Ministry of Agriculture and Forests
Royal Government of Bhutan

Data Collection Survey for Agriculture with and post COVID-19 in Bhutan

Final Report

January 2022

Japan International Cooperation Agency (JICA)

Oriental Consultants Global Co., Ltd.
Sanyu Consultants Inc.

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Please note that JICA Monthly Exchange Rate in JFY 2021 (BTN1 (Nu.) = JPY1.53092) is applied to this report.

EXECUTIVE SUMMARY

1. PROJECT OVERVIEW

1.1 Scope of Work

The purpose of the Project is to collect and analyze information on food security in Bhutan during and after COVID-19, and on growth strategies for the agricultural sector, including imports, and to examine and summarize what Japan can contribute to the Bhutanese government's efforts to resolve these issues.

The Counter-Part (C/P) for the entire study is the Ministry of Agriculture and Forests (hereinafter "MOAF") of Bhutan. The study is undertaken for the entire land of Bhutan.

1.2 Work Process and Implementation

In consideration of the impact of the corona pandemic, with support from local consultants, a series of interviews were conducted from May to September 2021.

From October to November 2021, four members of the Team conducted a field survey in Bhutan, conducted a seminar to explain the agricultural promotion plan and possibilities of future Japan's support on November 19th, 2021, and prepared a draft final report. The comments from the seminar and discussions with JICA were reflected in the Final Report, which was submitted by January 2022

2. Agriculture Promotion Plan

2.1 Directions on Food Self-sufficiency and Improved Nutrition

(1) Breaking Out of the Structural Vicious Circle

Since around 2010, Bhutanese agriculture has been shifting from subsistence-based agriculture to commercial agriculture by improving productivity, but the shift has not yet been sufficient. As described above, there are various problems in production, distribution, marketing, and consumption, and these problems affect each other.

As in other developing countries, the challenges in the agricultural sector consist of low productivity due to lack of technical skills of farmers and limited access to inputs such as seeds, lack of agricultural infrastructure such as irrigation, and inadequate distribution and market facilities such as warehouses and markets.

In the interviews conducted during the Survey, many of these voices were heard that Bhutanese agriculture will decline in the near future if this trend continues. However, there is no easy to promote agriculture in Bhutan and achieve food self-sufficiency by solving the problem of Bhutanese agriculture of "high prices for agricultural products and processed products". Therefore, based on the lessons learned from the impact of COVID-19, it is necessary to address the vicious cycle described above by aiming to create an environment in which farmers can take the initiative to maintain and expand production by ensuring adequate income for their labor and a working environment.

In order to achieve this, it is necessary to establish a method of sustainable land use of available farmland, to shift to efficient and market-oriented agriculture, and to take measures to reduce the production and marketing costs of agricultural products throughout the country by developing a post-production market and distribution system. In addition, given the limited size of the domestic market, it is necessary to promote exports as well in order to expand the market.

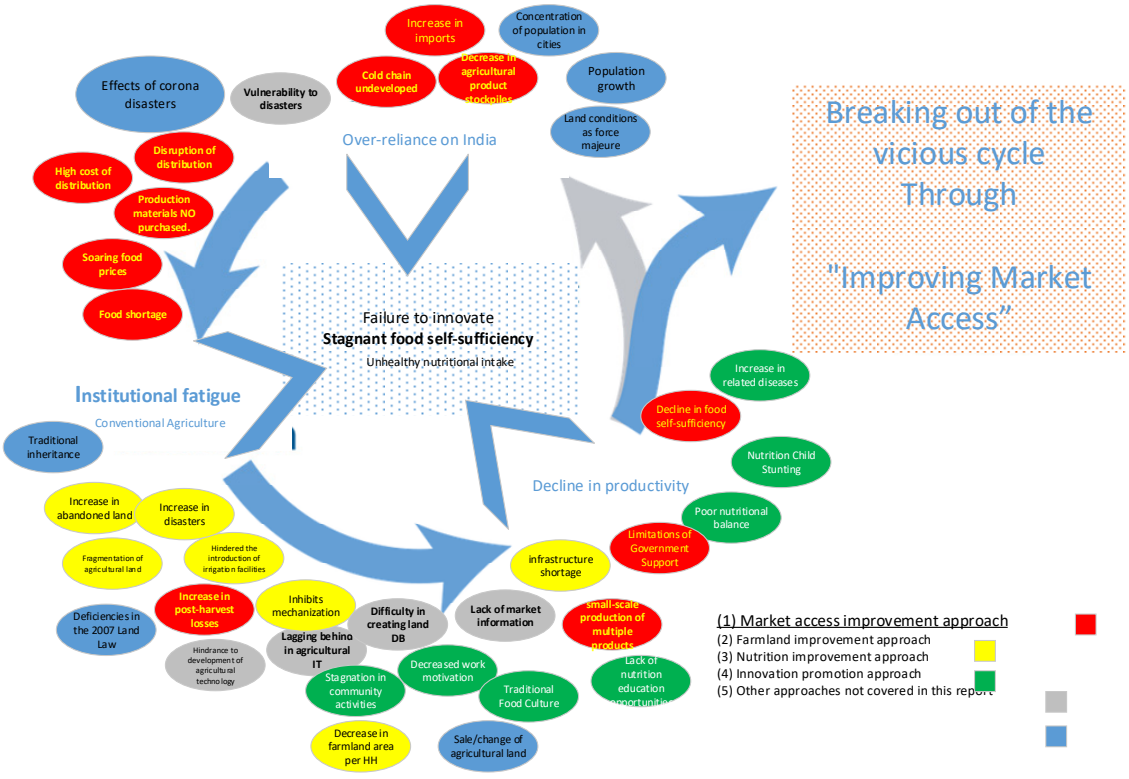

Figure 1 Images of Breaking out of the Vicious Cycle through Market Access Improvement Approaches

(2) Direction of Japan's Support

Since the current 12th Five Year Plan has become difficult to realize due to the impact of COVID-19, the MOAF has established a Bhutan National Pathways. It is expected that the next 13th Five Year Plan

will also be based on this National Pathways, and will be in line with the higher plan, the 2030 National Comprehensive Development Plan.

Based on Bhutan's higher plan, aid trends of other donors, local issues, and the direction of JICA's support, the following vision has been established as a direction for Japan's future support. The outline of this study is shown in Figure 2.

> *"Towards food and nutrition security in long-term, promoting Market-Oriented Agriculture and sustainable land use through providing opportunities where a farmer can access a better value chain together with adequate information"*

In order to actualize the direction above, the following will be taken into consideration:

- To contribute to the elimination of the imbalance between urban and rural areas.
- Adequate income will enable farmers to maintain sustainable agricultural production activities.
- Create new employment opportunities for young people and the unemployed, or support entrepreneurship.
- Contribute to the sustainable development of the agricultural sector, taking into account food security.

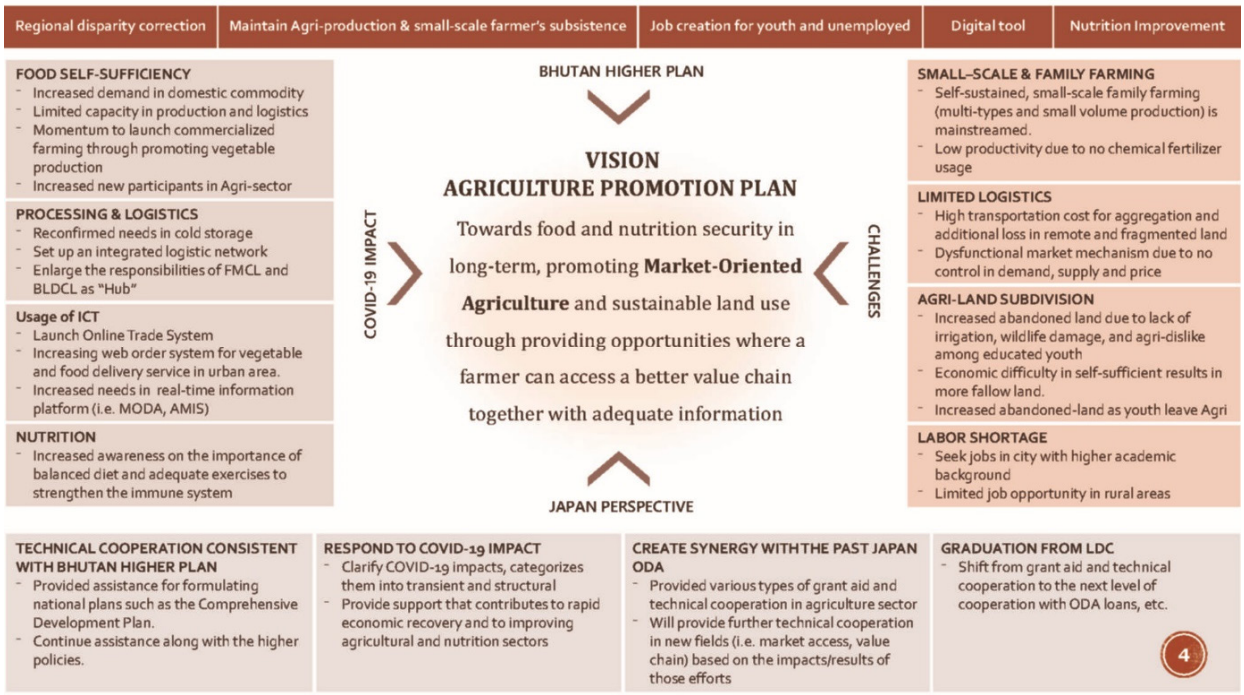

Figure 2 Study Policy on Agricultural Promotion Plan

2.3 Recommendation on Agricultural Promotion Plan

(1) Potential Cooperation Activity in Each Sector

Each field's challenges, main factors, and countermeasures are detailed, as well as the likelihood of Japanese help for these issues.

a) Market Access Improvement

Table 1 Possible Japan's Support for Improving Market Access

Challenges	Main factors	Development Approach	Possible Japan's Support
Unbalanced demand and supply	• Seasonal bias in production by topography and natural conditions. • Lack of diversification in production. • Underdeveloped trading system. • Agro-processing is underdeveloped. • Family farming is dominant and farmers are not aware of the market. • Farmers are less sensitive to market demand due to the buy-back system. • Underdeveloped storage technology without facilities • Difficult access to markets • Storage facilities are underdeveloped • Highly influenced by imports from India	• Promotion of market-oriented agriculture • Guidance on adjustment of production timing • Development of storage facilities and distribution system • Development and dissemination of storage technology at the farmer level • Improvement of storage facilities • Review of the buy-back system • Support for entrepreneurship in the agro-processing sector	Promotion of Market-Oriented Agriculture through improving market access Support on cottage and small level business incubation Promote and incentivize Good Agriculture Practices（GAP） Post-harvest techniques expert
Limited logistic service and infrastructure at national/regional/ community level	• Limited markets • No facilities for collection and sorting of products • Under undeveloped distribution system, many intermediaries are involved	• Development of infrastructure to improve distribution, such as rural farm roads • Development of collection, sorting and storage facilities • Review FCBL role in export logistic • Review of pricing policies • Promotion of market-oriented agriculture	Support to prepare master plan on establish agri-products supply chain in Bhutan Construction of supply chain facilities in Bhutan Construction of pack house at Pasakha Strengthen cooperatives specialist

