ADB

Technical Assistance Report

Investment Assessment and Application of High-Level Technology for Food Security in Asia and the Pacific

Asian Development Bank

ABBREVIATIONS

ADB	–	Asian Development Bank
ANR	–	Agriculture and Natural Resources
DMC	–	Developing Member Country
HLT	–	High-Level Technology
IFPRI	–	International Food Policy Research Institute
IRRI	–	International Rice Research Institute
PPP	–	Public-Private Partnership
TA	–	Technical Assistance

NOTE
In this report, "$" refers to US dollars.

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RESEARCH AND DEVELOPMENT TECHNICAL ASSISTANCE AT A GLANCE

1.	Basic Data			Project Number: 50058-001
	Project Name	Investment Assessment and Application of High-Level Technology for Food Security in Asia and the Pacific	Department /Division	SDCC/SDCC-AR*
	Country	REG	Executing Agency	Asian Development Bank

2.	Sector	Subsector(s)	ADB Financing ($ million)
✓	Agriculture, natural resources and rural development	Agricultural production	0.60
		Agriculture research and application	0.50
		Agro-industry, marketing, and trade	0.40
		Total	**1.50**

3.	Strategic Agenda	Subcomponents	Climate Change Information	
	Inclusive economic growth (IEG)	Pillar 2: Access to economic opportunities, including jobs, made more inclusive	Adaptation ($ million) Climate Change impact on the Project	0.40 Medium
	Environmentally sustainable growth (ESG)	Global and regional transboundary environmental concerns Natural resources conservation Urban environmental improvement		
	Regional integration (RCI)	Pillar 2: Trade and investment		

4.	Drivers of Change	Components	Gender Equity and Mainstreaming	
	Governance and capacity development (GCD)	Client relations, network, and partnership development to partnership driver of change Institutional development Institutional systems and political economy	Some gender elements (SGE)	✓
	Knowledge solutions (KNS)	Application and use of new knowledge solutions in key operational areas Knowledge sharing activities Pilot-testing innovation and learning		
	Partnerships (PAR)	Implementation Private Sector Regional organizations South-South partner United Nations organization		
	Private sector development (PSD)	Promotion of private sector investment Public sector goods and services essential for private sector development		

5.	Poverty and SDG Targeting		Location Impact	
	Geographic Targeting	No	Rural	High
	Household Targeting	Yes	Urban	Medium
	SDG Targeting	Yes		
	SDG Goals	SDG2		

6.	TA Category:	B

7.	Safeguard Categorization	Not Applicable

8.	Financing

RESEARCH AND DEVELOPMENT TECHNICAL ASSISTANCE AT A GLANCE

Modality and Sources	Amount ($ million)
ADB	**1.50**
Research and development technical assistance: Technical Assistance Special Fund	1.50
Cofinancing	**0.00**
None	0.00
Counterpart	**0.00**
None	0.00
Total	**1.50**

9. Effective Development Cooperation

Use of country procurement systems	Yes
Use of country public financial management systems	No

I.   INTRODUCTION

1.   The midterm review of the long term strategic framework,[1] and the Operational Plan for Agriculture and Natural Resources, 2015–2020 of the Asian Development Bank (ADB) emphasized on investing more in the agriculture and natural resources (ANR) sector. More investment is required to revitalize the ANR sector as a key driver of inclusive growth and to promote food security in the region. Other challenges that affect agricultural growth and food security include climate change and shrinking natural resources. This implies that investment has to be supported by high-level technology (HLT)[2] for climate resiliency, productivity enhancement, and better supply chain management to promote food security. The proposed research and development technical assistance (TA) will identify the priority actions to be undertaken by ADB and developing member countries (DMCs) to mobilize investment and promote use of HLT in the ANR sector to produce more food in the region.

2.   The TA builds on two previous TA projects[3] that developed the high-yielding rice varieties and site-specific crop management packages for cultivation in water-short areas; and examined value chain financing for selected crops. The proposed TA will complement the accomplishments of those TA projects by identifying priority actions to mobilize investments and by promoting the use of HLT in agricultural production, distribution, and the value addition, which will also complement the ongoing TA on Building Sustainable Food and Nutrition Security in Asia and the Pacific.[4] The design and monitoring framework is in Appendix 1.[5]

II.   ISSUES

3.   About 490 million people in Asia and the Pacific still suffer from chronic hunger.[6] The number is down from 552 million in 2013.[7] The complexity of food insecurity is exacerbated by the growth of middle-income consumers and rapid urbanization, aging populations and youth out-migration, climate change, and natural resource degradation. More investment, appropriate HLT, and new infrastructure are the key requirements to address this tall order and promote food security. The Food Security Forum, held at ADB headquarters 22–24 June 2016, also highlighted these issues for policy support and actions.

