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

Policies to Support Investment Requirements in Indonesia's Food and Agriculture Development for 2020–2045

Application of Information and Communication Technology in the Agriculture Sector of Rural China

Objectives

- 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
- To examine 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

Methodology

- Integrated agricultural and economy-wide modeling of the costs and impact of agricultural investments and policies on food security under climate change
- For China ICT, rural surveys and review of evidence to assess trends, constraints, and policies for development of rural e-commerce

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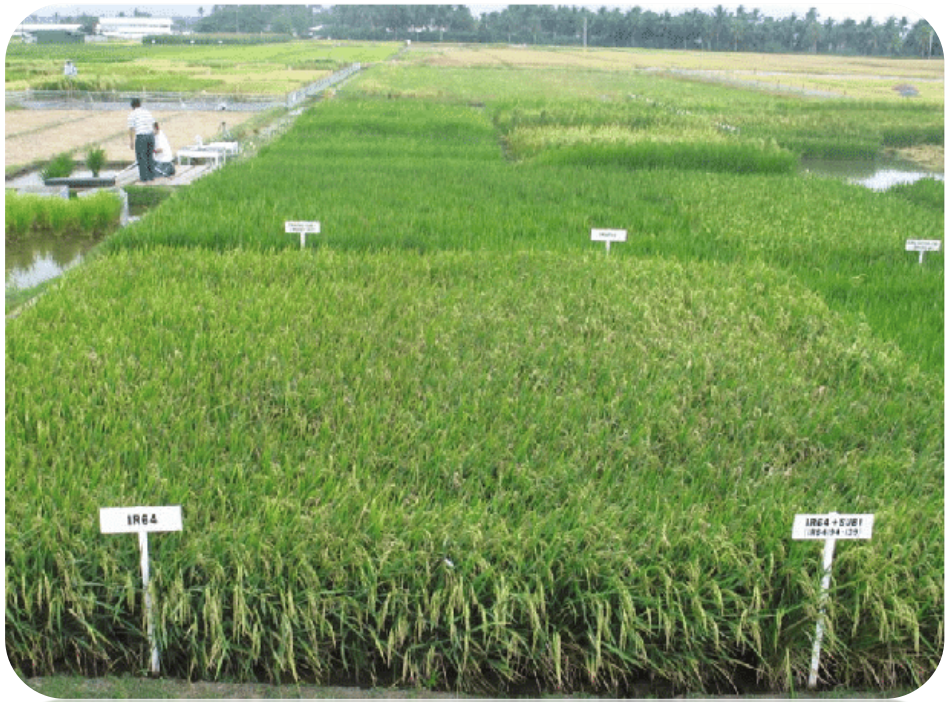
Investment pathways for food security

- Agriculture R&D investments
  - Increase agricultural productivity growth
  - Reduce food prices to consumers and increase food consumption
  - Higher agricultural productivity boosts economy-wide growth in GDP and household income

Lysimeter facility at ICRISAT - crop physiology research for better adaption to dryland stresses.
Photo credit: ICRISAT



IR64 and IR64-Sub1 under non-flooded conditions at IRRI.
Photo credit: IRRI

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Investment pathways for food security

- Irrigation investments (infrastructure and water use efficiency)
  - Increase crop area and yield
  - Reduce food prices and increase food consumption
  - Induce economy-wide growth in GDP and household income

Surface irrigation, India
Photo credit: Indian Express
(https://indianexpress.com/article/india/union-ministry-seeks-special-case-funds-to-reline-canals-help-rajasthan-irrigation-5375844)

Pumping groundwater with the energy generated from solar panels.
Photo: Prashanth Vishwanathan / IWMI
Photo credit: IWMI

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Investment pathways for food security

- Rural infrastructure investments
  - Reduce marketing margins and post-harvest losses
  - Increase farm-level profitability
  - Reduce prices to consumers and increase food consumption
  - Combined impacts drive economy-wide growth in GDP and household income

