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United Nations

# National Agricultural Innovation System Assessment in Cambodia

Consolidated report

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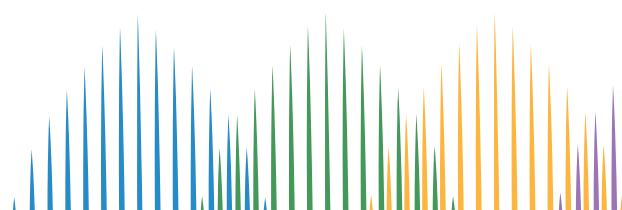


The TAP-AIS project

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## Abbreviations and Acronyms

<b>AIS</b>	Agricultural Innovation System
<b>AES</b>	Agricultural Extension System
<b>APS</b>	Agricultural Private Sector
<b>ARS</b>	Agricultural Research System
<b>ASEAN</b>	Association of South-East Asian Nations
<b>ASPIRE</b>	Agriculture Services Programme for Innovation, Resilience and Extension
<b>ATRI</b>	Agricultural Technical Regulatory Institutions
<b>CA</b>	Conservation Agriculture
<b>CASIC</b>	Cambodia Conservation Agriculture Sustainable Intensification Consortium
<b>CARD</b>	Council for Agriculture and Rural Development
<b>CARDI</b>	Cambodian Agricultural Research and Development Institute
<b>CD</b>	Capacity development
<b>CIAP</b>	Cambodia-IRRI-Australia Project
<b>COVID</b>	Corona Virus Disease
<b>DEAFF</b>	Department of Extension of Agriculture, Forestry and Fisheries
<b>DeSIRA</b>	Development Smart Innovation through Research in Agriculture
<b>DP</b>	Development Partner
<b>DPS</b>	Department of Planning and Statistic
<b>FA</b>	Forestry Administration
<b>FAO</b>	Food and Agriculture Organization of the United Nations
<b>FDI</b>	Foreign Direct Investment
<b>FI</b>	Financial Institution
<b>GDA</b>	General Department of Agriculture
<b>GDP</b>	Gross Domestic Product
<b>GDR</b>	General Directorate of Rubber
<b>GERD</b>	Gross Domestic Expenditure on R&D
<b>GVA</b>	Gross Value Added
<b>HEI</b>	Higher Education Institution
<b>HR</b>	Human Resource
<b>IRRI</b>	International Rice Research Institute
<b>KCNAI</b>	Kampong Cham National Institute of Agriculture

<b>KII</b>	Key Informant Interview
<b>MAFF</b>	Ministry of Agriculture Forestry and Fisheries
<b>MEF</b>	Ministry of Economics and Finance
<b>NGO</b>	Non-Governmental Organization
<b>NIS</b>	National Institute of Statistics
<b>NSDP</b>	National Strategic Development Plan
<b>OECD</b>	Organization for Economic Co-operation and Development
<b>PDAFF</b>	Provincial Department of Agriculture, Forestry and Fisheries
<b>PLNAI</b>	Prek Leap National Institute of Agriculture
<b>R&amp;D</b>	Research and Development
<b>RGC</b>	Royal Government of Cambodia
<b>RUA</b>	Royal University of Agriculture
<b>TAP</b>	Tropical Agriculture Platform

## Foreword

Characterized as a lower-middle income country, Cambodia's development is strongly influenced by the growth of agriculture. About one third of the country's GDP comes from the sector. Within agriculture, crop cultivation dominates fisheries, forestry and animal sub-sectors in terms of its share of the country's economic development.

At present, Cambodian agriculture is facing numerous challenges to satisfy growing demands for

food, with regards to quantity, quality and safety, by a fast-growing population of 1.4 percent per year. Competition for land by the urbanization program of the government and the expansion of industrial crops production, has become more critical and strongly affects the food crop production program of the Ministry of Agriculture, Forestry and Fisheries. Agricultural land for food production is continuously declining while crop productivity remains low because of slow agricultural technology development and adoption by the farming communities. Shortage of agricultural labour due to migration has become more critical particularly in some production regions in the country, where only less productive populations, of old farmers and young children, remain in the production areas. The effects of climate change have yet worsened the situation. Food crop production has been seriously affected by the increased intensity of floods, droughts, thunderstorms, and damage caused by pests and diseases. Additionally, tough challenges coming from market competition, including increased food quality and safety standards, have become more prevalent in the 21st century.

Responding to this difficult situation, the government has set up a policy to modernize agriculture for a more sustainable and competitive sector. The policy has been formulated with the vision to transform agriculture from labour intensive to technology-based, alleviate poverty, increase resilience to climate change, promote safe and environmentally friendly practices, produce food with better nutrition and safe for consumption, enhance access to regional and global markets for local products, and develop regional integration with countries in the region and the world.

In response to this policy, government institutions, UN organizations and research and development systems have made efforts towards the modernization of agriculture, however they have not been sufficient to achieve the objective. Weak coordination and limited knowledge sharing and actions among interrelated institutions, and a lack of initiatives toward developing capacities in order to improve coordination and responsiveness of all actors to achieve the millennium goals are to be blamed. As a result, little has been achieved and the situation in the agriculture sector remains difficult.

It is obvious that an effective coordinating system to guide all activities and efforts made by different institutions is needed. Such a system would enable all actors to communicate, share information and resources, and work together to build a strong rural economy platform. This would ensure effective and sustainable use of natural

resources and in the process increase profits made by local farmers and agricultural producers, cut down the costs of agricultural production, increase market competitiveness, and contribute to poverty alleviation within the rural populations.

Recognizing the situation, the Cambodian Ministry of Agriculture, Forestry and Fisheries entered an agreement with the Food and Agriculture Organization of the United Nations (FAO) to implement TAP-AIS DeSIRA project: Developing capacities in agricultural innovation systems: scaling up the Tropical Agriculture Platform (TAP) framework, as an effective way to sustainably intensify agricultural production to meet the challenges to food systems, such as increasing food demand and the need to conserve natural resources.

Within the agreement, an assessment of the status, constraints, and challenges of agriculture innovation systems (AIS) in the country, including all related institutions operating in the agricultural sector, was conducted. For this purpose, government institutions, agricultural input suppliers, processors, financial institutions, farmers, and NGOs were invited to discuss the issues in a series of workshops. Additionally, individual key informant interviews were also carried out with some highly experienced personnel working in their own field.

All relevant information from workshops and interviews as well as secondary data related to the status, constraints, and challenges of the agriculture innovation system (AIS) was collected and analyzed to produce sets of recommendations, which are highly relevant to trigger innovation in the agricultural sector, including capacity development and policy dialogue.



## Executive summary

Located in the southwestern corner of Indochina in Southeast Asia, Cambodia is influenced by the tropical monsoon climate with distinct dry and wet seasons. Rice is the main staple food crop for Cambodia and its cultivation ranges from rainfed upland, rainfed lowland, deep-water/floating, and dry season rice. Rainfed lowland rice dominates the country's rice-ecosystem, therefore it plays a significant role in the national economy. However, its productivity is generally low and is highly vulnerable to climate change.

Over the past decade, with increases in trade, tourism, and foreign direct investment (FDI), Cambodia has achieved significant economic growth and has entered the group of lower-middle income countries. Nevertheless, the proportion of the population still living below the national poverty line remains high and has increased to 17.8 percent in 2020 due to economic impact of the COVID-19 pandemic, at the same time close to one third of the population remains vulnerable to falling back into poverty (ADB, 2021; Ly, S. et al., 2020). The poverty incidence is found to be higher in the rural areas, where people are more likely to be less educated and solely dependent on farming for their living. Cambodia's development is strongly influenced by growth in the agriculture sector. Due to this context, the modernization of agriculture has been highly regarded by the government as a long-term strategy to transform traditional labour-based agriculture into technology-based and with that to effectively enhance the country's further regional integration with ASEAN countries.

In support of this strategic vision, TAP-AIS DeSIRA project: Developing capacities in agricultural innovation systems: scaling up the Tropical Agriculture Platform (TAP) framework conducted an assessment on Agricultural Innovation Systems in all related organizations working in the agricultural sector with coordination support from the General Department of Agriculture (GDA).

Objectives of the assessment were to: (a) characterize and take stock of agricultural innovation systems and provide insights on factors that determine their capacity to enable and promote inclusive and responsible innovations, (b) Identify critical gaps, needs, opportunities, good practices, etc. and (c) Formulate actionable recommendations including policies and strategies for reform and integration aiming at strengthening and making AIS more effective.

To achieve the assessment objectives, a participatory assessment of the national agricultural innovation system was conducted. The assessment involved multi-stakeholder workshops, key informant interviews, and secondary data analysis.

Three multi-stakeholder workshops were organized using a participatory approach with different groups of stakeholders representing national (Phnom Penh) and regional (Takeo and Kampong Cham) perspectives to identify, categorise and analyse constraints and challenges for innovation in climate resilient agriculture and the agrifood systems

following the AIS framework which focuses on the AIS' overall capacity, functions, structure and enabling environment. In addition to the workshop, key informant interviews were conducted with individuals who have first-hand knowledge about AIS in their own field.

Results obtained were critically analysed and by following AIS framework guideline, general and specific actionable recommendations have been proposed (refer to section 6 for detailed information on the following recommendations):

## A. General Recommendations

<b>1. Structural Analysis</b>
<ul style="list-style-type: none"> <li>a. Build an effective and functional network among all interrelated institutions/organizations.</li> <li>b. Increase staff number</li> </ul>
<b>2. Functional Analysis</b>
<ul style="list-style-type: none"> <li>a. Increase financial support</li> <li>b. Recognize research outputs</li> <li>c. Formulate functional and effective teaching structure</li> <li>d. Equip agricultural research and HEI systems</li> <li>e. Create transparent working environment for staff and management</li> </ul>
<b>3. Capacity Analysis</b>
<ul style="list-style-type: none"> <li>a. Develop research and teaching skills</li> <li>b. Build strategic planning capacity</li> <li>c. Build technical capacity of extension workers on agricultural technology</li> <li>d. Disseminate agricultural technology and practices</li> <li>e. Support the development of business and strategic planning</li> <li>f. Develop entrepreneurial skills</li> </ul>
<b>4. Enabling Environmen</b>
<ul style="list-style-type: none"> <li>a. Develop favourable policy frameworks</li> <li>b. Update extension policy with strategic actions</li> <li>c. Establish functional rural infrastructure</li> </ul>

## B. Specific Recommendations for the TAP-AIS DeSIRA project

In addition, there are two specific recommendations for institutional capacity development and policy dialogues to take place in order to support AIS in Cambodia.

<b>1. Institutional capacity development</b>
<p>Providing capacity building to some key organizations within the Ministry of Agriculture Forestry and Fisheries (MAFF) could effectively build innovation in the whole agricultural chain. In that regard, three organizations have been selected for</p>

the institutional capacity development program organized by the project. Those organizations are:

- Cambodian Agricultural Research and Development Institute (CARDI),
- Department of Extension of Agriculture, Forestry and Fisheries (DEAFF/MAFF), and
- Cambodia Conservation Agriculture Sustainability Intensification Consortium (CASIC).

## 2. Policy-level capacity development/dialogue

The formulation of actionable recommendations on policies will certainly support triggering innovation in the sector. At this level, three recommended policy frameworks are highly recommended to be formulated or updated. Therefore, the three suggested policies should be highlighted in national dialogue workshops involving all relevant stakeholders. Those policies are listed below:

- Policy on importation tax on agricultural inputs
- Agricultural credit with low interest rate, and
- Update Agricultural Extension Policy.

# 1. Introduction

## 1.1. Background

The Kingdom of Cambodia is located in the southwestern corner of Indochina in Southeast Asia between latitudes 10°N and 15° N and longitudes 102°E and 108° E. Cambodia covers an area of 181,035 square kilometers bordered with Lao PDR and Thailand to the north, Thailand and the Gulf of Thailand to the west and Vietnam to the east and south. Geographically, Cambodia is characterized by a low lying central plain dominated by the Great Lake Tonle Sap. The Mekong valley dominates in the east, the Dangrek Mountains to the north, and Kravahn (Cardamom) Mountains and Damrei (Elephant) Mountains to the south-west separating the coastal region from the rest of the country.

Cambodia's climate is governed by a tropical monsoon with distinct dry and wet seasons. The dry season is from November to April and the wet season is from May to October. Annual rainfall ranges from 1250 to 4000 mm. which is lower in the central plain and increases towards the Gulf of Thailand. The mean temperature ranges from 21 to 35°C with April as the hottest month and December as the coolest month.

Cambodia is characterized as a low-middle income country with the estimated gross domestic product (GDP) per capita of US\$1,561 in 2018 (NIS, 2021). Based on the population census 2019, Cambodia has a total population of 15.5 million with approximately 61 percent living in the rural areas (NIS, 2021).

Despite having significant economic growth over the past decade, Cambodia's overall development still lags behind its neighboring countries in ASEAN. More than 9.5 percent of the population still lives below the national poverty line (NSDP, 2019-2023) and with around 4.5 million people remain near-poor, vulnerable to falling back into poverty when exposed to economic and other external shocks (Ly, S. et al., 2020). Poverty incidence is found to be higher in the rural areas, where people are more likely to be less educated and solely dependent on farming for their living (RGC, 2010).

