOVATION AND TECHNOLOGY

- **Investing in agricultural research and development.**

Data suggests that for every US\$1 invested, at least US\$9 worth of additional food is produced in developing countries. The International Rice Research Institute's (IRRI) research, for instance, delivered benefits of US\$1.46 billion per year and boosted rice yields by an average of 11.2 per cent in Southeast Asia during 1985-2009. Unfortunately, International funding for agricultural development as a whole, and more specifically agriculture and rice research, have gone through highs and lows over the past 40 years. Financial support, in the form of official development assistance (ODA) to R&D is lacking. ODA to agriculture, particularly from major donors such as the EU, US and Japan has fallen over time. International resource flows emanating from loans, portfolio equity, remittances and foreign direct investments have grown rapidly over the years, while ODA has remained stagnant. ODA to agriculture as a share of total ODA has been declining, from 8.5 per cent in 1980 to 2 per cent in 2006. Moreover, most of the ODA funds for agriculture are already allocated to food aid, health and debt relief. While the world has been facing new challenges, the growth in global rice yield has significantly slowed due to worsening scarcity of land, labour and water resources. Furthermore, climate change is expected to reduce annual grain production. Increasing temperature, rising sea level, changes in rainfall patterns and weather hazards could destroy crops and farmlands. Therefore, in order to ensure food and nutrition security for all today and in the future, it is crucial to substantially invest in agricultural research and development.

- **The role of private equity.** The Food and Agriculture Organisation (FAO) estimated that in order to achieve

global food security, the developing world needs to double its food production by 2050, requiring US\$ 83 billion in investment annually. Current investment stands at US\$ 55 billion annually, with an annual shortfall of US\$ 28 billion. The majority of this will likely be met by the private sector with the balance by governments. Possible areas of private sector intervention include the food supply chain, storage facilities, food production, marketing and micro financing. But many food and agriculture value chains are not represented in the region's stock exchanges where it amounts to only about 5 per cent of market capitalisation. Private equity is viewed as a highly efficacious mode of accessing these value chain opportunities in Asia due to prevailing levels of market development and specific value chain characteristics.

- **Insurance and micro financing.** Poor farmers are the most vulnerable to multiple risks and they need insurance. Insurance therefore can help farmers avoid sale of productive assets and reduce their reliance on government post-disaster aid. Insurance enables investments to flow into the agricultural sector. It allows farmers to invest in other crops, fertilizers, machinery, and irrigation and reduces risks for investors. Insurance also provides access to credit. It can be used as collateral for credit; there is no need to pledge other assets. However, getting insurance, particularly paying the premiums, is already too expensive and complicated for farmers. Governments therefore can help farmers and intervene through subsidies which can be used to pay the insurance premiums. Micro financing is also crucial to provide the farmers with seed money which they can use to either innovate or rebuild their livelihoods after a disaster.

CHARTING AN INTEGRATIVE APPROACH FOR ASIA TOWARDS 2025

Rice will continue to be the key to Asia's food secure future. Rice is unsurpassed as the main staple food of Asia. A major portion of rice is both produced and consumed in Asia and it is often considered the most strategic crop for most Asian countries. Given the prevalence of rice in the Asian diet, the future of Asia's food security is inherently tied and linked to this crop. In order to be able to provide enough food in the future, a second green revolution will be required. Science and R&D are going to be of critical importance in achieving this. However, they need to answer the challenges arising from biotic and abiotic stresses (including climate change) as well as the human dimension of production and supply (for example institutions, technology, decision making, trade policy, etc.). It is through such improvements that we can look forward to having a rice secure Asia, which would in turn go a long way in guaranteeing a food secure Asia in the future.

Indexing, benchmarking and better monitoring for food and nutrition security. Food security is a complex and dynamic issue which involves multiple dimensions, disciplines, actors, processes and systems. It is thus often extremely difficult to assess the food security situation in a holistic manner taking into consideration the availability, accessibility, and utilisation aspects which constitute "security". Indexing and benchmarking of food security will also need to factor in the natural environment, health, macroeconomic policies, trade policies, tariffs, political stability as well as emergencies and natural disasters. An

index which accounts for all these dimensions which impact food security would help in establishing the baseline to compare food security situations between various countries or sub-regions. It could also be useful in understanding and comparing the level/state of food security in the same country over a period of time or from one year to the other. Food loss and waste also need to be mainstreamed via systematic monitoring tools and metrics. This can help in better guiding investments and R&D in areas and sectors that need the most amount of attention.

Reducing food insecurity during and after calamities and disasters. Other than making the physical stock of food available in disaster areas, countries and agencies dealing with the aftermath and food insecurity of affected people will also need to think about the best and most effective modalities in addressing the issue. This involves decisions as to whether providing physical food aid, food vouchers or cash transfers to the people is something that will need to be assessed and put into use. Ideally provision for all options should be put in place, so that there is the possibility of any of these strategies being used as and when deemed useful or necessary. Secondly, a pro-active and ex-ante planning approach is encouraged instead of reactive responses. The strategy includes building up and maintaining small strategic stockpiles of food in regions prone to or deemed vulnerable to disasters and calamities. Governments and policymakers should give more attention to improve emergency food reserves especially in vulnerable and isolated areas.

OPENING SESSION

Welcome Remark by Ambassador Barry Desker

*Dean, S. Rajaratnam School of International Studies (RSIS),
Nanyang Technological University (NTU), Singapore*

The global community has been facing common challenges such as high and volatile food prices, rising urbanisation and incomes, increasing scarcity and degradation of natural resources, and climate change. In addition, efforts towards securing food remain impeded by protectionism, subsidies, export restrictions and import controls in most countries around the world.

In Asia, problems such as poverty and undernourishment prevail in spite of Asia's steady economic growth. Despite being home to the world's largest rice exporters, Southeast Asia is the largest importer and consumer of rice per capita globally. 15 per cent of the undernourished in the Asia Pacific are located in Southeast Asia although the region continues to enjoy the benefits of dynamic growth.

There are at least three major challenges that face Asia in attempts to realize food security and agricultural development. These are, the shortage of rural labour, characterised by

manpower leaving the agricultural sector for manufacturing and services sectors; the scarcity of natural resources such as land and water for food production; and the uncertainty of food markets resulting from supply disruptions and declining productivity. Solutions to these challenges include improved agricultural technologies and practices, improved infrastructure, and more mature and efficient food distributions systems to address food wastage and food deficits.

In light of these challenges, the governments in Asia should take a more holistic and far-sighted approach to ensure food access and availability and appeal to public, private, and civil society interests to identify real measures to attain food security in the region by 2025. Singapore has contributed its share by taking part in the ASEAN Plus Three Emergency Rice Reserve (APTERR), sharing our expertise in maintaining rice stockpiles and encouraging research in food sciences, facilitating the marketing of rice and other staple foods through the development of agri-businesses, encouraging urban farming of vegetables and fisheries, and enhancing cold storage capacities and efficient distribution of food products.

Guest of Honour's Address by Dr Mohammad Maliki bin Osman

*Minister of State, Ministry of National Development and
Defence, Singapore*

The theme 'Towards Asia 2025: Policy and Technology Imperatives' is timely because the issues surrounding food security such as population growth, urbanisation, rising incomes, climate change, disease outbreaks and scarcity of resources are showing intensifying trends. Therefore it is important to discuss potential solutions before they aggravate food security even further. These driving factors cause growing scarcity of resources particularly land and water, growing demands for resource-intensive protein-based foods, decreasing crop yields globally, and increasing probability of a high mortality rate among live animals across borders. In light of these worrying developments, it is imperative to find the ways and means to mitigate such challenges and strengthen the world's food security.

Singapore's experience in ensuring its own food security is grounded on stringent food safety requirements and a strong belief in food research, development and technologies. Having to import 90 per cent of its food supply from 160 countries worldwide, Singapore entrusts the Agri-Food and Veterinary Authority (AVA) to conduct food sourcing trips to countries such as Indonesia, the Philippines, China, Denmark, and Brazil and to ensure that food produced at source is in compliance with AVA's regulatory requirements. Upon reaching Singapore, samples of imported food undergo laboratory testing at AVA's

Veterinary Public Health Centre. To complement its source diversification strategy, Singapore encourages local food production by providing technical and funding support to local farms, intensifying the use of limited farmland, and adopting technology and automation.

For Singapore, the use of technology is critical in enhancing food productivity, developing alternative food sources, and tackling the effects of climate change on farming. Singapore has a lot to learn from the Netherlands which, despite its relatively small size, is able to position itself as the world's second largest agricultural and food products exporter, thanks to technology applications. In this regard, Singapore, through Nanyang Technological University, has forged a meaningful cooperation with the Dutch world-class tertiary institution, Wageningen University, on food science research and technology. The dry spell that hit Singapore in early 2014 shows us how technological investments are necessary to not only ensure adequate and healthy food but also important in mitigating the effects of climate change that can have devastating repercussions on food production.

Creating access and availability of food should entail both domestic efforts and international cooperation, to bring about the best policies and technological interventions in addressing the complex challenges surrounding food security.

SESSION 1: ASIA 2025 – TRENDS AND CHALLENGES TO FOOD SECURITY

This session provides views from the domains of science, the private sector, the farming community and government on the trends and challenges that affect Asian food security, looking towards 2025 and beyond. Currently, the region faces significant pressures from a number of factors and recognised trends. These include changes in demography and consumption patterns, performance decline of agriculture, degradation of the natural resource base for food production and climate change.

Ending Hunger and Undernourishment in Asia by 2025: What Will It Take?

Asia is a region where hunger and malnutrition persists. In fact, Asia made up almost 60 per cent of the world's hungry in the period from 2011 to 2013. The prevalence of poverty and undernourishment incur high social and economic costs which stand at about two to three per cent of Gross Domestic Product (GDP) globally. The figures are even higher in Asia. Social losses associated with hunger and malnutrition come in the form of impaired physical and cognitive development, productivity losses due to illness, mortality, and low education attainment and problems of social exclusion.

Although undernourishment has decreased over the years, hunger reduction goals are unlikely to be achieved. In Asia, incidence of undernourishment has been slow in decreasing from 2000 to 2013 and large differences in hunger incidence still persist across regions and countries. East Asia and Southeast Asia experienced fifteen and twenty per cent reduction respectively in hunger incidence in the past decade, but the incidence of hunger in South Asia only went down by ten per cent during the same period. In the case of Indonesia, although undernourishment among children does show improvement, the changes are slight.

Realising the societal and economic burdens that poverty and undernourishment generate, eradication of these two components in Asia must be made a top priority by 2025. In order to reduce undernourishment and stunting to five per cent by then, the rates of hunger and stunting must drop annually by four per cent and nine per cent respectively. One way of doing this is for Asia to emulate existing initiatives practised in other regions such as the Zero Hunger Challenge, End Hunger in Africa, and Rio+20.

The opportunities for Asia to liberate itself from hunger and malnutrition come from its rapid economic growth, relatively high crop productivity and agriculture expansion, and transformation of Asia's agrifood systems, the latter being influenced by fast urbanisation, diet change, food

market transformation, rise of rural non-farm labour market, agricultural technology, and farm size change. The way to reaching hunger reduction goals however is rife with challenges. Wages are rising and rural labour is getting scarcer due to aging and decreasing number of farmers. Rising rural labour costs means higher cost of production, which then results in less production. Asia also suffers from rising inequality and large loss and waste of food. Further, Asia is prone to agriculture-related risks to health such as animal-borne diseases, unregulated food production, and increasing proximity to industrial and agricultural activities which may lead to problems such as milk and rice contamination.