Undeveloped strategy for export	• Difficulty in securing volume due to small-scale production and inadequate collection system • Dependence on exports to India • Lack of certification system • Lack of branding • Lack of packaging technology	• Review of policies for agricultural production • Review of the Buy-Back system to make it consistent with market-oriented agriculture • Promotion of certification through capacity building of BAFRA • Export promotion in collaboration with certified farmers • Research on global market demand, quality requirements, trends, brands, etc.	Capacity development on DAMC and related agencies to promote export
			Export promotion specialist
			Branding Expert (OGOP)
			Promotion of Organic Product

b) Sustainable Land Use

Table 2 Possible Japan's Support in Sustainable Land Use

Challenges	Main factors	Development Approach	Possible Japan's Support
Increase in fragmented and underutilized agricultural land in urban areas	• Land is being fragmented • Dispersed small parcels of farmland that are not expected to generate income	• Mobilization of agricultural land by lending in collaboration with the activities of the Fallow Land Bank • Introduction of high value-added agriculture (horticulture, hydroponics, etc.) in peri-urban areas	Promoting fallow land reversion through development of fallow land database and planning capacity
			Support program for strengthening the implementation system of SLM
Increase in abandoned farmland in rural areas	• Irrigation problem due to inadequate irrigation facilities and malfunctioning due to aging and natural disease • Outflow of labor force due to temporary and permanent migration to cities • Low workability and labor efficiency*1 due to harsh land terrains • Difficulty in investing in agricultural machinery and	• Mobilization of agricultural land by lending in collaboration with the activities of the Fallow Land Bank • Improvement of farmland conditions through ALD and SLM • Increase farmer's income and improve working environment by improving conditions of farmland • Maintaining and improving productivity of farmland through SLM	Farming village development project for revitalizing rural area through reversion of fallow land
			Development of fallow land database and planning capacity
			Support program for strengthening the implementation system of SLM
			Improvement of machinery and equipment for ALD

	facilities due to low profitability*2 • Poor access to remote farmland accelerates *1, *2 • Decreased productivity due to soil degradation	• Strengthening the implementation system of SLM • Organizing land information on fallow land and utilize it for rehabilitation of farmland • Utilization of ICT for SLM and fallow land measures (integration of soil and land information into fallow land information) • Development of soil monitoring system and introducing medium- to long-term soil conservation measures	Assessing and profiling Bhutanese soil biodiversity

c) Promoting Innovation in the Agricultural Sector

Table 3 Possible Japan's Support in ICT

Challenge	Cause	Development Approaches	Possible Japan's Support
Lack of information quality to trust users (agribusiness companies, including farmers)	Lack of information collection and implementation skills of local extension agents who are responsible for collecting information in rural areas Lack of IT literacy and business (financial) literacy on the part of users	Strengthen the capacity of the ICT Division in designing and supervising the development of ICT systems to improve the work efficiency of local extension workers. (Strengthen capacity for development of farmer and extension worker database, mapping tools, activity reporting system, and crop and harvest reporting system) Training of personnel to conduct surveys on a primary database of farmers and extension workers (assuming young age group such as unemployed Graduates) Training of rural extension workers in the use of ICT systems Training of users to improve their literacy	Strengthen capacity development to collect and use agricultural information with ICT

Challenge	Cause	Development Approaches	Possible Japan's Support
Lack of functionality in ICT systems (Existing functions alone do not directly benefit the users)	Lack of ICT human resources (unable to develop applications and information integration services using their human resources)	Strengthen the capacity of ICT Division (utilization of ODK tools, web application development, data scientist) Support linkage of ICT systems using MODA Platform Incorporation of distribution volume information (if there is a system to know the distribution volume to the market, such as warehouse management records)	ICT System Advisor
Lack of communication between developers and users of ICT systems	Private companies involved in agribusiness have not been developed. There is no place to collect requests from the private sector for ICT, especially for market information.	Publicize business plans and provide training for selected plans to become private sector aggregators, agricultural service providers, or agricultural entrepreneurs (entrepreneurship support) Establish a platform for the exchange of ideas between the government and the private sector. Identify new needs from social media text data analysis	Support for the organization of private agribusiness companies, including producers Basic Needs Survey in the regions by using ICT methodologies

d) Nutrition and Food Education

Table 4 Possible Support from Japan in the Nutrition Sector

Challenges	Major causes	Measures (Possible activities)	Proposed support from Japan
The Bhutanese people suffer from the triple burden of malnutrition (under-nutrition, inadequate micronutrient intake and over-nutrition).	There are Bhutanese who do not have the knowledge and skills pertaining to improved nutrition.	1. To conduct the Social and Behavior Change Communication (SBCC) targeting to all the population. 2. To conduct SBCC to address the following symptoms by involving not only the actually suffered persons but also their families and communities ✓ Stunted children under 5 years old	The SBCC strategy which is under the development by MoH, MOAF and MoE with support from WFP will be implemented, and give feed-back to MoH, MOAF and MoE on impact.

		✓ Women and children with symptoms of micronutrient deficiency (including anemia and glossitis) ✓ Non-communicable diseases in adult men and women (hypertension, diabetes, cancer, cardiovascular diseases, etc.)	
The system needs to be strengthened if locally produced and locally consumed school meals are to continue.	1. The amount of stipend is fixed and does not reflect inflation or the consumer price index. 2. The selling price in neighboring markets is often higher than the school's purchase price. 3. Some foods are not produced by neighboring farmer groups and are not available. 4. School meals may not meet the nutritional requirements of students, when schools cannot have all the ingredients as recommended. 5. The stipend is not sufficient when schools are located in remote areas and the cost of transporting food is high. 6. Some schools do not have an enough number of students for FGs to make profit by selling their produce. 7. The applied purchase rules vary from school to school.	1. To establish a monitoring system to assess the current situation. 2. To Identify good practices and draw up lessons learned. 3. To Produce a revised version of the current system based on the lessons learned. 4. To implement the proposed changes in pilot schools to demonstrate that they work. 5. To develop and update operational guidelines and manuals in line with the proposed changes.	Support for the strengthening “School Feeding Program”
Weak multi-sector coordination function	1. There are several task forces coordinating between the relevant institutions, but there is no coordination mechanism between the task forces. 2. All task forces are horizontal and there is no clarity on who is ultimately responsible.	1. To position the nutrition sector as a cross-ministry sector within the RGoB administrative system. 2. To clarify the scope of works of the Task Forces and the relationship between them. 3. To clarify the coordination mechanism between the relevant agencies in the nutrition sector.	Nutrition improvement advisor

(2) Agriculture Promotion Plan

The ideas of possible Japan's support in each field are sorted out. Based on them, model rural development projects combined with the proposed activities in each field were discussed. These are summarized in Table 7 below.

Table 5 Candidate of Agriculture Development Plan

Category	Project title	Activities
Market Access	Promotion of Market-Oriented Agriculture through improving market access	To construct a post-harvest storage at Gewog and operate it for establishing joint shipping by surrounding farmers groups. It will be a model to achieve stable shipments of a certain quantity and to strengthen the value chain. In conjunction with the improvement of market access, market information will be utilized using ICT technology. Meantime, SBCC will be implemented, so that ultimately improved profits will lead to improved nutrition.
	Support to prepare master plan on establish Agri-products supply chain in Bhutan	In order to eliminate the imbalance between supply and demand on agricultural products, a master plan to develop post-harvest facilities which strategically improve the distribution of agricultural products in line with its production is formulated.
	Construction of supply chain facilities in Bhutan	To construct necessary faculties for aggregation and distribution of products according to above Master Plan
	Capacity development on DAMC and related agencies to promote export	To prepare detailed export promotion plan based on the investigation on the potential for cop exports other than India, primarily to ASEAN market and domestic production capacities. The plan will be prepared not only DAMC but through discussion with related institutions.
	Promotion of Market-Oriented Agriculture through improving market access	To conduct survey on potential destination of export of organic products, strengthen mechanism on organic certification in BAFRA, and development of production systems through SLM, in order to promote export of organic agricultural products.
	Export promotion specialist	Provide advice on access to markets in neighboring countries with considering their market needs, and its compatibility with Bhutanese products through work with DAMC, FCBL and BEA
	Construction of pack house at Pasakha	To construct a pack house at Pasakha near border in Phuntsoling, for conducting quarantine, cleaning and soring required for export and inspection on imported product.
	Promote and incentivize Good Agriculture Practices （GAP）	To educate farmers on production norms and standards that are met with market demands and acceptable by food safety standards of the market.
	Support on Cottage and small level business incubation	A system to provide technical and financial support for starting and developing agro-processing businesses in rural areas will be established and implemented as a pilot project.
	Branding expert （collaboration with OGOP）	Improve attractiveness of the region together with Dzongkhag and Gewog government organizations, and disseminate such good practices to other regions
	Strengthen the cooperative specialist	To support organizing agricultural cooperatives and their self-reliant in DAMC.
	Post-Harvest techniques expert	Develops and train technologies for long-term storage of vegetables and agro-processing applicable at the farm level in NPHC.
Sustainable Land Use	Farming village development project for revitalizing rural areas	As a model for promoting the use of fallow land, a technological package to support the entry of newcomers as youth groups, etc. A high potential area to be used sustainably will be selected from fallow lands in Gewog, renewed them through ALD works.

	through the reversion of fallow land	The project creates successful cases of highly motivated farmers using fallow land through technical guidance by agricultural extension officers and coordination with market sales.
	Support program for strengthening the implementation system of SLM	To promote implementation of SLM through capacity development of agricultural extension officers and exhibiting construction equipment suitable for ALD work on slopes. It will also strengthen coordination of the SLM projects, its monitoring mechanism and its implementation through capacity development of the concerned parties and utilization of ICT support.
	Improvement of machinery and equipment for ALD	Based on the results of the pilot introduction of construction equipment suitable for ALD works, construction equipment for ALD works will be procured to accelerate the implementation of the ALD project.
	Development of fallow land DB and planning capacity	In addition to supporting the preparation of inventory database of fallow land including fragmented farmland, it will form a model district for land-readjustment facilitated by local government. At the same time, it will improve the capacity to prepare, implement, and monitor implementation plans for fallow land reversion by effectively using productivity information such as soil maps and land classification maps.
	Assessment and profiling of soil biodiversity	To conduct preliminary studies and preparations to conduct an assessment and profiling of soil biodiversity and ecosystem functioning in Bhutan for the conservation of soil fertility and maintenance of agricultural productivity in medium-long term.
ICT Agriculture	Support for the organization of private agribusiness companies, including producers	To establish a platform where the public institute to gather comments on requirement information and ICT from private sectors, agribusiness and producers. Assumed to be integrated into other activities (private sector support).
	Capacity development to collect and use agricultural information with ICT	In order to improve the type, quality, and frequency of market information and other information that is the basis of ICT systems, capacity of ICT division and Gewog extension officers is strengthen. Meantime, the IT and financial literacy of users will be strengthened in order to promote the use them.
	ICT System Advisor	To support the provision of data by AMIS that cropping and harvesting information provided by MODA Platform and its distribution data. This will further promote the use of market information and contribute to improving the business awareness of farmers in particular.
	Basic Needs Survey in the regions by using ICT methodologies	To provide new know-how to understand basic needs through social media (SNS). An expert will dispatch to the ICT Division, she/he provides new ways to understand the needs of consumers and advises to policy makers on how to reflect these needs in their policies. She/he will investigate the reasons for the lack of ICT adoption at the farm level.
Food security and nutrition	Combining Social and Behavior Change Communication (SBCC) into the activities	SBCC strategies will be linked to various project activities and implemented with targeted farmer groups and households in order to promote behavior change towards reducing the triple burden of malnutrition.
	Support for strengthening the “School Feeding Program”	Based on good practices, the school feeding program will be ensured as a system to improve for both students' low nutrition and inadequate intake of micronutrients and farmers' access to markets. The system will be disseminated nationwide.
	Dispatching Nutrition Advisor	Position nutrition as a cross-cutting field in the administrative system and strengthen its multi-sectoral coordination function.