## 1.2. Objectives and priorities for the assessment

Despite the important contribution that the agriculture sector can make towards the country's development, and even though the government policy on modernization of agriculture in Cambodia is already in place, there has been no effort to assess



constraints and challenges that the policy has encountered and reasons for not achieving it. Additionally, there has been no explicit focus on building and strengthening individual and institutional capacities of all relevant organizations to become more competitive and innovative.

Recognizing the situation, the Cambodian Ministry of Agriculture, Forestry and Fisheries (MAFF) entered into an agreement with FAO to implement TAP-AIS DeSIRA project: Developing capacities in agricultural innovation systems: scaling up the Tropical Agriculture Platform (TAP) framework, as an effective way to sustainably intensify agricultural production to meet the challenges in food systems - increasing food demand, with harmonized use of natural resources.

Therefore, based on the developed FAO guidelines for action-oriented assessment of agricultural innovation systems (AIS), an assessment was carried out with relevant institutions working in the agricultural sector. Results of the assessment were analysed and used to formulate recommended actions to strengthen the AIS in all relevant institutions. In addition, based on the analysis, some key organizations will be selected for institutional capacity development, along with recommendations for the development of some policies that have direct impact on AIS.

The objectives of the assessment are three-fold:

- a. Characterize and take stock of agricultural innovation systems and provide insights on factors that determine their capacity to foster and promote inclusive and responsible innovations,
- b. Identify critical gaps, needs, opportunities, good practices, etc. and
- c. Formulate actionable recommendations including policies and strategies for reform and integration aiming at strengthening and making AIS more effective.

## **2. Agricultural innovation in the national context**

### **2.1. National development context**

The important contribution that agriculture can have on the country's development is well acknowledged even back in 1990s, after more than 10 years of political and economic isolation, when the country first opened its economy and trade regime. To catch up with the development in other member countries in the regional association ASEAN, the government has put significant effort into the modernization of the agriculture sector. Working toward that goal, strong focus was placed on innovation

through the establishment of appropriate conditions to improve the macroeconomic framework, general business environment, information and communication technology infrastructure, entrepreneurship and labour market regulations (OECD, 2013). The government's intention was also directed at diversifying products for export to the world market. Many of the products identified for potential export are from the agriculture sector, including rice, cashew nuts, cassava, maize, fish, livestock, rice, rubber, silk, soybeans, fruit and vegetables – including organic mango, palm and pepper, and wood products.

In addition, significant efforts also went into the repair and building of major infrastructure to improve agricultural production and market competitiveness for agricultural products. The program included irrigation systems, roads, distribution of power supply and agricultural inputs, land management reform and consolidation and the establishment of agricultural cooperatives (MAFF, 2018).

Despite all the efforts that have been made by this program, the country's infrastructure is still limited for private investment. There are a number of major challenges that remain, including legal and financial institutional systems which are still weak with regards to supporting innovative entrepreneurial activity, and even though the country information and telecommunications infrastructure has been significantly expanded, it is still at an early stage of development (OECD, 2013).

The manifestation of weak innovative performance in different sectors of the country's economy is obvious, and likely to be rooted in low expenditure on research and development (R&D). The evidence is particularly clear in the agricultural sector, where the number of researchers is low, publication levels are poor, and patenting of agricultural technology is extremely rare (OECD, 2013).

According to the world data statistics (Knoema, 2020a), Cambodia's gross domestic expenditure on R&D (GERD) is very small, approximately 0.1 percent of the GDP as compared to 1.0 percent in

#### **Box 1: Researchers**

Researchers in R&D are professionals engaged in the conception or creation of new knowledge, products, processes, methods, or systems and in the management of the projects concerned.

Postgraduate PhD students engaged in R&D are  
Thailand and 0.5 percent in Vietnam, and 4.8 percent in South Korea (See Appendix 1). Corresponding with the R&D expenditure, the number of researchers in Cambodia is the lowest in the region joining Lao People's Democratic Republic, and Myanmar. Only 30 researchers are supposed to serve per one million population in Cambodia, while in Thailand, this number is 1,350, in Vietnam 708, and in South Korea 7980 (Knoema,

2020b).

Within the research and development (R&D) expenditure figure, more than 50 percent of it occurs in the private non-profit sector, 25 percent in the government sector, 12 percent in the business sector and only 12 percent in the university sector (Turpin & Magpantay, 2010). Regarding the source of R&D funding, more than 70 percent comes from development partners, the NGO sector or abroad. In addition, human resources available to undertake R&D are also limited. Half were employed in the government sector, 21 percent in the private non-profit sector, 16 percent in industry and just 13 percent in universities (OECD, 2013).

Studies have shown that there is a close relationship between public research spending and the country's economic development. Grovermann et al., (2019) have reported on this link by indicating the positive significant effect that public research funding can have on economic development of the country. This statement is strongly supported by the implementation of a rice research project (Cambodia-IRRI Australia Project) during 1987-2001. The project was financially supported by an external donor (Australia), but its implementation was fully integrated into the public system, therefore it had a strong positive impact to the country's economy, particularly to bring the country back to self-sufficiency in rice after more than 25 years of its dependence on importation and external aid (CIAP, 2001). In addition, an agricultural research foundation has been well established and continues to function beyond the implementation phase of the project.

Based on the World Data Atlas (Knoema.com, 2021), the innovation index for Cambodia was 21.50 as compared to 36.7 in Thailand and 60.60 in the United States of America. Similarly, the score given for Human Development Index

**Box 2: Human development index**

A composite index measuring average achievement in three basic dimensions of human development—a long and healthy life, knowledge and a decent standard of living.

was only 0.59 as compared to 0.78 in Thailand, and 0.93 in the United States of America. It is obvious that innovation has yet to play a significant role in Cambodia for economic development and therefore its performance as a whole in Cambodia is still weak. This statement is supported by the World Bank's Knowledge Economy Index in 2012, that shows Cambodia ranked 132nd regarding innovation performance and it has fallen sixteen places in the international ranking since 2000 (OECD, 2013).

Recognizing these challenges, the National Strategic Development Plan 2019-2023 (NSDP, 2019-2023) proposed some important approaches to enhance the development of agricultural technology in order to sustainably increase productivity with required quality and, increase crop diversification for better adaptation to climate change. The plan also looks into strengthening the role of the agriculture sector in generating jobs,

ensuring food security, reducing poverty, and developing rural areas.

Additionally, along with the recent adoption of NSDP 2019-2023, the establishment of the Council for Agriculture and Rural Development (CARD), Council for HEI Rectorates, an Accreditation Committee for degrees awarded by higher education institutions (HEIs), Ministry of Industry, Handicraft and Innovation, and of various political and technical frameworks between institutions and ministries are important platforms to support the country's economic development.

## 2.2. Agriculture sector context

The important contribution of the agriculture sector to develop the country's economy is reflected in the strategy of the Royal Government of Cambodia (RGC), and a recent development of the NSDP, 2019-2023. Modernization of agriculture remains the main strategic program of the government in order to increase agricultural productivity, develop agricultural products with high potential for market competitiveness, and enhance the development of agro-industry and agricultural cooperatives and, to promote agricultural research and agricultural extension services.

There are four main sub-sectors within the Cambodian agriculture sector including crops, animal husbandry, forestry and fisheries. These 4 sub-sectors are however structured into 5 general departments or general directorates as within the crop sub-sector, there are 2 general directorates, the General Department of Agriculture (GDA) and the General Directorate of Rubber (GDR). Other than these five general directorates, there are line departments that are annexed directly into the Ministry of Agriculture, Forestry and Fisheries (MAFF), such as the Department of Agro-industry, Department of Extension of Agriculture, Forestry and Fisheries, Department of Agriculture Legislation, Department of Planning and Statistics (DPS), and the Department of Personnel and Human Resources. Three higher educational centers such as the Royal University of Agriculture (RUA), Prek Leap National Institute of Agriculture (PLNIA), and Kampong Cham National Institute of Agriculture (KCNIA) and, a research organization, the Cambodian Agricultural Research and Development Institute (CARDI) are semi-autonomous establishments under MAFF and are mandated to produce highly qualified graduates in agriculture and, to develop agricultural technology appropriate for farming conditions in the country.

The contribution of the agricultural sector to the Cambodian economy has been declining over recent years. In 2017, the share of agriculture in the national economy was around 24.5 percent, dropping from 31.6 percent in 2013 (MAFF, 2018). Despite a



drastic decline in its contribution, agriculture remains one of the most significant sectors in Cambodia both in terms of income and employment. Agricultural Gross Value Added (GVA), continues to increase every year from 19,376,000 million riels in 2013 to 20,986,000 in 2017 with an annual growth of 2 percent (MAFF, 2018). In 2015, agriculture absorbed about 41.5 percent of the 8,351 million total labor force in the country (RGC, 2019) and approximately 60.6 percent of Cambodian people lives in the rural areas (NIS, 2021). Within the agriculture sector, crops contributed 58.1 percent, followed by fisheries 24.1 percent, livestock and poultry 11.1 percent and forestry 6.7 percent (RGC, 2019).

The country has a total land area of 18.1 million hectares (ha), of which about 4.5 million hectares or about 25 percent of the total land area is cropped. In 2018, Rice occupied more than 3 million ha or 76.4 percent of the total cropped area, followed by cassava (10.5 percent) and maize (6 percent) (MAFF, 2018).

Rice as the main staple food crop for Cambodia has been grown in the country for centuries. It contributes more than 15 percent to the GDP and it is the biggest contributor in the agricultural sector. Rice is cultivated in different agro-ecosystems, ranging from rainfed upland, rainfed lowland, deepwater/floating, and dry season rice. Rainfed lowland rice has the biggest share of wet season rice, and plays a significant role in the national economy. Productivity in this rice eco-system is generally low as it strongly depends on climatic conditions particularly rainfall during the growing period. The eco-system is therefore highly vulnerable to climate change, as it is susceptible to either floods or drought.

Despite low productivity, Cambodia produced a surplus of paddy rice of more than 5 million metric tons in 2017 (MAFF, 2018), and therefore it is one of the three main exporters of fragrant rice to the world market (Goletti, F., & Sin, S., 2016). In 2017, Cambodia officially exported 635,679 metric tons of milled rice to the world market. Within that exporting quantity, Phka Romduol rice, one of the world's best quality fragrant rice, made up approximately 79 percent of the total amount (MAFF, 2018 & 2019).

As rice dominates the rainfed lowland areas, many other crops like cassava, maize, soy bean, mungbean, peanut, sweet potatoes, sesame, sugar cane, vegetables and fruit crops dominate the upland ecosystems. These crops, with the exception of vegetable production, are cultivated mainly under rainfed conditions where climate change could have significant impacts on their performance. These crops even though are not the main diet for the country's population like rice, are nevertheless equally important to people's diets in terms of nutritional quality and farmer household income.

Within the region, Cambodia is regarded as one of the most vulnerable countries to the impacts of climate change. Climate hazards experienced in Cambodia include floods, droughts and thunderstorms. In coastal areas, underground water salinisation, and seawater intrusion are becoming common problems. The occurrence of drought and flood is widespread in the country, and frequency and intensity of both hazards may increase with changing climate conditions. Successions and combinations of droughts and floods have resulted in considerable economic losses particularly in the agricultural sector.

Cambodia's vulnerability to climate change is due to a combination of socio-economic and environmental factors. Those include:

- High reliance of rural communities on natural resources for their living
- High dependency of the country on agriculture
- High exposure of the country to climate risks including floods and droughts
- Vector-borne diseases, in particular malaria, may as well become more widespread among rural populations under flooding conditions
- Low institutional capacity to adapt to the change, including:
  - Low coverage of irrigation-drainage systems
  - Weak National Agricultural Research System
  - Limited extension personnel in the rural areas
- Low farmer's preparedness for climate change, including:
  - Limited information on seasonal forecasting
  - Inappropriate crop management practices that could lead to land degradation and nutrient depletion

Climate change is visible in modifying weather patterns particularly resulting in hot temperatures, seasonal water shortages, drought spells and floods. These changes will most likely also affect natural ecosystems and agriculture and food production systems in the country.

Up to the present day, agriculture in Cambodia has remained smallholder or family based with low productivity as compared to that in neighbouring countries. Linkages with markets are weak due to poor infrastructure, limited policy support, and poor market information. These issues are well-known and responses have been taken by the government. Efforts to consolidate agricultural production were undertaken as in response to market demand and to provide negotiation power to rural populations. Up to 1116 farmers' cooperatives have been successfully established in the country by the Ministry of Agriculture, Forestry and Fisheries (MAFF, 2018). An agricultural market office with the Department of Planning and Statistics of MAFF was also established and

a special homepage “Cambodian agricultural marketing Information Services (AMIS)” has been created and is fully dedicated to providing useful market information in agricultural production to all concerned people including farmers and traders.