Financing Agricultural Innovation and Technology – Farmers' Perspective: Towards Improved Security in Asia by 2025

On the food supply side, Asia is facing natural resource constraints that result from competition in land and water use, land conversion, increase in degraded soil and polluted water, and rising costs of land and water. Global climate change may modify the frequency and/or cycles of adverse weather and will very likely lead to the reduction of crop yields as a whole, affecting food access, utilisation and price stability. Uneven ownership of land and natural capital and technology, and unequal food production and availability across regions and countries, further exacerbate the stability of food supply. In addition, Asia's agriculture sector, dominated by small-scale farming, possesses its own set of challenges that hinder food productivity. Farmers are often exposed to hazardous conditions as they work with chemicals and machinery, and are susceptible to occupational accidents and illnesses.

Established knowledge suggests that high costs of labour, fertilisers and chemicals as well as corruption in the government further jeopardise small farmers' enterprises. In order to support small farmers, enhance their income and productivity, and increase food availability and accessibility in the market, agricultural investment is needed. Further, safeguarding soil from erosion, preserving water, and conserving land and biodiversity, will also help farmers increase productivity.

Food Security Challenges Faced by Developing Asian Countries and Responses towards 2025: The Case of Indonesia

In Indonesia, high demand for food is attributed to a large population size of 252 million (in 2014). Indonesia also experiences a high annual growth rate of 1.35 per cent. Rapid urbanisation, that is expected to go from the current

49.5 per cent to 60 per cent of total population in 2025, will further increase demand for food. Female participation in the labour force, currently at 36.4 per cent of total employment, will escalate “eat-out” rates and heighten demand for processed food.

On the food demand side, transformations in food consumption patterns have resulted in increasing demands for certain types of foods such as those with protein and vitamin sources. A change in demographic structure and urbanisation influences people’s preferences for foods as they are increasingly aware of food variety, quality, nutrition, and safety. Busy lifestyles that come with urbanisation increase demands for processed food. Demands for food as energy, feedstock, and other industrial uses are also on the rise. Growing demand for food therefore pressurises existing food production capacity and affects food availability and supply.

Against this backdrop, policy intervention is paramount in addressing food supply and demand issues. Failure to craft necessary and timely policies will likely result in decreasing yields of some important food commodities such as rice and fishery products, decreasing food production capacity, increasing food production costs, increasing food prices, stagnating or declining global food stock, and volatile global food prices. In order to achieve all aspects of food security, policy intervention needs to promote nutrition-sensitive production based on the “seed to fork” framework, address food loss and waste, and ensure food safety along the whole food value chain. Additionally, policy approaches have to enhance targeted social protection with focus on nutrition. Such approaches will also have to facilitate open, transparent, and fair trade, and encourage country-owned, evidence-based strategies and policies.

In the case of Indonesia, the Food Security Law no. 18/2012 outlines food sovereignty and food resilience as the basis of Indonesia’s food security. The law aims to nurture healthy, active, and productive individuals and communities. The policy direction for sustainable food security in Indonesia begins from food self-sufficiency, and moves towards food resiliency by implementing comparative and competitive advantages of locally based resources. Food production increase should result in an increase in farmer income by facilitating efficiency and competitiveness, and farmers’ protection and empowerment. Lastly, the policy envisions a shift from food consumption based on quantity towards diverse, nutritious, balanced, and safe consumption by promoting food processing technology, nutrition, and food safety standards.

Food Security in Asia: The Role of the Private Sector

As already seen in the last decades, technology has an important role to play in food security as it creates better seeds, pesticides, fertilisers, hybrids and increases productivity consistently. The potential of genetically modified organism (GMO) technology should be explored to ensure future food production. In this regard, universities and the private sector, as technology developers and providers, connect people, land and technology and may offer better solutions to support rural economies, and attain resource efficiency. Success stories from the application of technology have been seen in places like Vietnam and the Philippines. Over a span of a decade since 1990, Vietnam has doubled its rice production, exported seven times as much, and has become the world’s largest rice exporter to date. In the Philippines, both hybrid corn and now GM corn have resulted in lower production costs, higher productivity, and a safer environment.

As a private sector player in the food industry, Syngenta stipulates its commitments in The Good Growth Plan which include

- making crops more efficient by increasing average productivity of the world’s major crops by 20 per cent without using more land, water or other agricultural inputs,
- rescuing more farmland by improving the fertility of 10 million hectares of farmland on the brink of degradation,
- helping the natural environment flourish by enhancing biodiversity on five million hectares of farmland,
- empowering smallholders by reaching 20 million smallholders and enabling them to increase productivity by 50 per cent, and
- helping people stay safe by training 20 million farm workers on labour safety, especially in developing countries, and looking after every worker by striving for fair labour conditions throughout the entire supply chain network.

Discussion

- **Climate Change and the need for adaptive technology, food stocks, and greater food trades among countries.**

In the face of climate change, food sustainability needs to incorporate food systems adaptability. As temperature and rainfall changes result in less water input, technology can provide the necessary tools for farmers to adapt to such changes in a more resilient way. Similarly, food market systems also need to adapt to climate change as it can cause possible disruptions. The agriculture sector therefore has to be more responsive and be more reliant on food stocks, and countries need to foster greater interdependence and food trade among them.

- **Climate change and food loss.** Longer dry or rainy seasons create storage and logistical problems, and farmers often lack mechanical driers and mechanical harvesters. To mitigate food loss and wastage problems, the government and the private sector need to ensure that farmers have easy access to agricultural technology. Educating farmers of the different agricultural technologies is therefore important to strengthen the basic units of food security. In this light, there is a need to invest time in direct communication because it will enable growers to learn from each other in a more effective way by translating and transferring experiences, best practices and technical know-how across regions.

- **The Right to Food.** The discussion on food security cannot be separated from the law as the right to food is part of an individual's universal human rights. In addition to being an economic issue, the right to food is also a normative one. Legislation that mandates 'right to food' is therefore important in achieving food security as it gives the legal basis for the government to provide subsidised food for the hungry, ensure sufficient food supply, and stabilise food prices. Stand alone legislation, however, is not sufficient. Instead, more meaningful government interventions such as proper incentives and market conditions, and good infrastructure need to be put in place. Although policy implementation plays a critical role in food security systems, governments often fail in this regard.

- **Technology development** is necessary in boosting minor crop productivity and in bringing innovation to the market. Although minor crops do not necessarily attract a lot of investments, government subsidies and international donors can provide the necessary means to get farmers to cultivate them. However, in the long run there is a need for a more balanced approach to promote both major and minor crops. More investments are needed to increase minor crop yield.

Box 1. Recommendations and Considerations for Policy Directions

- Focusing on food security as predominantly a function of production and availability is not sufficient. With changing diet trends, especially in urban regions, there is a greater need to assess food security through the lens of nutrition and nutrition security.
- Support for small farmers, who make up the overwhelming bulk of food producers, is more critical now than ever before. Rising costs associated with labour, inputs, climate change impacts, and natural disasters have made major investments in technology, innovation and financing imperative.
- It is important for food security policies and decisions to be thought of and assessed in a "seed to fork" framework to take the entire supply chain into consideration, and not dwell on either the supply/production or demand/consumption sides alone. Both sides affect one another significantly.
- The private sector needs to be encouraged to play a leading role in terms of investments in new technology and solutions for future challenges to food security which include the effects of climate change.

SESSION 2: SUPPLY AND DEMAND – IMPROVING PRODUCTIVITY GROWTH AND SUPPLY CHAINS

The Post 2015 Agenda on Hunger and Malnutrition

The Millennium Development Goals (MDGs) project has inspired global discussions on food security and nutrition. As we are approaching the end of the MDGs, countries are seeking to continue global efforts post 2015 in ending poverty. There are two successive strategies that countries are negotiating in the post-2015 development agenda. These include the Open Working Group (OWG) on Sustainable Development Goals (SDGs) and the Post-2015 UN Agenda negotiations. Food security has been regarded as an important goal in both processes. However, in the present draft report of the OWG, the concept of establishing food security is replaced by the urgent need to end hunger. Such a move may not necessarily be conducive for the fight against hunger and malnutrition as food security itself is an inclusive discourse that encompasses aspects of production, availability and consumption as well. It is important that the rhetoric surrounding food security discourse is brought back to the final report of the OWG.

The world has made uneven progress in achieving hunger-related MDGs. East Asia, Southeast Asia and Latin America have significantly reduced the number of hungry people, while South Asia and Africa have made little progress. The sub-Saharan region used to be a net food exporter but has now become reliant on food imports. In particular, the challenge to eliminate malnutrition is even greater than ending hunger. More than half of child deaths in the world are related to malnutrition and hundreds of millions of children suffer from consequences of chronic malnutrition. Malnutrition has serious implications for both individuals and national development. It can impede intellectual and physical development of young people, constrain health systems and inflict fiscal burdens. Sanitation is another key element for ensuring food security as bad sanitation can lead to gastrointestinal diseases that affects people's ability to absorb nutrients. The world has made least progress in sanitation-related MDGs so far. To ensure food security, it is crucial to give sufficient attention to nutrition and sanitation as they have not been sufficiently recognised.

Implementation is an important aspect in achieving food security. Although many countries have policies to improve and optimise nutrition intake of the population, there are gaps in awareness. For instance, people are not aware that obesity is a problem more serious to Mexico than the United States. Governments need to make interventions tailored to the specific context.

Food safety is another issue of concern. For instance, people feed antibiotics to livestock before they are slaughtered, to make their meat look fresh. Hence, countries need to adopt a systemic approach to food security that gives equal attention to food availability, nutrition and food safety.

Food Supply and Demand in Asia: Challenges and Opportunities for Policy and Technology Interventions

Food demand in the world will be driven by population growth, urbanisation, and income growth, expansion of biofuels and mitigation of greenhouse gas emission. Food supply will also be influenced by the growth of food demand in other regions. Africa has seen rapid economic and population growth in the last decade and this has powered their food imports. On the other hand, food supply will be influenced by water and land scarcity, climate change, investment in agricultural research and science and technology policy.

The International Food Policy Research Institute (IFPRI) used a set of models to project food demand and supply between 2010 and 2050, such as the DSSAT Crop Models, the IMPACT Global Hydrological model and the IMPACT Water Simulation Model. The DSSAT models simulated plant growth and crop yield by variety day-by-day according to variations in temperature, precipitation, soil characteristics, applied nitrogen and carbon dioxide fertilisation. In the baseline scenario, the production of major crops and meats is projected to grow slowly between now and 2050 while demands will increase fast, particularly in Asia. Many Asian countries will become more reliant on food imports and food prices are projected to go up substantially. As a result, countries in this region are not likely to attain the set goals for ending hunger.

Application of agricultural technologies may considerably improve the projections. IFPRI used the DSSAT model and the IMPACT global partial equilibrium agriculture sector model to assess the impacts of technologies on farm productivity, prices, hunger and trade flows. The simulations were made at global and regional levels, with eleven technologies (for example, no-tillage, integrated soil fertility management, organic agriculture, precision agriculture, crop protection, drip irrigation, sprinkler irrigation, water harvesting, drought tolerance, heat tolerance and nitrogen use efficiency) applied to the production of three crops – wheat, rice and maize. The projections from this scenario are much more promising than the baseline projections. Crop yields dramatically increased and food prices are much lower than the baseline scenario.

In addition, the efficiency of land use is also improved and this means more land is available for other crops or re-forestation. In the end, the number of people at risk of hunger is reduced by 35 per cent. Hence, agricultural technologies can make substantial contributions to food security and sustainable development.

Given that technologies can significantly improve food production, countries should accelerate investments in research and development (R&D) in agricultural technologies, promote complementary policies and investment, and reform economic policies. With regard to investment in research and development, it is important to pay attention to technologies for crop and livestock breeding that increase yields and enhance the ability of crops and livestock to resist diseases, drought, heat and salinity. Policy reforms in domestic regulation and trade are also essential to facilitate the application of new agricultural technologies and encourage free and open trade.