4.   Firstly, mobilizing new investments in the ANR sector is part of government development plans in most DMCs, albeit with varying importance and focus. The need for investments also varies across agriculture subsectors within a country, which makes the

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[1] ADB. 2014. *Midterm Review of Strategy 2020: Meeting the Challenges of a Transforming Asia and Pacific*. Manila; and ADB. 2008. *Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank, 2008–2020*. Manila.

[2] Any technology and/or method that can improve the efficiency and productivity of operations; address climate mitigation, adaptation, and resilience to disaster risk; and introduce innovative process and/or inputs, creates opportunities for economies of scale and maximizes cross-sectoral synergies can be termed as HLT. Thus, increased efficiency of existing technology and/or the introduction of information and communication technology, e-commerce, and drip irrigation can be identified as HLT.

[3] ADB. 2011. *Technical Assistance for Innovative Financing for Agriculture and Food Value Chains.* Manila; and ADB. 2013. *Technical Assistance for Development and Dissemination of Climate-Resilient Rice Varieties for Water-Short Areas of South Asia and Southeast Asia.* Manila

[4] ADB. 2015. *Technical Assistance for Building Sustainable Food and Nutrition Security in Asia and the Pacific (Phase 1)*. Manila.

[5] The TA first appeared in the business opportunities section of ADB's website on 7 September 2016.

[6] Food and Agriculture Organization of the United Nations. 2015. *Regional Overview of Food Insecurity Asia and the Pacific: Towards a Food Secure Asia and the Pacific*. Bangkok.

[7] Independent Evaluation Department. 2013. Food Security Challenges in Asia*. Working Paper*. Manila: Asian Development Bank.

guesstimate of total ANR investment requirements in the region difficult. The proposed TA will conduct an analysis to (i) estimate the total investments required in the ANR sector by taking account of changing climate and ongoing economic and demographic transitions to produce adequate food to meet the demand in the region by 2030, (ii) prioritize areas for investment in selected DMCs, and (iii) suggest actions to be taken by governments and other stakeholders to mobilize new investments in the prioritized areas.

5.   Secondly, climate change will affect every area of agricultural production and food security in almost all DMCs. Difficult choices for many DMCs are already looming about the competing use of water between agriculture and other sectors.[8] The majority of the nearly 500 million of the rural poor in Asia and the Pacific are subsistence farmers who depend mainly on rain-fed agriculture,[9] climate change causing less rainfall will seriously affect them. Application of HLT will be able to help farmers address these new challenges. Therefore farmers' access to affordable HLT for climate change adaptation and mitigation will continue to play an important role in enhancing agricultural yield and promoting food security. The proposed TA will identify successful technologies that are currently available in the ANR sector and the actions required to promote their wider use by the farmers from all strata. It will also analyze how HLT can be effectively disseminated among the farmers and how DMCs can apply it in their ANR operations to produce more food in an era of climate change.

6.   Thirdly, the current agricultural distribution channels in most DMCs are unable to support reliable supply of fresh and safe food to growing urban consumers. These channels are mostly dominated by thousands of unregulated intermediaries who collect products from millions of farmers.[10] Due to the dispersed nature of farming activities and the lack of coordination with logistics providers, reliable supply of safe and fresh food becomes difficult. If these suppliers are linked to larger distribution channels and market infrastructure, the supply of fresh food will improve. It will also make it easier for the respective regulatory authorities to monitor, detect, and promote safe and fresh food.

7.   One of the major elements of the food distribution channel is a fresh food wholesale market.[11] For emerging economies in Asia, where urbanization is happening at a rapid pace, wholesale markets are envisaged to play a major role in food security and the growth of agribusiness. The proposed TA will develop custom-tailored models of wholesale markets for selected DMCs. It will also train government officials on the awareness and implementation of these models.

8.   While the analysis of investment (output 1) will identify the priority actions to mobilize more investments in ANR, the review of HLT (output 2) will help to sequence them, and the promotion of wholesale markets (output 3) will also help to increase investments in distribution and market infrastructure. Thus, the TA will help to increase investment in the farming and agri-logistic sectors.