The current agricultural policy of the government is to modernize the agriculture sector with a strong push towards agricultural product diversification, mechanization, agro-processing, and agricultural research enhancement. According to the introduction of the Policy Paper on the Promotion of Paddy Production and Rice Export by the government, the export volume of milled rice has gradually increased despite the target of one million tons per year not having been achieved officially. The implementation of Agriculture Services Programme for Innovation, Resilience and Extension (ASPIRE) is another innovative approach in trying to link different actors working in the sector to help smallholder farmers as a means to contribute to local economic growth through agro-enterprises. In the area of higher education, the establishment of the Rector Council of Cambodia (RCC) and Accreditation Committee of *Cambodia* (ACC) are seen as two important platforms for networking among HEI and to monitor the quality of learning and teaching in high education institutions (HEI) in the country.

## **2.3. Vision for development, challenges and constraints to innovation**

### **2.3.1. Vision for development**

The agricultural modernization policy which has been endorsed by the Royal Government of Cambodia is the key strategic direction to transform Cambodian agriculture into a more sustainable and competitive sector. Under this policy there are 7 development visions to be undertaken, including,

- Alleviating poverty and eradicating hunger
- Promote the transformation and modernization of Cambodia from labour intensive to skills-based agriculture
- Build agriculture with increasing resilience to climate change, involving mitigation and adaptation, to pests and diseases and others
- Work toward building safe and environmentally friendly agricultural production
- Produce food with better nutrition and safe for consumption
- Enhance access of local products to regional and global markets
- Develop regional integration with countries in the region and the world on developing new technologies appropriate for agricultural production in the country.

### **2.3.2. Challenges, and constraints**

In Cambodia, the agriculture sector faces a number of challenges, which can be

classified into,

- Interactions across different systems – networking between interrelated institutions, between research and extension, and with market system are still weak or absent.
- Technical and Functional Capacity - institutional and individual capacity of key institutions are still at low levels.
- Farm Size – Agricultural land areas still small and fragmented.
- Sustainable climate-smart agriculture practices - adoption of these practices is still low at farm level.
- Productivity in crop and livestock production remains low.
- Production costs - a complex issue, which involves many interconnected problems and challenges. Those problems include high cost of agricultural inputs (seeds, fertilizer, etc.), limited number of service providers at the local level, high costs of electricity, fuel, and transportation, and complicated logistics. All of these contribute to higher production costs (MAFF, 2019).
- Infrastructure - irrigation and drainage systems have yet to cover all production areas in the country. Most of the areas still rely heavily on rainwater for crop production. Due to this issue, agricultural production in the country remains very vulnerable to floods and droughts. Limited number of rural roads, post-harvest handling and storage are also common in the rural areas.
- Research and Agricultural technology development - due to poor financial support, the number of researchers is still very limited (30 persons per one million population), research poorly covers the major problems encountered by the agricultural sector in the country. In addition, investments in agricultural education, and extension are still very low (OECD, 2013; MAFF, 2019).
- Crime - forestry crimes, fishery crimes, the illegal import and export of agricultural products including rice, vegetables and poultry do still exist. Land clearance around forestry areas and flooded forests are still alarming issues (OECD, 2013, MAFF, 2019).

## **3. Overview of the AIS assessment process**

### **3.1. Entry points and focus for the AIS assessment**

The Food and Agriculture Organization of the United Nations (FAO) Cambodia, in partnership with the Ministry of Agriculture, Forestry and Fisheries is implementing the national component of a global project entitled “Developing Capacity in Agriculture Innovation Systems Project”: Scaling up the Tropical Agriculture Platform Framework” (GCP/GLO/017/EC), and the General Department of Agriculture (GDA) of the Cambodian Ministry of Agriculture, Forestry and Fisheries acted as the National Project Coordinator.



### **Box 3: Agricultural Innovation Systems**

Agricultural Innovation Systems (AIS) is a network of actors (individuals, organizations and enterprises), together with supporting institutions and policies in the agricultural and related sectors that bring existing or new products, processes, and forms of organization into social and economic use. Policies and institutions (formal and informal) shape the way that these actors interact, generate, share and use knowledge as well as jointly learn (TAP, 2016).

The project aims to strengthen capacities to innovate for climate resilient agriculture and food systems. It is part of a larger European Union Initiative “Development Smart Innovation through Research in Agriculture (DeSIRA): Towards climate-relevant Agricultural and Knowledge Innovation Systems”.

The DeSIRA Initiative supports the implementation of the Tropical Agriculture Platform (TAP) Action Plan 2018-2021, and will deliver four outputs:

- a) TAP governance strengthened and TAP Secretariat operational;
- b) Countries’ AIS are assessed, capacity development needs are identified and AIS strengthened;
- c) TAP tools and approaches are integrated into African Comprehensive Africa Agriculture Development Programme ex-Pillar IV organizations, and in regional research and extension organizations in Asia-Pacific, and Latin America and the Caribbean; and
- d) Increased awareness and knowledge on using the TAP Common Framework on capacity development for agricultural innovation systems through information and communication platforms.

Assessment is the systematic collection, review, and use of information about the concerned programs undertaken for the purpose of improving and developing the program. In the implementation of this project, the assessment was carried out in the following 4 steps: inception, customization, operational, and validation (TAP; 2020).

1. Inception: launch the process, galvanize commitment & buy-in of all relevant stakeholders
2. Customization: design a process and help the assessment team adapt the assessment framework and approach to national context
3. Operationalization: data collection, analysis, interpretation & formulation of recommendations
4. Validation & communication: presentation of findings, recommendations, stakeholder validation, & final report

In order to facilitate the assessment process with different institutions involved in the agriculture sector in Cambodia, the AIS framework was followed, which consists of four analyses that identify the functions of the AIS and major problems in the system to enable the formulation of actionable steps (recommendations) at the end of the assessment:

- Structural: actors, interactions and networks
- Functional: knowledge generation & diffusion, market development, entrepreneurial activity, resource mobilization
- Capacity: individual and collective, technical, functional
- Enabling Environment: policy, regulatory framework, governance, infrastructure, institutions

#### **Box 4: Capacity and Capacity Development**

By definition, capacity is defined as “the ability of people, organizations and society as a whole to manage their affairs successfully”, while Capacity Development is “the process of unleashing, strengthening and maintaining such capacity” (Adopted from OECD, 2013; Aerni *et al.*, 2015)

### **3.2. Methodology (incl. approaches and tools used, case studies, sampling, and limitations, validation, etc.)**

As the country level output, the project will also focus on building functional capacity of key organizations, whose mandates play a very important role in the coordination of the AIS to strengthen capacities to innovate at the country level; the participatory assessment of the national agricultural innovation system was also used to identify these key organizations. The assessment involved multi-stakeholder workshops, key informant interviews, and secondary data analysis.

The multi-stakeholder workshops employed a participatory approach with different groups of stakeholders – individually and in homogeneous and in heterogeneous groups representing national and regional levels to identify, categorise and analyse constraints and challenges for innovation in climate resilient agriculture and the agri-food systems. The primary focus of the workshop was on the AIS framework for data collection, aggregation and management, including capacity, functional, structural analysis and enabling environment. Stakeholder participation in the workshop can provide insights into the different dimensions of the problem and the types of solutions that are both technically feasible and socio-culturally and economically acceptable (Schut *et al.*, 2015).

Three workshops were organized, one at the national level and the other two at the regional (sub-national) level. The national workshop was organized in Phnom Penh on the 15 January 2021 in the meeting hall of the Ministry of Agriculture, Forestry and Fisheries. There were 36 participants present at the workshop representing different stakeholder groups working in Cambodia. They were actively involved in the

discussions.

A one-day workshop was also organized in Takeo and in Kampong Cham, on the 25 November 2020 and 05 January 2021, respectively. In all the three workshops, participation from representatives of stakeholder groups was satisfactory.

Key informant interviews (KII) were conducted in order to collect information from a wide range of people who have first-hand knowledge about AIS in their own field. Selected individuals who attended the workshops were interviewed. In total 14 KII were conducted (Annex 2). A semi-structured interview was applied for more in-dept analysis to follow up the subjects discussed in the workshop particularly on challenges and solutions they have found to sustain their operations in their own organizations or companies.

Results from the three workshops and Key Informant Interviews were collected and analysed. Summary of it is presented in the Section 4: main findings of the assessment.

## **4. Main findings of the assessment**

Results presented in this chapter are derived from secondary data from relevant literature, from three multi-stakeholder workshops and from 14 key informant interviews. More than 90 participants from 60 organizations and/or companies operating in the country participated in the study. Results are presented based on the stakeholder groups with their representatives who attended the workshops. To many participants, the term “innovation” was new for them, even though they certainly have taken part in the generation or dissemination of innovations in the agriculture sector before.

Problems and/or challenges that hindered innovation are presented by stakeholder group (System approach) and based on the main building blocks of the AIS framework.

### **4.1. System Approach**

#### **4.1.1. Agricultural Research System (ARS)**

Cambodian scientific research is predominately public, only with a few exceptions where research activities are managed and implemented by private companies or NGOs. In the field of crop research, the Cambodian Agricultural Research and Development Institute (CARDI) is the prime agricultural research organization that exists in the country. The institute has two research stations one located in a suburb of Phnom Penh and the other one located in Preah Vihear province. Other than CARDI, rubber related research is carried out by the Cambodian rubber research institute, while fisheries, forestry, and animal related research activities are carried out by their own research institutions.

Crop research is also conducted by the GDA and the universities, but the nature of those research activities is mainly adaptive, and/or student thesis research. GDA has a number of field stations specialized in different crops such as black pepper, vegetables, rice, banana, legumes, and maize. At present, there are few long-run research projects conducted in the country by all known research or research related organizations. The Royal Government of Cambodia (RGC) often does not provide long-term funding for supporting research and development in the area of agricultural innovation, but the main source of funding is rather from development partners and NGOs.

The Cambodian Agricultural Research System encountered a number of challenges in their operations as presented below.

<b>Structural</b>	<ul style="list-style-type: none"> <li>• Lack of networking within national and international research systems</li> <li>• Weak linkages with agricultural extension systems, HEI, development partners, and market</li> <li>• Number of qualified research personnel is extremely low therefore, is not in a position to effectively solve problems/constraints facing the agriculture sector and/or rural populations</li> </ul>
<b>Functional</b>	<ul style="list-style-type: none"> <li>• Low financial support from the government toward research and research related activities</li> <li>• Research projects are largely donor driven</li> <li>• Lack of long-term strategic planning</li> </ul>
<b>Capacity</b>	<ul style="list-style-type: none"> <li>• Lack of coaching systems for new recruited staff</li> <li>• Technical background in agriculture research is low,</li> <li>• Shortage of technical expertise in developing research proposals and research strategic planning</li> </ul>
<b>Enabling Environment</b>	<ul style="list-style-type: none"> <li>• Policy on special incentive for researchers is not available</li> <li>• Poor research infrastructure</li> <li>• Lack of appropriate condition for research creativity</li> </ul>

#### 4.1.2. Agricultural Higher Education Institutions (Agricultural HEI)

Many graduates with BSc, MSc or PhD who are now taking high responsible positions within the government, UN, non-governmental and private systems received their educations from overseas, from various countries in the region and the world. Nevertheless, building human resources in agriculture remains vital responsibility of local higher educational institutions (HEI). There are three HEIs within the agricultural sector, the Royal University of Agriculture (RUA), Prek Leap National Institute of Agriculture (PLNIA) and Kampong Cham National Institute of Agriculture (KCNIA).

Within these three agricultural HEIs, students' enrolment is low compared to private universities in the country. There are many challenges and constraints that agricultural

HEI in Cambodia are facing. Those challenges could be classified based on innovation framework as:

<b>Structural</b>	<ul style="list-style-type: none"> <li>• Limited cooperation between national and international partners</li> <li>• Inadequate communication among agricultural HEI and with private corporations</li> <li>• Number of highly qualified lecturers and PhD holders is limited</li> </ul>
<b>Functional</b>	<ul style="list-style-type: none"> <li>• Poorly equipped with teaching and research facility</li> <li>• Lack of long-term strategic planning</li> <li>• Remuneration for lecturers and support staff is low</li> <li>• Research program within the system is still weak</li> <li>• Availability of textbooks in Khmer is limited</li> </ul>
<b>Capacity</b>	<ul style="list-style-type: none"> <li>• Lecturers do not have qualifications complying with HE requirement</li> <li>• Teaching experience of lecturers is low with limited exposure to national and international standards</li> <li>• Shortage of technical expertise in developing research proposals and strategic planning</li> </ul>
<b>Enabling Environment</b>	<ul style="list-style-type: none"> <li>• Government budget for higher education is low</li> <li>• Absence of incentivizing policies for university lecturers and support staff.</li> <li>• Teaching staff is centrally recruited by the government hence the recruited personnel does not always comply with required TOR of the HEI</li> </ul>

#### 4.1.3. Agricultural Extension System (AES)

Agricultural extension is an important strategy to promote the development of the agricultural sector in Cambodia through educating, training and transferring new technologies and innovations to farmers and their communities to those will get the increase in agricultural productivity production value chains process, diversification and commercialization of agriculture. More specifically, Agricultural extension is an important part of contributing to the development of the agricultural sector through the transfer of new agricultural techniques and technologies to farmers and farming communities to improve productivity, quality and safety of agricultural products. However, agricultural extension services still face several problems that need to be addressed, such as a lack of new technical skills and technology, appropriate technical components for extension (such as materials, means and methods), budget, human resources, technical support and cooperation from partners, legal standards, research documents, new technologies appropriate to respond to climate change and needs of marketing as well as market information.