Modernising Food Supply Chains as an Integral Necessity to Assure Food Security

Modern supply chains play a crucial role in assuring food availability. Southeast Asian countries are active in food trade. Thailand and Vietnam are major exporters of rice; Philippines dominates the supply of bananas; Indonesia exports shrimp and prawns. Several Southeast Asian countries have big surpluses of rice and there is potential for greater rice trade within the region as well as across regions. However, current supply chains in Southeast Asia for commodities such as rice, fruits and seafood have not been efficient enough. There are bottlenecks impeding the rice trade. For non-exporting countries, their rice supply chains face challenges at home, such as small production lots, poor road networks, post-harvest losses, inefficient mills and inefficient ports. Regional supply chains are constrained by problems in customs, stevedoring, port handling and informal costs. In terms of rice logistics (transportation, storage, handling) cost, coastwise shipping can be higher than ocean freight. For instance, the cost to ship rice from Ho Chi Minh to Manila is lower than that for delivery from Manila to Mindanao. The supply chains for fruits, vegetables, meats and seafood face similar problems. In particular, cold chain and food safety are crucial for the food to stay fresh throughout the transportation process.

Factors that affect the effectiveness of supply chains include border management, logistics costs and power costs. Efficient border management ensures timeliness of delivery and this is crucial for commodities such as meat and seafood. Infrastructure also has a critical role in logistics. For instance, congestion may increase delivery costs and cause delay.

Tracking of commodities is an important aspect of supply chains. South and Southeast Asian countries have varied performance in logistics, with Singapore and Japan ranking high in the global logistics performance index. To improve the efficiency of regional supply chains, it is necessary to strengthen physical infrastructure and increase connectivity among countries. There are several such infrastructure networks in expansion, such as the Greater Mekong Sub Region transport connectivity and the Brunei, Indonesia, Malaysia and Philippines - East ASEAN Growth Area (BIMP-EAGA). In addition to improvements in physical infrastructure, it is equally important to address procedural constraints. In many Southeast Asian countries, the protocols for import and export are not as efficient as those in developed countries and this reduces the competitiveness of supply chains in the region. Moreover, the cost for domestic transport is often higher than overseas shipping in countries such as the Philippines and Indonesia.

To improve the effectiveness of regional supply chains, it is necessary to simplify procedures for port handling and border control, reduce costs in domestic transport and cold chains, ensure food safety, enhance infrastructure and review legislation to facilitate the flow of commodities.

Achieving Food Security in a Growing World of Scarcity: The Role of Scientific Innovations

Scientific and technological innovations play an important role in ensuring food and nutrition security. There have been a variety of scientific breakthroughs available for improving food security, such as genetics technology, molecular biology, plant physiology, and remote sensing. Technological innovations have two main impacts on society – scientific/technological impacts and socio-economic impacts. Some innovations are significant in only one of the two dimensions while some others amount to breakthroughs in both dimensions. For instance, technologies related to genetically modified organisms (GMO) have both scientific and socio-economic significance.

Innovations contribute to food security through the latter's three components – availability, access and consumption. Agricultural technologies enhance availability of food through higher crop yields and more efficient use of food. There are two ways to increase crop productivity – to close the gap between the actual yield and potential yield and to increase the potential yield. Because the yield of crops is affected by a variety of factors, such as weeds, pests, diseases, pollution and availability of water, among others, the actual yield is always lower than the theoretical maximum yield. Closing the gap between the two will lead to higher outputs. Developing countries in Africa and Asia have great potential to increase output through this approach.

Poverty, pollution and eco-inefficiency are factors that limit yields. While poverty requires long-term solutions, technologies can mitigate the impacts of inefficiency and pollution by increasing intensity and reducing inputs. The strategy for developing countries is to increase the potential yield.

Climate change poses another threat to agricultural production. Climate smart agriculture that applies technological innovations has been proposed to improve the efficiency and resilience of the agricultural system, and to adapt in the light of changing climate patterns and its resulting environmental impacts. Water management, eco-efficiency, precision agriculture, and crop breeding are areas open for technological innovations. For instance, GMO breeding programmes may help India deal with droughts brought on by the effects of climate change.

Another way to improve availability is to avoid food loss and waste, and create alternative protein sources. New technologies improve the structuring of food, diversify the sources of protein and prolong food preservation. With regards to food access, factors such as economic development, price volatility, local production and a 'level playing field' (equal access to markets) are key. As for consumption, it is important to diversify people's diet and sources of nutrition. Given how technology plays a vital role in agriculture and establishing food security, policies are needed to support the availability and dissemination of technological innovations, including enforcing intellectual property rights, supporting poor households financially and rewarding commercialisation of technologies.

Discussion

- Policies play a critical role in promoting the use of agricultural technology, encouraging innovation and enhancing cooperation and coordination among countries. However, regulatory policies in many countries are not coordinated at present and thus limit innovation. In addition, agricultural subsidies (in both production and supply chain) are accused of causing unfair competition among countries.
- As mentioned earlier, the rate for domestic delivery in the Philippines is higher than that for international freight from Vietnam to the Philippines. High fuel and power costs are the reasons. The Filipino government does not give fuel and power subsidies and this makes its supply chains less competitive than other countries in the region in terms of costs.
- Investment is essential for technological innovations. A one to two per cent increase in yield requires doubling or even tripling the expenditure on research. Although the importance of food and nutrition has been increasingly recognised, the research and development in food and agriculture has been underfunded compared to other sectors such as health and communication. Foreign investment provides one way to address the shortfall and it is especially critical for the agricultural and food sectors of many developing countries. In the meantime, it is necessary for these countries to build national ownership over existing and new technology.
- Genetically modifying food is a controversial issue. The Food and Agriculture Organization does not take a position on this but a gradual shift in thinking in favour of GM food has been seen among member states. There have been different levels of adoption of GMOs across the globe. Indonesia, like many other countries, does not produce GM food but allows imports from the United States and Brazil. There has been evidence that the area under GM soybean has steadily grown in the past decade. It is argued by some people that it should be up to the farmers to decide whether to choose GM crops as long as the decision is informed. It is natural that all technological innovations face doubt and controversy at the initial stage, but it is important that research continues as many of these innovations can effectively solve challenges to attaining food security.

Box 2. Recommendations and Considerations for Policy Directions

- Food security goals cannot be fully realised without taking into consideration nutrition, sanitation, health, and food safety together as a collective, where one impacts all other dimensions.
- New technology will be able to improve overall yield and production of crops and livestock. However new technology will also have to be able to factor in challenges such as disease, drought, heat and salinity.
- Technology and innovations can boost overall production but it is equally important to understand both the scientific and socio-economic impacts of new innovations and technologies. So while it is important to have policy support for protecting Intellectual Property (IP) rights, there is also a need for policies to ensure support to poorer households/food producers to be able to afford and use such technologies.
- Supply chains in Southeast Asia are comparatively not efficient enough due to lack of infrastructure and inefficient procedures/methodologies. There is an urgent need to improve supply chains, especially cold chains, and food safety governance to minimise wastage and improve total availability and access to food.

SESSION 3: MARKET INTEGRATION, TRADE AND ECONOMIC ACCESS TO FOOD

Asia's move towards deeper regional integration and trade liberalisation is expected to enhance food security but such integration will also bring about risks. This session reflects on the impacts of integration, issues concerning trade in food commodities, and timely policy interventions. Equally important are emerging issues relating to two major players in the region, China and India, with particular focus on their impact on food trade and regional food security.

Regional Integration and Economic Access to Food

There is disparity among the food security performance of countries within the Association of Southeast Asian Nations (ASEAN) region. As reflected by various food security indicators: the richest economies in the region (Singapore and Brunei) recorded the highest level of food security. On the other hand, the poorest nations (Cambodia, Myanmar and Lao PDR) accounted for the most food insecure within the region. The trend reveals an interesting paradox since the most food-secure nations are the ones with deficient food production capacity while the food-insecure member states have abundant agricultural resources but are also most vulnerable to price shocks. Such trends are indicative of the fact that domestic food production self-sufficiency does not necessarily equate to food security. This further highlights the importance of economic access as one of the key dimensions of food security.

Despite food security gaps in ASEAN, the region has been one of the most successful in terms of improving income and reducing poverty. On average, poverty has dramatically declined from 45 per cent in 1990 to 16 per cent in 2010. The percentage of middle class in the region has also risen significantly. However, there remains a substantial number of poor and near poor in the region. The challenge is to increase economic access to food to improve food security.

Through greater regional economic integration efforts the ASEAN region stands to gain through higher growth and increase in per capita gross domestic product (GDP). The ASEAN Economic Community (AEC) 2015 agenda, which includes tariff reduction, enhanced trade facilitation, reduction in barriers to trade, among others, aims to accelerate economic growth and development. With the improvement in growth rates, economic access to food can also increase. Growth and development in the ASEAN region also signal investment attractiveness of the region. ASEAN has overtaken China in terms of the value of foreign direct investment flowing into the region.

There is also potential for ASEAN and wider Asian integration, including India. ASEAN could benefit from regional agreements and economic ties with other regions to boost intra-regional trade and increase growth potential. However, ASEAN agricultural trade faces various chokepoints in its supply chains (that is, customs clearance and transparency) that have to be further addressed. Despite significant progress made in the AEC front to improve food security much remains to be done. The paramount concern would be the continuity or the momentum beyond 2015 target deadlines. According to an ongoing study on ASEAN and the AEC Post-2015, a more complex expansion of the existing AEC blueprint may be needed with the main objective of not only establishing an integrated regional community but also achieving robust and equitable growth beyond 2015.

Trade Facilitation and Logistics Service Liberalisation

The term trade facilitation generally refers to the regulatory controls and requirements relating to movement of goods across national borders. The key elements of trade facilitation include trade and customs regulation, trade documentation, customs clearance, trade enforcement, trade finance and infrastructure development. Trade facilitation has become a critical concern for the region due to a growing share of international trade (representing 30 per cent of world GDP), rapid advances in information technology, proliferation of trade agreements and the changing nature of traded goods. Furthermore the region aims to improve trade facilitation because it brings forth large potential savings due to reduction in transaction costs.

Agricultural trade has a complex structure that involves different entities such as the government sector, financial sector and business companies among others. However, certain trade issues between these entities hinder the facilitation of trade and negatively affect the food supply chain in the region. Bureaucratic processes on importation and exportation increase uncertainties and impede trade across the supply chains. This is especially disadvantageous because food requires stability and reliability across the supply chains both within and between countries. Lack of automation and insignificant use of information technology encumbers efficient data entry. Lack of inter-agency coordination and cooperation among customs and government agencies also reflects inefficiencies. Addressing these barriers to trade and improving trade liberalisation are included in the AEC2015 agenda. The move towards greater integration will also provide substantial improvement in the facilitation for cross-border trade within the region, which

enhances physical access to food and therefore improves food security. One specific step towards this goal is the implementation of the “National Single Window” approach, which accelerates trade procedures and reduces corruption.

Logistics services are likewise crucial aspects of trade and regional integration. Establishing a more integrated and liberalised logistics environment will enhance the competitiveness of the ASEAN single market and production base. These goals are engendered in the ‘Roadmap of Logistics Services Integration’ in ASEAN, which includes specific measures on trade liberalisation, trade and logistics facilitation, service provider, human resource and multimodal transport. The Thai-Japan Food Supply case study, where the logistics services is controlled by the importing country, shows how an integrated model of supply chain which spans infrastructure and facilities (i.e. cold storage, handling of agricultural produce, networks of storage, information network), institutions (government policies, regulations, food safety standard), businesses (quality standards, cost reliability, perception, information flow) and consumers could be improved to enhance food security across the supply chain.

Key Regional Players: Benefits and Challenges to Food Security

Zooming in on the biggest economies in the region, there is concern that the rise of China will put immense pressure on international markets and importing countries, putting their food security at greater risk. India, on the other hand, is the only country in the region to have legislated food security but this has raised questions and debates as to the impact on its domestic economy and food security.