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[8] Asia and the Pacific has the world's lowest available water on a per capita basis—5,224 cubic meters compared with the world average of 8,349 cubic meters. United Nations and ADB. 2012. *Green Growth, Resources, and Resilience: Environmental Sustainability in Asia and the Pacific.* http://www.unep.org/dewa/Portals/67/pdf/G2R2_web.pdf)

[9] International Fund for Agricultural Development. Undated. *Climate Change Impacts in the Asia/Pacific Region.* https://www.ifad.org/documents/10180/88baa1cf-4661-4077-9292-84dfff5253f0

[10] In some provinces in India for example, large retailers are also not allowed to directly purchase from farmers due to Agricultural Produce Marketing Committee Act.

[11] This is a model that has been practiced in most parts of the developed world, where the government plays a significant role in establishing the wholesale market infrastructure and managing its operations. However, the operators in these markets are private wholesalers and producer cooperatives.

III.   THE RESEARCH AND DEVELOPMENT TECHNICAL ASSISTANCE

A.   Impact and Outcome

9.   The impact of the proposed TA will be increased investments in farming and agri-logistics. The outcome will be increased knowledge of governments and ADB about identifying appropriate ANR projects.

B.   Methodology and Key Activities

10.   The TA will support analytical works, pilot frontier technologies, and knowledge dissemination in DMCs.[12] It will support (i) estimating the total investments required in the ANR sector to achieve food security in Asia and the Pacific by 2030 by taking account of climate change and economic and demographic transitions, (ii) analyzing to identify priority areas for investments in the ANR sector in selected DMCs, (iii) stocktaking of existing successful technologies and identifying actions required to scale them up, (iv) piloting HLTs, (v) preparing an integrated supply model (wholesale market) for fresh and safe food, and (vi) disseminating knowledge. The three outputs shown in paras. 11–13 will lead to the accomplishment of the TA outcome, which will eventually help to increase investments in farming activities and agri-logistics.

11.   **Output 1: Overall agricultural investment requirement and prioritized areas for investment identified in developing member countries.** A comprehensive review of trends and patterns of investment in ANR sectors in Asia and the Pacific since 2010 will be carried out to identify the main obstacles. The review will identify the institutional and policy barriers to investment. A group of IFPRI experts will estimate the total investment requirement in agricultural production related infrastructure to promote food security in the region by using an existing economic model. The analysis will be done by taking account of climate change and economic and demographic transitions in the region. The investment situation in up to three DMCs will be analyzed to prioritize actions and subsectors within agricultural sectors to promote private and public investments to promote food security. These studies will be internally reviewed and evaluated for quality control before presenting at knowledge dissemination events that ADB staff and DMC officials will attend.

12.   **Output 2: Climate-resilient agricultural technology promoted and disseminated in selected developing member countries**. A comprehensive review of the current use of different high-level technologies, such as reduced or zero tillage (ZT), machine seeding or transplanting, water-efficient alternate wetting and drying (AWD), crop residue retention, crop rotation, and information and communication technology in rice and non-rice crops will be conducted. The review will analyze the affordability, development impacts, and sustainability of these technologies and recommend policy and institutional support, appropriate logistics, and financing to scale them up. Climate-resilient technologies will be selected for piloting in at least two countries based on prior trials and experiments,[13] and technical and environmental

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[12] In prioritizing the DMCs for this TA, three factors will be used: (i) active ANR loans and grants (in 2016), (ii) resources earmarked for ANR in country operations business plans, 2016–2018, and (ii) the country's food security ranking in 2016. In addition to these factors, the rate of urbanization and growth of middle-income consumers will be considered for output 3. At least one of the countries to be included in this TA will be selected from the Pacific DMCs. Prior to commencing or financing of any proposed activities under the TA, a no-objection in writing will be obtained from each selected DMC.

