POLICY BRIEF

Food Security Robustness: A Driver of Enhanced Regional Cooperation?

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'Food Security Robustness':
A Driver of Enhanced Regional Cooperation?

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Abstract

Food security encompasses multiple, inter-connected dimensions, from production-related concerns, to market and price dynamics, environmental trends and policy approaches. Given this, 'robustness', the ability to withstand disruptions to the various dimensions, is critical to food security. Yet, countries in Southeast Asia continue to be largely focused on domestic production alone, which is unsustainable in the long run. This Policy Brief suggests that, in order to increase food security robustness, countries could turn to regional-level action. Towards this end, an analysis using the Rice Bowl Index© is used to identify possible areas of cooperation and collaboration at the regional level.

Introduction: The robustness imperative

The food price spikes of 2007–2008 catalysed many food security initiatives at the national, regional and global level. ASEAN implemented the ASEAN Integrated Food Security (AIFS) Framework and the ASEAN Plus Three Emergency Rice Reserve (APTERR) to ensure short- and long-term food security in the region. However, as a group of 10 nations with diverse geographical characteristics, natural endowments, demographics, institutions and policies, achieving food security remains a major challenge.

In addition to diversity, several trends have significant ramifications for the region's food security outcomes. First, food demand patterns are changing as a result of rapid urbanisation and rising incomes. According to the Asian Development Bank, the share of cereals in total caloric intake has been declining over the years 1961 to 2009 in Southeast Asia.[1] Concomitant with that, consumption of processed food, meat and dairy products has increased, resulting in greater pressure to produce more such foods.

Second, Southeast Asia is particularly vulnerable to the impact of climate change. The region is projected to experience more extreme and intense heat and rainfall events.[2] Sea levels will also rise, inundating coastal agricultural land.

Third, Southeast Asia is home to 76 million of the world's poor; and 65 million people in the region are undernourished.[3] This situation is further aggravated by the increasing volatility of food prices. Poor households, which spend 50–70 per cent of their income on food, are the most vulnerable to large swings in food prices.[4] These numbers show that food insecurity exists alongside poverty.

These trends and challenges suggest that food security encompasses multiple dimensions, and that maintaining food security would require a country to have 'food security robustness', namely, the ability to withstand disruptions to the various dimensions of food security. In this Policy Brief, food security robustness is conceptualised as a function of a country's capacity to: (i) balance the different instruments (domestic production, trade, stockpiling, contract agriculture, etc.) that support food availability; (ii) ensure that production is sustainable; (iii) provide the necessary infrastructure and policies to support domestic production; (iv) promote trade; and (v) manage food demand and affordability.[5] This implies long-term and systematic interventions to address the different dimensions of food security.

This Policy Brief suggests that actions at the national level remain inadequate for achieving sustainable food security, and calls for national robustness to be strengthened through cooperation and collaboration at the regional level. Specifically, it explores the current food security policies of ASEAN member countries and analyses data from the Rice Bowl Index© (RBI) to identify potential interventions and areas for collaboration within the region.[6]

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[1] Asian Development Bank (ADB), *Food security in Asia and the Pacific* (Manila: ADB, 2013), 10, http://www.adb.org/publications/food-security-asia-and-pacific

[2] RSIS Centre for Non-Traditional Security (NTS) Studies, 'Impact of climate change on ASEAN food security', *NTS Issues Brief*, no. IS13–04 (Singapore: RSIS Centre for NTS Studies, 2013), 2, http://www.rsis.edu.sg/nts/HTML-Newsletter/Issue-Brief/pdf/Issues_Brief_1304.pdf

[3] ADB, *Food security in Asia and the Pacific*, 14–15.

[4] Asian Development Bank (ADB), *Food security and poverty in Asia and the Pacific: Key challenges and policy issues* (Manila: ADB, 2012), 8, http://www.adb.org/publications/food-security-and-poverty-asia-and-pacific-key-challenges-and-policy-issues

[5] Paul P.S. Teng and Maria C.S. Morales, 'Rethinking food security: Robustness as a paradigm for stability', *RSIS Commentaries no. 111* (Singapore: S. Rajaratnam School of International Studies (RSIS), 2013), http://www.rsis.edu.sg/publications/Perspectives/RSIS1112013.pdf; Paul Teng and Maria C.S. Morales, 'A new paradigm for food security: Robustness as an end goal', *NTS Policy Brief*, no. PO13-05 (Singapore: RSIS Centre for Non-Traditional Security (NTS) Studies, 2013) http://www.rsis.edu.sg/nts/HTML-Newsletter/Policy-Brief/pdf/PO1305.pdf

The policy landscape in Southeast Asia

Rice is the basic staple and main source of nourishment in Southeast Asia. As a result, most countries in the region commonly equate it to food security.[7] This view has strongly influenced the direction and approach of most countries in developing strategies to enhance food security, especially after the 2007–2008 food price spikes.