(3) Implementation Plan

The agricultural promotion plan is drafted from five perspectives of "sustainable use of farmland and improvement of farmers' livelihoods," "economic revitalization and job creation in rural areas," "ripple impact," "appropriateness as Japan's support cooperation," and "environmental and social consideration". In accordance with the plan, priority projects are listed in Table 8.

Table 6 Priority Project List

Sector	Project Title	C/P
Market Access Improvement	Support to prepare master plan on establish Agri-products supply chain in Bhutan	DAMC,DoA,NPHC,FCBL
	Promotion of Market-Oriented Agriculture through improving market access	DAMC,DoA,Dzongkhag DAO,Gewog Extension Officer,HPD-DoPH-MOH,WFP
Sustainable Land Use	Farming village development project for revitalizing rural areas through the reversion of fallow land	NSSC,DoA,Dzongkhag DAO,Gewog Extension Officer,WFP
ICT	Capacity Development to collect and use agricultural information with ICT	ICT Division,DAMC, DoA,Gewog Extension Officer
Nutrition and Food Education	Support for strengthening the "School Feeding Program"	DAMC, DOA-MOAF, SHND-DoSE-MoE, Dzongkhag Officers

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ABBREVIATION

ADSS	Agro-met Decision Support System
AEDIC	Agro-based Entrepreneurship Development and Incubation Centre
AEZ	Agro-Ecological Zones
ALD	Agriculture Land Development
ALMC	Agro-Logistic and Marketing Cooperative
AMC	Agricultural Machinery Centre
AMIS	Agriculture Market Information System
ARED	Agriculture Research and Development
ARDC	Agriculture Research and Development Center
ASSR	Agriculture Support Service Representatives
BAFRA	Bhutan Agriculture and Food Regulatory Authority
BCCI	Bhutan Chambers of Commerce and Industry
BDB	Bhutan Development Bank Limited
BDFC	Bhutan Development Financial Corporation
BIMSTEC	Bay of Bengal Initiative for Multi-Sectorial Technical and Economic Cooperation
BIPS	Bhutan Information and Communications Technology Policy and Strategies
BITS	Bhutan Information Technology Strategy
BTS	Bhutan Trade Statistics
BLDCL	Bhutan Livestock Development Corporation Limited
CARLEP	Commercial Agriculture and Resilient Livelihoods Enhancement Program
CMU	Central Machinery Unit
CNDP	Comprehensive Development Plan
CPF	Country Partnership Framework
CSI	Cottage and Small Industry
DAMC	Department of Agricultural Marketing and Co-operatives
DAO	District Agriculture Officer
DCS	Department of Cottage and Small Industry
DITT	Department of IT and Telecom
DOA	Department of Agriculture
DOL	Department of Livestock
DoPH	Department of Public Health (MoH)
DSE	Department of School Education (MoE)
FAO	Food and Agriculture Organization
FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
FCBL	Food Corporation of Bhutan Limited
FG	Farmer Group
FMCL	Farm Machinery Corporation Limited
FSAPP	Food Security and Agriculture Productivity Project
FYP	Five Year Plan
GCIT	Gyalpozhing College of Information Technology
GDP	Gross Domestic Product
GNH	Gross National Happiness
HAOB	Horticulture Association of Bhutan
HIV	Human Immunodeficiency Virus
ICTD	Information and Communication Technology Division
ITU	International Telecommunication Union
IFAD	International Fund for Agricultural Development
IMF	International Monetary Fund
JICA	Japan International Cooperation Agency
LDC	Least Developed Countries
MHV	Mountain Hazelnuts Venture
MOAF	Ministry of Agriculture and Forests
MODA	Mobile Operational Data Acquisition
MoE	Ministry of Education
MoEA	Ministry of Economic Affairs
MOF	Ministry of Finance
MoH	Ministry of Health

MoIT	Ministry of Information Technology
NCDs	Non-Communicable Diseases
NCHM	National Center for Hydrology and Meteorology
NCSIDB	National Cottage and Small Industry Development Bank
NKRA	National Key Result Areas
NLCS	National Land Commission Secretariat
NMC	National Mushroom Center
NNTF	National Nutrition Task Force
NPPC	National Plant Protection Centre
NSB	National Statistics Bureau
NSC	National Seed Center
NSSC	National Soil Services Center
ODA	Official Development Assistance
ODK	Open Data Kit
PPD	Policy and Planning Division
PPR	Peste des Petits Ruminants
RGoB	Royal Government of Bhutan
RIMES	Regional Integrated Multi-Hazard Early-warning System
RAMCO	Regional Agricultural Marketing and Cooperative Office
RMA	Royal Monetary Authority
RNR	Renewable Natural Resources
RSEB	Royal Securities Exchange of Bhutan
SAARC	South Asian Association for Regional Cooperation
SBCC	Social and Behavior Change Communication
SDGs	Sustainable Development Goals
SFP	School Feeding Program
SLM	Sustainable Land Management
STCBL	State Trading Company of Bhutan Limited
TCARD	Technical Committee on Agricultural and Rural Development
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
VNR	Voluntary National Review
WASH	Water, Sanitation and Hygiene
WB	World Bank
WFP	World Food Programme
WHO	World Health Organization

Chapter 1 STUDY FRAMEWORK

1.1 Background and Purpose of the Project

1.1.1 Background of the Project

Agriculture accounts for 15.7% of the GDP, while the proportion of farmers is at 51.1% out of total labor force, making agriculture a key industry in Bhutan. In rural areas in particular, 71.2% of the working population are farmers, 61.7% of the female working population are engaged in agriculture, and 96.8% of the poor live in rural areas.

In terms of food self-sufficiency, it is 68% self-sufficient in food grains (2014-2016), 46.7% in rice, 86% in maize, 84% in vegetables, and 37% in meat, and 96.2% in imported food, respectively.

However, only 12% of the farmers have access to roads/distribution networks, and market information is difficult to obtain, so the market-oriented agriculture reflecting market needs is required.

Looking at the nutritional status of the people, while anemia among women and stunting among children are improving, obesity among people over 18 has increased 2.5 times in the past 15 years to 6.4% (2016), and there is a need to improve the traditional diet, which is heavily dependent on staple foods.

In light of this situation, Bhutan formulated the National Comprehensive Development Plan (Target Year at 2030) in 2019 with the support of Japan, having the aim of maximizing Gross National Happiness by promoting balanced development of urban and rural areas across the country. The plan proposes a development approach based on the consideration of development alternatives, with the aim of promoting Bhutan's national identity and balanced development in the region. The three main development policies for the promotion of agriculture are to increase the self-sufficiency rate of rice (60%), to promote market-oriented agriculture, and to improve nutrition.

In response to the COVID-19 pandemic, the Royal Government of Bhutan (RGoB) sealed the Indian border, restricted trade to daily necessities, stopped accepting tourists from abroad, and imposed a lockdown to prevent the spread of infection in the city. As a result, the shortage of supply of imported vegetables and meat, as well as consumer insecurity, has led to instability in market prices, with the Consumer Price Index (November 2020) showing a year-on-year increase of 7.5%, of which food shows the highest at 14.9%. For this reason, there is renewed awareness of the need to support domestic agriculture in order to maintain a stable supply of agricultural products even during times of crisis.

In response to this situation, RGoB notified the entire country in March 2020 to promote food production through support for farmers, and in April of the same year, announced a plan to revitalize agriculture with the aim of ensuring food security and employment opportunities. In addition, in July 2020, RGoB announced an emergency economic countermeasure plan for the construction, tourism, and agriculture sectors, which were severely affected by COVID-19, and in the agricultural sector, the government will work to increase food production, focusing on winter vegetables, through technical guidance and material support, aiming for "food self-sufficiency and nutritional security.

In addition, as long-term issues to be tackled for the promotion of agriculture after COVID-19, it has become important to utilize abandoned land by improving farmland, to eliminate agricultural losses by improving market access, and to promote innovations that enable efficient production activities even in remote environments.

Therefore, this study is to examine food security and growth strategies for the agricultural sector from a medium- to long-term perspective with and after COVID-19, while reviewing the results of these emergency measures.

1.1.2 Purpose of the Project

The purpose of the Project is to collect and analyze information on food security in Bhutan with and after COVID-19, and on growth strategies for the agricultural sector, including imports, and to examine and summarize what Japan can contribute to the RGoB's efforts to resolve these issues.

1.2 Project Framework

1.2.1 Counterpart (C/P) Agency

At this stage, the C/P for the entire study is assumed to be the Ministry of Agriculture and Forests (hereinafter "MOAF") of Bhutan, but a series of surveys are undertaken considering the areas supposed to be covered in the Study (Table 1-1).

Table 1-1 Organizations Conducting Interviews in the Field Survey

Area	Government Agency	Private Sector, Donor Agencies
Market Access	MOAF, FCBL etc.	BCCI, HAoB, ALMC etc.
Agriculture Production	MOAF, DOA, DAMC, ARDC, AMC etc.	WB, ADB, WFP, Coops, etc.
Nutrition aspects	MOAF, MoE, MoH, Local government unit of Thimphu, etc.	WFP, UNICEF, Broadcasting media, etc.
ICT aspects	IT-related department of; MOAF, Agriculture Research/Development Center, ICIMOD, MOIC, MOWHS, etc.	Agriculture Machinery Centre, BDB, Mountain Hazelnuts Venture, Gyalpozhing College of Information Technology Royal University, Agritask etc.
Trade and Investment Promotion	MOAF: RNR, PPD, DAMC, BAFRA National Statistics Bureau, etc.	FCBL, BEA etc.