[13] Under the TA: "Development and Dissemination of Climate-Resilient Rice Varieties for Water-Short Areas of South Asia and Southeast Asia (footnote 3)", ADB supported dissemination of new rice technology in Bangladesh, Cambodia, India, Lao PDR, and Nepal.

feasibility, including adaptability to the situation of smallholders and female farmers. In addition to rice, the pilot projects will also focus on other crops such as vegetables produced after rice harvest. The implementation arrangements for these pilot projects will be finalized in consultation with the operational departments and concerned DMCs. Each pilot project will be monitored and evaluated, and a report summarizing the outcomes and experiences will be prepared by the TA team for discussion. The findings of this output coupled with other outputs will also be used for the capacity building of DMCs by promoting South–South cooperation through a workshop. Target DMCs will be selected in consultation with regional departments.[14]

13.   **Output 3: Knowledge on customized wholesale markets improved**. The potential of wholesale markets in selected DMCs will be analyzed by the TA team by taking full cognizance of projected economic growth and urbanization—the two main determinants of demand for safe and quality food. The legal and institutional environment will be assessed to recommend actions required to support the wholesale markets. Depending on the country context, custom-tailored models of wholesale markets for selected DMCs will be developed. Instead of carrying out an assessment of the wholesale market system, these models will focus on the mobilization of investment in this new market and distribution facilities and the use of HLT in their operation and management. DMC government officials will be trained in the development and management of wholesale markets.

14.   For the outcome, the major risk is the lack of government interest in modernizing the agricultural sector and agricultural supply chain. Another risk arises from the bias of governments toward subsidizing agricultural inputs such as water, fertilizer, and pesticides. This bias may result in government apathy that prevents them from taking serious interest in the findings of this TA. For the outputs, the main risks involve high turn-over of government officials trained on wholesale markets, lack of an effective agricultural investment policy and guidelines for climate-resilient growth, and limited interest in agri-logistics and fresh and safe food.

15.   To minimize these risks, the TA team will work closely with the government, establish inter-ministerial committees, and facilitate dialogue among government agencies.

C.   Cost and Financing

16.   The TA is estimated to cost $1,500,000, which will be financed on a grant basis from ADB's Technical Assistance Special Fund (TASF-V). The cost estimates and financing plan is in Appendix 2.

D.   Implementation Arrangements

17.   The TA will be implemented over 3 years, from October 2016 to October 2019.[15] ADB will execute the TA through the Agriculture, Rural Development, and Food Security Unit of the Sustainable Development and Climate Change Department. The secretariat of the Rural Development and Food Security (Agriculture) Thematic Group will be responsible for the overall supervision of the implementation. The secretariat will report to the thematic group committee on the progress and consult with the Climate-Smart Agriculture Working Group and Agribusiness Value Chain Working Group during the implementation of the TA. The secretariat will also work closely with the other concerned operational departments and focal points to coordinate the work of the consultants and ensure effective dissemination of the TA findings.

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[14] Initial criterion is discussed in concept paper.

[15] Depending on the need to ensure the success of the planned pilot activities, the duration may be extended and the amount of the TA budget may be increased.

18.   For output 1, ADB will carry out analytical work with assistance from organizations with knowledge and expertise in investment in ANR sectors involving 12 person-months of international consultants and 15 person-months of national consultants. The International Food Policy Research Institute (IFPRI) will be engaged on a single-source selection basis to render these consultancy services in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time).[16] IFPRI, a member of the Consultative Group for International Agricultural Research, is an international center of excellence. Single-source selection is justified because IFPRI has (i) multiple expertise in agriculture, rural development, and food security necessary for output 1; (ii) significant teams of technical and policy experts in the field who can provide information and insights on ANR investment; and (iii) extensive experience working collaboratively in the sector with DMC governments and ADB. In implementing the output, IFPRI will collaborate with other international, regional, and national centers of excellence, as necessary.

19.   The International Rice Research Institute (IRRI) will be a knowledge partner for delivering output 2 under the knowledge partnership agreement signed with ADB on 23 June 2016. IRRI is a well-established knowledge center that has expertise in agriculture and food security, and is well placed to ensure collaboration among the governments of DMCs, ADB, and other agricultural centers of excellence. IRRI has the expertise and experiment centers for undertaking cutting edge research to address climate change and technology dissemination.

20.   For output 3, ADB will carry out relevant works with the help of firms and/or organizations experienced in wholesale market development. The TA will engage consultants in accordance with ADB's Guidelines on the Use of Consultants (2013, as amended from time to time). It will recruit international (6 person-months) and national consultants (6 person-months) through firms. For the recruitment, the fixed budget selection method will be adopted for engaging firms and institutions.

21.   In addition, ADB will recruit international consultants (8 person-months, shown as unallocated) on an individual basis to assist in coordinating and monitoring the overall implementation of the TA and undertake other activities, as necessary. All disbursements under the TA will be made in accordance with ADB's *Technical Assistance Disbursement Handbook* (2010, as amended from time to time).