The countries in the region that were net importers adopted either a self-sufficiency or a food resilience approach. The former emphasises higher domestic production and lower reliance on food obtained through international trade while the latter is grounded on having diverse sources for key food items. For example, the Philippines and Indonesia aimed to become rice self-sufficient by 2013 and 2014 respectively. To that end, the Philippine government committed to buy rice from farmers at a competitive price to incentivise them to produce more. It also reduced in-quota tariffs for rice to encourage the private sector to import rice. Aside from increasing rice production and allocating new farmlands, Indonesia began advocating a reduction in household consumption of rice and encouraging consumption of alternatives such as cassava.

Brunei Darussalam, an oil-rich nation, also embarked on a rice self-sufficiency plan that entailed the use of high-yield varieties, adoption of new technologies, opening of new areas for rice production, upgrading of existing farm infrastructure and development of local capacity.[8] Similarly, Malaysia, through its National Food Security Policy, revised its rice self-sufficiency levels to no less than 70 per cent and included input and output subsidies geared towards increasing production. Its neighbour, Singapore, undertook a diversification of its food sources. It encouraged the private sector to produce agricultural foodstuff in overseas farmlands and promoted stockpiling.

In addition to imposing temporary export bans on rice, Cambodia, Lao PDR, Thailand and Vietnam carried out several policy interventions to alleviate the effects of the food price spikes and ensure long-term food security. Vietnam and Thailand both encouraged higher production of rice through price mechanisms and fertiliser subsidies while Cambodia released stocks and distributed food subsidies to vulnerable consumers. In the case of Lao PDR, the government ordered its Ministry of Industry and Commerce to monitor retail prices and ensure their stability.[9]

Looking at the myriad of policies implemented by countries in Southeast Asia, the following observations can be made: (i) countries in the region continue to view food security as a national objective and there is minimal collaboration among them; (ii) policies implemented to achieve food security are still short-term in scope and unsustainable in the long-run (e.g., subsidies); and (iii) there is a potential for collaboration due to the degree of commonality and complementarity in crops produced in the region, e.g., rice. With this in mind, there is a need to identify priority areas for collaboration. This is addressed in the next section.

Analysis of food security robustness in the ASEAN region

The RBI© allows for an in-depth analysis of the areas that contribute to food security robustness in Southeast Asia, represented by the range of indicators organised under four rubrics (farm-level factors, demand and price factors, policy and trade factors, environmental factors).[10] To identify the most significant areas, correlation analysis was performed on the data, which covered the 10 ASEAN countries[11] and encompassed the period 2001–2013. The following outlines the results of the analysis and their implications for regional food security.

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[6] Syngenta, 'Purpose', *Rice Bowl Index*, accessed 5 December 2013, http://www.ricebowlindex.com/Pages/Purpose.aspx

[7] Asia-Pacific Economic Cooperation Policy Support Unit (APEC-PSU), *Food security policies in APEC* (Singapore: APEC, 2012), 31, http://publications.apec.org/publication-detail.php?pub_id=1326

[8] APEC-PSU, *Food security policies in APEC*, 34.

[9] Mercedita A. Sombilla et al., 'Policy responses to the food price crisis and their implications: The case of four Greater Mekong Subregion countries' (Occasional Papers no. 12, Rome: International Fund for Agricultural Development (IFAD), 2011), 35, http://www.ifad.org/operations/projects/regions/pi/paper/12.pdf

[10] The data for each of the indicators under the four rubrics of the RBI© are from various databases. They are selected based on their importance to the rubric but also on the availability and consistent quality of data across most countries. For more details on the technical aspects of the RBI©, please refer to: Rice Bowl Index, 'Technical aspects of the Rice Bowl Index', http://www.ricebowlindex.com/Pages/TechnicalAspects.aspx

[11] The ASEAN countries initially included in the RBI© are Indonesia, Malaysia, Myanmar, the Philippines, Thailand and Vietnam. For purposes of this analysis, Brunei, Cambodia, Lao PDR and Singapore were added.