1.2.2 Project Term

May 2021 ~ January 2022（9 months）

1.2.3 Target Area

The entire land of the Kingdom of Bhutan

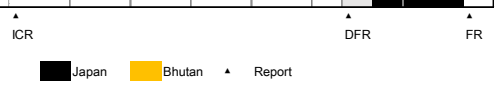
1.2.4 Work Process and Implementation Schedule

In consideration of the impact of the corona pandemic, the Study employing local consultants was conducted during the period from May to September 2021, and a field survey will be conducted in September 2021, assuming that the spread of the disease is somewhat under control. After the field survey by all members of the Team, the Study team will finalize a plan to support agricultural development and a proposal for possible cooperation by Japan.

From October 2021, four members of the Team conducted a field survey in Bhutan, conducted a seminar to explain the agricultural promotion plan and possibilities of future Japan's support on November 19th, 2021, and prepared a draft final report. The comments from the seminar and discussions with JICA were reflected to the Final Report, which was submitted by January 2022 (Table 1-2).

Table 1-2 Work Schedule

	Work Item	2021 May	June	July	August	September	October	November	December	2022 January
Item (1)	**Preparation of Inception Report (2021.06)**									
1	Collection and review of existing materials									
2	Formation of knowledge chain with experts, interviews to the knowledge chain									
3	Organize and analyze the surrounding environment for agricultural development in the target countries									
4	Collect and organize information on the impact of the Corona disaster on agriculture.									
5	Understanding of trends and intentions of Japanese companies already operating in the target country, and analysis of international trends in agriculture									
6	Coordinate local re-commissioning									
7	Preparation of inception report, explanation and discussion, etc.									
Item (2)	**Review of the survey process (2021.06)**									
8	Reconfirmation of the survey methodology, taking into account the situation of new coronary infections in each country									
9	Scrutinize survey items that can/can't be conducted in coronary disasters.									
Item (3)	**Domestic desk study (2021.07-08)**									
10	Interviews with domestic experts and specialists in the agricultural industry, etc.									
11	Confirmation of examples of smart agriculture in Japan									
Item (4)	**Field survey (2021.09)**									
12	Confirmation of progress and understanding with subcontractors									
13	Collect and analyze information on improving food self-sufficiency									
14	Information collection and analysis on measures against abandonment of cultivation through improvement of agricultural land									
15	Information collection and analysis on improvement of national nutrition									
16	Information collection and analysis on promoting innovation in the agricultural sector									
17	Information collection and analysis on improvement of market access and overseas market marketing									
18	Study and analysis on model farming villages									
19	Interviews with the Japanese government, JICA, JETRO, and Japanese companies already operating in the area									
20	Interviews with target country governments, local companies, farmers, international organizations, etc.									
Item (5)	**Compilation of field survey results (2021.10)**									
21	Report the results to the reporting organizations and explore the possibility of cooperation with each organization.									
22	Examine the possibility of Japan's cooperation in each field									
23	Consideration of a draft plan for supporting agricultural promotion With and after COVID-19									
Item (6)	**Preparation of Draft Final Report (DFR) (2021.11)**									
24	Preparation of the Draft Final Report (DFR)									
25	Response to comments on DFR									
26	Completion of work by subcontractors									
Item (7)	**Organize seminars/workshops**									
27	Organize seminars/workshops									
Item (8)	**Preparation of final report (2022.12)**									
28	Preparation of Final Report (FR)									



1.2.5 Resource Plan

The Study will be conducted with a total of about 16 MM of man-months in accordance with the manning schedule described below. In addition, in view of the global outbreak of the COVID-19 pandemic, the schedule will be revised as necessary (Table 1-3).

Table 1-3 Resource Plan

	Field of Responsibility	Name	2021								Days Total	Total	
			May	June	July	August	September	October	November	December	days	Bhutan	Japan
Work in Bhutan	PM/Market Access	Masashi TAKANO									0	0.00	
	Asst. PM/ Project Promotion	Hideki HIROSHIGE									39	1.30	
	Agricultural Land Reform	Kazuhiro TSUCHIDA									39	1.30	
	Nuturition/ Food Education	Hiroko YASHIKI									39	1.30	
	ICT Agriculture	Hajime KITA									36	1.20	
	Distribution/ Agricultural Input	Miki IMAI									0	0.00	
											Total Field Work	5.10	
Work in Japan	PM/Market Access	Masashi TAKANO	17.8(0.89)								17.8		0.89
	Asst. PM/ Project Promotion	Hideki HIROSHIGE	13 (0.65)								13		0.65
	Agricultural Land Reform	Kazuhiro TSUCHIDA	4 (0.2)								4		0.20
	Nuturition/ Food Education	Hiroko YASHIKI	4 (0.2)								4		0.20
	ICT Agriculture	Hajime KITA	6 (0.3)								6		0.30
	Distribution/ Agricultural Input	Miki IMAI	21(1.05)								21		1.05
											Total Domestic Work		3.29
	Report			△ Ic/R					△ DF/R	△ F/R			
											Sub Total	5.10	3.29
											TOTAL	8.39	

Legend : ■ Work in Bhitan
Work in Japan

Chapter 2 SOCIO-ECONOMIC CONDITION IN BHUTAN

2.1 Major Socio-Economic Indicator

2.1.1 Population

The census undertaken in 2017 shows the total population within the country is 727,145 and The National Statistics Bureau (NSB) of Bhutan confirms that the population will continuously and slightly rise from 2017 to 2047, which will reach approximately 884 thousand by 2047[1]. The study undertaken by NSB also confirms that the share of the youth population under 15 years old will decrease from 26 percent to 17 percent while the share of the elderly above 65 years old will be up to 13 percent from 6 percent. Bhutan has also experienced a global trend: an aging society.

Table 2-1 shows the population by district level. Thimphu embraces the largest population, which is 19 percent of the total population, Chukha (9.5%), Samtse (8.6%), and Paro (6.4%) follow.

Table 2-1 Population by District

District	Total (person)	Distribution (%)
Thimphu	138,736	19.1
Chukha	68,966	9.5
Samtse	62,590	8.6
Paro	46,316	6.4
Sarpang	46,004	6.3
Trashigang	45,518	6.3
Wangdue	42,186	5.8
Mongar	37,150	5.1
Samdrup Jongkhar	35,079	4.8
Punakha	28,740	4.0
Dagana	24,965	3.4
Pemagatshel	23,632	3.2
Tsirang	22,376	3.1
Trongsa	19,960	2.7
Bumthang	17,820	2.5
Zhemgang	17,763	2.4
Trashiyangtshe	17,300	2.4
Lhuentshe	14,437	2.0
Haa	13,655	1.9
Gasa	3,952	0.5
Total	727,145	

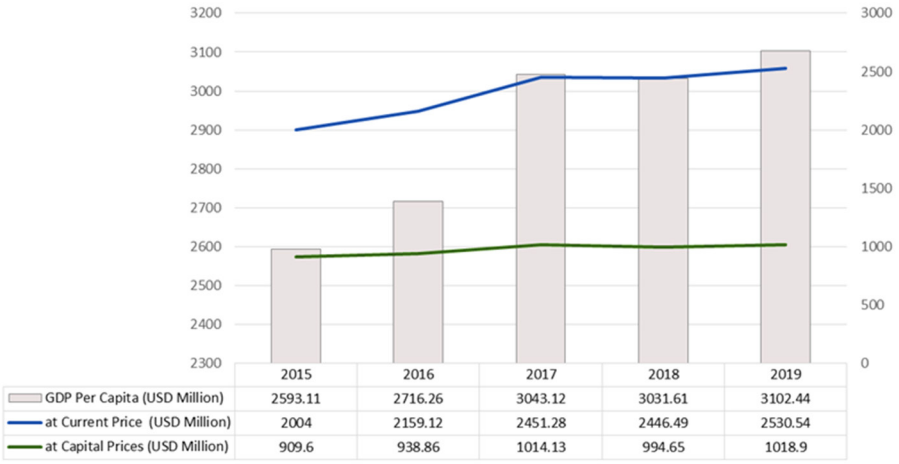
Source: Population & Housing Census of Bhutan

2.1.2 Gross Domestic Product

Gross Domestic Product (GDP) continuously grows from 2015 to 2019. According to International Monetary Fund (IMF)[2], FY2015-2016 growth was driven by the hydropower sector, and it was maintained even in FY2017 together with strong growth in service and manufacturing in hydropower construction. GDP at FY2018 slightly dropped; however, it recovered in FY2019 with outstanding growth in the education and health sector (Table 2-2). NSB reported the Bhutanese economy grew at -10.08 percent in 2020, which is 15.83 percent down from FY2019 growth at 5.76 percent[3].

World Bank (WB) reported the macro-finance in Bhutan is moderate for the last decades; however, Bhutan today faces challenges brought by the COVID-19 pandemic as the other countries experience4. Thanks to the prompt and appropriate actions taken by the Royal Government of Bhutan (RGoB), as of September 2021, 90 percent of the eligible Bhutanese are fully vaccinated, and there are only 2,617 confirmed cases as of 19th October 2021 while the death toll is 3.

[1] NSB (2019), Population Projections Bhutan 2017-2047
[2] IMF (2018), Bhutan 2018 Article IV Consultation
[3] NSB (2021), National Accounts Statistics 2021
[4] WB (2021), The World Bank in Bhutan



	2015	2016	2017	2018	2019
GDP Per Capita (USD Million)	2593.11	2716.26	3043.12	3031.61	3102.44
at Current Price (USD Million)	2004	2159.12	2451.28	2446.49	2530.54
at Capital Prices (USD Million)	909.6	938.86	1014.13	994.65	1018.9

Figure 2-1 GDP 2015-2019
Source: National Account Statistics 2020 by NBS

The pandemic invited high economic costs due to the country lockdown maintained for almost one year from July 2020 to June 2021. During the period, the tourism sector was not able to resume, the labor force from foreign countries was not allowed to enter into Bhutan, and the trade with India got restricted so Bhutan faced a critical moment to run the economy with the limited daily essentials. The unemployment rate has gradually increased from 2.7 percent in 2019 to 5 percent in 2020. Youth employment is one of the crucial agendas RGoB is facing.

Figure 2-2 shows the sectoral share of GDP from 2015 to 2019. There is no significant change in the major share; however, construction share in 2018 and 2019 slightly declined while the mining and quarrying sector slightly increased. The share in the agriculture, livestock, and forestry sector, which is a key industry in Bhutan, has maintained between 14 to 16 percent for the said years.