However, if the above challenges are addressed, agricultural extension services can

contribute to changing the mindset of farmers, producers from family farming to agribusiness by accessing specific information on potential agricultural production for both domestic and foreign markets.

The other function that agricultural extension also plays is to collect feedback from farmers and/or farming community and deliver this to technology developers for further development of new technology based on community need.

Because of this dual function, the agricultural extension system plays a crucial role in boosting agricultural productivity, insuring food security, improving rural livelihoods, and promoting agriculture as an engine of economic growth. It also plays an important role to support the government policy on modernizing the agricultural sector and to promote commercialization within the sector.

Despite having these important functions, the agricultural extension system in Cambodia faces many constraints and challenges with regards to supporting innovation. Those can be listed as follows:

<b>Structural</b>	<ul style="list-style-type: none"> <li>• Shortage of agricultural extension workers at all levels</li> <li>• Linkage with technology development/research institutions is weak</li> <li>• Farmer participation in extension program is low</li> </ul>
<b>Functional</b>	<ul style="list-style-type: none"> <li>• Low budget allocation for extension system</li> <li>• Extension methodology is still vague</li> <li>• Lack of extension database</li> </ul>
<b>Capacity</b>	<ul style="list-style-type: none"> <li>• Low technical capacity and limited experience in the agricultural field among extension staff</li> <li>• Lack of capacity to access new technology</li> </ul>
<b>Enabling Environment</b>	<ul style="list-style-type: none"> <li>• Shortage of extension communication centers at community level</li> <li>• Lack of extension strategy with clear extension model for most effective delivery of the services</li> </ul>

#### 4.1.4. Agricultural Private Sector

The private sector plays an important role in the economic development of the country. Private stakeholders in the agricultural sector include seed producers and suppliers, agricultural input suppliers, agricultural machinery and equipment suppliers, financial institutions, and traders. Agricultural processors and farming community can be regarded as within the private sector, but they are presented separately in this section.

The important contribution that the private sector makes towards the country's development is highly recognized by the government. It is obvious as they are always included in different government discussion platforms, such as a government-public-private forum, and/or invited to different consultative seminars or meetings.



Generally, the private sector is active in activating and driving innovation in their own specialised field in order to survive particularly in the fast-growing economy where market competitiveness is high. However, there are some constraints that may hinder the sector from triggering innovation. These hindering factors to innovation in agricultural private sector group are categorized and presented below.

<b>Structural</b>	<ul style="list-style-type: none"> <li>• Lack of networking between farmers/producers and input suppliers</li> <li>• Lack of interactions with agricultural development institutions</li> </ul>
<b>Functional</b>	<ul style="list-style-type: none"> <li>• Limited capital for investment in new products and/or activities, while loan given by the bank is with high interest rate</li> <li>• Market price is unstable and highly driven by external markets in the neighboring countries</li> <li>• High competition from imported products</li> </ul>
<b>Capacity</b>	<ul style="list-style-type: none"> <li>• Technical knowledge on agriculture is limited</li> <li>• Limited knowledge on business plan development</li> <li>• Lack of strategy to promote the products</li> </ul>
<b>Enabling Environment</b>	<ul style="list-style-type: none"> <li>• Lack of local agricultural market to collect production from farmers/producers within or close by to the production areas</li> <li>• Lack of government support to reduce production and transportation costs</li> <li>• Costs for importation of agricultural inputs are high</li> <li>• Poor storage systems for storing and/or preserving agricultural products</li> </ul>

#### 4.1.5. Agricultural Producers Group

The agricultural producer group is composed of the associations of the farming community that have been established to support crop production of some particular crops or group of crops and to link their products to the market. This group also consists of individual farmers and farmer cooperatives. Even though the group is diverse in its composition, they have more or less the same basic goal: to boost the production, increase productivity and improve the livelihoods of their families or families of their members' community. Providing the nature of the group that ranges from a single farmer to few hundred, various activities that they are taking, and services that they can provide, the problems and challenges that the group is facing also vary greatly. These challenges are presented below.

<b>Structural</b>	<ul style="list-style-type: none"> <li>• Farmers are not clustered based on any specific criteria</li> <li>• Poor established network between farmers/producers and brokers or traders</li> <li>• Shortage of manpower, as most young farmers migrate to the cities therefore those remaining in agricultural production are often old aged, disabled farmers and</li> </ul>
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	children.
<b>Functional</b>	<ul style="list-style-type: none"> <li>• Lack of local agricultural market to collect production from farmers/producers within or close by to the production areas</li> <li>• Lack of investment funding. Getting loan money from the bank is with high interest rate.</li> <li>• Adoption of new agricultural technique/ technologies is low</li> <li>• Market for agricultural products is uncertain</li> </ul>
<b>Capacity</b>	<ul style="list-style-type: none"> <li>• Technical knowledge on agriculture and related fields within the community is limited</li> <li>• Farmers have poor technical knowledge on planning and new production technologies</li> <li>• Poor ability to access agricultural information, both technological and market</li> <li>• Farmer literacy is poor therefore it is hard for them to adopt new technologies</li> <li>• Limited knowledge on agricultural processing</li> </ul>
<b>Enabling Environment</b>	<ul style="list-style-type: none"> <li>• Lack of support from government institutions with regard to production losses or losses due to market issues for agricultural products</li> <li>• Prices of agricultural products fluctuated too much without any control by the government institutions</li> <li>• Limited irrigation systems- accessibility to water sources is a constraint for agricultural activities</li> <li>• Access to market information is limited</li> <li>• No local/community market where agricultural productions can sell their goods within and/or close by to the production areas.</li> <li>• Different projects or programs bring different, sometimes contradictory information to the rural populations, causing confusion within farming community.</li> <li>• No effective measures developed by government institutions to help managing environmental catastrophes.</li> </ul>

#### 4.1.6. Agricultural Processing Group

This is a big group of agricultural entrepreneurs who deal primarily with changing, transforming, packaging, sorting, or grading *agricultural* commodities, or plants or plant products into goods that are used for semi-final or final consumption; and goods other than food or just to preserve it for further use. Included in this group are food processing, rice processing, organic fertilizer producers, beverage processing, rice mills, etc.

Agricultural processing is an important sector for socio-economic development in Cambodia. Contributions of this sector can be through providing new processed products to the country, providing more income to the farmers by value-adding their primary into more valuable processed products, providing more employment to the

rural populations and to reduce city migration, and stimulate agricultural production by creating intermediate markets for raw agricultural products. Agriculture processing, most of the time, triggers innovation in some ways, through building a network of organizations, enterprises and individuals to bring new products with economic, social and environmental promotion. Several issues that have been considered as major constraints and/or challenges to innovation in this sector were identified.

<b>Structural</b>	<ul style="list-style-type: none"> <li>• Shortage of skilled technical workers in the industry</li> <li>• Networking with research and technical regulatory institutions is weak</li> <li>• Interaction between processing industries and the primary production for agricultural raw material is critically constrained</li> </ul>
<b>Functional</b>	<ul style="list-style-type: none"> <li>• Shortage of capital investment in expanding new business activities</li> <li>• Competition with imported products is high as local consumers do not trust the quality of products processed by local processors, and as well due to poor packaging systems of local products</li> <li>• Availability of standard agricultural raw material is a constraint</li> <li>• Lack of good storage facility</li> </ul>
<b>Capacity</b>	<ul style="list-style-type: none"> <li>• Technical knowledge on product manufacturing and attractive packaging is limited</li> <li>• Capacity to conduct business management and preparing the business plan is limited</li> </ul>
<b>Enabling Environment</b>	<ul style="list-style-type: none"> <li>• High competition with imported products</li> <li>• Production cost is high due to high costs of electricity, water and transportation</li> <li>• Bank loan has high interest rate</li> <li>• Shortage of appropriate storage facilities</li> <li>• Limited foreign investment in the industry</li> </ul>

#### 4.1.7 Non-Governmental Organization Group

NGO is a non-profit group that functions independently of government involvement. In Cambodia, there is a big group of NGOs consisting of many types of organizations including International NGO (INGO), International Organizations (IOs), Community based organizations (CBO), and Civil Society Organization (CSO). NGOs provide a wide range of services to communities across the country. These organizations have different missions, different working partners, and different budgets. Some constraints that may affect the way the group functions could be:

<b>Structural</b>	<ul style="list-style-type: none"> <li>• Weak coordination network within NGO system on agricultural issues</li> <li>• Competition for funding with one another</li> </ul>
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<b>Functional</b>	<ul style="list-style-type: none"> <li>Activities are strongly based on fixed project implementation plans</li> </ul>
<b>Capacity</b>	<ul style="list-style-type: none"> <li>Limited access to new agriculture information and innovation or technical capacities on new agricultural technologies</li> <li>The coordination meeting/workshop for sharing lessons learned/experiences and challenges during implementation between NGOs and Government advisory services is limited.</li> </ul>
<b>Enabling Environment</b>	<ul style="list-style-type: none"> <li>Coordination network for sharing information is limited and does not function well due to limited financial support</li> <li>No platform/annual forum exists for all partners to meet and share experiences at sub-national levels</li> </ul>

#### 4.1.8. Technical Regulatory Institutions

The regulatory system in Cambodian agriculture has a mix of functions, both advisory and technical regulatory. The system consists of many institutions with various mandates, roles and responsibilities. Within the Cambodian Ministry of Agriculture, Forestry and Fisheries (MAFF), those are general directorates of all the subsectors such as agriculture, fisheries, forestry and animal. Department of Planning and Statistics, Department of Agro-Industry, Department of Agricultural Legislation, Provincial Department of Agriculture, Forestry and Fisheries (PDAFF), and District Office of Agriculture, Forestry and Fisheries are as well included in this group. There are some constraints and/or challenges to triggering innovation in these organizations. Those are listed below:

<b>Structural</b>	<ul style="list-style-type: none"> <li>Number of technical officers to carry out given tasks/ activities is too little</li> <li>Lack of coordination between institutions</li> </ul>
<b>Functional</b>	<ul style="list-style-type: none"> <li>Low budget to support field operations</li> <li>Public awareness on the role and responsibility of government departments is poor</li> <li>Limited agricultural techniques/technologies to support the production</li> </ul>
<b>Capacity</b>	<ul style="list-style-type: none"> <li>Lack of technical competency to effectively implement the given tasks</li> <li>Staff motivation is poor</li> </ul>
<b>Enabling Environment</b>	<ul style="list-style-type: none"> <li>Infrastructure and funding support to carry out field operations is limited and difficult to be obtained on time</li> <li>Staff promotion system is not transparent</li> <li>Poor governance-institutional management and lack of transparency</li> </ul>

#### ***Box 5: Assessment limitations***

There are some limitations within the assessment process that affected the quantity and quality of the study results. Those limitations include:

COVID 19 Pandemic - The assessment was carried out at the time of the Corona Virus Disease (COVID-19) outbreak. Travel and mass gathering were highly restricted by the government.

Budget Limitation - only a small proportion of relevant stakeholders was selected to discuss AIS and related constraints/challenges faced by their organization.

AIS Technical knowledge – the innovation concept together with AIS framework are new for the assessment team, therefore mistakes and/or missed interpretations could have happened during the assessment process.

## 5. Analysis and discussion of results

Based on the results presented in section 4, it is obvious that there are many constraints and/or challenges that have hindered innovation in the agricultural sector. The constraints vary between stakeholder groups but can be grouped and analyzed across the innovation framework with proposed solutions to overcome those constraints and to foster innovation (See Table 1).

Lack of effective networking or working coordination between interrelated institutions is likely one of the major constraints encountered by all institutions involved. Shortage of staff, particularly highly qualified/competent staff, could be another challenge within the structure of the AIS. With a limited number of staff, the workload could be heavier to individuals who are on duty, hence individual creativity could not be triggered as they have no time to put effort into questioning assumptions, challenging the existing business models and whatever frustration they may encounter in performing their organizational duty. Therefore, staff is not in the “innovation zone” where they could trigger self-motivated innovation.

Concerning the functions of the AIS, there are five challenges that are listed as the main issues hindering innovation within the sector. The lack of appropriate financial support to implement mandated activities is a major problem faced by all organizations involved in the study. The other significant hindering factors are: absence of strategic planning to shape the future organizational direction, inefficient market planning to sustain organizational business growth, availability of appropriate technology for production, post-harvesting, and agri-processing and, inadequate facility for research, teaching and technology dissemination. Those listed are considered major hindering factors responsible for weak individual and institutional innovation within the sector.