Farm-level factors

Three indicators under this rubric emerge as statistically significant[12] for food security robustness in the region: (i) availability of irrigation; (ii) adult literacy, which increases the ability gain access to information and services; and (iii) 'rural electrification', which could be seen as a proxy for access to technology, markets and information (see Appendix, Table 1 for the correlation matrix).

These findings underline the importance of several types of interventions. The positive correlation between food security robustness and irrigation is consistent with the need to provide infrastructure that could enhance agricultural productivity.[13] The link between higher adult literacy rates and robustness reinforces the importance of access to knowledge. This suggests that farm efficiency could be improved by imparting information and modern farming techniques to farmers through extension services. The significance of 'rural electrification' points to the impact of investments in public infrastructure such as power generation facilities. According to the World Bank, such investments not only improve farm productivity, but also the overall welfare and quality of life in rural areas.[14]

Demand and price factors

On the demand side, urbanisation and changing dietary patterns remain important influences on food security robustness (see Appendix, Table 2 for the correlation matrix). The positive correlation between food security robustness and urbanisation highlights the challenge of feeding populations in cities, where the consumption of protein-rich and processed foods has increased. Concomitantly, as may be expected, the analysis shows a negative relationship between meat consumption and food security robustness.

Environmental factors

For this rubric, no statistically significant indicators emerged from the correlation analysis (see Appendix, Table 3 for the correlation matrix). However, this does not necessarily mean that the areas covered by these indicators are not significant to food security robustness. It may just be that the effects associated with indicators under this rubric would become apparent only over the longer term.

Policy and trade factors

The analysis of indicators under this rubric shows three statistically significant areas for food security robustness: 'Doing Business rankings' (which evaluates the regulatory environments for businesses), intellectual property rights (IPR) and transport infrastructure value (see Appendix, Table 4 for the correlation matrix).

The salience of the 'Doing Business rankings' indicator highlights the importance of policies and regulations that encourage investments in the agricultural sector. The more enabling the business environment, the more it appears to strengthen food security robustness. This factor is closely related to IPR. The data suggest that the higher the IPR ranking, the more robust the food security system. Research and development (R&D) is indispensable for the creation and application of new technologies that will help improve yields and productivity.

Aside from the enabling policies that would encourage food security robustness, the positive correlation between robustness and transportation infrastructure highlights the impact of lower transportation costs on food prices as well as the cost of production inputs.[15] Thus, an efficient transport and logistics network will not only address the issue of physical access but also economic access.

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[12] Having a p-value of less than 0.05.

[13] ADB, *Food security in Asia and the Pacific*, 76.

[14] World Bank. *World development report 2008: Agriculture for development* (Washington, DC: World Bank, 2007), 114, http://web.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTWDRS/0,,contentMDK:23062293~pagePK:478093~piPK:477627~theSitePK:477624,00.html

[15] World Bank, *World development report 2008*, 210.

Recommendations: Food security robustness through regional collaboration

The findings above strongly suggest that regional collaboration is requisite to improve food security robustness within the ASEAN region. There is significant potential for leveraging on complementarities between countries in the region. Each country in the region has its respective comparative advantage(s) in agriculture and food security while also experiencing food insecurity to a greater or lesser degree. Based on the RBI results, there are several areas that the region can focus on.

- **Facilitate investments in development of new technologies and high-yield rice varieties.**

Existing literature on food security recognises that higher yields and efficient farm management are key to coping with increasing food demand. In order to do so, there is a need for more investments in R&D and farming technologies. Beintema et al. observed that the public agricultural R&D intensity in Asia was low compared to other regions such as Latin America.[16] The benefits of the Green Revolution have waned and there is a need for sustained investment in the agricultural sector. Improving yields is one of the best options amidst the increasing scarcity of natural resources such as land and water. A corollary to this is the reduction of pre-harvest and post-harvest losses which in some instances account for almost half the potential yield of some crops. Investments in R&D to produce loss reducing technologies for small farmers need to receive much more government attention. Expenditure on agri-food R&D in all ASEAN countries needs to be increased beyond the current small fraction of total country R&D expenditure.