China: In the early 1990s the projected growth of China and its impact on trade and regional food security had drawn dismal predictions. However, these predictions have not materialised. Instead China has been able to adequately meet its demand for food. Throughout the past 25 years China’s economy continued to grow at a rapid rate. The agriculture sector accounted for a notable share of its growth at 4 per cent annually. This corresponded to about five times more than the country’s population growth. Such sustained growth had made China a net exporter. However, recent figures in China, recording an increase in imports exceeding exports, are setting off alarms across the region. Concerns are being raised as to whether China will be able to meet its increasing demand for food. Given the emerging dynamics of China’s economy and its implications it is essential to understand this major driving force that could impact regional food demand and supply.

20 per cent of the world’s population live in China. However only 8 per cent of China’s land area is cultivated. Four main factors that impact agricultural growth and ensure food security in China were identified. These are: institutional reforms, technological change, market liberalisation and investment. Through institutional reforms the total factor productivity in China, particularly in grains, recorded a 50 per cent increase from 1979 to 1984. These reforms had been pivotal in easing food demand and fuelling agricultural growth. While technological advancement has been beneficial in improving farmers’ income, market liberalisation has helped farmers get cheaper input prices and higher output prices. Significant government investment has also effectively propelled agricultural growth in the country. The Chinese government provided huge amounts of decoupled subsidies, particularly in grains, machinery and aggregate input. In 2012, the total subsidy amounted to 164.3 billion yuan (US\$ 26.1 billion), which is equivalent to 3.13 per cent of agricultural GDP.

Taking into account these major drivers, what are the future prospects for China and the region? The decrease in China’s population growth rate will have limited impact on food demand. What is of greater concern is the increasing mobility towards urban areas and income growth which could influence food consumption patterns. China will also benefit from investment in farming technology and agricultural research and development (R&D). As for key commodities, projections show that China will achieve self-sufficiency in rice and wheat but demand for maize and soybean is expected to rise. Increments in demand will be compensated through existing trading partners in North and South America, which eases pressure on food imports by other countries within the Asian region. Projections also indicate that Asia will gain from the demand surge in palm oil and tropical products from China.

India: India’s National Food Security Act (NFSA), passed in 2013, generally seeks to provide food and nutritional security by means of providing sufficient amount of food at affordable prices. The act aims to subsidise the monthly food grain needs of about 75 per cent of the rural and 50 per cent of the urban poor population. While the objective is greatly applauded, the act was plagued with much criticism and politically charged debates. Given the size of India’s economy, it is essential to understand the conditions that instigated the enactment of NFSA to gain deeper perspectives of the country’s food security challenges and their wider implications on its fiscal capacity.

India's labour market followed a different trajectory from other countries, which posits impact on the growth and development of its agricultural sector. Based on census data in 2001 and 2011, the country's workforce participation rate recorded decline from 74 per cent to 71 per cent respectively, while marginal workers (with employment for less than six months) increased by 3 per cent. Proportionate to the total number of workers, is a huge increase in the percentage of agricultural labourers. Corresponding to the rise in agricultural labour is a decline in the proportion of cultivators particularly in areas with highest poverty concentration. Such labour market outcome affirms India's dependence on the agriculture sector (with 55 per cent of labour market engaged in agriculture) and also raises concerns on the glaring gap in numbers between agricultural labourers and cultivators.

Looking at more important indicators of growth, there is less movement of labour from low to high productivity activities, which results in slower rates of increase in agricultural wages. Employment mismatch and dissatisfaction is also evident from a survey conducted in 2003 that indicated 27 per cent of farmers did not like farming because it was not profitable and 40 per cent of farmers are open to taking up other employment options. The unemployment growth trend has not improved with economic growth and has veered significantly apart from the economic trajectory when compared with other countries, and this has provided part of the context towards the food security act. However providing food and agriculture subsidies do not completely tackle the root cause of the problem, which is the sluggish performance of the labour market. The enactment of NFSA does not provide an automatic mechanism that will increase

income and wages to improve economic access to food. As earlier discussed income growth weighs in substantially in improving food security. Thus to ease constraints in the agriculture sector it is of crucial importance to fix problems in the labour market.

While NFSA addresses the country's food security and growing hunger and malnutrition problems, the act remains a directive principle and not a fundamental right. This poses certain disadvantages in the legal process and litigation because fundamental rights hold greater power than directive principles, in the event of violations. Criticisms also hover heavily on the main implementation mechanism of NFSA, which is the Public Distribution System (PDS). The PDS is structured in such a way that the central government handles procurement of food grains and farmer subsidies while the state governments separately identify eligible beneficiaries and manage distribution. The PDS system has been regarded as 'broken' and problematic, raising questions on implementation and governance as well as emerging problems on procurement and distribution. Regulations on access to food entitlements vacillated repeatedly from targeted to universal access to food by eligible households. This has resulted in overflowing food grain stocks in storage. The government has also been widely criticised in its food grains procurement methods and its inefficient system of identifying beneficiaries. As reports on leakages, rotting food grains as well as hunger leading to litigation become prevalent, both the central government and respective state governments will have to step-up to address the problems and improve food security in the country.

Discussion

- The Asian region can benefit substantially from the ASEAN Economic Community 2015 but there remain impediments and constraints that could hinder the goal of becoming a globally competitive single market and production base. ASEAN member countries reflect diverse legal traditions. Such differences heavily impact implementation of rules and regulations at the national level. Another key constraint is the emerging barriers from Non-Tariff Measures (NTMs), which mostly relate to procedures, processes, transparency and inter-agency coordination. Emphasis was also on the evolving nature of NTMs that encompasses the whole supply chain (for example, a halal supply chain). The issue of NTMs is not so much on its existence, since these measures will always be present, but more specifically on reform of the processes and efficient implementation of the measures. Broadly speaking, what matters for the region is not particularly the target deadline but the incremental progress and the continuing efforts post-2015.
- Both China and India remain key influencers in the region. However several distinct issues and emerging trends should be further addressed to enhance regional food trade and food security. The involvement of the private sector in building food information technology systems is a step forward in enhancing India's public distribution system. However India's deadlock on global trade facilitation agreements puts up barriers to food trade.
- In contrast to India, the private sector in China is not really encouraged by the government. There are private companies engaging in crop production but this mostly requires huge capital investment in order to sustain operations. Other related sectors like livestock, fisheries, poultry and custom service for farmers benefit more from the involvement of the private sector in China. In terms of factors affecting food demand, population policies will have little impact but the growing affluence in the country may shift demand for more diversified and high-quality food, particularly away from rice. These emerging concerns and challenges clearly convey how the domestic economy and agriculture sector of the biggest economies in the region could create major impacts in food trade and consequently regional food security.

Box 3. Recommendations and Considerations for Policy Directions

- With globalisation of trade, regional trade agreements, and international supply chain networks, it is no longer relevant to think of food security from a strictly national/ domestic perspective.
- Regional integration can potentially bring major benefits in food and agricultural trade. However issues of customs, food safety regimes, transparency, and corruption (to name a few), remain and will have to be addressed internally by countries involved, as well as collectively, in the region.
- Trade facilitation and economic integration can be powerful instruments in ensuring food security. Under the ASEAN Economic Community starting 2015, the ASEAN member states can improve their food security through improving trade logistics and supply chains (cold storage, handling, storage, information networks, food safety and quality standards).
- The most populous nations, China and India, are likely to have major impacts on global food trade should they enter the international markets for imports. Based on current projections, China is expected to import more soybeans and corn from the international markets. India is likely to be sourcing for more pulses and edible oils. Monitoring and ensuring greatest possible levels of food security in these two countries will, by extension, be essential for food security in the rest of the world.

SESSION 4: FINANCING AND INVESTING IN AGRICULTURAL INNOVATION AND TECHNOLOGY

The panel explored the importance of providing robust financial support to agricultural research and development, and the possible challenges that will have to be faced to realise it.

Investing in agricultural research and development

It has already been forecasted that global demand for rice will steadily increase by eight to 10 million metric tons annually. Meanwhile, growth in global rice yield has significantly slowed due to worsening scarcity of land, labour and water resources. Furthermore, climate change is expected to reduce annual grain production. Increasing temperatures, rising sea levels, changes in rainfall patterns and weather hazards could destroy crops and farmlands. Therefore, in order to ensure food and nutrition security for all today and in the future, it is crucial to substantially invest in agricultural research and development. International funding for agricultural development as a whole, and more specifically agriculture and rice research, has gone through highs and lows over the past 40 years. The drivers of such ebbs and flows have included fears of famine in the 1950s. These fears subsided with progress achieved in the “green revolution”, but were stoked again by the food price crises of the late 1990s.

Research and development (R&D) in hybrid rice has been considered a public good as it is primarily aimed at raising rice productivity and making rice varieties resilient to the effects of climate change. As a form of adaptation to climate change, the International Rice Research Institute (IRRI) has been developing rice varieties that are more resilient to drought, submergence/flooding, salinity and heat. In terms of climate change mitigation, IRRI has several projects to make rice varieties more efficient in water-use and fertiliser uptake.

However, financial support, in the form of official development assistance (ODA), for R&D is lacking. ODA to agriculture, particularly from major donors such as the EU, US and Japan, has been falling over time. International resource flows emanating from loans, portfolio equity, remittances and foreign direct investments have grown rapidly over the years, while ODA has remained stagnant. ODA to agriculture as a share of total ODA has been declining, from 8.5 per cent in 1980 to 2 per cent in 2006. Moreover, most of the ODA funds for agriculture are already allocated to food aid, health and debt relief. This is a reflection of agricultural complacency, when the world is getting enough crop yields, funding for R&D fall in real terms. It was highlighted that the return on investment from R&D is at least 40 per cent, with a huge potential to contribute to the eradication of hunger in impoverished rural communities which can outperform other forms of intervention. For every US\$1 invested, at least US\$9

worth of additional food is produced in developing countries. IRRI research for instance, delivered benefits of US\$1.46 billion per year and boosted rice yields by an average of 11.2 per cent per year in Southeast Asia. The average benefit the Philippines obtained is US\$52/ha/year; Indonesia and Vietnam earned US\$76/ha/year.

A US\$20 investment in rice research will lift one person out of chronic poverty. R&D, in the long-run, will uplift farmers from poverty and encourage the current and future generations to have greater interest in farming. The international development community needs to understand and appreciate the long-term nature of agricultural research, particularly in response to the challenges of ever-growing populations, diminishing resources, and the impacts of climate change. International mechanisms that ensure significant and stable assistance for scientific research in support of inclusive and sustainable security in nutrition and food must be crafted. Progress in international policy and programming for agricultural research, coupled with more open trade, will go a long way in enabling the global community to share in the immense benefits from advances in agricultural science.

The role of private equity

The Food and Agriculture Organization (FAO) estimated that in order to achieve global food security, the developing world needs to double its food production, requiring US\$ 83 billion in investment annually; current annual investment stands at US\$ 55 billion, with an annual shortfall of US\$ 28 billion. The majority of this will likely be met by the private sector with the rest being met by governments.

It is hoped that private/venture capitalists can invest in the agriculture sector through private equity in order to reinvigorate the sector, making it more competitive and efficient. Asia faces a wall of structural supply and resources constraints. Investment opportunities, while complex, will be abundant, arising from both a supply shortage as well as major dietary shifts. Changes in Asian dietary preferences present many exciting investment opportunities, extending sector-level structural supply-demand dislocations. Asia is the world's biggest consumer food market with a market value of US\$ 5.9 billion.

In contemplating whether to invest in agriculture the private sector must consider major systemic shifts in Asia. There is strong growth in demand in Asia as unprecedented economic transformation with 40 per cent of global population spending at least 40 per cent of their new dollars on food. There are accompanying major dietary shifts with rapidly increasing

dairy and protein intake. These changes provide many attractive investment opportunities as supply-demand dislocations play out.