Photo credit: http://thai.logistics-manager.com//

Photo credit: https://www.google.com/

Average annual public investments in Asia and Pacific, Baseline, billion 2005 US$, 2016-2030

Region	Average Annual Cost			
	Agricultural R&D	Irrigation	Rural Infrastructure	Comprehensive
Central and West Asia	0.35	0.95	0.86	2.16
East Asia	5.12	4.50	11.62	21.24
Pacific	0.01	0.03	0.15	0.19
South Asia	1.25	4.62	7.52	13.39
Southeast Asia	0.70	1.78	2.24	4.72
Total for Asia and Pacific	**7.43**	**11.88**	**22.39**	**41.70**

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Annual additional public investments for different scenarios in Asia and Pacific (billion 2005 US$), 2016-2030

Region	Average Annual Cost			
	High Agricultural R&D	High Irrigation	High Rural Infrastructure	Comprehensive
Central and West Asia	0.22	2.06	2.04	4.32
East Asia	0.36	5.36	7.58	13.30
Pacific	-	0.08	0.09	0.17
South Asia	0.38	6.28	4.64	11.30
Southeast Asia	0.35	6.00	1.46	7.81
Total for Asia-Pacific	**1.31**	**19.78**	**15.81**	**36.90**

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Impacts of the comprehensive investment scenario

- 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
- Results by region and scenarios are available in the report

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Indonesia: investment impacts on agricultural production in 2045

Commodity group	Change from baseline levels in 2045 (%)			
	Climate Effect	Comprehensive Investment I	Comprehensive Investment II	Comprehensive Investment III
Staple crops	-2.47	7.13	16.78	18.59
Other crops	-0.83	3.36	6.33	7.06
Livestock	-2.18	15.17	16.55	19.01
Fishery	-1.25	3.71	7.07	7.82

The Comprehensive Investment III scenario ends hunger in Indonesia in 2034

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Indonesia: investment impacts on economy-wide welfare in 2045

Sector	Change from baseline levels in 2045 (Trillion Rp)			
	Climate Effect	Comprehensive Investment I	Comprehensive Investment II	Comprehensive Investment III
Absorption	-401	1,081	1,639	1,834
Private consumption	-299	692	1,122	1,271
Investment	-85	81	92	102
Government consumption	-17	308	425	462

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Indonesia: policy recommendations

- **Investments –** significant increase 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

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PR China: drone application in agriculture: new but growing fast

Number and area of spraying pesticides by drones

	2015	2017
Number	2,324	5,229
Area (million ha)	0.77	2.04

Photo credit: https://image.made-in-china.com/

- 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

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PR China: development of rural E-commerce

- Rural e-commerce growing fast
  - Still limited in remote areas
  - Widespread in more advanced regions

- Nearly 60% of surveyed rural households in Shandong and Zhejiang used e-commerce during 2016-2017

Photo credits: CCAP

PR China: rural E-commerce increases farmer income

The online and offline selling prices, first class (yuan/kg)

Description	Online sales			Offline sales		
	2015	2016	2017	2015	2016	2017
Apple						
Price (P)	11.2	11.6	11.4	7.8	6.8	7.2
Marketing cost (C)	**3.6**	**3.8**	**4.0**	**0.8**	**0.8**	**0.8**
P-C	**7.6**	**7.8**	**7.4**	**7.0**	**6.0**	**6.4**
Difference	0.6	1.8	1.0			
Peach						
Price (P)	16.4	15.5	15.6	7.9	8.0	8.4
Marketing cost (C)	3.6	3.8	4.0	0.8	0.8	0.8
P-C	**12.8**	**11.7**	**11.6**	**7.1**	**7.2**	**7.6**
Difference	5.7	4.5	4.0			

Similar results for sweet potato and kiwifruit

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PR China: policies to support spread of rural E-commerce

- Build farmers' capacity through training
- Invest in storage and transportation
- Reduce operational costs – scale and cooperatives
- Provide farmers financial and credit support
- Strengthen e-commerce market regulation: trust issues
- Pay attention to inclusive development among regions and households

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