- **Increase collaboration in knowledge and information sharing on modern farming techniques especially those that focus on efficient management of natural resources as well as urban farming.**

With the increasing scarcity of natural resources such as water and the impact of climate change being felt in the region, ASEAN countries would do well to learn from each other. Farming systems and agro-ecological zones across the ASEAN region have many similarities and the region is missing on opportunities for synergy and leverage from the existing knowledge. Farmer schools and demonstration farms are a good avenue for disseminating knowledge and information on best practices and modern farming techniques. Also, increased collaboration between the various agricultural R&D and extension institutions can facilitate learning and information sharing among the ASEAN countries. In this area, information and communications technologies (ICTs) can play a role in improving extension services and information dissemination.[17] A pan-ASEAN agri-food knowledge management community is advocated.

In addition, the role of cities and urban farming as part of the solution to achieving food security robustness merits attention at the regional level. The Food and Agriculture Organization (FAO) estimates that cities produce 15-20 per cent of global food production. In ASEAN, Hanoi is an example of a city that produces 80 per cent of fresh vegetables, 50 per cent of pork, poultry and fresh water fish and 40 per cent of eggs within its boundaries.[18] With case examples and the availability of technology, knowledge and information sharing on best practices in urban agriculture, it can be a springboard for regional cooperation on other food security issues.

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[16] Nienke Beintema et al, 'ASTI Global Assessment of Agricultural R&D Spending: Developing Countries Accelerate Investment' (October 2012, Washington, D.C.: Agricultural Science and Technology Indicators, 2012), 5. http://www.asti.cgiar.org/pdf/ASTI_global_assessment.pdf

[17] Mercedita A. Sombilla, Dennis Mapa and Sharon Piza, 'Overcoming Critical Constraints to Sustaining Productivity Growth in Key Commodities of Asia and the Pacific' (ADB Economics Working Paper Series No. 376, Manila: ADB, 2013), 24, http://www.adb.org/sites/default/files/pub/2013/ewp-376.pdf

[18] Paul S. Teng, 'Food Security: Cities as part of the solution and not the problem', *RSIS Commentaries no. 142* (Singapore: S. Rajaratnam School of International Studies (RSIS), 2012), http://www.rsis.edu.sg/publications/Perspective/RSIS1422012.pdf

- **Promote investment in human capital through technical assistance and capacity building.**

The significance of access to information and technologies to food security robustness underscores the importance of human capital. In the case of Southeast Asia, two trends are clear regarding agricultural labour: the declining rates of increase in this group and the shrinking proportion of male agricultural labour to total agricultural labour.[19] Having new technologies is not enough and they should be complimented by technical assistance and capacity building that will ensure that farmers understand their proper use. Greater knowledge and skills could lead to improved farm management, and thus higher productivity.

Human capital development for food security should also focus on arresting the declining enrolment in agricultural higher education institutes. Beyond the traditional agri-food disciplines such as agronomy and pest management, there is a great need to improve the entrepreneurship skills of graduates so that farming becomes a viable career for a younger generation in ASEAN.

- **Fast-track existing plans and initiatives to improve infrastructure in the region.**

Results from the analysis of the RBI data indicate that investment in infrastructure is still crucial for achieving food security robustness in the region. Infrastructure such as better rural roads, irrigation, electricity grids and rail transport are some examples of public investments that can help improve food security. Farm infrastructure such as irrigation is also crucial in improving productivity. Studies have shown that efficient infrastructure improved agricultural productivity, reduced transportation costs as well as risks of food insecurity for vulnerable groups.[20] On a regional scale, more efficient transport and distribution networks will not only enhance intra-ASEAN trade but also lower prices for food and farm inputs. In this regard, the role of the private sector is to be strongly encouraged as investors and suppliers of modern technologies.

Currently, efforts to achieve food security are highly fragmented and each country implements domestic policies in isolation and lacks awareness of their regional implications. Although the success of regional cooperation on food security hinges upon national policies, they should also support intra-ASEAN trade, platforms for knowledge and technology exchange and those that will facilitate the creation of an enabling business environment. In the end, achieving food security robustness does not only require an integrated approach but also a concerted effort. This can best be achieved if there is synergy achieved by countries cooperating to improve the factors shown to influence food security robustness, i.e. in the areas of policy and trade, farm level production, food demand and pricing, and environmental sustainability.