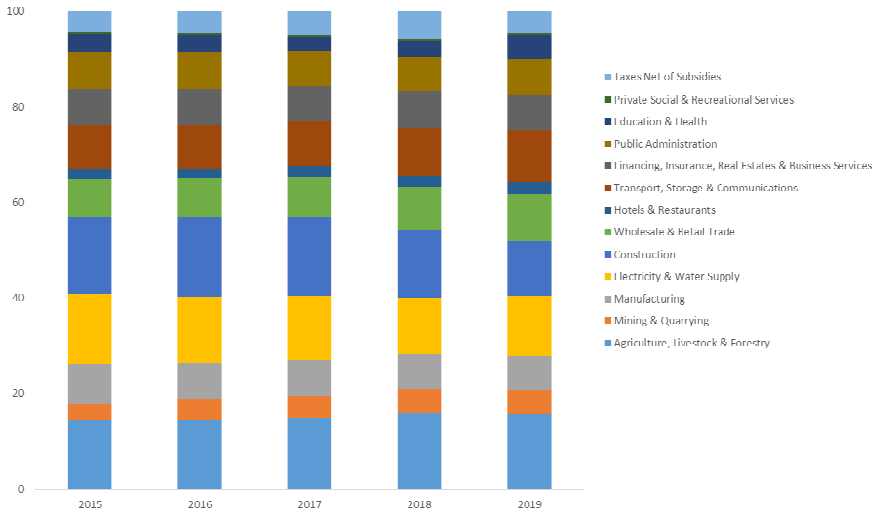


Figure 2-2 Sectoral Share of GDP (at constant Nu)
Source: National Account Statistics 2020 by NBS

2.1.3 Trade

The trade balance of Bhutan has been in deficit for the last 5 years as Figure 2-3 confirms that high dependency on imported items and limited goods to export lead to the deficit. A sharp fall in import

with a slight increase in export can be confirmed in 2020, which is brought by the Covid-19 pandemic. Ministry of Finance (MOF) reports that FY2020 recorded an unprecedented economic condition with -6.3 percent GDP growth.

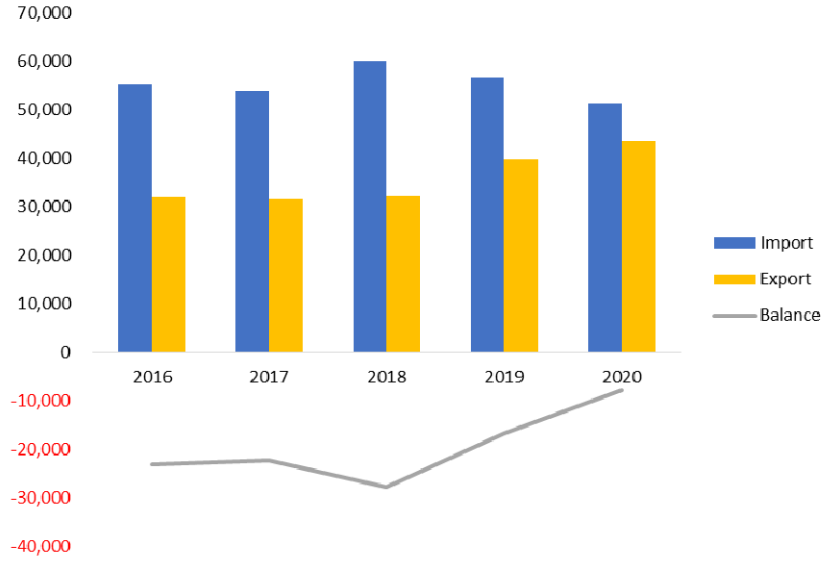


Figure 2-3 Total Volume of Import and Export 2016-2020

Source: Bhutan Trade Statistics 2020, MOF

2.1.4 Poverty

Bhutan's poverty line was defined in 2017 with reference to the monthly per capita levels of food and non-food consumption. It is called the Cost of Basic Needs approach, and the food poverty line in 2012 was "based on the estimated cost of a single national reference food bundle providing an average subsistence diet of 2,124 kcal per day", and it was defined in 2017 that "households (and their members) consuming (in real terms) less than the food poverty line, of Nu 1,473.45 per person per month, are considered subsistence poor", with consideration for Consumer Price Index and inflation[5].

Table 2-2 Absolute Poverty and Subsistence Poverty

	2012		2017	
	% of Population	% of Household	% of Population	% of Household
Subsistence Poverty (%)	2.80	1.80	1.54	1.02
Poverty (%)	12.00	8.60	8.21	5.75
Population of Poverty	87,257.40		59,698.60	
Total Population	727,145.00		727,145.00	

Source: Poverty Analysis Report 2012, 2017

Table 2-2 shows a decrease in the percentage of the population who experience absolute poverty and subsistence poverty between 2012 and 2017. Although the poor population is shrinking, a regional poverty gap can be confirmed shown in Table 2-3, and it shows those who live in the eastern part more likely to be poor.

[5] National Statistics Bureau of Bhutan (2017), Poverty Analysis Report 2017

Table 2-3 Poverty and Subsistence Poverty by District

(%)

District	Population of Poverty	Population of Subsistence Poverty	District	Population of Poverty	Population of Subsistence Poverty
Dagana	33.3	10.6	Lhuentshe	6.7	0.4
Zhemgang	25.1	4.4	Samdrup Jongkhar	6.2	2.0
Mongar	17.1	0.0	Wangduephodrang	5.4	0.4
Trongsa	14	3.9	Tsirang	4.8	0.4
Pemagatshel	13.7	1.8	Chukha	3.5	0.2
Gasa	12.6	1.0	Punakha	2.6	0.1
Samtse	12.3	2.1	Bumthang	2.1	0.0
Sarpang	12.1	0.0	Haa	0.9	0.4
Trashiyangtshe	11.9	1.2	Thimphu	0.6	0.0
Trashigang	10.7	1.6	Paro	0.3	0.0

Source: Poverty Analysis Report 2017

2.2 Impact of Corona Pandemic

2.2.1 Lessons Learned from the Pandemic by the Bhutanese Government

As of December 2021, the pandemic caused by Covid19 is coming to an end in Bhutan. It has begun with the sealing of the border with India in March 2020, followed by a major economic blow to the tourism and agricultural sectors, while the revitalization of the economy toward 2022 is ongoing at present. Hence, JICA Study Team will summarize the lessons learned by the Bhutanese government from the economic stagnation caused by the pandemic.

a. Hydropower as an economic backstop

The Mangdechhu hydropower project generated 6.8 billion Nu in its first six months of operations since June 2019, easily offsetting the 3.5 billion Nu that the government had to spend to combat the Covid19 epidemic. It is obvious that without hydropower, the economy would have been facing a comparable deficit.

b. Employment

The government failed to come up with timely and long-term strategic interventions to address this issue: despite the rampant spread of Covid-19, young migrant workers were forced to return to work abroad to maintain their economic conditions and livelihoods.

The "Build Bhutan Project" is not received favorably by the growing number of unemployed youths. The Government is seeking for a proper investment and a formulation of policy to create employment opportunities and address this social threat in the long term.

c. Private Sector

There was no significant progress in private sector activities. It is difficult for the Government to sustain an economy that is public sector driven with a weak private sector. There was an increased need for bold policy, legislative, and enforcement measures and the government's counter-actions took effect in various senses.

As a result, the combination of interest rate waivers, loan deferments, soft loans, and the extension of Druk Gyalpo's Kidu Relief not only ensured that a large part of the private sector was saved from collapse but also maintained many jobs in the process

d. Closure of the Centenary Farmers Market (CFM)

The government's sudden decision to close CFM in the name of combating the Covid-19 pandemic has hurt more than 700 vegetable vendors, their families, and farmers. Such a policy decision was not timely as the people were already in a difficult situation. The construction of the new vegetable market that the government had promised was also significantly delayed, and a series of procedures stirred up concerns about vegetable distribution in urban areas.

When looking ahead to the post-pandemic period, while the Bhutanese government should focus on the agricultural sector, which is a key industry, it is also important to provide reconstruction support to the business entities of supporting industries of agriculture as a market. For this reason, JICA Study Team compiled the following information on the effects of the Corona on the major business segments that support the whole economy, and their requests to the government for reconstruction.

Table 2-4 Impact of the Pandemic on Economic Actors Involved in Agriculture and their Requests to the Government

Type of Industry	Impact of Pandemic	Request to the Bhutan Government
Construction	Lack of construction workers (both skilled and unskilled) and construction materials makes it impossible to carry out new construction work.	Establishment of a labor bank to pool human resources
Hotel/Restaurant	Major business damaged due to reduced human resources, rent, and customer traffic to related tenant	Stop implementation of SDF***. Free provision of basic facilities such as water and electricity.
ABTO*, Ticket Issuer, Hand Craft	A long time recovery period for the tourism industry	Request for extension of working capital financing period. Loan from National CSI Development Bank.
Private school, University, ECCDS**, Training Institutions	Delayed payment of salaries to non-paying staff due to school closure Parents question the effectiveness of e-learning	Consideration for promotion of students based on current education system
Automobile related	Factory/employee layoffs due to lack of spare parts	Preparation of Standard Operation Procedures (SOPs) for maintaining industries
Phamacy, Diagnosis Center	Shortage of medical supplies (most medical supplies and equipment are on India's restricted export list)	Clear guidelines and instructions from the government
Media house/ Print company	Government advertising down 70-80%, private advertising none	COVID-19 awareness advertisements ordered from private media Direct block grant to private media houses.
Karaoke	Limited customer sales while maintaining social distance.	Acceptance of employees into Dessung program. Land lending for agribusiness.
Trade, Beauty salon, Fitness, Tailor	Demand declines, business diversification gains	Sales based on sales guidelines. Exempting BITs for 2020.
Movie industry	Crew members, technical staff and other support staff laid off due to restrictions on screening, filming and production of the film	Direct contracting without bidding to FAB for videos and materials for advocacy, promotion and awareness
ICT	With the inflation of the U.S. dollar, the procurement price of ICT products has increased, and facing HUAWEI issue as well.	Request to reconsider penalties in case of supply delays
Young entrepeunors	Lack of financing options from CSI and other banks to the service sector, including training institutions	Requested that equal opportunity should be given to urban startups instead of concentrating support on rural areas
Cable related industry	Maintenance problems to meet the increasing demand for new cable TV connections	Requested All Dielectric Self-Support (ADSS) facility to transmit cable TV signals to distant geogs and chiwogs.

*Association of Bhutanese Tour Operators (ABTO)

**Early Childhood Care and Development (ECCD)

***The Bhutanese government imposes a "sustainable development fee" (SDF) on tourists from India, Bangladesh and the Maldives, making a visit to the Himalayan country more valuable.

Source: Compiled by the JICA Study Team from a search of two major newspapers in Bhutan (The Bhutanese and BBS).

2.2.2 The Impact of the Corona Disaster on Bhutanese Agriculture

The first border closure in March 2020 led to widespread panic consumer buying. Although governments have been reassuring consumers by announcing that they have sufficient food reserves for six months, the closed borders and limited food supplies have caused nations to reaffirm the importance of food self-sufficiency.