22.   The TA findings will be disseminated through project reports, conferences, workshops, knowledge events, and development networks. The TA team will produce a working paper for electronic dissemination by ADB and its resident missions. This working paper will also be posted on the ADB website.

IV.   THE PRESIDENT'S DECISION

23.   The President, acting under the authority delegated by the Board, has approved the provision of technical assistance not exceeding the equivalent of $1,500,000 on a grant basis for Investment Assessment and Application of High-Level Technology for Food Security in Asia and the Pacific, and hereby reports this action to the Board.

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[16] ADB's Procurement Guidelines (2015, as amended from time to time) will be followed in case of purchase of services, equipment, or payments to conference venues.

DESIGN AND MONITORING FRAMEWORK

Impact the Technical Assistance is Aligned with
Investment in farming and agri-logistics increased[a]

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
Outcome Governments' and ADB's knowledge to identify appropriate ANR projects increased	a. At least one investment project in ANR based on the findings of this TA included in the COBP, 2019–2021 of participating DMCs by 2020 (2016 baseline = 0)	a. Annual reports of the RDFS-TG, TA progress report, and the reports produced under the TA	Lack of government commitment to adopt innovative technologies, and a bias towards the subsidization of agricultural inputs instead of promoting technology.
Outputs 1. Overall agricultural investment requirement and prioritized areas for investment identified in DMCs	1a. A report estimating the total investment in ANR sectors to ensure food security in Asia and the Pacific prepared by 2019 (2016 baseline = 0) 1b. Country reports on three selected DMCs identifying the priority actions and areas for investment prepared by 2019 (2016 baseline = 0)	1a. Annual reports of the RDFS-TG, TA progress report, and the reports produced under the TA 1b. Annual reports of the RDFS-TG and the reports produced under the TA	Lack of effective agricultural investment policy, effective guidelines for climate-resilient growth, and limited interest in agri-logistics and fresh and safe food.
2. Climate-resilient agricultural technology promoted and disseminated in selected DMCs	2a. A report on existing HLT and actions required to scale-up their uses delivered to ADB by 2019 (2016 baseline = 0) 2b. At least two pilots of climate-resilient frontier HLT conducted by the end of 2019 (2016 baseline = 0) 2c. Report on assessing the preliminary outcomes of these pilots is prepared by 2019 (2016 baseline = 0) 2d. One workshop to disseminate the findings to	2a. Annual reports of the RDFS-TG and the reports produced under the TA 2b. Annual reports of the RDFS-TG and TA reports on these pilots 2c. Annual reports of the RDFS-TG 2d. Annual reports of the RDFS TG	

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
	promote South–South cooperation among DMCs conducted by 2019 (2016 baseline = 0) and 75% of participants indicate enhanced understanding of pilot findings		
3. Knowledge on customized wholesale markets improved	3a. One analytical report on the economic prospect of wholesale markets in selected DMCs are prepared by 2019 (2016 baseline = 0)	3a. Annual reports of the RDFS-TG and TA progress reports	High turn-over of government officials trained on wholesale markets.
	3b. At least three government officials from each selected DMCs are trained on wholesale markets by 2019 (2016 baseline = 0)	3b. Annual reports of the RDFS-TG and TA progress reports	
	3c. Custom-tailored models of wholesale markets submitted to selected DMCs by 2019 (2016 baseline = 0)	3c. Annual reports of the RDFS-TG and the reports produced under the TA	

Key Activities with Milestones
1. Overall agricultural investment requirement and prioritized areas for investment identified in DMCs
1.1 Analyze the current pattern and trend of investment since 2000 in agriculture in Asia and the Pacific (Q1 2017–Q2 2017).
1.2 Conduct in-depth studies in selected DMCs to identify the priority actions required and areas to mobilize investment in ANR sector (Q1–Q3 2017).
1.3 Prepare a technical model to assess the total investment requirements to promote food security in Asia and the Pacific by 2030, and identify the sources of data to conduct this exercise (Q2 2017–Q4 2017).
1.4 Prepare the preliminary results of this technical exercise (Q3 2017–Q1 2018).
1.5 Disseminate the preliminary reports summarizing the findings of this exercise (Q2 2018).
1.6 Incorporate the comments received on the preliminary findings and finalize the report (Q4 2018).
1.7 Disseminate the reports at knowledge dissemination events at headquarters and in some DMCs (Q1 2019–Q2 2019).

