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Ending Hunger in Asia and the Pacific by 2030:
An Assessment of Investment Requirements in Agriculture

Mark Rosegrant, Research Fellow Emeritus, International Food Policy Research Institute, USA
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Both the studies in Asia Pacifica and Indonesia shared the objectives and methodology, which was to assess the investments and polices required in the agriculture and rural sector to meet food demand and end hunger in Asia-Pacific and Indonesia by 2030; in Indonesia we took the analysis up to 2045 as requested by Bapenas in Indonesia. We used integrated agricultural and economy-wide modeling of the costs and impact of agricultural investments and policies on food security under climate change. In China, we examined trends in applications of ICTs in rural China, the enabling factors and constraints to adopting ICTs, assess impacts, and generate policy implications for further development. For China ICT, rural surveys and review of evidence to assess trends, constraints, and policies for development of rural e-commerce were conducted. We relied on our colleagues in CCAP. In the study we looked at three types of investments:

- Agriculture R&D investments
- Irrigation investments (infrastructure and water use efficiency)
- Rural infrastructure investments.

Each of these scenarios has specific pathways to generate food security. Under agriculture R&D investments, the primary pathway was through agricultural productivity growth, which tends to reduce food prices to consumers and increase food consumption. Higher agricultural productivity also boosts economy-wide growth in GDP and household income. Impacts in agriculture have broad implications for the general economy. Under irrigation, pathways start with increase in crop area and yield through expansion of area or savings of water; this reduces food prices and increases food consumption; thus inducing economy-wide growth in GDP and household income. Under the rural infrastructure investments, the initial impact is to reduce marketing margins and post-harvest losses. We have hearing in this meeting how important it is to do that; that in turn increases farm-level productivity and profitability, reducing prices to consumers and increasing food consumption. The combined impacts drive economy-wide growth in GDP and household income. We have already heard some of the key results here. In the Asia Pacific region, average annual public investments project to 2030 of about $42 billion; incremental investments required for the comprehensive scenario are about $37 billion. Some of the key impacts of the combined scenario of the three types of investments:

- Ends hunger in Asia-Pacific by 2030 (reduces hunger share below 5% of population, the prudential threshold established by FAO/WHO for effectively achieving zero hunger);
- Generates GDP benefits of US $1.1 trillion in Asia-Pacific in 2030 compared to baseline investments;
- Agricultural R&D has highest rate of economic returns and hunger reduction, followed by rural infrastructure and irrigation.

In Indonesia we did a similar approach with specific models for Indonesia; we have three scenarios that focus on comprehensive investment impacts on agricultural production in 2045; in scenario III increases of about 19% are expected by 2045 compared to baseline for staple crops and livestock and over 7% for other crops and fisheries. Investment impacts on economy-wide welfare in 2045, based on a concept called absorption, the comprehensive investment scenario III projects the benefits compare to the Indonesia baseline are Rupiah 1,834 trillion annually by 2045, which about $129 billion annually.

Based on the study, a number of policy recommendations were made; the most obvious ones are significant increase in investments in

- **Agricultural R&D** (crop and livestock breeding) both from government and private sector
- **Infrastructure** (rural roads, electricity, cell phone towers, markets, cold chains, processing facilities) in partnership with private sector
- **Irrigation** - expansion and improvement of existing systems with careful attention to cost-effectiveness
- **Extension services and agricultural education –** need upgrading to support adoption of conventional and advanced agricultural technology (precision farming)
- **Legal and regulatory reforms** – to reduce barriers to private investment and adoption of advanced agricultural technologies
- **Fertilizer subsidies** – should be phased-out; resources invested in increased agricultural R&D and targeted direct income support to small farmers.

Turning to ICT application in PRC, the brief summary is: drone application in agriculture is growing very fast; the area of pesticide spraying by drones tripled in just two years up to now 2 million ha in 2017. It has important benefits; improves speed and effectiveness of pest control—more responsive to pest outbreaks; drones use less pesticides and a tenth of the water traditionally required by manual spraying, reducing ecological and economic costs. Rural e-commerce is also growing very fast; still limited in remote areas but widespread in more advanced regions; nearly 60% of surveyed rural households in Shandong and Zhejiang used e-commerce during 2016-2017. We also find the use of

rural e-commerce in the regions we studied increases farmer income; the prices obtained through online sales for apple and peach are significantly higher than what can be obtained through offline sales. There is substantial benefit for income increase to farmers. In order to boost e-commerce, we found that there needs to be building of farmers' capacity through training; investment in storage and transportation; reduction in operational costs – scale and cooperatives; provision of financial and credit support to farmers; strengthening of e-commerce market regulation: trust issues; and paying attention to inclusive development among regions and households.