Within the capacity analysis, two major constraints are listed, technical and planning capacity. Technical capacity refers to the relevant ability of staff and organizations to successfully manage their businesses. This capacity can differ among institutions involved but it is classified around agricultural subjects, including marketing and entrepreneurial skills. Capacity to build long-term strategic planning for sustainable development of each organization within the systems, research, education, advisory, business and so on, is the other capacity in need of support for all key organizations within the sector.

There are five major constraints that hinder the activation of innovation within the enabling environment of the AIS. Those include a lack of policy support from the government and proper infrastructure, internal factor conditions that hinder individual and institutional creativity within each organization, and cost of production due to external factors. Regarding policy support from the government, this includes the development of financial and/or policy framework that could support the effective day to day operations of all government-funded stakeholder organizations. Even though all groups participated in the study are affected by this factor, its impact varies depending on the institution concerned. The infrastructure issue involves market, community

centre, library, convention centre, laboratory, appropriate classroom, etc.

Organizational internal hindering factors to innovation refers to governance issues, corruption, and lack of working and promotion transparency. Costs of production can refer to high cost of electricity and water, transportation, and importation tax for agricultural inputs. Those are not under control of each organization but could strongly affect to institutional innovation.



Table 1. Major challenges/constraints to AIS in Cambodia

Innovation framework	Issues pertaining to innovation	Stakeholder Group*							
		1	2	3	4	5	6	7	8
Structural	Linkage/ Communication/ Coordination/ Cooperation	X	X	X	X	X	X	X	X
	Number of staff/ manpower	X	X	X		X	X		X
Functional	Finance	X	X	X	X	X	X	X	X
	Planning	X	X	X		X	X		X
	Market				X	X	X		
	Technology					X	X	X	X
	Equipment/facility	X	X	X					
Capacity	Technical	X	X	X	X	X	X		X
	Planning	X	X	X	X	X	X		
Enabling Environment	Policy support	X	X	X	X	X	X		X
	Infrastructure	X	X	X	X	X	X		X
	Internal condition for creativity	X	X	X					X
	Cost of production due to external factors				X	X	X		

Note: \* 1. Agricultural Research system, 2. High Education Institutions, 3. Agricultural Extension system, 4. Agricultural Private Group, 5. Agricultural Producer Group, 6. Agricultural Processing Group, 7. NGO, and 8. Technical Regulatory Group.

Due to the presence of the above constraints and/or challenges, innovation in Cambodia is still weak as has been reported earlier and, for that reason, modernization of agriculture has been delayed and/or inactive. All the constraints listed in Table 1 vary in nature and degree between organizations operating within the sector, therefore their detailed solutions should be done case by case except when a recommended group solution is viable. The recommended solutions are described in the following:

## 5.1. Agricultural Research Systems (ARS)

Agricultural Research Systems (ARS) play an important role in supporting the government strategy on modernization of agriculture. The ARS are mainly involved in the development of appropriate agricultural production technology to enhance farm economic viability and rural livelihood improvement. Many significant achievements have already been attained by this group and soundly contributed to the country's economic development.

After more than 20 years of food deficit, through intensive national rice research program, the country has resumed its rice producing country status by reaching self-sufficiency in food (rice) in 1995 and, in 2017 Cambodia had more than 5.56 million tons rice surplus (CIAP, 2001; MAFF, 2018). Apparently, the release of many rice varieties and their associated production technologies along with the enhancement of capacity building program by the agricultural research system and, in particular, the Cambodian Agricultural Research and Development Institute (CARDI) have strongly contributed to this success (CARDI, 2018).

Regardless of these great achievements, there is still much more that the ARS could do to support the rural agenda of the government if the AIS is to be strengthened. There are numerous constraints and/or challenges that the system is confronting.

**Networking** – expansion and strengthening of the national research system, inclusive partnerships and better coordination are key factors to boost agricultural productivity and products' competitiveness in terms of quality, safety, standard and price as a pathway to build long-term impact for economic development of the country. However, in the current situation linkages within the national agricultural research system are weak with no effective working platform where all actors in the system can harmoniously work together. Besides that, communication between research and extension systems is weak or absent, and so flow of information forwards and backward between the two systems does not exist. With international research systems, other than attending meetings in some existing platforms, or joining in some research projects driven by external partners, there is no sound collaborative platform has been established.

Strong networks with other research institutions operating in the country and region, with extension establishments and academic institutions should be well established. Joint organizing research forum across agricultural research systems, national and international, in the country should be regularly conducted. In the meantime, in order to improve research coordination, building effective agricultural research network, developing a working platform between research and extension systems should be strongly considered.

At the country level, research-extension forum should be regularly conducted to share the past experience and, in response to the demand in agriculture and agri-food systems, to jointly develop responsive and effective work plan for the years ahead. Grovermann *et al.* (2019), made a strong remark and concluded that research, extension, business and policy-making are key factors in the intensification and commercialisation of farming systems around the world and their roles needs to be

better understood. Therefore, organizing this kind of platform – research-extension forum should be conducted annually with the participation of agricultural research and extension systems and, private sector and policy making bodies.

**Capacity** - the innovation process consists of two phases, individual and organisational, manifesting in a cyclical manner. The agricultural innovation system's success depends on the capacity of innovative ideas within each institution. Individual innovation can be fostered either in the work place, and/or in formalized training. This can be influenced by 4 factors: team, organisational, social and educational factors and their interactive impact on the way and degree to which an individual is innovative (Standing *et al*, 2016). It is obvious therefore that investment in individual education and training in agriculture including theory and practices is strongly required (Aerni *et al*, 2015).

Capacity development, both individual and institutional, is essential to move the country research system ahead toward the direction and position that will be able to help solving the problems that the country is facing in securing foods for all its citizen and to enhance the country's economic development. At the present, other than poor capacity of researchers, the number of qualified research personnel working in the system is extremely low as compared to all other countries in the region. For instance, in Thailand, there are 1350 researchers to serve one million population as compare to only 30 in Cambodia (Knoema, 2020b).

To strengthen research capacity within the system, there are several key directions that need to be taken.

**Funding** - understanding about research and its contribution to the country's development is still limited among policy makers. In 2015, the Gross Domestic Expenditure on R&D (GERD) was less than 0.1 percent of the country's GDP, while Thailand's GERD was 1.0 percent or 10 times higher in terms of allocation proportion from the country's GDP. Increased investment into research by the government to support capacity development of young researchers, and to provide more new research projects is seen as an important step toward strengthening research system in the country.

**Incentive policy** – monthly salary for researchers ranges between USD 250 to USD500. Obviously, they can earn more from joining research projects funded by external sources but that is minimal and seasonal. Other than low salary, the government's recognition of researchers' contribution to the country's economic development is still absent. Research personnel with outstanding achievements have never been acknowledged for their inputs to the country's development. Therefore, poor salary and no recognition of high achievement, are two critical factors responsible for hindering creativity among individuals within the national agricultural research system.

**Infrastructure** – having appropriate research laboratories equipped with up-to-date research apparatus, kits and chemical substances, research glasshouse/screen houses, and resource-full library, are essential to inspire individual innovation in research systems. However, this factor has remained a constraint in most research organizations

in Cambodia. In addition, the limited number of research stations representing different agricultural ecosystems that exist in the country could be another limiting factor to the enhancement of the development of suitable technology for the end users, farmers.

As discussed, overall solutions to support innovation within the agricultural research system can be summarized as below and in the following recommendation section.

- Build an effective network among all interrelated institutions through co-creation of research setting, and research-extension forum
- Build research capacity in key areas within each research organization through recruiting highly qualified personnel who have had profound experience in major research subjects, and at the same time to continue building internal/young research personnel to upgrade their qualification in either local or international HEI.
- Increase financial support through investing in more research projects and increasing salary to research personnel.
- Give recognition to outstanding research personnel and/or institutions which significantly contributed to the socio-economic development of the country through developing outstanding technology that are responsible for the country's development.
- Equip agricultural research system with modern research infrastructure including research laboratory, library, and research stations.

## 5.2. Higher Education Institutions (HEI)

Even though facing great challenges in performing their function, agricultural HEI in Cambodia has been very active and successfully produce a significant number of graduates to fill the workforce in the agriculture and related sectors in the country. It has been reported that for the duration of 6 years period (2012-2017), a total of 8,593 graduates from all levels (Associate, BSc, MSc and PhD) and with different disciplinary subjects received their degree from the three HEIs. Among those, RUA produced 4,540, PLNIA 2,452, and KCNIA 1,601 (MAFF, 2018). This great achievement contributed by the agricultural HEIs certainly has a positive impact on the implementation of the government agenda on modernising agriculture in Cambodia.

In spite of this great contribution, the agricultural HEI have encountered many challenges in order to bring agricultural education in Cambodia to join any of the World University Ranking Systems. Following are some recommendations to strengthen HEI in the country:

**Networking with national and international partners** – within the country, building cooperation and networking between national and regional higher education institutions is essential in order to take up cooperative solutions for some critical socio-economic challenges. Unfortunately, at the present, there is inadequate communication between its own agricultural HEI, with other HEI of the national system, and with private corporations as outsiders. Thus, within the agricultural sector, this hinders functional cooperation among the three educational institutions particularly on scarce resources

and, on the necessity to jointly develop curricula reflecting the country priorities and requirements of the agricultural sector and markets.

Building linkages with international HEI, to some extent, have been established, but limited to student and staff exchanges. There is still no university consortium with international university system where it can help lift up Cambodia's higher education for the world recognition and to be recognized by Asian University Rankings and/or World University Rankings.

**Low government budget to support public HEIs** - Public funding for higher education (HE) in Cambodia is relatively minimal to make significant positive impact to improve higher education quality for local HEIs. It is well recognized that, Cambodia is one of the countries in the region that invests the least in its higher education (Mak Ngoy et al., 2019). As quoted by Mak Ngoy et al., 2019, the world average expenditure on higher education is 1 percent of GDP with the highest investment between 2.5 to 3.0 percent of GDP in the United States of America, New Zealand and Canada. The investment level is far lower in Cambodia where less than 0.01 percent of the GDP is spent on higher educational system.

**Qualification and research experience of lecturers** - the number of highly qualified lecturers with PhDs in the three agricultural HEIs is approximately 9 percent (MAFF, 2019). Due to lack of highly qualified lecturers, most of the times, under-qualified teaching staff that have limited exposure to national and international experience, and/or fresh BSc graduates with poor experience in the subject field are allowed to lecture. Further development in agricultural HEI to build conceptualized creativity among students in the fields of sciences, engineering, processing and entrepreneurship should be prioritized.

**Teaching and research facilities** - the three agricultural HEIs are poorly equipped with appropriate teaching and research facilities- advanced laboratory and library and effective learning classroom. Ideal classrooms along with resource full and well-furnished library and laboratory should be prioritized to enhance innovation in HE. In addition, there is a shortage of teaching material and textbooks particularly in Khmer language.

**Incentive policy** - there are two types of teaching staff within the HEI system, full and part time. Full teaching staff is centrally recruited by the government and sent over to the HEIs to get assigned to any department or faculty. This type of lecturer receives low remuneration, with an average monthly salary of \$160 dollars (Mak Ngoy et al., 2019) with slight variation depending on position and job responsibility. Nevertheless, this teaching staff can earn extra income from teaching or conducting consultancy work with external research collaborators. The second type of lecturer are those professionals who may work outside the HE system but are invited to do the teaching for specific subject where internal lecturer cannot cover. This part time lecturer only receives teaching fees from the university/institution.

Following the constraints/challenges that the agricultural HEIs are facing, several solutions are recommended and responsible actions need to be taken by respective institutions. Details are in the following section.

- Build an effective network among all interrelated institutions.
- Attract more financial support to the HE systems for increasing salaries for teaching personnel and improving teaching and learning facilities.
- Build teaching capacity to teaching staff through recruiting staff with high qualification and with extensive experience in their related subject; and to provide opportunity for the existing teaching staff to undertake degree and non-degree trainings in the country and abroad
- Encourage HEI staff and management to be actively involved in research activities to gain comprehensive experience in their related subject.

### 5.3. Agricultural Extension System (AES)

The Agricultural Extension system in Cambodia has provided significant support to the modernization agriculture strategy of the government in building the rural economy through improving extension services and rural infrastructure to support agricultural production and commercialization. Under financial support from the Agriculture Services Programme for Innovation, Resilience and Extension (ASPIRE), AES were able to capitalize their efforts in developing capacity for agriculture extension personnel, improving extension services through farmers trainings, linking farmers to market systems, and supporting rural infrastructure in the communities such as irrigation and drainage systems, community ponds and rural roads (MAFF, 2018). Despite having these great achievements but in order to accomplish the long-term objective of the AES in Cambodia, where building sustainable rural economy is the prime goal of the government, many more challenges on AIS remain to be solved.

One of the key roles of agricultural extension is to provide outreach services to rural people for fast and reliable access to knowledge and information they need in order to increase farm productivity and livelihood improvement. This function to some extent encounters difficulties as appropriate solutions and/or specific technological needs differ depending on given agro- ecological zones. Attempting to solve the situation would involve high transaction costs for traveling particularly to remote areas. Due to this situation, the establishment of community extension centers is regarded as an effective extension model with demand-based approach. As the center is located within the community it can promptly deliver information, provide fitting technical services to the farmers, to promote appropriate technologies and, to collect valuable feedback from farmers.