2. Climate-resilient agricultural technology promoted and disseminated in selected DMCs
2.1 Review the available successful ANR high-level technologies currently prevailing in Asia and the Pacific (Q1 2017–Q3 2017).
2.2 Analyze the existing policy support and institutional settings, logistics, financing, and dissemination for high-level technology, and recommend the required actions to scale-up these technologies (Q1 2017–Q3 2017).
2.3 Identify frontier biophysical and/or agronomic, information and communication technology, and ecosystem based climate resilient technologies that will meet the needs of DMCs and can be pilot-tested with TA support (Q2 2017–Q4 2017).

Key Activities with Milestones
2.4 Prepare the implementation arrangements for the selected pilot activities in consultation with internal and external stakeholders (Q2 2017–Q4 2017).

2.5 Implement the selected pilot activities (Q1 2018–Q2 2019).
2.6 Prepare a report summarizing the key findings of the pilot activities (Q1 2017–Q2 2019).
2.7 Disseminate the findings through workshop and electronic publications (Q3 2019).

3. Knowledge on customized wholesale market improved
3.1 Review the existing agricultural supply chain and infrastructure in Asia and the Pacific (Q1 2017–Q3 2017).
3.2 Analyze future demand for safe and fresh food in selected DMCs (Q1 2017–Q3 2017).
3.3 Prepare a training program on the development and management of wholesale markets (Q3 2017).
3.4 Train government officials and policymakers on wholesale market development and management (Q4 2017–Q2 2018).
3.5 Prepare a report summarizing the results and key features of the training program (Q4 2018).
3.6 Develop custom-tailored wholesale market models for selected DMCs (Q4 2017– Q2 2019).
3.7 Present the wholesale market models to stakeholders (Q3 2019).

Inputs
ADB: $1,500,000 (grant)

Assumptions for Partner Financing
Not Applicable

ADB = Asian Development Bank, ANR = agriculture and natural resources, COBP = country operations business plan, DMC = developing member country, HLT = high-level technology, Q = quarter, RDFS-TG = Rural Development and Food Security (Agriculture) Thematic Group, TA = technical assistance.
[a] ADB. 2015. *Operational Plan for Agriculture and Natural Resources: Promoting Sustainable Food Security in Asia and the Pacific in 2015–2020*. Manila.
Source: Asian Development Bank.

COST ESTIMATES AND FINANCING PLAN
($'000)

Item	Amount
Asian Development Bank[a]	
1. Consultants and Knowledge Partner[b]	
a. Remuneration and per diem	
i. International consultants	723.12
ii. National consultants	232.00
b. International and local travel	46.00
2. Surveys and meetings	60.00
3. Training[c]	105.00
4. Pilot testing[d]	80.00
5. Miscellaneous administration and support costs[e]	82.00
6. Seminars, workshops, and conferences[f]	116.00
7. Contingencies	55.88
Total	**1,500.00**

[a] Financed by the Asian Development Bank's Technical Assistance Special Fund (TASF-V).
[b] Includes amounts for engaging knowledge partner who will be engaged using knowledge partnership agreement.
[c] Any advances provided should be liquidated within a 30-day period. The target number of government officials to be trained is 15.
[d] Excludes consultancy fees and only includes the cost of piloting, training, and purchase of goods. Purchase of goods will follow ADB's Procurement Guidelines (2015, as amended from time to time).
[e] These allocations are earmarked for the implementation of the activities selected during the TA implementation.
[f] At least one inception and one final workshop with 40 expected participants will be organized in ADB headquarters and/or selected developing member countries. Includes ADB staff travel to attend the workshops as resource persons.
Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