There are other constraints that the private sector must also take into consideration. These are prolonged and severe periods of underinvestment, global warming and weather extremes, falling crop yield growth and 'glass ceiling' crop yields, arable land scarcity, and water scarcity. These constraints are also exacerbated by the diversion of food for fuel. These constraints that have resulted in deteriorating supply-demand dislocations have reverberated across the agriculture industry and its value chains, creating attractive investment opportunities for financial investment. While there is a long-term uptrend in the Asian food and agriculture industry, it is important to understand the myriad of secular and cyclical drivers that provide investment opportunities at different 'hotspots' of relevant value chains.

Possible areas of private sector intervention include the food supply chain, storage facilities, food production, marketing and micro financing. But many food and agriculture value chains are not represented on the region's stock exchanges where it amounts to only about 5 per cent of market capitalisation. Thus, it is viewed that private equity is a highly efficacious mode of accessing these value chain opportunities in Asia due to prevailing levels of market development and specific value chain characteristics. Private equity fund managers or companies which are focusing on food and agriculture investments assist potential investors in analysing the sector by conducting in-depth research on relevant state policies and the complexity of the domestic agriculture sector. They help the private sector assess whether investing in the agriculture sector is viable and profitable. Investors venture into agri businesses based on private equity fund managers' proprietary research and targeted deal origination as to which sectors of the value chain that fund managers believe investors will earn attractive returns. The investment attractiveness of each business model in the agribusiness sector is largely determined by the unique fundamentals of respective value chain segments in different geographies and sub-sectors.

Insurance and micro financing

It was emphasised that agriculture is a risky business, primarily due to the harmful consequences of climate change such as extreme weather events. Poor farmers are the most exposed to risk and the most vulnerable to different

shocks which accentuate their need for insurance. There are significant benefits of insurance. It secures liquidity as there will be fulfilment of obligations in case of a disastrous loss. It therefore helps farmers avoid sale of productive assets and reduce their reliance on government post-disaster aid. Insurance enables investments to flow into the agriculture sector. It allows farmers to invest in other crops, fertilisers, machinery, and irrigation and reduces risks for investors. Insurance also provides access to credit. It can be used as collateral for credit without a need to pledge other assets.

There are various factors that are needed for a sustainable agriculture insurance scheme for smallholders. Insurance should be cost effective which entails effective distribution (alternative channels), effective claims adjustment processes and effective administration which uses mobile platform for policy administration and payments. Insurance must also be supported by the necessary infrastructure such as access to data/statistics and accessible and user-friendly payment systems. Incentives, such as premium subsidies and a conducive regulatory environment, must also be made accessible for insurance companies to motivate them to reach far-flung rural areas.

However, getting insurance, particularly paying the premiums, is already too expensive and complicated for farmers. Governments therefore can help farmers and intervene through subsidies which can then be used to pay the insurance premiums. A national crop insurance policy which guarantees stable income for farmers in spite of unpredictable weather phenomena, can be set up through the vibrant partnership between the state and the insurance sector.

Micro financing is also crucial to provide the farmers with seed money which they can use to either innovate farming practices or rebuild their livelihoods after a disaster. However, just like insurance, micro financing is also inaccessible for many farmers. As a competitive and cost-effective strategy, major banks focus on large scale loans instead of providing small scale loans to smallholder farmers. Banking infrastructure in the rural areas remains poor. Non-governmental organisations (NGOs) such as the Association for Social Advancement (ASA) in Bangladesh can help disaster-prone rural communities gain access to micro financing.

Discussion

- One major challenge for the private sector in dealing with governments is that most civil servants do not have prior knowledge of insurance and micro financing. Hence, it is difficult for the private sector to meaningfully engage them in the provision of such assistance to farmers. Therefore, there should be substantial investment in capacity-building of relevant government officials and employees with willing assistance from the private sector.
- A clear and market-friendly regulatory framework should also be institutionalised by states to facilitate innovation in distributing insurance and micro financing through a mobile platform and multilateral financial institutions (MFIs). In some countries, MFIs are still not allowed to distribute insurance policies.
- While capacity-building may take time to take effect, there are reforms that can be easily done to make insurance and micro financing widely accessible. For instance, by increasing coordination among government agencies.
- The public and private sectors should be able to harness their resources to sustainably finance R&D in the agribusiness sector. It is incumbent upon governments to provide the seed money in R&D. Governments can package an interesting and profitable project that a private sector investor could look at and participate in. There are ways to manoeuvre this arrangement as the private sector has the capacity to engineer the appropriate public-private partnerships.

Box 4 Recommendations and Considerations for Policy Directions

- Investment in agriculture has been proven to yield very favourable results and returns, especially in terms of establishing food security. Since governments have limited financial capacity, greater commitment from governments is necessary to create greater space for the private funds to play more roles in closing the gaps in financing R&D in agriculture and food sectors.
- Asia offers great opportunities for investments in food and agriculture sectors. This is due to increasing incomes, wealth, and growth rates in the region. It is therefore important to build a favourable environment for private sector investments since there is an awareness of attractive returns that the sector offers.
- Provision of insurance and micro-financing is critical for producers to have access to seed capital as well as to hedge against potential losses and risks. This will be increasingly important when the predicted impacts of climate change are taken into consideration.

SESSION 5: CHARTING AN INTEGRATIVE APPROACH FOR ASIA TOWARDS 2025

Session 5 comprised of presentations centred on ideas and directional imperatives which Asia will need to consider in order to reduce food insecurity by 2025. The session offered perspectives from research and development (R&D) institutions, the private sector, as well as non-governmental organisations who are often first responders in the event of disasters and/or calamities.

Rice will continue to be the key to Asia's food secure future

Rice is unsurpassed as the main staple food of Asia. It is both mainly produced and consumed in Asia and is often considered the most strategic crop for most countries in the region. Given the prevalence of rice in the Asian diet the future of Asia's food security is inherently tied to this crop.

Throughout the years, both Asia and the world have continued to see growth in the demand for rice. This has been driven by both increases in population as well as increase in the consumption per capita for many developing countries. However, demand for rice increases while the effects of climate change such as varying rainfall patterns and sea level rise are negatively impacting the production of rice. Most of the rice today is grown in delta regions, which unfortunately also happen to be areas which are most vulnerable and at risk due to climate change.

There are also other serious constraints. Increasingly, there is less land, water and labour which are essential for production. Under these environmental as well as socio-political constraints, Asia has to try and increase the supply of this staple crop.

The Green Revolution in the 1970s played an important role in being able to boost the production of crops to ensure enough food supply for everyone. The rice revolution in Asia which saw yield increases contributed significantly. The yield growth and production has however started to plateau in recent years. In order to be able to provide enough food in the future, a second green revolution will be required.

Science and R&D are going to be of critical importance in achieving this. The study of soil biology and chemistry will need to come together even closer to better understand and manipulate the potential of sustainable rice production. Recent improvements in technology offer unprecedented computational capacity; remote sensing, satellite monitoring capabilities, and superior modelling techniques will also have to be increasingly used. There are other opportunities which advancements in information and communications technology offer which will also need to be tapped to make the production of rice and food more efficient and productive.

Genetic engineering will also play a major role. At present the International Rice Research Institute (IRRI) situated in Philippines already has over 110,000 different varieties of rice. Suitable and favourable traits from this vast collection will need to be combined to develop varieties which will be more resilient to future climate and non-climate shocks. Such rice varieties already in development at IRRI are often referred to as "climate-ready" rice.

Adoption and use of climate-ready rice has started and this will need to continue into the foreseeable future. Every year it is estimated that some 10 million hectares of lowland rice get submerged as a result of flooding or adverse weather. Similarly millions of hectares are affected by drought or late onset of the monsoons which can significantly affect the total production. Seeds which are resistant to flooding as well as drought conditions will have to be increasingly put to use.

The other side of climate-readiness will be in managing rice production with less water resources. High levels of water stress are expected in many regions of Asia which is driven by both socio-economic development as well as climate change. The future of farming, especially that which is heavily water dependent like rice, will need to be re-examined in light of these changes. On the other hand rice cultivation is also known to be a major contributor to greenhouse gas emissions. Climate-ready rice will therefore also need to have reduced emission levels.

A major aspect of food security in the future will be the high dependence on the availability and access to real-time information for policy makers, traders, and consumers. The advancements in technology combined with improvements in the soil science, seeds and environment will be able to mitigate possible negative impacts in the future. It is through such improvements that we can look forward to having a rice secure, and ultimately, a food secure Asia.

Indexing, benchmarking and better monitoring for food and nutrition security

Food security is a complex and dynamic issue which involves multiple dimensions, disciplines, actors, processes and systems. It is thus often challenging to assess the food security situation in a holistic manner taking into consideration the availability, accessibility, and utilisation aspects which constitute "security". Some kind of integrative technique and metrics to measure the level of security between countries and regions is needed and can serve as a useful tool to better understand and address food security needs and concerns.

Availability, access, affordability, and the inter-relatedness of quality and safety are also becoming more important in food security assessment. To get a better understanding of how food security really works, there is also a need to better understand macro- and micro-nutrient issues which fall largely within the quality and safety dimension of food. Such an approach will also help in grappling with the problem of obesity which is rapidly affecting not only developed countries but increasingly developing countries as well, and especially middle income countries such as, Brazil, China and Malaysia.

Indexing and benchmarking of food security will need to consider the natural environment, macroeconomic policies, health dimension, trade policies, tariffs, political stability, as well as emergencies and natural disasters. An index which accounts for all these dimensions which impact food will help in establishing the baseline to compare food security situations between various countries or regions. It could also be useful in understanding and comparing the state of food security in the same country over a period of time or from one year to the other.

One of the major problems faced globally has been the issue of food waste. It is estimated that one of every four calories of food produced today is wasted. This is a high percentage of loss which if reduced could help in increasing food availability. There is good scope for the development of monitoring tools and metrics to keep tabs on wastage and losses of food.

Lastly, tools like indices would also help in better guiding investments and R&D in sectors that need the most amount of attention. Such collaborative approaches and tools will go far in diminishing food security in the short, medium, and long-terms.

Reducing food insecurity during and after calamities and disasters

Often times the most food insecure people are found in regions and areas which have been hit by disasters and calamities, both man-made and natural. Asia has continued to see higher numbers of people being affected by emergencies and disasters over the years. Ensuring steady and stable supplies of safe food to victims and affected populations is an area which Asia will need to carefully consider and plan collectively to deal with.

Other than making physical stocks of food available in disaster areas, countries and agencies dealing with the aftermath and food insecurity issues will need to think about efficient and effective modalities in addressing the issues. The means of providing food, by either physically distributing food or by providing food vouchers or cash transfers is something that will need to be closely assessed and implemented effectively. Ideally, provisions for all the above options should be put in place, so that any of these strategies might be used as and when deemed useful or necessary.

Secondly there is also a need for greater proactive rather than reactive planning in the region. One of the suggestions is to build up and maintain small strategic stockpiles of food in regions prone to or deemed vulnerable to disasters and calamities. Such a stance would also force governments and policymakers to give more attention to vulnerable areas and people, and also help in planning and preparation before hazards occur.