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[19] Mercedita A. Sombilla, Dennis Mapa and Sharon Piza, 'Overcoming Critical Constraints to Sustaining Productivity Growth in Key Commodities of Asia and the Pacific' (ADB Economics Working Paper Series No. 376, Manila: ADB, 2013), 18, http://www.adb.org/sites/default/files/pub/2013/ewp-376.pdf

[20] Asian Development Bank (ADB), *Food security in Asia and the Pacific* (Manila: ADB, 2013), 53, http://www.adb.org/publications/food-security-asia-and-pacific

Appendix

Table 1: Correlation matrix for farm-level factors

	Overall	Unit labour cost	Mobile phone subscribers	Roads and bridges Network	Short-term household credit	Availability of arable land	Irrigation	Adult literacy	Cereal yield	Rural electrification
Overall	**1**									
Unit labour cost	**0.008885**	**1**								
Mobile phone subscribers	**0.211462**	**-0.03751**	**1**							
Roads and bridges Network	**0.089478**	**0.543981**	**0.079587**	**1**						
Short-term household credit	**-0.31924**	**-0.04009**	**0.31269**	**-0.19521**	**1**					
Availability of arable land	**0.951327**	**-0.13486**	**0.048216**	**-0.11171**	**-0.24319**	**1**				
Irrigation	**0.808123***	**-0.23623**	**0.564926**	**-0.15228**	**-0.13922**	**0.737435**	**1**			
Adult literacy rate	**0.644319***	**-0.1761**	**-0.07909**	**-0.05533**	**-0.49695**	**0.614128**	**0.374537**	**1**		
Cereal yield	**0.909142**	**-0.13672**	**0.08169**	**-0.07732**	**-0.27228**	**0.885886**	**0.810177**	**0.598308**	**1**	
Rural electrification rate	**0.570627***	**0.040492**	**-0.04103**	**-0.03248**	**-0.08166**	**0.694962**	**0.247162**	**0.330587**	**0.290926**	**1**

*Note: * statistically significant at 0.05 based on p-value*

Table 2: Correlation matrix for demand and price factors

	Overall	Personal disposable income	Food per capita consumption	Population	Consumer price index	Urban population	Oil imports	Meat consumption
Overall	**1**							
Personal disposable income	**0.043211**	**1**						
Food per capita consumption	**-0.31829**	**0.40183**	**1**					
Population	**-0.19475**	**0.574706**	**0.158854**	**1**				
Consumer price index	**0.637966**	**0.126569**	**0.195767**	**-0.04739**	**1**			
Urban population	**0.760259***	**-0.10287**	**-0.30827**	**-0.39354**	**0.136438**	**1**		
Oil imports	**-0.38236**	**-0.05733**	**0.661668**	**0.073183**	**-0.08434**	**-0.20351**	**1**	
Meat consumption	**-0.5133***	**-0.38143**	**-0.10391**	**0.00518**	**-0.29293**	**-0.61132**	**0.03059**	**1**

*Note: * statistically significant at 0.05 based on p-value*

Table 3: Correlation matrix for environmental factors

	Overall	Electricity consumption	Total internal renewable water resources	Change in water quantity	Change in forest area
Overall	**1**				
Electricity consumption	**0.419065**	**1**			
Total internal renewable water resources	**0.973957**	**0.381037**	**1**		
Change in water quantity	**0.312865**	**0.438567**	**0.311903**	**1**	
Change in forest area	**0.877664**	**0.550438**	**0.764845**	**0.305676**	**1**

*Note: * statistically significant at 0.05 based on p-value*

Table 4: Correlation matrix for policy and trade factors

	Overall	Short-term political rating	Transportation infrastructure value	Intellectual property rights	Net agricultural trade	Government spending	Doing Business ranking
Overall	**1**						
Short-term political rating	**0.974133**	**1**					
Transportation infrastructure value	**0.454029***	**0.405594**	**1**				
Intellectual property rights	**0.707938***	**0.716951**	**0.435376**	**1**			
Net agricultural trade	**0.051585**	**-0.07333**	**-0.1657**	**-0.44064**	**1**		
Government spending	**0.381136**	**0.380085**	**0.149408**	**0.450897**	**-0.15544**	**1**	
Doing Business ranking	**0.519988***	**0.542233**	**0.100845**	**0.384721**	**-0.48241**	**0.061309**	**1**

*Note: * statistically significant at 0.05 based on p-value*

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