1.   The implementation of the technical assistance (TA) will require a total of 26 person-months of international and 21 person-months of national consulting services, and knowledge and expert services of the International Rice Research Institute (IRRI) to be provided under ADB–IRRI Knowledge Partnership Agreement. The International Food Policy Research Institute (IFPRI) will be engaged to implement output 1; IRRI, as a knowledge partner, will implement output 2; and consultants, engaged through a firm, will implement output 3. IFPRI will be selected on a single-source selection basis in accordance with the Guidelines on the Use of Consultants (2013, as amended from time to time) of the Asian Development Bank (ADB). IFPRI, a member of the Consultative Group for International Agricultural Research, is an international center of excellence. Single-source selection is justified because IFPRI has (i) multiple expertise in agriculture, rural development, and food security relevant to output 1, (ii) significant teams of technical and policy experts in the field who can provide country-level information and insights on agriculture and natural resources (ANR) investment, and (iii) extensive experience in collaborative work in the sector with developing member country (DMC) governments and ADB. In implementing the output, IFPRI will collaborate with other international, regional, and national centers of excellence, as necessary. IRRI will be engaged through the ADB–IRRI Knowledge Partnership Agreement signed on 23 June 2016. IRRI will collaborate with other centers of excellence if necessary in implementing this output. Consultants for output 3 will be engaged through a firm using the consultants' fixed budget selection method. In addition, ADB will recruit international individual consultants, like the coordinator and monitoring specialists, for 8 person-months on an individual basis. All consultants will be engaged following ADB's Guidelines on the Use of Consultants. The outline terms of reference are provided in paras. 2–11.

A.   Consultant Requirements for Output 1

2.   **Agricultural investment specialists** (international, 3 person-months; national, 9 person-months). The specialists will have graduate degrees in agriculture, economics, finance, or other relevant fields with extensive experience in working in the agriculture and/or food security sector and ADB operations in the ANR sector. Their outputs will include (i) an analysis of the current agricultural investment situation in Asia and the Pacific and in selected DMCs, including investment gaps; (ii) an analysis of the agriculture subsector and accompanying analytical work; and (iii) TA progress reports. The specific tasks are as follows:
- (i)   evaluate the current agriculture investments, including patterns and trends in the region and in selected DMCs;
- (ii)   identify agriculture investment funding gaps and barriers;
- (iii)   carry out relevant subsector analyses and other analytical works on agricultural investments;
- (iv)   work with the agricultural modeling specialist to identify priority agriculture investment opportunities in the medium and long term and provide recommendations to promote agricultural investments, taking advantage of synergies and opportunities in the public and private sectors;
- (v)   consult with the public and private sectors to assess potential investors in agriculture;
- (vi)   review ADB's ongoing and pipeline projects in agriculture and contribute to ADB operation's pipeline development by identifying, conceptualizing, and preparing technical feasibility studies based on identified priority investment opportunities;
- (vii)   present and disseminate findings in appropriate forums, including country and regional conferences; and

(viii)   report on the progress of TA activities to ADB and relevant DMC project offices.

3.   **Agricultural modeling specialist** (international, 6 person-months). The specialist should have a graduate degree in agriculture, economics, finance, or other relevant fields, with at least 10 years of demonstrated knowledge and experience in agriculture and food security and economic modeling. His or her outputs will include (i) an assessment of total investment required in ANR sector by taking account of climate change and economic and demographic transition to end hunger in Asia and the Pacific by 2030, and (ii) TA progress reports. The specific tasks are as follows:
　　(i)   design a macroeconomic model to estimate total investments required in ANR sector by taking account of climate change and economic and demographic transition to end hunger in Asia and the Pacific by 2030;
　　(ii)   determine the country and regional agriculture investment gaps and shortfalls;
　　(iii)   work with the agricultural investment specialists to identify priority agriculture investment opportunities in the medium and long term and provide recommendations to promote agricultural investments, taking advantage of synergies and opportunities in the public and private sectors;
　　(iv)   present and disseminate findings in appropriate forums, including country and regional conferences; and
　　(v)   report on the progress of TA activities to ADB and relevant DMC project offices.

4.   **Agricultural policy specialists** (international, 3 person-months; national, 6 person-months). The specialists will have graduate degrees in agriculture, economics, finance, or other relevant fields, with extensive experience in agricultural policy and institutional support structure in Asia and the Pacific. Their outputs will include (i) analysis of the current agricultural policy and institutional situation in the region and selected DMCs and recommended courses of action to improve investment climate for agriculture and (ii) TA progress reports. The specific tasks are as follows:
　　(i)   analyze the genesis, evolution, and current status of the agricultural policy and institutional structure in Asia and the Pacific;
　　(ii)   carry out country studies on the agricultural policy and institutions in selected DMCs;
　　(iii)   identify the main policy obstacles to investment;
　　(iv)   recommend actions to promote agricultural investment in the region; and
　　(v)   report on the progress of TA activities to ADB and relevant DMC project offices.

B.   Experts Requirements for Output 2

5.   IRRI, through the ADB–IRRI Knowledge Partnership Agreement, will deliver output 2 by involving agricultural scientist, knowledge development and dissemination specialist, and participatory consultation specialists.