Discussion

- Given the importance of rice in ensuring long term food security in Asia, part of the discussion focused on the potential improvements to nutritional value of new rice varieties. While rice fortified with Vitamin A, or Golden Rice as it is more commonly known, is still going through extensive testing, questions on whether protein can be added to white rice was discussed. There was also mention of whether current rice varieties can be engineered to reduce the potential for development of Type II diabetes which is increasingly becoming an epidemic around the globe. It was highlighted that in order to try and modify rice to such an extent is a considerable challenge and would require significant funding for research.
- It was also noted during the discussion that the role of fisheries is going to become more important in the future of food security. This is going to be especially true with regards to Asia, where fishing is an important form of livelihood and fish constitutes a major part of many people's diets. Currently fish stocks and fisheries are experiencing significant environmental challenges as well. Given this important role of fisheries in Asia, coastal resource management will have to be part of the debates and discussions surrounding the future of Asia's food security. More attention and focus might also be needed on exploring co-farming of rice and fish and other such innovative ideas and practices.
- Lastly, it was highlighted that when quantifying food security and developing indices, the addition of social protection and other social factors becomes critical. These are however not always easy to quantify. Nonetheless social dimensions and protection will be critical in order to obtain a full assessment and measurement of food security.

Box 5 Recommendations and Considerations for Policy Directions

- Rice, the most important food commodity in Asia continues to face challenges. Greater investments in R&D to develop new varieties which can produce higher yields and be less vulnerable to climate change will be critical for Asia's food security in the future.
- Some kind of emergency buffer stock for key commodities like rice and other staples is desirable to ensure availability of food during disasters and calamities.
- Indexing and benchmarking can be useful comparative tools. However there is a greater need to not only index food security, but potentially nutrition, hunger, wastage and losses, and other related areas to get a better perspective on the levels of food insecurity within countries and in the region as a whole.

CONCLUDING SESSION: WAY FORWARD—REGIONAL COOPERATION FOR FOOD SECURITY

This session aggregates the major food security themes and challenges. The discussion also charts the next steps for Asia and ASEAN regions and highlights policy recommendations with regard to food security. The perspectives from a development bank were also given strong emphasis in this session.

Challenges in Ensuring Future Food Security

There are a range of food security related issues that have been shared and raised but emphasis is given to four emerging challenges that impact future food security in the region. The concept of food requires rethinking because agricultural policies have failed to take into account the changing patterns of food consumers and the evolving components of food. In the past, food security mainly connoted required caloric intake but now the concept spans nutritional concerns and safety issues. It is also important to note the link between food and safe production, for instance, the use of pesticides on food crops must be closely monitored. Furthermore, based on an Asian Development Bank (ADB) study, aggregate Gross Domestic Product (GDP) in the Asian region will account for more than half (52 per cent) of the world's GDP. This growth forecast is based on the fact that about 3 billion Asians will move up to the middle class. The changing affluence and lifestyles of the population will also bring about corresponding changes in patterns of food consumption. Consequently this points to a range of different issues and scenarios in food security that will need to be addressed by the region.

The current use of water and land resources has already surpassed sustainable levels. Such environmental degradation will trigger substantial losses in food supply capacity by 2050. Climate change and natural disasters will also adversely affect developing countries in the region, in particular, a significant percentage of irrigated crops. The widespread effects of such environmental vagaries on food security require further investments in climate change adaptation and mitigation projects.

It is also important for the future of food to adopt a new business model for agriculture. With reference to the structural transformation of developed economies, the trajectory shifts from agriculture to industry then to the services sector. Such transformations bring about a corresponding increase in income. However, in the Asia-Pacific region, around 40 per

cent of labour remains dependent on the agriculture sector with relatively marginal contribution of 10 per cent to GDP. It is thus crucial to develop a business model that would increase productivity in the agriculture sector. This new model must also take into account rural-urban movements by 2030-2040. Such movements result in rural farm population and potential agriculture labour reductions. The decline in farming populations also relates to the low aspirational value of farming. It is thus important to create opportunities that will attract a younger labour force into the agriculture sector. Increasing farming productivity and promoting agribusinesses will generate more commercial opportunities for farmers. Given the efforts toward market integration in the ASEAN Economic Community (AEC), there is huge potential to create lucrative business opportunities in agriculture.

Equally significant for future food security are the segments beyond the farm gate. These post farm gate segments of the food value chain have been effective in generating value additions for the agriculture sector. As such it will be beneficial to increase investments to upgrade related food value chain infrastructure such as food storage, railways, power grids, mobile phone communication, and logistics distribution. To transform productivity and enhance world food systems it is also essential to minimise food losses across the supply chain, which will require further investment in post-harvest operations.

Way Forward for Regional Food Security

In order to effectively address future food security challenges, there is a need to drastically transform the entire food supply system from “seed to fork”. This new system will have to be defined by higher productivity, deeper integration, higher efficiency and better resilience to shocks. Innovation will prove to be of critical importance to successfully attaining such transformations.

Developing and disseminating innovative technologies will be instrumental in increasing crop production per hectare, per litre of water used, energy per kilo watt and per farmer hours worked. This can be achieved through more extensive research and development (R&D), hence the need for greater support and funding for agri-food research. One of the means to increase investments in agricultural R&D is through partnerships involving the public and private sectors.

There is also a need for more infrastructure investment which is currently ADB's area of focus. The Asian region will have to upgrade infrastructure to integrate fragmented markets, reduce transaction costs and disseminate resource saving technology across the value chain. In Asia, the majority of agricultural markets are not fully integrated, which often stems from a lack of interest. This is why investment efforts need to be focused on developing storage technologies, market infrastructure, cold chains, and processing facilities, all of which are essential components that link different markets. Improving infrastructure along with logistics services and institutional capacity will enhance physical access to food.

Logistics innovation backed by institutional capacity building is essential to aggregate and manage the quality of products generated by smallholders. This is particularly beneficial for the Asian region because 90 per cent of the farms are cultivated by small holder farmers. They produce the bulk of food distributed across the value chains. Their successful integration into the commercial food value chain will be key to improving food security. Logistics should also be adapted to the needs and prevailing conditions of the market and consumers. For instance it has become essential for emerging value chains for high value crops that cater for urban elites to involve more sophisticated logistics arrangements and vertical integration of value chains.

From a development angle, good policy and regulation are imperative. The region particularly needs an efficient regulatory environment for developing agricultural technology and enabling policies to provide adequate incentives for sustainable business development. Policies will also be crucial in improving water and energy resource use, enhancing trade, and correcting market distortions. There is a need to ensure that agricultural policies and regulations adequately address evolving issues in relation to food production, storage and consumption.

Fundamental investments in agriculture are required for successful upgrading of food value chains. Agricultural investment is a significant area of strength for multilateral agencies like the ADB to consider. In the past, there have been a number of investment projects devoted to the agriculture sector supported by ADB in collaboration with other international organisations such as the Food and Agriculture Organization (FAO). However in recent years it has become a challenge to find investment-worthy projects.

In Asia, the access to formal financing for smallholder farmers remains a key constraint. Smallholders have often been limited to microfinance loans that provide them with too small an amount to address their needs. Governments should look more closely in creating agricultural policies that would incentivise poor smallholder farmers beyond micro-finance. Collaboration and partnership from public and private sectors to support farmers and agriculture in general should also be further explored.

Regional Cooperation for Food Security: Recommendations

The region remains strongly committed to achieving cooperation and integration. This has been manifested through robust trade, cross-border investments and proliferation of cross-border agreements within the region. Regional integration likewise is engendered in the ADB mandate, which involves developing connectivity across countries. This is why most of the agency's support and investments were directed towards improving infrastructure capital such as transport, road, and railways. Sub-regional programs also open up opportunities for cooperation and promotion of common interests in infrastructure, trade and public goods between the sub-regional groupings of Southeast Asia such as the Greater Mekong Sub Region, Indonesia, Malaysia and Thailand-Growth Triangle (IMT-GT) and the Brunei, Indonesia, Malaysia and Philippines - East ASEAN Growth Area (BIMP-EAGA). Utilising market-based approaches enables institutions like the ADB to fill gaps in technology, infrastructure and institutions for food sectors across the region.

Enabling policy and regulatory environments are a crucial part of regional trade and cooperation. Bottlenecks within cross-border trade are major constraints in the region and this will have grave repercussions on food trade. It is important to harmonise policies and regulations and ensure transparency. Also, part of ADB's directive as a regional development bank is to coordinate actions toward generating regional public goods that could benefit the region. One example is provision of food safety standards and quality assurance among other regional food programmes. From a regional bank's perspective, with a mandate and vision for development and poverty reduction, significant efforts and funding have been dedicated to food and agriculture in general. However, there is a need to address the challenges and provide more support for the improvement of food security in the region.

CLOSING REMARKS: TOWARDS ASIAN FOOD SECURITY BY 2025

While many dimensions of food security have been highlighted, little has been done in terms of concrete policy action. The question of why this has been the case remains unanswered. The fact that the conversation has been kept alive through events like ICAFS is noteworthy and will hopefully continue to stress the importance of effective policies.

It is clear that food security is a multi-sectoral, inter-agency, transnational issue which requires collaboration and collective action in order to address future food problems. In other words, food security is everybody's business, from communities, businesses, governments, farmers, policy makers and so on. The issue of collective action remains a challenge especially when there are so many divergent sectors and stakeholders. It is therefore little wonder that food security often times still remains within the narrow domain of agriculture ministries in most countries.

In terms of the conference theme "Towards 2025: Technology and Policy Imperatives", 2025 was chosen for a number of reasons. From a national planning standpoint, a decade usually represents a good medium-run timeframe for policies to be formulated and implemented. At a regional level ASEAN's post 2015 agenda will also be looking at a 10 year time-frame. Lastly, IFPRI, the world's leading food policy research centre has also chosen 2025 as the time period by when the world should aim to eradicate hunger and malnutrition. Hence there seems to be a good convergence on this particular date; one we should all, as institutions and individuals, commit to making the region and world less food insecure.

With regards to technology, presentations over the two days successfully demonstrated the promise and attractiveness of technology in potentially helping reduce food insecurity in the future. However it was also clear that despite already having quite a number of science and technology options to improve the current situation, many governments have been reluctant to take concrete steps towards its full adoption and realising its benefits. Why this has been the case is something that policymakers and scholars will need to continue exploring.

Box 6. Final Remarks

- As a continent, Asia is still very much dependent on other regions of the world for its food supply. Asia currently takes on average about 80 per cent of the world's surplus soybeans and 30 per cent of the world's surplus maize.
- All current trends and projections suggest that Asia will continue to demand and import more food in the near future. This will continue to impact and change the global supply and demand dynamics.

- There is increasing awareness not just about food security but also about nutrition security and how the latter is an important component and cannot be excluded from our understanding of the former.
- There is now an increasing awareness about losses and wastage and how these issues supplement and bolster our understanding in terms of productivity and production of food that is required for the future.
- The conference clearly highlighted the need for a significant re-connection of disconnected dots - between various stakeholders and sectors in the field of food and agriculture.
- There is quite a bit of excitement and interest being generated by increasing connectivity within the Asian region, whether it is through mechanisms like the AEC or major trans-boundary infrastructure projects. However, increasing connectivity means the issue of bio-security becomes extremely important.
- With increasing connectivity, some questions which confront the region were highlighted. These include whether we have the necessary infrastructure to address the potential problems of easier movements of pests and diseases, and the question of vulnerability of supply chains on a regional scale as a result of outbreaks.
- In terms of the discourse on food security, there still seems to be differences in the approaches when thinking on a national versus regional scale. The question of whether a regional or sub-regional (for example, Mekong subregion) approach to food security is more ideal compared to a national approach is indeterminate.
- One of the major challenges for Asia will be on how to tap private equity to support public sector works or future research. This will be essential for the development of infrastructure and the promotion of R&D to address food security challenges of the future.
- Lastly, the role of science and technology cannot be side-lined when thinking of the future of agriculture and the production of sufficient and nutritious food for all.