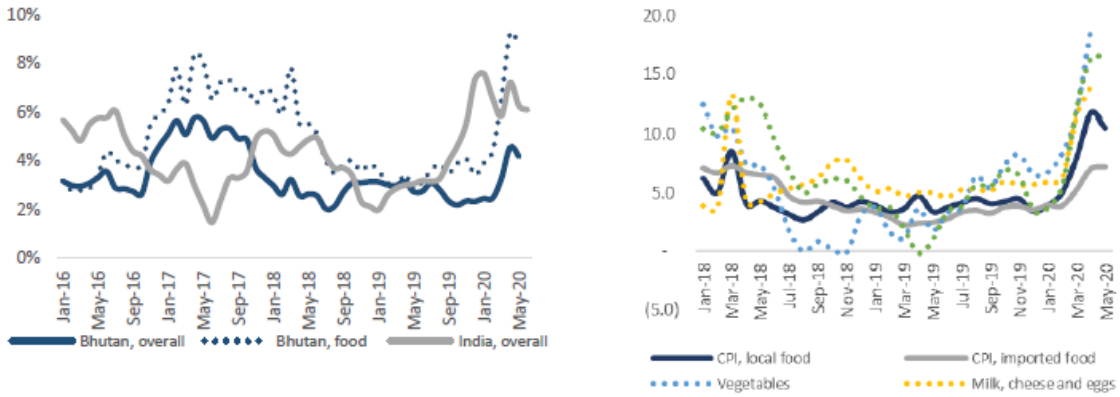


Figure 2-4 Trend of CPI on Food

Source: "Bhutan Food Security and Agriculture Productivity Project (FSAPP)", August 2020, WB, pp22

Since the beginning of the COVID-19 pandemic, the prices of some food items such as vegetables, fruits, dairy products, and cheese have risen sharply.

In the past, a wide variety of imported vegetables were available in the market at low prices during the winter season, and consumers preferred to buy only imported vegetables. However, due to the pandemic, the quantity of imported vegetables has decreased, forcing consumers to substitute an expensive and limited variety of domestic vegetables.

According to the production data of winter vegetables at the national level, about 3,142 MT of vegetables are needed every month during the winter season; the forecast for the period from October to next March indicates that about 16,071 MT of vegetables are needed nationwide. On the other hand, among vegetables, the focus is on the production of chilies, tomatoes, and onions, and according to the Department of Agriculture (DOA) winter vegetable production analysis data, it is estimated that about 3,263 MT of chilies, 651 MT of tomatoes, and 628 MT of onions can be produced in the winter season of 2020 (business Bhutan, Dec. 1, 2020). This is equivalent to only a little less than 30% of the total vegetable requirement in the country.

As a result of the continued lockdown in India, Bhutan has experienced a shortage of labor and the movement of goods, which has led to a shortage of food imports and critical production materials for agricultural production. Since the import regulations were placed on the movement of goods across the Indian border, there were reports of increased costs and difficulties in importing, transporting, and storing (and stockpiling) perishable goods, as well as supply-side disruptions due to rising transportation and logistics costs and labor shortages.

2.2.3 Financial Support to Farmers

As the pandemic drags on, banks will find it difficult to maintain lines of credit for all players in the food supply chain, accordingly the farmers will need to tap other sources of funding. The National Cottage and Small Industry Development Bank has launched an investment scheme for farmers and youth. Under this scheme, farmers can repay the loan after harvesting their crops. In addition, using funds from the National Resilience Fund, interest rates are being waived for six months until March 2021 and 50% for the following six months. These initiatives are helping to maintain the credibility of the Bhutanese economy. In opinion polls conducted by various organizations, more than 50% of the respondents are of the view that the provision of low interest and unsecured loans (even though this intervention may distort the market significantly) is a good measure to support farmers.

2.2.4 Evaluation of the Corona Response as a Nation

Bhutan's experience in ensuring food security during the pandemic has given a valuable lesson for other countries, especially BIMSTEC member countries.

Notably, the government's National Strengthening Fund, which totals over US$400 million, was spent on priority for financial support to farmers and producers, consumer protection agencies, and others that actively controlled the prices of essential commodities to avoid burdening the public. In the case of Bhutan, the priority was to prevent the spread of disease; the second was to ensure adequate medical and food services, and the third was to help people maintain their livelihoods as long as possible. Through deferred action on principal and interest payments, the general public, including tenants, suppliers, and private sector employees, also benefited. For example, "The Build Bhutan Project" was one of the first to hire workers who lost their jobs and migrants who returned to their home countries for projects that needed labor, projects where professionals had left their jobs, and agricultural activities.

It also gave impetus to the use of digital technology and the commercialization of agriculture. In the process, leaders at both public and private sectors communicated regularly both internally and externally, and were able to enlist the help of citizens and development partners.

2.2.5 The Temporary Challenges posed by the Corona Disaster and the Structural Challenges facing Bhutanese Agriculture.

Comparing the current situation with the issues related to food security described in the "Data Collection Survey Report on Self-Sufficiency and Food Security in Bhutan (2012)" (hereafter referred to as the "2012 Survey") compiled by JICA, there are slight changes in the confirmed issues.

Table 2-5 Challenges Surrounding Bhutan's Food Self-Sufficiency and Security

Macro Issues	Challenges from the Perspective of the Food Supply Chain
1. Lack of impetus for agricultural sector growth 2. Permanent current account deficit 3. National financial crisis (borrowing more than 100% of GDP every year) 4. Inequitable subsidy distribution 5. Inadequate agricultural financing 6. Complicated local government service support plan 7. Land use regulations 8. Lack of principle of FDI and incentives 9. Dependence on India for food 10. Health hazards caused by food for consumers 11. Inadequate support for private sector development	1. Issues in the Production Sector (1) Land constraints (2) Inadequate access to information (dissemination and production technology) (3) Lack of agricultural infrastructure (4) Damage from wild animals 2. Distribution issues (1) Delays in collectivization and branding (2) Inadequate storage facilities and distribution methods (3) High post-harvest losses, Food Loss, Food Waste (4) Lack of agro-processing technology 3. Market issues (1) Unbalanced food inoculation (2) Food safety

Source: Final Report on Data Collection Survey Report on Food Self-Sufficiency and Food Security, 2012

Since the completion of the above project in 2012, the Bhutanese government has continued to provide technical guidance and dissemination on increasing production of fruit trees and horticultural crops, as well as agricultural mechanization and irrigation projects aimed at increasing the production of major crops such as rice and vegetables- both of which have low self-sufficiency rate.

In 2020, two concerns caused by COVID-19 were confirmed, i) the decline of agriculture due to urbanization caused by population growth, and ii) the stability and security of food supply. They have combined and led people to move toward more productive agriculture.

The issues observed in the 2012 study were defined as "structural issues" that are not affected by the pandemic, and they were also observed in the corona disaster. On the other hand, issues that temporarily appeared in the corona disaster (issues with reversible phenomena) as shown in 2.1.1 are considered "temporary issues". Immediate emergency measures are needed for reversible declines, and post-corona planning will include emergency response measures tailored to the frequency and depth of sudden disasters in the future. On the other hand, permanent countermeasures need to be considered for the impacts that have brought about structural changes. Japan's assistance, which will be considered at the conclusion of this study, will be a separate planning proposal for each impact.

Chapter 3 FOOD SECURITY, AND CHALLENGES IN AGRICULTURE SECTOR

3.1 Higher Plan and Political Framework

3.1.1 The Project for Formulation of Comprehensive Development Plan for Bhutan 2030

The Project for Formulation of Comprehensive Development Plan for Bhutan 2030 (hereinafter "CNDP") aims to promote balanced development in both urban and rural areas in Bhutan in order for contributing to Gross National Happiness (GNH) maximization. Under the vision: "A GREENIST country leading Sustainable Development," CNDP is composed of eight major development goals as shown in Table 3-1 with fourteen developmental approaches categorized into three major fields: 1) stabilization factor, 2) driving factor, and 3) national spatial structure.

The approaches in the 1) field are to establish a robust national foundation for the long-term development in Bhutan while those in the 2) are to revitalize the country through accepting eco-friendly technologies, diverse lifestyle, new economic model, self-reliant society and etc. The approaches in 3) are to restructure the national spatial condition through formulating an urban center and hub cities connecting between the urban center and suburban areas with consideration for the uniqueness of each region, city, village, and community.

Table 3-1 CNDP Overview

Objective	Description
Global happiness centre	To promote well-being through use of local resources and share experience and knowledge with the international community.
Richness and Diversity	To promote diversity in urban and rural areas by creating National Capital Region and Linked Urban Centres.
Eco-friendly green industry	To promote green industries with comparative advantages e.g., hydropower, export-oriented agriculture and NWFP using renewable resources in keeping with a concept of zero-emission and a commitment to remain carbon neutral.
Environmental management for livelihood and economy	To ensure sustainable livelihood and living environment through management by communities and proper land use control system.
Network society for integrated communication	To link the entire country and society with road network consisting of east-west and north-south highways with further linkage to air transport, information technology and advanced means of transport.
Innovative development model	To develop innovative solutions for problems and constraints such as human-wildlife conflict, mountainous topography, and natural disasters etc. through appropriate technology characterized by environmentally symbiotic society, balancing economic growth and environmental conservation.
Self-reliant society	To pursue for a sustainable society through effective use of renewable energy, enhanced food supply from domestic agriculture produce and diverse human resources.
Tradition and cultural life	To pursue development that is inclusive and mindful of tradition and culture of the country.

Source: CNDP 2030 Final Report

Closely looking at the approaches in 3), CNDP suggests a land-use plan within the national spatial plan, which basically puts the land in four different categorizations: urban area, rural area, sustainable forest area, and protected area. This categorization aims to clearly distinguish a land for people, and for

nature, and to provide several suggestions on the respective land improvement, for Bhutan's sustainable development. Towards agriculture and livelihood promotion in Bhutan, CNDP suggests the following.

a) Improve self-sufficiency in rice production. While implementing conventional improvement measures such as irrigation development, promotion of double cropping, and introduction of agricultural machinery, it is important to promote efforts for addressing labor shortages, animal damage, and weed damage.
b) Promote market-oriented agriculture/farming based on global market needs, and strengthen Bhutan's signature brand. A certification system with a grading system, antenna stores, farm roads, and storage facilities need to be established.
c) Undertake awareness-raising activities on nutrition improvement and eating/diet habits.
d) Improve cattle and domestic fowl production in short-term because cattle produce five livestock products including four dairy products that are very important in the Bhutanese diet, and domestic fowl produce chicken and eggs.
e) Improve pork pig and fish production in mid-term because their import price and amount have shifted relatively higher in recent years.

CNDP points out that Bhutan's diet is supported by imported food. The staple food, rice, is only stockpiled in quantities sufficient to feed the entire population for 2.5 days[6]. Therefore, in order to improve the availability and accessibility of food in the country, agricultural resources should first be utilized for food production and then for cash crop cultivation.

3.1.2 The Twelves Five Year Plan 2018-2023

The Twelves Five Year Plan 2018-2023 (herein after "The 12th FYP") was formulated with a series of consultations with diverse stakeholders in order to create a stronger, united, self-reliant country, while considering that Bhutan is graduating from Least Developed Countries (LDC) by 2023. The 12th FYP aims to achieve "Just, Harmonious, and Sustainable Society through enhanced Decentralization" with a consideration for United Nations Sustainable Development Goals and the lesson learned from the 11th FYP, which is leaving no one behind, narrowing gap between the rich and poor, and ensuring equity and justice. The vision is broken down into three goals: "Just Society," "Harmonious Society," and "Sustainable Society" as shown in Table 3-2.