C.   Consultant Requirements for Output 3

6.   **Agricultural market and distribution specialists** (international, 2 person-months; national, 6 person-months). The specialists will have graduate degrees in agriculture, economics, finance, or other relevant fields with extensive experience in working in the agriculture and/or food security sector, the agricultural markets and distribution, and ADB operations in the ANR sector. Their outputs will include (i) a review of the existing legal and institutional environment in selected DMCs; (ii) a demand analysis on safe and fresh quality foods in Asia and the Pacific; (iii) a report on wholesale market models in selected DMCs,

including potential public–private partnerships (PPPs); and (iv) TA progress reports. The specific tasks are as follows:

      (i)   review the existing legal and institutional environment in selected DMCs to identify gaps and weaknesses that may hinder the development and operation of wholesale markets and suggest remedies to overcome these hindrances;

      (ii)   analyze the evolving demand for safe and quality food with urbanization and demographic shifts in the selected DMCs to assess the prospect for wholesale markets in these countries;

      (iii)   prepare customized models for wholesale markets for selected DMCs and their implementation arrangements;

      (iv)   recommend a partnership framework among private and public sectors to develop wholesale markets specifying the role of each sector; and

      (v)   report on the progress of TA activities to ADB and relevant DMC project offices.

7.   **Knowledge and training specialist** (international, 1 person-month). The specialist will have a graduate degree in agriculture, economics, communications, or other relevant fields, with extensive experience in knowledge management and training in agriculture. His or her outputs will include (i) a training manual on wholesale markets and agri-logistics and infrastructure, (ii) successful capacity-building training programs on wholesale markets and agri-logistics and infrastructure, (iii) a report on the training programs conducted, and (iv) TA progress reports. The specific tasks are as follows:

      (i)   develop a training manual on the development and implementation of wholesale markets and improved agri-logistics and infrastructure;

      (ii)   impart training program or programs for capacity building of government officials on different aspects of wholesale markets, agri-logistics, and infrastructure;

      (iii)   prepare a report on the training programs and lessons; and

      (iv)   report on the progress of TA activities to ADB and relevant DMC project offices.

8.   **Agri-logistics specialist** (international, 1 person-month). The specialist will have a graduate degree in agriculture, economics, or other relevant fields, with extensive experience in logistics in the agriculture sector. His or her outputs will include (i) a situation analysis on agri-logistics in selected DMCs, including recommendations for ADB interventions; and (ii) TA progress reports. The specific tasks are as follows:

      (i)   review the state of agri-logistics in selected DMCs;

      (ii)   recommend priority areas for ADB interventions in agri-logistics and supply chains, including potential sources, modalities, and instruments to finance the agri-logistics; and

      (iii)   report on the progress of TA activities to ADB and relevant DMC project offices.

9.   **Public–private partnership specialist** (international, 1 person-month). The specialist will have a graduate degree in agriculture, economics, finance, or other relevant fields, with extensive experience in PPP. His or her outputs will include (i) a report on the application of PPPs to develop wholesale markets in select DMCs, and (ii) TA progress reports. The specific tasks are as follows:

      (i)   review PPPs, including policies, strategies, trends, and best practices in agriculture in selected DMCs;

      (ii)   assess the feasibility of PPPs in agriculture wholesale markets in selected DMCs;

      (iii)   recommend country-specific PPP models for wholesale markets in selected DMCs; and

      (iv)   report on the progress of TA activities to ADB and relevant DMC project offices.

10.   **Financial specialist** (international, 1 person-month). The specialist will have a graduate degree in agriculture, economics, finance, or other relevant fields. His or her outputs will include (i) a review of the financial aspects of agricultural markets and distribution, (ii) a financing modality for agricultural wholesale markets, and (iii) TA progress reports. The specific tasks are as follows:

(i)   review financing policies, strategies, trends, and best practices in agricultural markets, distribution, and agri-logistics in selected DMCs;

(ii)   recommend financing models and identify financing sources for agricultural wholesale markets in selected DMCs;

(iii)   consult with key financing sources on their experience and willingness to scale-up investment and/or expand to new areas, such as wholesale markets; and

(iv)   report on the progress of TA activities to ADB and relevant DMC project offices.

D.   Unallocated experts and resource persons (international 8 person-months)

11.   Part of these consultancy services will be used for the coordination and monitoring of TA implementation. Other expertise requirements will be determined as the implementation of the TA progresses.