Therefore, constraints to innovation that the agricultural extension group are facing are very similar to the agricultural research and higher education groups. Challenges are on building networking with technology developers, poor financial support from the government, capacity of extension personnel, extension strategy and the establishment of community extension centre. More specifically, the technical staff is limited in providing agricultural technical information to farmers and customers who are unable to respond to incoming calls and find timely solutions.

In light of these constraints, there are some proposed solutions that are to be considered so that innovation in this field can be activated:

- Strengthen networking/cooperation within the agricultural extension system, national and international.
- Strengthening network with research institutions to direct technology flow from technology development to the farmers.
- The capacity of media officers and farmers on information and communication technology (ICT) to download and use technical documents should be strengthened, although it is noted that internet service in some rural areas is still not available or instable
- Increase number of extension workers at the national and sub-national levels
- Establish Commune Learning Centers (CLC)
- Update Extension policy with specific strategic actions

## 5.4. Agricultural Technical Regulatory Institutions (ATRI)

There have been significant achievements made by the ATRI group in supporting MAFF development strategy. The accomplishments can be categorized into policy and technical support. In the area of policy support, there are numerous policy frameworks developed by the groups including those policies and legal documents that are still in the discussions and approving stages (MAFF, 2019). Two policy frameworks developed in the recent years include Agricultural Sectoral Development Strategy 2018-2023 and the Establishment of Agriculture Development Master Plan 2030 (MAFF, 2018).

Based on an effective coordination and active partaking from ATRI, the country crop productivity increased significantly. This achievement was particularly visible on rice crop production where the national average yield increased from 3.163 metric tons per hectare in 2013 to 3.298 metric tons per hectare in 2017 (MAFF, 2018). Due to this effect, paddy production increased from 9.39 million metric tons in 2013 to 10.52 million metric tons in 2017 or with an increase of approximately 12 percent. That has let Cambodia to reach a paddy surplus over 5.56 million tons or with approximately 3.56 million tons of milled rice (MAFF, 2018).

Even though they have different nature of work, the ATRI share common constraints and challenges as faced by the ARS, AES and HEI. Therefore, all recommended actions for 5.1, 5.2 & 5.3 are also applicable to Agricultural technical regulatory institutions, and will be presented in detail in the following section. Due to this commonality, a separate discussion on the regulatory institutions is not carried out.

## 5.5. Agricultural Private Sector

In Cambodia, the private sector dominates the country's economy. It plays an important role in transforming the Cambodian economy to reach the annual growth rate of gross domestic product of more than 7 percent per annum since 2012 (ADB, 2014; EMC, 2017). With this strong economic performance, largely contributed by the private sector, poverty rates in the country have fallen, literacy and primary school enrolment have increased, and child mortality and maternal health have improved (EMC, 2017).

In the field of agriculture, the private sector has also been recognized as a driving factor for the growth in the agricultural sector and key foundation for modernizing agriculture.



In that respect, MAFF has been active in the promotion of “public, private and producer partnership in agriculture” to support the linkage between private investment to agricultural production, processing and market (MAFF, 2018).

Although the national economy has experienced significant growth and the government has adopted a number of policy reforms such as the Cambodian Industrial Development Policy 2015-2025 (IDP 2015-2025) to support the growth of the sector, the constraints/challenges remain high for the private sector to reach its potential. This is particularly true in the case of agricultural private group which confronted a number of critical issues on AIS.

The three private groups: commercial, agricultural producers, and agricultural processors are facing common constraints to innovation, therefore the discussions and recommendations will be drawn together for the agricultural private sector (APS) as a whole. Based on the results obtained, it is obvious that there are many challenges encountered by the sector and without solving them, innovation is unlikely to be sprouted.

**Networking** – networking within and between agricultural private groups is seen as an important platform where market competitiveness could be challenged and improved. Agricultural markets are largely unpredictable and influenced by many internal and external factors including low standard agricultural products, competition from imported products, *etc.* At present, agricultural trade in Cambodia is fragmented, production is scattered and farmers are not cooperating or loosely cooperating with one another to produce harvest at an economic scale. Additionally, farmers are unable to base their production decisions on a reliable market analysis, and they are unable to produce specialized products for particular markets. Consequently, a majority of farmers are facing difficulties in marketing their farm products profitably. Due to the situation, agricultural processors and other commercial buyers need to import raw materials with required quality and quantity from other countries for their processing requirements. Therefore, through building networking between all related market actors in agriculture, there will be information sharing and joint priority setting within the network.

**Market system** – effective market system is always an issue raised by participants and the key informants involved in the interviews. Establishing community markets could be an effective solution on many issues including market access, information sharing, production costs, market availability, prices, *etc.*

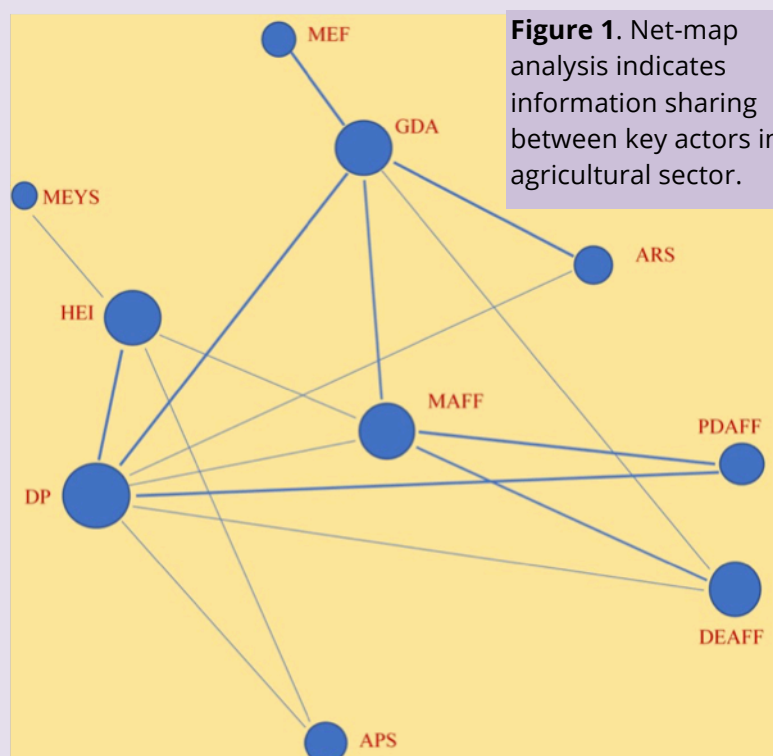
The absence of effective market systems could be a major constraint on agricultural innovation activation. As the market is the place where input suppliers, farmers, processors and consumers can meet, discuss, communicate, and undoubtedly information sharing between these actors can happen, and hence a real network could be well established. Therefore, developing an effective market system down to the community level, *i.e.*, community markets, could be a starting point for innovation to be triggered, and consequently agricultural productivity is anticipated to be increased but in the meantime production costs will be lower due to reduction in transportation cost from the production field into the market, and *vice versa*. With this effect, storage systems for agricultural products can be modernized and equipped with up-to-date

technology set up by agricultural market agents as individual farmers will have no need to build their own warehouse or cold room because they can transport and sell directly their products to these agents.

### Box 6: Networking analysis

Assessment results have clearly indicated a weak or lacking networking between key institutions in the agricultural sector in Cambodia. This situation has been further analysed and fully presented in Table 1 (see above, page 35). A visualization of these networking issues was therefore created using a net-map analysis.

Evidence of poor or lacking networking between key institutions in the Cambodian agricultural sector is clearly visible in net-map analysis depicted in Fig. 2. The analysis, involving MAFF and its key institutions, private sector (APS) and Development Partners (DP), shows an absence of networking between all key organizations of MAFF. As an exception, there were linkages between General



**Figure 1.** Net-map analysis indicates information sharing between key actors in agricultural sector.

Department of Agriculture (GDA), Agricultural Research System (ARS), and Department of Extension of Agriculture, Forestry and Fisheries (DEAFF) or AES. High education institutions (HEI) have weak linkage with APS, but this is not the case in all other key institutions.

In contrast, there is a strong interaction with DP by all key institutions and APS. This result clearly indicates of important involvement of DP in supporting institutional performance of all actors in the agricultural sector including MAFF and its key institutions.

Results from this net-map analysis could again provide a strong signal to all relevant institutions to undertake strong actions in order to establish functional networking with others in order to successfully implement the government strategy on agriculture modernization.

**Capacity** – capacity development on various subjects ranging from production, processing, planning, and entrepreneurship could help make the sector more viable and stable as an important contributor to the economic growth of the country. National research and extension systems should work hand in hand towards achieving this

agenda. Financial support from DP could be tapped into implement the process. It is hoped that by having capacity built, business plan of the sector will be effectively developed and the agricultural production will be improved.

**Bank loan and taxes** – Government intervention on lowering the interest rate on bank loans for agricultural related activities and importation tax for agricultural inputs is important to enhance the production ability of the farmers and agricultural processors. With the development and implementation of this policy, production cost will be lowered and all the actors in the sector will benefit and thus be better able to contribute to the country's economy.

#### **Box 7: Functional analysis**

In order to demonstrate the impact of capacity and enabling environment on the performance of organizational function, a summary with selected actors or the key players in the agricultural sector such as Agricultural Research System (ARS), Agricultural High Education Institution (HEI), Agricultural Extension System (AES), Agricultural Technical Regulatory Institution (ATRI), and Agricultural Private Sector (APS) is presented in Annex 6.

## **6. Recommendations and actions to take**

### **6.1. General recommendations**

Agricultural modernization in Cambodia remains a high priority for the Royal Government of Cambodia. To enable this government strategic vision to be realized, building innovative spirit and capability among institutions and their staff should be prioritized. Within this context, strengthening AIS in all key institutions should be strongly encouraged. As presented in the above Sections 4 & 5, there are a number of constraints and challenges that may hinder agricultural innovation from being activated. Hence, agricultural modernization can only be realized if those constraints /challenges are removed. Following this critical analysis on the subject, a number of key actions are recommended. They are presented in the Table 2.

The Agricultural Innovation System in Cambodia can be effectively activated, providing all interrelated institutions are working together to achieve the common goal. Within this context, sharing resources, information and efforts by all institutions involved will be the key successful factor to achieving agricultural modernization in Cambodia. Based on this concept, there are key actions that need to be taken by all relevant institutions:

4. Build an effective and functional network among all interrelated institutions.
5. Increase staff number.

The key functions of the AIS could be improved by strong efforts from all institutions involved in generating and diffusing available knowledge to improve the market environment and to mobilize resources to properly fund all key organizational activities. Overall, the functional analysis revealed some key actions that need to be taken into

consideration:

6. Increase financial support
7. Recognize research outputs
8. Formulate functional and effective teaching structure
9. Equip agricultural research and HEI systems
10. Create transparent working environment

Agricultural innovation system success depends on the capacity to innovate within all concerned institutions. It is the ability of individual staff and entire organizations as a whole to manage their affairs successfully. Lack of teamwork, organisational support, social environment and educational factor all could hinder both individual and institutional innovation. There are key actions that are recommended for all organizational management:

- Develop technical capacity in all key institutions within the sector
- Disseminate agricultural practices, lessons learned and best practices obtained from the pilot projects such as greenhouse leaf vegetable techniques, and rice intensification technique (promoted in Conservation Agriculture).
- Support the development of business and strategic planning
- Develop entrepreneurship skills

Building a supportive enabling environment is an important pathway to activate agricultural innovation in all concerned institutions within the sector. Within this context, interventions from the government on some critical issues remain essential. In this regard, there are a number of key recommended actions that must be taken into account:

- Establish community markets
- Establish functional community extension centres
- Establish a practical rural credit with lower interest rate
- Provide Government subsidizing system on agricultural sector

Table 2. General recommended actions based on AIS Framework

AIS Framework	Recommended Actions	
Structural	Build an effective and functional network among all interrelated institutions/organizations. This action could be achieved through:	<p>Agricultural Research Council - MAFF should establish the Council, where all agricultural research organizations, without separating them in different line departments, are clustered under one administrative body at the level of General Directorate.</p> <p>Establish Agricultural Research Forum - where research organizations can join together in preparing research strategic plan for the sector and for</p>

individual institutions, and set priority for each institution without competing with one another for scarce resources.

Conduct national research congress – where researchers from all around the country and, possibly, the world can come to present their research outputs and set objectives for the future research plan. The congress should be organized at least once a year, involving all research institutions and HEIs.

Conduct research-extension forum, where research institutions, extension and private sector can join together to discuss newly developed technologies and to discuss feedback received from farming communities, and/or agricultural processing group.

Conduct academic forum – where the three agricultural HEIs can come together to discuss developing/updating teaching curricula focusing on sector priority, benefit sharing, and national development context.