The 12th FYP also sets National Key Result Areas (NKRAs), and NKRA 8 clarifies the aims towards food and nutrition security to enable farmers to enjoy returns of their labor from the growing economy, to increase food production for self-efficiency and nutrition security. NKRA 8 is led by MOAF, and for nutrition security, they face a challenge to reduce malnutrition among women and children together with many other such as loss of agricultural land and declining productivity, outbreak of pest and diseases, and farm labor shortage.

[6] CNDP Japanese abridged version, pg 3-12

Strategies responding to the challenges above have been identified: a) encourage cultivation of fallow land, b) expand and strengthen irrigation system, c) enhance farm labor supply, d) establish network of post-production and marketing facilities, d) strengthen price support for agriculture produce, e) strengthen research and extension service, and f) farm mechanization.

In accordance with the aforementioned strategies, three major programs will be undertaken for 1) food and nutrition security for food self-sufficiency, organic farming, biosecurity, and food safety, 2) value chain and enterprise development for agricultural commercialization, and 3) research and extension service on soil fertility, plant protection, post-harvest, and market linkages to develop targeted RNR products.

Table 3-2 The 12th FYP Objective

Just Society

- Where every citizen has equitable access to resources and opportunities to pursue and realize individual and national aspirations.
- Priorities:
  - Reduce poverty
  - Create productive and gainful employment
  - Improve access to quality health services
  - Improve quality of education and skills
  - Strengthen democracy and decentralization
  - Reduce corruption
  - Improve justice services and institutions
  - Promote gender equality

Harmonious Society

- Where every individual lives in harmony with oneself, community, nature, culture and traditions'
- Priority
  - Preserve and promote culture and traditions
  - Maintain health eco-system, carbon neutral and climate resilient development
  - Promote healthy and caring society
  - Endure livability, safety and sustainability of human settlements

Sustainable Society

- Where all is able to sustain its social, economic and environmental development needs
- Priority
  - Ensure renewable energy supply
  - Endure macro-economic stability
  - Enhance economic diversity, and productive capacities
  - Ensure water, food and nutrition security
  - Preserve cultural authenticity
  - Endure community vitality

Source: The 12th FYP

3.1.3 Bhutan National Pathways - Food System for Gross National Happiness: Transformative Pathways for Bhutan

His majesty the King announced "Food System for Gross National Happiness: Transformative Pathways for Bhutan," (hereinafter the "Pathway") which aims that *by 2030, Bhutan will achieve a carbon neutral, environmentally benign, high performance food systems, which is resilient to shocks and climate change; effectively provide affordable, safe, and nutritious food for all; provides gainful employment, empowers women and children; and radically advances maximization of GNH and achievement of SDGs*. The Pathway embraces eight-fold pathways for Bhutan Food System Transformation as shown below:

1. Secure production
2. Enhance value, standard, market
3. Unleash digital power
4. Secure financing and investments
5. Invest science and technology
6. Boost nutrition positive initiatives
7. Nature first approach – championing environmental conservation
8. Build capacity and partnership

The Pathway also indicates three-year action plan by phasing the first period to reimagine foundations, the second to strengthen the foundation, and the third to ramp up for impacts. Figure 3-1 grasps the Pathway with activities which should be undertaken in the targeted year respectively.

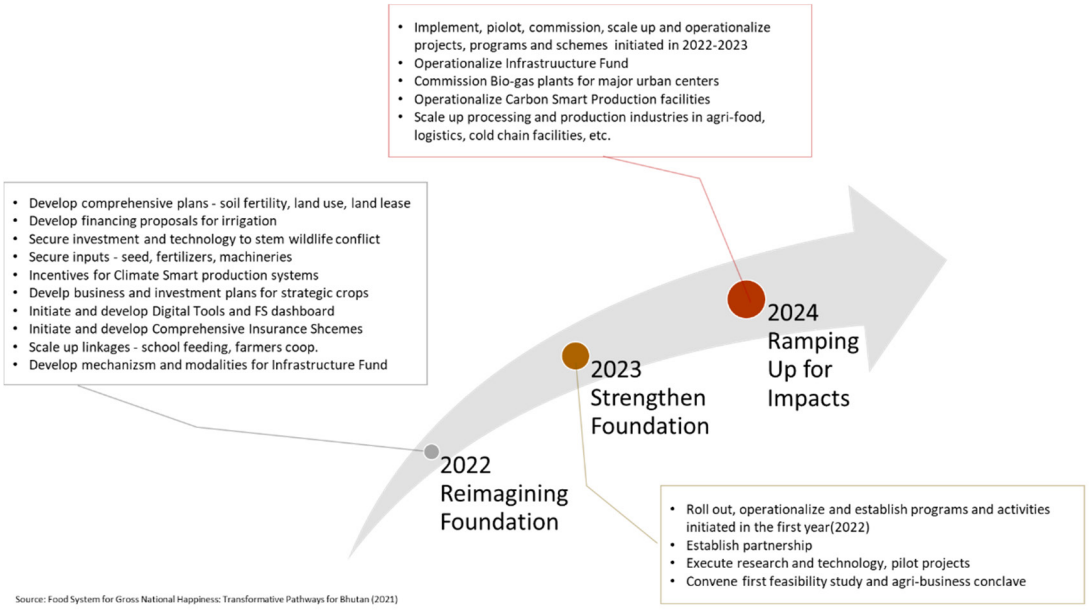


Figure 3-1 Three Year Action Plan in Bhutan National Pathways

3.1.4 Transformations for Sustainable Development in the 21st Century

"Transformations for Sustainable Development in the 21st Century" is Bhutan's secondary Voluntary National Review report (hereinafter the "2nd VNR), prepared by GNH Commission at the backdrop in the pandemic, regarding the implementation of the 2030 Agenda for Sustainable Development, and was submitted to the United Nations High-Level Political Forum in 2021[7].

Chapter 2 in the 2nd VNR shows the great leadership of His Majesty the King to fight against COVID-19. His Majesty has poured his great effort into ensuring preparedness and securing high-risk areas, reducing vulnerabilities triggered by the pandemic, strengthening capacities for a multi-purpose human resource pool, and ensuring access to essential public services, and leaving no one behind. The lesson learned from the experience of the pandemic is that *coordination and collaboration are possible with clear purpose and integrity as a persistent challenge to effective implementation of policies, plans, and programs.*

Towards achieving SDG 2 "End hunger, achieve food security and improved nutrition, and promote sustainable agriculture," the 2nd VNR summarizes the objectives/challenges which are 1) enhancing nutrition security, 2) sustainable food production, and 3) climate-resilient agriculture practice, and it also covers way forward in the agriculture sector that a big public investment is essential to

[7] The 2nd VNR is structured around the theme of transformational process that builds on past achievements and draws lessons from the pandemic as Bhutan works to "build back better" while also moving ahead towards LDC graduation, Sustainable Development Goals (SDGs), and GNH.

respond to the challenges together with enhancing agricultural and food production, improving food distribution, setting up an efficient, comprehensive and systematic value chain, and gaining emergency preparedness. It is also important to involve youth in farming to find long-term and transformative solutions in the sector.

3.1.5 RNR Marketing Strategy

Renewal Natural Resource (RNR) Marketing Strategy[8] dated March 2021 (hereinafter "RNR Marketing Strategy 2021") was prepared by Thimphu Consultants International under the support of DAMC, MOAF through a study to develop a comprehensive and vibrant marketing strategy to enhance competitiveness, efficiency, and effectiveness of the RNR marketing system. The final report for the RNR Marketing Strategy 2021 covers fourteen short-term strategies and seven long-term strategies to improve market access for smallholder farmers while encouraging better quality products to the consumer at reasonable prices. The report starts from reviewing the current RNR marketing system, and points out multiple challenges towards promoting agriculture marketing; for example:

a) limited legislative and regulatory guidance on agricultural marketing at local, regional, and international level is a barrier for agriculture trade
b) lack of infrastructure, transport system, and collaboration and coordination for food security needs
c) lack of intensive and motivation to become commercial farmers
d) big imbalanced trade and decline in food self-efficiency
e) non-use of fiscal and monetary policy instruments
f) low domestic production brings high dependency on imported food

Confirming the challenges above and the lesson learned from RNR Marketing Strategy 2018, RNR Marketing Strategy 2021 suggests short-, medium- and long- term strategies shown in Table 3-3.

Table 3-3 RNR Marketing Strategy 2021

Short- and Medium- term Strategy	
Strategy 1	Revise RNR Marketing Policy in line with RNR Policy and Strategy 2040 as well as linking to trade policy
Strategy 2	After carrying out a detailed assessment of existing Farmer Groups and RNR Cooperatives, promote collective marketing through solidarity-based cooperatives
Strategy 3	Outpost DAMC staff to dzongkhags
Strategy 4	Explore scope for setting up mini-auction yards in dzongkhags
Strategy 5	Establish infrastructure support in strategic locations to supply to major urban markets

[8] The RNR Marketing Strategy 2021 was developed with the aim of addressing the challenges faced in both the domestic and export markets, analyzing the current state of agricultural marketing and proposing strategies and actions to be implemented based on this analysis.

Strategy 6	Upgrade Agriculture Marketing Information System (AMIS) with an IT-based system linking farmer groups, cooperatives, entrepreneurs and end markets.
Strategy 7	Incentivize product aggregators through government support
Strategy 8	Harmonize imports of fruits and vegetables with production plans of dzongkhags
Strategy 9	Plan seasonal supplies using GIS/GPS data to connect to end markets
Strategy 10	Promote RNR enterprise by providing enabling policy environment and technical support for feasibility studies
Strategy 11	Designate FCB as the sole importer of fruits, vegetables, and strategic commodities up to the border towns and wholesale at set prices
Strategy 12	Improve RNR certification and accreditation systems
Strategy 13	Develop action plans for potatoes and cardamom, statutory marketing boards
Strategy 14	Organize marketing and production hubs
Long-term Strategy	
Strategy 15	Improve RNR marketing by using IT-driven system
Strategy 16	Set up production cooperatives with full cooperation in marketing, their products in long- term and pilot test the IT-driven marketing system for Thimphu Market
Strategy 17	Suggest key elements of modern IT-based commodity flows, warehouse loans-based on warehouse receipts
Strategy 18	Promote utilization of commodity exchange (RSEB) as a supplement to FCB physical auction yards
Strategy 19	Improve market information system (smartphone, real-time dashboard, updated daily by collaborating with farmers, reliable, timely, and interactive market information system
Strategy 20	Introduce innovative measures to harmonize imports with domestic production
Strategy 21	Propose the RNR sector transformation act (draft) to support the farming communities and encourage the agriculture sector to be more competitive.

Source: RNR Marketing Strategy 2021

The prepared RNR Marketing Strategy 2021 was reviewed by MOAF taskforce and consultations with stakeholders. Finally, the Strategy was revised as consisting with seven strategies showing below Table 3-4 and actions toe taken in short term and mid-long term.