ICAFS 2014 PROGRAMME

21 August 2014 (Thursday)

Meeting Room: Grand Ballroom II (Level 4)

08:00 – 08:55 Registration

08:55 Arrival of Guest of Honour

*Dr Mohamad Maliki Bin Osman
Minister of State
Ministry of National Development and
Defence, Singapore*

09:00 – 09:30 Opening Ceremony

*Guests to be seated by 8.55am to
welcome the Guest of Honour*

09:00 – 09:10 Welcome Remarks

*Amb. Barry Desker
Dean, S. Rajaratnam School of
International Studies;
Nanyang Technological University, Singapore*

09:10 – 09:30 Opening Address

*Dr Mohamad Maliki Bin Osman
Minister of State
Ministry of National Development and
Defence, Singapore*

09:30 – 10:00 Photo Opportunity & Morning Tea

10:00 – 12:40 Session 1: Asia 2025 – Trends and Challenges to Food Security

Chairperson

*Amb. Barry Desker
Dean, S. Rajaratnam School of
International Studies;
Nanyang Technological University, Singapore*

10:00 – 10:25 Ending Hunger and Undernutrition in Asia by 2025: What Will It Take?

*Dr Shenggen Fan
Director-General
International Food Policy Research Institute
(IFPRI) Washington DC*

10:25 – 10:50 Food Security in Asia: The Role of the Private Sector

*Mr Davor Pisk
Chief Operating Officer, Syngenta*

10:50 – 11:15 Financing Agricultural Innovation and Technology – Farmers' Perspective: Towards Improved Security in Asia by 2025

*Mr Edwin Y. Paraluman
Farmer and Coordinator of the ASEAN
Farmers Regional Network (ASFARNET)*

11:15 – 11:40 Food Security Challenges Faced by Developing Asian Countries and Responses towards 2025: The Case of Indonesia

*Dr Achmad Suryana
Former Director-General, Indonesian
Agency for Food Security, Ministry
of Agriculture;
Research Professor in Agricultural Economics
and Policy, Indonesian Agency for Agricultural
Research and Development*

11:40 – 12:40 Q & A

14:15 – 17:30 Session 2: Supply and Demand – Improving Productivity Growth and Supply Chains

Chairperson

*Dr Siang Hee Tan
Executive Director, CropLife Asia*

14:15 – 14:40 The Post-2015 Agenda on Hunger and Malnutrition

*Dr Jomo Kwame Sundaram
Assistant Director-General for Economic and
Social Development, Department of FAO*

15:05 – 15:30 Modernizing Food Supply Chains as an Integral Necessity to Assure Food Security

*Dr Rolando Dy
Executive Director, University of Asia & the
Pacific Center for Food and Agribusiness*

15:55 – 16:30 Afternoon Tea

16:30 – 17:30 Q & A

17:30 – 18:15 Cocktail Reception

18:15 – 20:15 Conference Dinner Sponsored by Syngenta
(Waterfront Ballroom, Level 2)

22 August 2014 (Friday)

Meeting Room: Grand Ballroom II (Level 4)

08:30 – 11:00 Session 3: Market Integration, Trade and Economic Access to Food

Chairperson

*Prof. Mely Caballero-Anthony
Associate Professor
S. Rajaratnam School of
International Studies (RSIS);
Head, RSIS Centre for Non-Traditional
Security (NTS) Studies, Nanyang
Technological University, Singapore;
and Former Director, External Relations,
ASEAN Secretariat*

08:30 – 08:55 Post-2015 Impact of the ASEAN Economic Community on Food Security

*Dr Ponciano Intal Jr.
Senior Researcher
Economic Research Institute for ASEAN
and East Asia (ERIA)*

08:55 – 09:20 Impact of Trade Facilitation, Logistics and Services Liberalisation Reforms on the Food Supply Chain

*Dr Ruth Banomyong
Associate Professor, Faculty of Commerce &
Accountancy Thammasat University, Thailand*

09:20 – 09:45 China's Role in the Future Food Security Situation of Asia: A Threat or an Ally?

*Dr Jikun Huang
Founder and Director of the Chinese Centre
for Agricultural Policy for China*

09:45 – 10:10 India's Food Security Bill: A Retrospect

*Prof. S. Chandrasekhar
Associate Professor
Indira Gandhi Institute of
Development Research*

10:25 – 11:00 Q & A

11:00 – 13:20 Session 4: Financing and Investing in Agricultural Innovation and Technology

Chairperson

*Prof. Paul Teng
Senior Fellow and Advisor (Food Security)
RSIS Centre for NTS Studies; and
Principal Officer, National Institute of
Education (NIE), Nanyang Technological
University, Singapore*

11:00 – 11:25 Agriculture and Rice Research: International Public Goods with Unmatched Return to ODA

*Dr Bruce Tolentino
Deputy Director General
International Rice Research Institute (IRRI)*

11:25 – 11:50 Private Equity, Agriculture, and Food Security

*Mr Victor Lean
Managing Partner, Caudex Asia*

11:50 – 12:15 Risk Management and Financing for Food Security: An Insurance Industry Perspective

*Mr Ivo Menzinger
Head Asia-Pacific Global Partnerships,
Swiss Reinsurance*

12:15 – 12:40 Access to Agricultural Financing – The Experience of ASA in Bangladesh

*Mr Md Fayzer Rahman
Executive Vice President
Association for Social Advancement
(ASA), Bangladesh*

12:40 – 13:20 Q & A

14:20 – 16:45 Session 5: Charting an Integrative Approach for Asia towards 2025

Chairperson

*Dr Shenggen Fan
Director-General
International Food Policy Research
Institute (IFPRI) Washington DC*

14:20 – 14:45 **The Role of R&D in Asia's Food Security: Rice Security through Policy, Science and PPPs**
Dr Robert Zeigler
Director General, International Rice Research Institute (IRRI)

14:45 – 15:10 **Going beyond Food Security: Putting Nutrition Security in the Equation**
Mr Kobus De Klerk
Regional President, SAFI ASPAC DuPont Nutrition & Health

15:10 – 15:35 **Reducing/Preventing Food Insecurity from Regional Calamities & Disasters**
Ms Puspasari Indra
Asia Regional Emergency Food Security and Livelihood Coordinator, Oxfam

16:00 – 16:30 **Q&A**

16:30 – 17:15 **Concluding Keynote Address: Way Forward – Regional Cooperation for Food Security**
Dr Bindu Lohani
Vice President for Knowledge Management and Sustainable Development, Asian Development Bank

17:15 – 17:30 **Closing Remarks: Towards Asian Food Security by 2025**

Prof. Mely Caballero-Anthony
Associate Professor

*S. Rajaratnam School of International Studies (RSIS);
 Head, RSIS Centre for Non-Traditional Security (NTS) Studies, Nanyang Technological University, Singapore;
 and Former Director, External Relations, ASEAN Secretariat*

&

Prof. Paul Teng
*Senior Fellow and Advisor (Food Security) RSIS Centre for NTS Studies; and
 Principal Officer, National Institute of Education (NIE), Nanyang Technological University, Singapore*

- End of ICAFS 2014 -

INTERNATIONAL ADVISORY COMMITTEE MEMBERS

Dr Shenggen Fan,

Director-General, International Food Policy Research Institute (IFPRI)

Dr Ponciano Intal,

Senior Researcher, Economic Research Institute for ASEAN and East Asia (ERIA)

Dr Achmad Suryana,

Former Director-General, Indonesian Agency for Food Security, Ministry of Agriculture, Indonesia; Research Professor in Agricultural Economics and Policy, Indonesian Agency for Agricultural Research and Development

Dr Bev Postma,

Executive Director, Food Industry Asia (FIA)

Dr Jikun Huang,

Founder and Director, Chinese Centre for Agricultural Policy (CCAP)

Mr Marcel van Doremaele,

CEO, Rabobank Singapore

Dr Maripaz Perez,

Regional Director for Asia, WorldFish Center

Mr Melvin Chow,

Director, Planning and Management Division, Agri-Food & Veterinary Authority, Singapore (AVA)

Dr Robert Holmer,

Regional Director for East and Southeast Asia, Asian Vegetable Research and Development Center (AVRDC)

Dr Tan Siang Hee,

Executive Director, CROPLIFE Asia

LIST OF SPEAKERS

Dr Mohamad Maliki Bin Osman,

Minister of State, Ministry of National Development and Defence, Singapore

Amb. Barry Desker, Dean,

S. Rajaratnam School of International Studies; Nanyang Technological University, Singapore

Dr Shenggen Fan,

Director-General, International Food Policy Research Institute (IFPRI) Washington DC

Mr Davor Pisk,

Chief Operating Officer, Syngenta

Mr Edwin Y. Paraluman,

Farmer and Coordinator, ASEAN Farmers Regional Network (ASFARNET)

Dr Achmad Suryana,

Former Director-General, Indonesian Agency for Food Security, Ministry of Agriculture; Research Professor in Agricultural Economics and Policy, Indonesian Agency for Agricultural Research and Development

Dr Siang Hee Tan,

Executive Director, CropLife Asia

Dr Jomo Kwame Sundaram,

Assistant Director-General for Economic and Social Development, Food and Agriculture Organization (FAO)

Dr Mark Rosegrant,

Division Director, Environment and Production Technology, International Food Policy Research Institute (IFPRI)

Dr Rolando Dy,

Executive Director, University of Asia & the Pacific Center for Food and Agribusiness

Prof. Martin Kropff,

Rector Magnificus, Wageningen University

Prof. Mely Caballero-Anthony,

Associate Professor, S. Rajaratnam School of International Studies (RSIS); Head, RSIS Centre for Non-Traditional Security (NTS) Studies, Nanyang Technological University, Singapore; and Former Director, External Relations, ASEAN Secretariat

Dr Ponciano Intal Jr.,

Senior Researcher, Economic Research Institute for ASEAN and East Asia (ERIA)

Dr Ruth Banomyong,

Associate Professor, Faculty of Commerce & Accountancy, Thammasat University, Thailand

Dr Jikun Huang,

Founder and Director, Chinese Centre for
Agricultural Policy for China

Prof. S. Chandrasekhar,

Associate Professor, Indira Gandhi Institute of
Development Research

Prof. Paul Teng,

Senior Fellow and Advisor (Food Security) RSIS Centre for
NTS Studies;
Principal Officer, National Institute of Education (NIE), Nanyang
Technological University, Singapore

Dr Bruce Tolentino,

Deputy Director General, International Rice Research
Institute (IRRI)

Mr Victor Lean,

Managing Partner, Caudex Asia

Mr Ivo Menzinger,

Head, Asia-Pacific Global Partnerships, Swiss Reinsurance

Mr Md Fayzer Rahman,

Executive Vice President, Association for Social Advancement
(ASA), Bangladesh

Dr Robert Zeigler,

Director General, International Rice Research Institute (IRRI)

Mr Kobus De Klerk,

Regional President, SAFI ASPAC, DuPont Nutrition & Health

Ms Puspasari Indra,

Asia Regional Emergency Food Security and Livelihood
Coordinator, Oxfam

Dr Bindu Lohani,

Vice President for Knowledge Management and Sustainable
Development, Asian Development Bank