Establish a research-academic forum, where the two systems, ARS and HEI, can work together to build and/or strengthen research and education synergy, conducting joint research projects, supervising graduate and undergraduate students, and sharing teaching responsibilities.

AES should prioritize forming rural business clusters, where all actors involved in agricultural businesses, including farmers, agricultural processors, input suppliers, and FIs, can jointly work together in sharing information and benefits, and support one another in building business plans for each organization.

Increase staff number

ARS and HEI should develop a long-term human resources (HR) plan and search for a possibility to recruit more research and teaching professionals with high qualification and extensive working experience on demanding subjects in the national and international contexts.

AES should build a plan for recruiting more competent staff to be posted at the national and regional levels, and at the established community extension centers.

Functional	Increase financial support	<p>MAFF will work closely with the Ministry of Economics and Finance (MEF) to establish a national research grant to fund core research projects responding to national and sectorial priorities. The grant should be competitive and open mainly for research and HEI institutions.</p> <p>All organizations, ARS, HEI, AES, ATRI, should work toward building medium and long-term strategic plan with logical vision and priority activities, required investment fund and HR, supporting infrastructure and funding sources plus the mechanism to creating a sustainable funding mechanism for the organizations.</p>
	Recognize research outputs	MAFF should provide research recognition to outstanding research personnel and/or institutions which significantly contributed to the socio-economic development of the country through developing outstanding technology that is responsible for the country's development.
	Formulate functional and effective teaching structure	HEI to design effective academic and teaching systems for each of the Agricultural HEI as a step towards increasing teaching and learning capacities of lecturers and students.
	Equip agricultural research and HEI systems	MAFF to mobilize funds to help to strengthen and/or improve research and teaching facilities in ARS and HEI, by providing more advanced research and teaching laboratories, and resource-full and contemporary library.
	Create transparent working environment for staff and management	All concerned institutions to apply good governance in managing the organization in order to ensure creativity among staff. This means that institutions produce results that meet the needs of society while making the best use of resources – accountability, transparency and compliance with the rule of law (lack of corruption) are essential to good governance.
Capacity	Develop research and teaching skills	<p>ARS and HEI to provide capacity building to junior and less experienced researchers/teaching staff on a regular basis through direct mentoring program from key professionals in related subjects; and through in-house, short term non-degree and/or degree trainings.</p> <p>ARS and HEI to involve young research/teaching personnel in different research and academic</p>

Enabling Environment		forums and the national research congress.
	Build strategic planning capacity	Capacity building exercises on strategic planning should be conducted by experienced professional for staff working in planning section of the concerned organization.
	Build technical capacity of extension workers on agricultural technology	ARS to work closely with AES to provide regular trainings, such as training of trainers, to extension personnel working at the national and the regional level on agricultural technologies.  AES to encourage all extension workers to develop own search for newly developed technology, to join research-extension forum and be invited to the national research congress
	Disseminate agricultural technology and practices	ARS should regularly conduct trainings on specific subjects particularly newly developed technology and/or new findings to famers, processors and input suppliers.
	Support the development of business and strategic planning	AES should organize a consultation support for coaching all related organizations on building their own business and strategic plans.
	Develop entrepreneurial skills	AES to help facilitate and organize trainings on entrepreneurial skills development for famers, processors and input suppliers.
	Develop highly demanded policy frameworks	Formulate Government subsidy system for agricultural sector through exemption of importation tax for some essential agriculture inputs such as seeds, fertilizers and agricultural machineries.
	<i>To achieve this action, a series of national dialogues should be organized by MAFF in order to bring the identified issues to the attention of the government.</i>	Formulation of policy framework on the price of agricultural products and/or relief actions to assist farmers and processors in some critical circumstances.  Provide Government intervention on establishing a practical rural credit with lower interest rate for related agricultural activities loan in order to assist farmers, agricultural processors and agricultural input suppliers to operate in a more financially secure environment and increase their incomes. This would result in elevating agricultural productivity with required quantity, quality and safety that complies with international standards.
	Update extension policy	AES to develop clear and functional extension



with strategic actions	methodology along with appropriate extension models and strategic actions to effectively provide outreach services to rural populations.
Establish functional rural infrastructure	<p>AES to develop functional community market as a starting point for innovation to be triggered at the community level. Undoubtedly the transportation and potentially production costs will be reduced as a result, which could lead to higher marginal profits for local producers and their community. Network between all actors could be formed, discussion among them could regularly happen and information could readily flow.</p> <p>AES to establish Community Extension Centre in order to facilitate outreach services to rural people to have easy access to new knowledge, to information on newly developed production technology and to any updated market information that could be important for managing their farms.</p>

Note: <sup>1)</sup> RS: Research System, HEI : Higher Education Institution, AE : Agricultural Extension, RI : Regulatory Institution, MAFF : Ministry of Agriculture, Forestry and Fisheries, FI: Financial Institution, MEF: Ministry of Economics and Finance.

## 6.2. Specific recommendations for the TAP-AIS DeSIRA project

The objectives of TAP-AIS DeSIRA Project are (i) to strengthen capacities for climate-relevant innovation in key organizations, and platforms or networks that provide innovation support services, and (ii) to strengthen the policy environment for climate-relevant agricultural innovation. In response to these objectives, recommendations are specifically organized into two sections: (a) Organizational capacity development and (b) Policy level capacity development/dialogue.

### 6.2.1. Organizational capacity development

As has been discussed and analyzed above, it is obvious that there are gaps in support for and understanding of innovation in some key institutions within the AIS. Therefore, providing capacity building to those key organizations could trigger innovation in the whole agricultural system. For that reason, a strong recommendation, which would better enable innovation in the sector, is to provide capacity development to the key organizations as listed below.

- a) Cambodian Agricultural Research and Development Institute (CARDI) – CARDI is a public agricultural research organization, mandated to develop

appropriate agricultural (crops) technology to support the government's rural development strategy through improving agricultural productivity and rural livelihoods. Despite this key and important mandate, the organization remains slow in achieving its objectives. There are challenges that the organization is facing (details are fully discussed in section 5 on ARS). Therefore, providing capacity development to this organization as the major agricultural technology developer will help trigger innovation and contribute to the successful accomplishment of the government strategy.

- b) Prek Leap National Agricultural Institute (PLNAI) - PLNAI is one of the three agricultural higher education institutions in Cambodia, along with the Royal University of Agriculture (RUA) and the Kampong Cham National Agricultural Institute (KCNIA). The three HEIs are facing similar challenges on agricultural innovation as has been discussed in section 5 on HEI. Even though it has been established more than half a century ago, the PLNAI remains minimally developed and has made little significant progress. Providing capacity development to this organization would improve agricultural HEI by upgrading their agricultural teaching and learning systems to catch up with educational standards in the region and the world.
- c) Strategic priority areas of the Department of Extension of Agriculture, Forestry and Fisheries (DEAFF), which is the main extension service provider within MAFF, could benefit greatly from capacity building activities. It has its offices in every province of the country. DEAFF is facing challenges on agricultural innovation as was discussed in section 5, therefore strengthening the capacity of DEAFF would help support the department to effectively perform its role and responsibility in line with the ministry and the RGC policies on building prosperity in rural Cambodia.
- d) The Cambodia Conservation Agriculture Sustainable Intensification Consortium (CASIC) has the vision to be a well-established platform with a vast network of organizations that are working on Conservation Agriculture (CA) issues in Cambodia, e.g. markets, research, policies, and service provision. CASIC consists of a group of organizations who come together and meet on a regular basis to discuss the promotion of CA practices in Cambodia via knowledge management, advocacy, networking and collaboration between the member organizations and in the wider AIS. CASIC however, is not an implementing organization (it is a unique platform led by MAFF senior government officers). It only serves as a platform for the members to network with other organizations that are involved in CA and have access to the resources and repository of the Consortium in order to promote CA practices in Cambodia. The mission of CASIC is to establish and promote knowledge management of CA related resources for easy access by smallholder farmers, semi-commercial farmers, and agricultural cooperatives, create an enabling environment to boost investment in CA as

well as sustainable intensification and to promote and enhance CA practices and enhance collaboration between stakeholders.

- e) The General Department of Agriculture (GDA) is the key technical regulatory organization for the crops sub-sector within MAFF. This organization coordinates and supervises all activities, technically and functionally, related to crop production techniques. The GDA is facing challenges on agricultural innovation, as was discussed in section 5, and therefore strengthening the capacity of GDA would help build its capability to effectively implement the government strategy on modernization in agriculture, and to help build a prosperous rural Cambodia without hunger.

### 6.2.2. Policy-level capacity development/dialogue

The formulation of actionable recommendations on policies and strategies will certainly support triggering innovation in the sector. More specifically, the formulation or update of the following policies is strongly recommended:

- a) Policy on importation tax on agricultural inputs: It is strongly recommended that a dialogue involving the government department responsible for taxation be conducted. The implementation of tax exemptions for imported agricultural inputs such as crop seeds, fertilizers, and agricultural machineries, would directly and indirectly lower the cost of agricultural production and consequently improve the rural economy and farmer livelihoods. Therefore, the formulation of this policy and its endorsement by the government should be an important step toward agricultural modernization in Cambodia.
- b) Agricultural credit with low interest rate: The establishment of rural credit with low interest rates for agriculture-related loans will create better conditions for all related agricultural rural enterprises, farmers, agricultural processors and agricultural input suppliers, to increase investment in their production and businesses. The establishment of this program should be an effective way toward building economic prosperity in rural Cambodia. High level negotiation between the government and FI should be conducted to get a fair deal beneficial to all concerned actors.
- c) Update Extension Policy: Supporting the modernization of agriculture requires strong involvement from the extension outreach program set up by the government. Within this context, an old version of extension policy released in 2015 (MAFF, 2015) is now out of date and a new updated version should replace it. Therefore, a national workshop should be organized to discuss the issue and to search for a better extension approach that can be adapted to the present and the near future conditions of rural Cambodia. Participation from all major stakeholders, national and regional, including rural enterprises is important.

## References

- Aerni, P., Nichterlein, K., Rudgard, S., & Sonnino, A.** 2015. Making Agricultural Innovation Systems (AIS) Work for Development in Tropical Countries. In: Sustainability, pp: 831-850. (also available at <https://www.mdpi.com/2071-1050/7/1/831/htm>)
- ASEAN, 2015.** *Vision and strategic plan for ASEAN Cooperation in Food, Agriculture and Forestry (2016-2025)*. (also available at <https://asean-crn.org/vision-and-strategic-plan-for-asean-cooperation-in-food-agriculture-and-forestry-2016-2025/>)
- Asian Development Bank (ADB).** 2021. *Poverty: Cambodia*. In: Asian Development Bank [online]. Last Modified: 2021-05-14T21:07+08:00. publisher: Asian Development Bank. [Cited 11 June 2021]. (also available at <https://www.adb.org/countries/cambodia/poverty>)
- Asian Development Bank (ADB).** 2014. *Country Partnership Strategy: Cambodia, 2014-2018*. (also available at <https://www.adb.org/documents/cambodia-country-partnership-strategy-2014-2018>)
- Beerkens, B.** 2018. Influencing factors in innovation on individual and group level. Wageningen University and Research, Geoffrey Hagelaar, MST-81812. (also available at <https://edepot.wur.nl/458406>)
- Cambodia-IRRI-Australia Project (CIAP).** 2001. *Completion Project Report*. International Rice Research Institute, Phnom Penh, Cambodia.
- Cambodian Agricultural Research and Development Institute (CARDI).** 2018. *Achievements in Research and Technology Development (1999-2017)*. Cambodian Agricultural Research and Development Institute, Phnom Penh, Cambodia
- Emerging Markets Consulting (EMC).** 2017. *Unlocking the potential of the Cambodian private sector. Consultation report*. Mekong Business Initiative (MBI). (also available at <http://mekongbiz.org/unlocking-the-potential-of-the-cambodian-private-sector/>)
- Goletti, F., & Sin, S.** 2016. *Development of Master Plan for Crop Production in Cambodia by 2030*. Final Report. Prepared for Ministry of Agriculture Forestry and Fisheries (MAFF), Tonle Sap Poverty Reduction and Smallholder Development Project (TSSD), May 2016. (also available at <http://extwprlegs1.fao.org/docs/pdf/cam173300.pdf>)
- Grovermann C., Wossen T., Muller A. & Nichterlein K.** 2019. *Eco-efficiency and agricultural innovation systems in developing countries: Evidence from macro-level analysis*. PLoS ONE 14(4): e0214115. (also available at <https://doi.org/10.1371/journal.pone.0214115>).
- Knoema.** 2020a. R&D expenditure as a share of GDP by country, 2020 - knoema.com. In: Knoema [online]. [Cited 9 June 2021a]. (also available at <https://knoema.com/atlas/topics/Research-and-Development/RandD-Expenditure/RandD-expenditure-as-a-share-of-GDP>).
- Knoema.** 2020b. Number of researchers in R&D by country, 2020 - knoema.com. In: Knoema [online]. [Cited 9 June 2021b]. (also available at <https://knoema.com/atlas/ranks/Number-of-researchers-in-RandD>)

**Ly, S., Hollweg, C.H., Hebous, S.W., De Meneval, P., Tran, T.T., Cunningham, W., Shrestha, M., Karamba, R.W., Tong, K., & Vashakmadze, E.T.** .2020. *Cambodia Economic Update : Restrained Recovery - Special Focus Adapting to COVID-19 in an Uncertain World* (English). Cambodia economic update Washington, D.C. : World Bank Group. (also available at <http://documents.worldbank.org/curated/en/986491608013945613/Cambodia-Economic-Update-Restrained-Recovery-Special-Focus-Adapting-to-COVID-19-in-an-Uncertain-World>)

**Ministry of Agriculture, Forestry and Fisheries (MAFF).** 2019. Agricultural Strategic Development Plan 2019-2023. Ministry of Agriculture, Forestry and Fisheries, Phnom Penh, Cambodia

**Ministry of Agriculture, Forestry and Fisheries (MAFF).** 2018. Annual Report on Agriculture, Forestry and Fishery 2017-2018 and Directions 2018 -2019. Ministry of Agriculture, Forestry and Fisheries, Phnom Penh, Cambodia

**Ministry of Agriculture, Forestry and Fisheries (MAFF).** 2015. Agricultural Extension Policy in Cambodia. Phnom Penh, Cambodia. 30 pp.