LIST OF PARTICIPANTS

Fadzil Abdul Rahman,

Centre for Protective Security Studies

Natalya Ann Twohill,

Cassia Foundation

Glenn Banaguas,

De La Salle Araneta University

Paul Belesky,

Global Change Institute, University Of Queensland

Kim Huat Bujang,

University Consortium / Universiti Putra Malaysia

Bessie Burgos,

SEARCA/ University Consortium

Jose Camacho,

SEARCA/ University Consortium/ University of the Philippines
Los Banos

Maria Celeste Cadiz,

SEARCA / University Consortium

Chan King Yi, Candy,

Agri-Food & Veterinary Authority, Singapore

Joanne Chen,

Croplife Taiwan

Shaun Chen,

Fu Jen Catholic University

Eddie Chew,

Syngenta Asia Pacific Pte Ltd

Jacquelyn Chew,

National Security Coordination Secretariat, Singapore

Chew Lock Pin,

National Security Coordination Secretariat, Singapore

Chew Wei Yen, Stephanie,

Agri-Food & Veterinary Authority, Singapore

Wu Yuan Qing,

Agri-Food & Veterinary Authority, Singapore

Colin Chiok,

National Maritime Sense-Making Group, Singapore

Wiboon Chongrattanameteeikul,

University Consortium / Kasetsart University

Choo Xue Lian,

Agri-Food & Veterinary Authority, Singapore

Melvin Chow,

Agri-Food & Veterinary Authority, Singapore

Chua Tze Hoong,

Agri-Food & Veterinary Authority, Singapore

Maria Cristeta Cuaresma,

SEARCA / University Consortium

Michael Crozier,

Murdoch University

Cui Haining,

China Foreign Affairs University

Yu Deng,

Swiss Reinsurance Company Ltd

Neil Dyason,

National Security Coordination Secretariat, Singapore

Peter Edwards,

Singapore-ETH Centre

Elaine Ee,

National Maritime Sense-Making Group, Singapore

Kenny Eng,

Kranji Countryside Association

Miftah Farid,

Ministry of Trade, Republic of Indonesia

Manda Foo,

Kranji Countryside Association

Harvey Glick,

Monsanto Company

Harry Gruppen,

Wageningen University

Richard Higgott,

Murdoch University

Hoon Shi Cherin,

Agri-Food & Veterinary Authority, Singapore

Nathan Kambuno,

Commercial Attache , Embassy of the Republic of Indonesia

Kasan Muhri,

Ministry of Trade, Republic of Indonesia

Khoo Gek Hoon,

Agri-Food & Veterinary Authority, Singapore

Joanna Khoo,

Ministry of National Development, Singapore

Suzuki Kojiro,

University Consortium / Tokyo Nodai

Matthew Kovac,

Croplife Asia

Jill Kuehnert,

Seed Stories

Devi Kusumaningtyas,

Dupont Indonesia

Kyu-Hang Kyung,

Sejong University

Lai Kah Wah,

Defence Science Organisation, Singapore

Germaine Lau,

Tohoku University

Cheryl Lee,

Ministry of Foreign Affairs, Singapore

Lee Siew Mooi,

Agri-Food & Veterinary Authority, Singapore

Lee Weng Foo,

National Maritime Sense-Making Group, Singapore

Lee Yee Fung,

International Enterprise Singapore

Leong Shew Ying, Cynthia,

Agri-Food & Veterinary Authority, Singapore

Steve Leong,

National Security Coordination Secretariat, Singapore

Leong Xin Yi,

Defence Science Organisation, Singapore

Lim Chee Hwee,

Ministry of National Development, Singapore

Lim Chung Fee,

Ministry of National Development, Singapore

Colin Lim,

Agency For Science, Technology and Research, Singapore

Lim Huan Sein,

Agri-Food & Veterinary Authority, Singapore

Lim Lay Har,

Ministry of Home Affairs, Singapore

Lim Mei Wen, Jocelyn,

Agri-Food & Veterinary Authority, Singapore

Lim Suang,

National Security Coordination Secretariat, Singapore

Lim Xiu Qing, Joyce,

Agri-Food & Veterinary Authority, Singapore

Lim Zhon Hern,

Agri-Food & Veterinary Authority, Singapore

Lim Tse Yin, Zing,

National Security Coordination Secretariat, Singapore

Jang R. Liu,

Deagu Gyeongbuk Institute of Science and Technology

Liu Yankai,

Agri-Food & Veterinary Authority, Singapore

Emerald Loh,

Ministry of National Development, Singapore

Loh Kean Wah,

National Security Coordination Secretariat, Singapore

Loh Tunxi, Felicia,

Agri-Food & Veterinary Authority, Singapore

Levie Lyn Cequena,

EAS Strategic Advice Pte Ltd., EAS Asia

Drajat Martianto,

University Consortium / Bogor Agricultural University

Ir. Masyhuri,

University Consortium / Universitas Gadjah Mada

Andrew Mcconville,

Syngenta Asia Pacific

Machito Mihara,

Tokyo Nodai

Victor Mills,

Singapore International Chamber of Commerce

Verna Mitura,

The High Commission of Canada

Tamara Nair,

Incoming Staff of RSIS

Neo Shan Yu,

Agri-Food & Veterinary Authority, Singapore

Ng Wei Xuan, Trina,

Agri-Food & Veterinary Authority, Singapore

John Noonan,

Curtin University

Nurhuda Nordin,

Genetic Modification Advisory Committee, Singapore

Ong Xuan Feng,

Agri-Food & Veterinary Authority, Singapore

Ong Yihang,

Agri-Food & Veterinary Authority, Singapore

Adam Patterson,

Department Of Foreign Affairs and Trade,
Commonwealth of Australia

Maripaz Perez,

Worldfish Center

Kevin Phun,

IGIT Consulting

Bev Postma,

Food Industry Asia

Andrew Powell,

Asia Biobusiness Pte. Ltd.

Martina Purba,

Ministry of Trade, Republic of Indonesia

Eric Ra,

Embassy of the United States of America

Rajeev Raina,

Olam International Limited

Chandru Raman Chandrasekar,

Sustain Ltd

Evie Ruymbeke,

Embassy of Belgium

Mark Saavedra,

US Department of State

Gil Saguiguit Jr.,

SEARCA

Raghavan Sampathkumar,

Croplife Asia

Rosalia Sciortino,

Mahidol University

Seah Peng Leong,

National Security Coordination Secretariat, Singapore

Benjamin Seet,

Agency for Science, Technology and Research, Singapore

Shashi Sharma,

Murdoch University

Sim Mong Soon,

Defence Science Organisation, Singapore

Sim Wi-Min,

Agri-Food & Veterinary Authority, Singapore

Lalita Siritattananon,

Rajamangala University of Technology Thanyaburi

Sonny Tababa,

Croplife Asia

Audrey Tan,

International Enterprise Singapore

Tan Lee Kim, Kim,

Agri-Food & Veterinary Authority, Singapore

Tan Lu Hsia,

Agri-Food & Veterinary Authority, Singapore

Tan Swee Chuan, Alice,

Agri-Food & Veterinary Authority, Singapore

Tan Sze Wee,

Agency for Science, Technology and Research, Singapore

Theodosia Tan,

Genetic Modification Advisory Committee, Singapore

Tan-Low Lai Kim,

Agri-Food & Veterinary Authority, Singapore

Subagyo Tanton,

Croplife Asia

Tay Ching Ann, Luke Barnabas,

Agri-Food & Veterinary Authority, Singapore

Tham Kit Yeng,

Agri-Food & Veterinary Authority, Singapore

Thomas, Thomas,

Asean CSR Network

Toh Wee Khiang,

National Environment Agency, Singapore

Tong Yong How,

Centre for Protective Security Studies, Singapore

Tsai Tsung-Yu,

Fu Jen Catholic University

Susan Van Boxtel,

Netherlands Embassy

Chelsea Wan,

Kranji Countryside Association

Wang Yanqing,

BASF (China) Co.Ltd

Tjahya Widayanti,

Trade Policy Analysis and Development Agency,
Republic of Indonesia

Wong Chow Ming,

Ministry of Foreign Affairs, Singapore

Justin Woo,

International Enterprise Singapore

Yang Yanli,

Ministry of National Development, Singapore

Yang Razali Kassim,

RSIS, Nanyang Technological University

Yeap Soon Eong,

Agri-Food & Veterinary Authority, Singapore

Zhang Hongzhou,

RSIS, Nanyang Technological University

Laura Zseleccky,

International Food Policy Research Institute (IFPRI)

Constant Van Aerschot,

Business Council for Sustainable Development

Immanuel Lingga,

Ministry of Trade, Republic of Indonesia

ABOUT THE RSIS CENTRE FOR NON-TRADITIONAL SECURITY (NTS) STUDIES

The **RSIS Centre for Non-Traditional Security (NTS) Studies** conducts research and produces policy-relevant analyses aimed at furthering awareness and building capacity to address NTS issues and challenges in the Asia-Pacific region and beyond.

To fulfil this mission, the Centre aims to:

- Advance the understanding of NTS issues and challenges in the Asia-Pacific by highlighting gaps in knowledge and policy, and identifying best practices among state and non-state actors in responding to these challenges.
- Provide a platform for scholars and policymakers within and outside Asia to discuss and analyse NTS issues in the region.
- Network with institutions and organisations worldwide to exchange information, insights and experiences in the area of NTS.
- Engage policymakers on the importance of NTS in guiding political responses to NTS emergencies and develop strategies to mitigate the risks to state and human security.
- Contribute to building the institutional capacity of governments, and regional and international organisations to respond to NTS challenges.

Our Research

The key programmes at the **RSIS Centre for NTS Studies** include:

- 1) Internal and Cross-Border Conflict Programme
 - Dynamics of Internal Conflicts
 - Multi-level and Multilateral Approaches to Internal Conflict
 - Responsibility to Protect (RtoP) in Asia
 - Peacebuilding
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 - Mitigation and Adaptation Policy Studies
 - The Politics and Diplomacy of Climate Change
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 - Security and Safety of Energy Infrastructure
 - Stability of Energy Markets
 - Energy Sustainability
 - Nuclear Energy and Security

4) Food Security Programme

- Regional Cooperation
- Food Security Indicators
- Food Production and Human Security

5) Health and Human Security Programme

- Health and Human Security
- Global Health Governance
- Pandemic Preparedness and Global Response Networks

The first three programmes received a boost from the John D. and Catherine T. MacArthur Foundation when the RSIS Centre for NTS Studies was selected as one of three core institutions leading the MacArthur Asia Security Initiative in 2009.*

Our Output

Policy Relevant Publications

The RSIS Centre for NTS Studies produces a range of output such as research reports, books, monographs, policy briefs and conference proceedings.

Training

Based in RSIS, which has an excellent record of post-graduate teaching, an international faculty, and an extensive network of policy institutes worldwide, the Centre is well-placed to develop robust research capabilities, conduct training courses and facilitate advanced education on NTS. These are aimed at, but not limited to, academics, analysts, policymakers and non-governmental organisations (NGOs).

Networking and Outreach

The Centre serves as a networking hub for researchers, policy analysts, policymakers, NGOs and media from across Asia and farther afield interested in NTS issues and challenges.

The **RSIS Centre for NTS Studies** is also the Secretariat of the Consortium of Non-Traditional Security Studies in Asia (NTS-Asia), which brings together 20 research institutes and think tanks from across Asia, and strives to develop the process of networking, consolidate existing research on NTS-related issues, and mainstream NTS studies in Asia.

More information on our Centre is available at www.rsis.edu.sg/nts

LIST OF RSIS-NTS STAFF

Dr Alistair D. B. Cook,
Research Fellow

Dr Jonatan A. Lassa,
Research Fellow

Ms Cheryl Lim Sze Hui,
Program Manager

Ms Hia Mooi Huang,
Admin/Finance Officer

Ms Gianna Gayle Herrera Amul,
Senior Analyst

Mr Julius Cesar Imperial Trajano,
Senior Analyst

Ms Margareth Sembiring,
Research Analyst

Mr Maxim Shrestha,
Associate Research Fellow

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The **S. Rajaratnam School of International Studies (RSIS)** is a professional graduate school of international affairs at the Nanyang Technological University, Singapore. RSIS' mission is to develop a community of scholars and policy analysts at the forefront of security studies and international affairs. Its core functions are research, graduate education and networking. It produces cutting-edge research on Asia Pacific Security, Multilateralism and Regionalism,

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S. RAJARATNAM
SCHOOL OF
INTERNATIONAL
STUDIES

Nanyang Technological University

Block S4, Level B4, 50 Nanyang Avenue, Singapore 639798

Tel: +65 6790 6982 | Fax: +65 6794 0617 | www.rsis.edu.sg