**Mak Ngoy, Sok Say, Un Leang with Bunry Rinna, Chheng Sokunthy & Kao Sovansopha.**

2019. Governance in Public Higher Education in Cambodia. CDRI Working Paper Series No. 114. Phnom Penh: CDRI. (Also available at [https://cdri.org.kh/wp-content/uploads/WP114\\_Gov-PHE.pdf](https://cdri.org.kh/wp-content/uploads/WP114_Gov-PHE.pdf))

**National Institute of Statistics (NIS).** 2021. General Population Census in Cambodia in 2019. Ministry of Planning, Phnom Penh, Cambodia

**Organization for Economic Co-operation and Development (OECD).** 2013. *Cambodia: innovation profile*. In: Innovation in Southeast Asia, OECD Publishing, Paris.

**Royal Government of Cambodia (RGC).** 2019. National Strategic Development Plan 2019-2023. Phnom Penh, Cambodia, 255 pp.

**Standing, C., Jackson, D., Larsen, A-C., Suseno, Y., Fulford, R. & Gengatharen, D.** 2016. *Enhancing individual innovation in organisations: a review of the literature*. Int. J. Innovation and Learning, Vol. 19, No. 1, pp.44–62.

**Turpin, T. & Magpantay, J.A.** 2010. *Science, technology and innovation assessment of Cambodia*. STEPAN Update, 10(1) June 2010. (also available at <http://unesdoc.unesco.org/images/0018/001887/188733E.pdf>)

**Tropical Agriculture Platform (TAP).** 2016. *Common Framework on Capacity Development for Agricultural Innovation Systems: Conceptual Background*. CAB International, Wallingford, UK. (also available at <https://www.cabi.org/Uploads/CABI/about-us/4.8.5-other-business-policies-and-strategies/tap-conceptual-background.pdf>)

**Tropical Agriculture Platform (TAP).** 2020. *Handbook and practical guidelines for implementation of country level activities (Output 2) [Draft]*. TAP-AIS DeSIRA project.

## Annexes

**Annex 1** Number of researchers and the proportion of R&D expenditures in GDP in few selected countries (Knoema, 2020a,b)

	Country	Number of researchers <sup>1)</sup> per one million population	R&D expenditures (percent) in proportion to GDP
1	Cambodia	30 (2015)	0.1 (2015)
2	Thailand	1350 (2017)	1.0 (2017)
3	Vietnam	708 (2017)	0.5 (2017)
4	Singapore	6803 (2017)	1.9 (2017)
5	Malaysia	2397 (2016)	1.4 (2016)
6	Philippines	106 (2015)	0.2 (2015)
7	Indonesia	216 (2018)	0.2 (2018)
8	United States of America	4412 (2017)	2.8 (2018)
9	Australia	4532 (2010)	1.9 (2017)
10	South Korea	7980 (2018)	4.8 (2018)
11	Japan	5331 (2018)	3.3 (2018)
12	China	1307 (2018)	2.2 (2018)
13	India	253 (2018)	0.6 (2018)
14	Russian Federation	2784 (2018)	1.0 (2018)
15	France	4715 (2018)	2.2 (2018)
16	Germany	5212 (2018)	3.1 (2018)

Note: <sup>1)</sup> Researchers in R&D are professionals engaged in the conception or creation of new knowledge, products, processes, methods, or systems and in the management of the projects concerned. Postgraduate PhD students (ISCED97 level 6) engaged in R&D are included (Knoema, 2020b).

## Annex 2 List of key informants interviewed

	Position/Organization	Location
1	Farmer	Takeo province
2	President, Cambodian Agricultural Community Alliance	Takeo province
3	Deputy director, DEAFF, MAFF	Phnom Penh
4	Chief of CACA,	Kampong Cham province
5	Agricultural Cooperative Office, PDAFF	Takeo province
6	Chief of district agricultural office (DAO)	Kampong Cham province
7	Consultant of smart water solution, SNV	Phnom Penh
8	Vice Dean, Agro-Industry Faculty, RUA	Phnom Penh
9	CEO, Soy and Fish Sauce Enterprise	Takeo province
10	Deputy Head, Plant Breeding Center, CARDI	Phnom Penh
11	Vice Chief, Soil Classification Office, Department of Agricultural Land Resources, GDA	Phnom Penh
12	Chair Woman, Mordok RungReoung AC	Takeo province
13	Sale Manager, Sre Bai Tong Ley Vuchnea Enterprise	Kampong Cham province
14	Project Manager, Development and Cooperation, Angkor Green Investment and Development Co.,Ltd	Phnom Penh
15	Chief of Agriculture Cooperative (organic fertilizer)	Takeo province

**Annex 3** Selected main AIS Functions of key agricultural actors along with their capacity and enabling environment

Actors	Capacity	Enabling Environment
<b>Function 1: Develop appropriate agricultural production technology to enhance farm economic viability and rural livelihood improvement</b>		
<u>Key Actor</u>	<u>Existing:</u>	<u>Enablers:</u>
<b>Agricultural Research Systems (ARS):</b>	Long-time experience in conducting crop-based research projects	Sub-decree for the establishment of the institute by the government
<b>Cambodian Agricultural Research and Development Institute (CARDI)</b>	Expertise in variety development for some major food crops particularly rice	Well established infrastructures with sophisticated buildings, offices, laboratories, and field stations
	Extensive working experience in germplasm collection and conservation	Well known as the key agricultural research institution in the country
<u>Supporting Actors:</u>	Existing capacity on soils, plant protection and social research	Existing research network in the country and abroad
<b>IRRI</b>		<u>Disablers:</u>
<b>KOICA</b>	<u>Capacity in need:</u>	Limited financial support
	Institutional capacity to provide closed mentoring system to young researchers	Lack of policy to give recognition to personnel with significant contribution
	Capacity to develop long term strategic planning on research	Loss of key staff due to poor incentive and management issues
	Research methodologies, critical data analysis and scientific report writing	Poor networking with other research organizations at home or abroad
	Project development skills	Research activities are largely donor driven
	Communication skills	Laboratories and library are poorly equipped
		Research facility is insufficient



## Function 2: Produce qualified agricultural graduates to fill the workforce in the agriculture and related sector

### Key Actor

**Agricultural Higher Educational Institutions (HEI)**  
  
**Royal University of Agriculture (RUA)**  
**Prek Leap National Institute of Agriculture (PLNAI)**  
**Kampong Cham National Institute of Agriculture (KCNAI)**

### Existing:

Long-time experience as agricultural educational centers  
Expertise in delivering agricultural courses and related disciplines  
Experienced in developing teaching curricula

### Enablers:

Sub-decree for the establishment of the three HEI by the government  
Well established infrastructures with offices, classrooms, laboratories and library  
Recognized as key agricultural HEI in the country

### Capacity in need:

Institutional capacity to provide a closed mentoring system to young lecturers  
Capacity to develop long term strategic planning on agricultural education and research  
Enhancement teaching capacity for junior and less experience teaching staff  
Teaching methodologies, data analysis and scientific report writing  
Capacity on project development

### Disablers:

Limited financial support  
Lack of policy to give recognition to personnel with significant contribution  
Poor staff incentive  
Poor networking among the three agricultural HEI and with other national and international HEI  
Laboratories and library are poorly equipped  
Interaction with ARS and AES is weak

## Function 3: Provide outreach services to rural populations for fast and reliable access to knowledge and information in order to increase farm productivity and livelihood improvement

### Key Actor

**Agricultural Extension System (AES):**

### Existing:

Long-time experience as agricultural

### Enablers:

Sub-decree for the establishment of the

<b>Department of Extension of Agriculture, Forestry and Fisheries (DEAFF)</b>	extension service provider Capacity to work with rural populations Working knowledge in ICT	DEAFF by the government Well established extension network within the country Extension policy was endorsed by MAFF in 2015
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#### Capacity in need:

#### Disablers:

#### Supporting Actors:

**Office of Extension of Agriculture, Forestry and Fisheries in PDAFF ASPIRE (2015-2022)**

Technical capacity on agricultural technology  
Capacity to develop long term strategic planning on agricultural extension  
Capacity to conduct effective farmers training  
Project development skill  
Interpersonal Communication skills  
Writing skill

Limited financial support  
Number of extension staff is limited  
Poor staff incentive  
Extension policy is out of the present context  
Linkages with other organizations including ARS, and HEI are weak/absent

**Function 4: Enhance effective coordination to build a prosperous rural Cambodia without hunger through harmonized agricultural production and marketable products with high quality standards**

#### Key Actor:

#### Existing:

#### Enablers:

**Agricultural Technical Regulatory Institutions (ATRI):**

**General Department of Agriculture (GDA).**

**Under GDA, there are 9 technical departments and 1 department for administration, Planning, Finance and Collaboration.**

**Technical departments are listed below**

**Department of Rice**

Long-time experience and capable agricultural technical regulatory organization  
Good expertise in agricultural fields  
Capacity to work with farming communities and different actors in agriculture and related fields

#### Capacity in need:

Capacity to develop

Sub-decree for the establishment of the GDA by the government  
Well established infrastructures with working offices, laboratories, and field stations  
Recognized as key agricultural technical regulatory in crop subsector.  
Known as a center with mass of highly qualified personnel experiencing in

<b>crop</b> <b>Department of Horticulture</b> <b>Department of Industrial and Subsidiary Crops</b> <b>Department of Plant Protection, Hygiene and Sanitary</b> <b>Department of Agricultural Land Resources and Management</b> <b>Department of Agricultural Cooperatives</b> <b>Department of crop seeds</b> <b>Department of Agricultural Engineering</b> <b>National Agricultural Laboratory</b>	long term strategic planning on agricultural regulatory system Capacity on project development Capacity on policy formulation and analytical review Knowledge on Agricultural technology including newly developed Networking and Communication skills Technical report writing and publication	agriculture <b>Disablers:</b>  Limited financial support Policy support to give recognition to personnel with significant contribution Interaction within its line departments remains a challenge Networking with related institutions, ARS, HEI, AES and PD AFF is weak or absent Cooperation with another subsectors is limited Poor staff incentive Governance issues
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#### Supporting Actors:

**Provincial Departments of Agriculture, Forestry and Fisheries**

**Function 5: Contribute to the development of a sustainable rural economy through interconnected agricultural production and processing with required quality standard and market competitiveness products**

#### Key Actor:

**Agricultural Private Sector (APS):**  
**Agricultural producers**  
- farmers  
- farming community  
- farmer association, and

#### Existing:

Ability to start business in agricultural related activities  
Traditional knowledge and family record in agriculture production, processing and marketing

#### Enablers:

Government recognition of inevitable contribution to the country economic development by the private sector  
Well known as a driven factor for the agricultural growth and key foundation for modernization agriculture

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**- agricultural  
cooperative**

**Agricultural processing  
Input suppliers  
Agricultural marketers  
and brokers**

**Capacity in need:**

Knowledge on  
agricultural  
technologies, cultural  
practices of major  
agricultural crops  
Entrepreneurship  
skills  
Packaging and  
promotion systems  
Capacity to develop  
long term strategic  
business planning  
Interpersonal  
Communication skill  
Technical background  
on project  
development

MAFF provides strong  
support to activate the  
“public, private and  
producer partnership in  
agriculture” to build  
effective networking with  
all relevant actors.

Government adoption of  
Cambodia Industrial  
Development Policy (IDP  
2015-2025)

**Disablers:**

Limited capital investment  
Banking loan is with high  
interest rate  
Importation tax is high  
Lack of policy to give  
support on reducing  
production costs  
Poor networking among  
the APS actors  
Lack of functional market  
systems particularly within  
the production areas  
Lack of reliable market  
information  
Networking with  
technology development  
organizations and  
outreach service providers  
is weak or non-exist  
Competitions from  
imported products are  
high

**Annex 4** Pictures Plates of assessment activities conducted by the assessment team



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