Table 3-4 RNR Marketing Strategy 2021（Approved version）

	Strategy
I	Promote enabling policy environment and multi-sector coordination to support effective RNR marketing.
II	Promote market led commercial production
III	Enhance market infrastructure development investment.
IV	Promote market research and information to empower value chain actors.

V	Develop internal market distribution system to ensure access to domestic markets.
VI	Ensure access to international markets.
VII	Promote RNR enterprise for value addition and product development.

Source: RNR Marketing Strategy 2021, September 2021

Moreover, following two development concepts were shown in the Strategy

RNR Economic Hub (RNR EH）

RNR Economic Hub is an economic zone development concept that focuses on specific agricultural products among crops, livestock products, and forest products. A few specific crops are defined in each dzongkhag, and the RNR economic hub shall be the center for supply of inputs and also for the collection of the products in the cluster of the specific crops.

Real-time Marketing Apps Development

The concept of the real-time marketing application is to bridge the information gap between farmers and buyers by allowing them to exchange information with use of simple Mobile Apps. It also aims to cover the entire country so that the government can monitor the distribution of agricultural products and keep track of the situation.

3.1.6 Agriculture and Rural Development by SAARC

The South Asian Association for Regional Cooperation (SAARC)[9] was established in 1985, and the member states are Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, and Sri Lanka. South Asia embraces a quarter of the global population and the majority lives in rural areas and depends on agriculture and livestock. Concerning food and nutrition security in the region, SAARC leaders announced “SAARC Agriculture Vision-2020”, which directs regional engagement in agriculture to maximize the benefits and to enhance ability and knowledge to address challenges and opportunities. SAARC undertakes various initiatives to contribute to “SAARC Agriculture Vision-2020” as briefly summarized below.

a) SAARC Agriculture Minister’s Meeting
b) Technical Committee on agricultural and Rural Development (TCARD)
   TCARD deals with all the broad and micro-Cooperation issues pertaining to Agriculture and Rural Development in the South Asian region.
c) Multi-stakeholder’s Dialogue on Agriculture
d) The SAARC Food Bank
   SAARC Food Security Reserve transformed into SAARC Food Bank to reserve food grains for shipment and transaction.
e) The SAARC Seed Bank
   The main purpose of the Seed Bank is to provide regional support to national seed security

[9] SAARC Official HP

efforts; address regional seed shortages through collective actions and foster inter-country partnerships and promote increase of Seed Replacement Rate (SRR) with appropriate varieties to ensure the availability of top-quality seeds across the region before the onset of cropping seasons

f) Enhanced networking among SAARC Chief Veterinary Officers' Forum
g) Agricultural Research, Extension and Farmers linkages
h) SAARC Development Fund
i) SAARC Agricultural Centre
j) SAARC's partnership with the development partners
k) Efforts to combat transboundary animal disease

As part of SAARC's support to agriculture, the SAARC Development Fund (SDF) launched the "Livelihood enhancement of small farmers in SAARC region through small scale agribusiness focusing on value chain development," in 2018 with the objective of improving livelihoods of farmers by increasing their income, empowering rural women and creating employment. USD 1.81 million was budgeted by SDF for the implementation of the project, and USD 0.435 million was budgeted as self-financing by the member countries. In Bhutan, Chukha and Samtse were selected as the project sites, and vegetables such as broccoli and fruit trees such as oranges and bananas are being produced.

Several donors have supported SAARC in various fields[10]. Japan also attaches great importance to SAARC. On the basis of its traditionally good relations with other countries, Japan has been supporting the promotion of cooperation within the region by organizing the Japan-SAARC Symposium, setting up the Japan-SAARC Special Fund, and providing support and exchange programs called JENESYS to strengthen the activities and infrastructure of SAARC. In particular, for the JENESYS invitation program held in 2018, Bhutanese trainees visited Nagano and Tokyo to deepen their knowledge of Japanese agriculture.

3.2 Issues of Food Production in Bhutan

3.2.1 Issues on Food Production

Limited Land

The increase in agricultural production is achieved by expanding the area of farmland and increasing productivity. The total land area of Bhutan is 38,394 km^2, of which 96,653 ha (238,835 acres) is agricultural land, which accounts for only 2.5%. Agricultural land is such a valuable land resource, but of the 94,550 ha (233,637 acres) of cropland including permanent crops[11], 76,674 ha (189,465 acres) is under cultivation and 26,758 ha (66,120 acre) is fallowed (RNR Census 2019). Even though

[10] For the last two decades, ADB supported technical assistance on "SAARC Food Security Through Control of Transboundary Animal Disease", FAO Technical Cooperation Project on "Technical Assistance for formulation of Strategies for the control of Peste des Petits Ruminants (PPR) at Global and Regional Levels"; IFAD supported Project on "Strengthening the Role of SAARC in the Sustainable Intensification of Agriculture in South Asia"; and FAO implemented Technical Cooperation Project on "Strengthening the Capacity of SAARC in the Development, Coordination, and Monitoring of a Regional Food Security and Nutrition Framework, Strategies and Programmes"

[11] Agricultural land" is the area of "Cropland (Arable land and land under permanent crop)" plus "Land under permanent meadows and pastures" (RNR Census Land Use Category).

agricultural land is a limited and precious resource in Bhutan, the increase of abandoned land has become a major problem.

Due to the harsh terrain, limited land resources, and increasing fragmentation of land, the land area held by each farm household is as small as 1.5 ha (3.7 acre). Farmland is being subdivided but the drive to consolidate is not working, so that it causes to reduce the farmer's motivation to farming. In addition, it limits farmers' income and makes it difficult for them to invest in farmland improvements, such as agricultural machinery, irrigation facilities, land consolidation, and agricultural input. As a result, it is creating a vicious cycle that hinders the improvement of labor and land productivity.

Labor Shortage

According to the RNR Census 2019, 19.95% of farmers cited labor shortage as a constraint related to farming, the second highest after irrigation problem, and the labor shortage is the number one constraint in nine provinces. Narrow farmlands dispersed on slopes have low labor productivity and require a lot of labor. The fact that the economically active population in rural areas often works seasonally or migrates to work to urban areas in occupations other than agriculture in search of cash income, and the fact that young people tend to be reluctant to engage in agriculture have led to an outflow of labor from rural areas. It results in the aging and female-headedness of agricultural workers in rural areas. Efforts have been made to reduce the burden of agricultural labor and alleviate the labor shortage through farm mechanization and land improvement projects, but the labor shortage in rural areas is still a major constraint to agricultural production. The labor shortage not only causes increase of the fallow land due to the limited area of cropped but also leads to lower productivity and loss of sustainability of farmland use due to insufficient farmland management.

Limited Information

The issues in Bhutan's agriculture are that those involved in the supply chain have a limited awareness and knowledge base and that the extension system has traditionally focused on increasing production and has not paid much attention to linking production to (local) markets. In addition, it is difficult to form a collective knowledge and knowledge chain since an organizing of farmers (unity as an agricultural cooperative) has not been achieved. As a result, the following issues have become apparent.

- Farmers are forced to sell their produce at low prices to intermediaries because they do not know the market price of the produce at the yard.
- Lack of know-how on shipping time adjustment and preservation hinders opportunities to increase farm income.
- Agricultural materials, distribution costs, and sales prices vary widely in the country.
- Difficulty in propagating countermeasures against pests and diseases and other agricultural technology.
- Excess and shortage of agricultural products occurs from year to year, season to season,

and region to region, which cannot be resolved

On the other hand, financing and voting through mobile phones have made rapid progress in recent years. Therefore, it is expected that information access in the agricultural sector will also improve rapidly in the future.

Lack of Agricultural Infrastructure

Bhutan's food system has not sufficiently developed in storage capacity, transportation infrastructure, post-harvest management technology and practices, and trade finance. These delays, coupled with the producer's cash constraints at harvest time, have been positioned as a challenge to agricultural production, especially in the selection of products, and a challenge to market access, such as constraints on where and how to sell. These factors combine to create a lack of capacity to handle large food surpluses.

Wildlife Damage

Wildlife damage is a major threat to Bhutanese farmers. On one hand, there are concerns that rules meant to protect farmers may encourage the killing of wild animals such as endangered leopards.

Many farmers are killed or injured by wild animals; in 2019, there were 14 reported cases of elephant and bear attacks and about 20 cases of injuries caused by wild animals. A survey of farmers conducted by researchers at the Royal University of Bhutan found that wild dogs, leopards, and tigers pose a threat to farmers.

Damage to livestock by wild animals has become a major source of conflict with farmers, leading to retaliatory killings of wild animals. In southern Bhutan, conflicts between people and elephants are on the rise. Elephants raid crops and trample farmland at night, and the increase in population encroaching on elephant habitat can be seen as a contributing factor.

In contrast to the damage caused by wild animals, there is no official record of the number of wild animals killed by humans. Some farmers use traditional traps and snares to exterminate wildlife, but this practice is not widespread and is sometimes illegal.

3.2.2 Issues Related to Agricultural Infrastructure (Farmland Improvement)

Fallow Land

According to the RNR Census of Bhutan 2019, 27.7% of agricultural land is fallowed or abandoned. This is an increase of about 4.7 point from 23.0% in the Census 2009.

Table 3-5 Ratio of Fallow Land

Dry land	Wetland	Orchard	Total
29.0%	17.9%	25.9%	27.7%

Source: RNR Census of Bhutan 2019

According to the Census, the proportion of the number of farmers with reasons for keeping their farmland fallow is shown in the table below. The major common reasons over the land types are

"irrigation problem," "wildlife damage," "labor shortage", and "too far from home". In Wetland, which is considered as mainly used for paddy fields, the biggest problem is the lack of irrigation water rather than remoteness of farmland, while the shortage of labor is the biggest in Dryland, which is used as upland field. The remoteness of farmland and the difficulty of access are important factors in the upland field and orchard areas that are widely distributed mainly on slopes.

Table 3-6 Reasons for Keeping Land Fallow （Ratio of HH）

Reasons	Wetland	Dryland	Orchard
As part of crop rotation	0.5%	3.3%	7.0%
Want to convert to other land type	1.0%	1.3%	3.0%
Irrigation problem	33.6%	2.6%	1.7%
Wildlife damage	24.6%	26.5%	23.7%
Labor shortage	19.3%	32.4%	10.5%
Low soil fertility	2.1%	4.7%	7.8%
Too far from home	10.0%	19.8%	22.0%
Other reasons	8.8%	9.5%	24.3%

Source: RNR Census of Bhutan 2019

It is recognized that the expansion of fallow and abandoned farmland is due to “vicious cycle” surrounding the labor shortage, that is harsh working conditions and low land productivity => low farm income => population outflow to urban areas => labor shortage. However, it is also highly likely that farmers are choosing not to cultivate the dispersed farmland they own that has poor productivity and accessibility. As shown in the figure below, the distribution and percentage of fallow farmland vary greatly by Dzongkhag (districts), from 13% to 48%. This indicates that the situation and the factors behind the abandonment of cultivation differ from region to region.

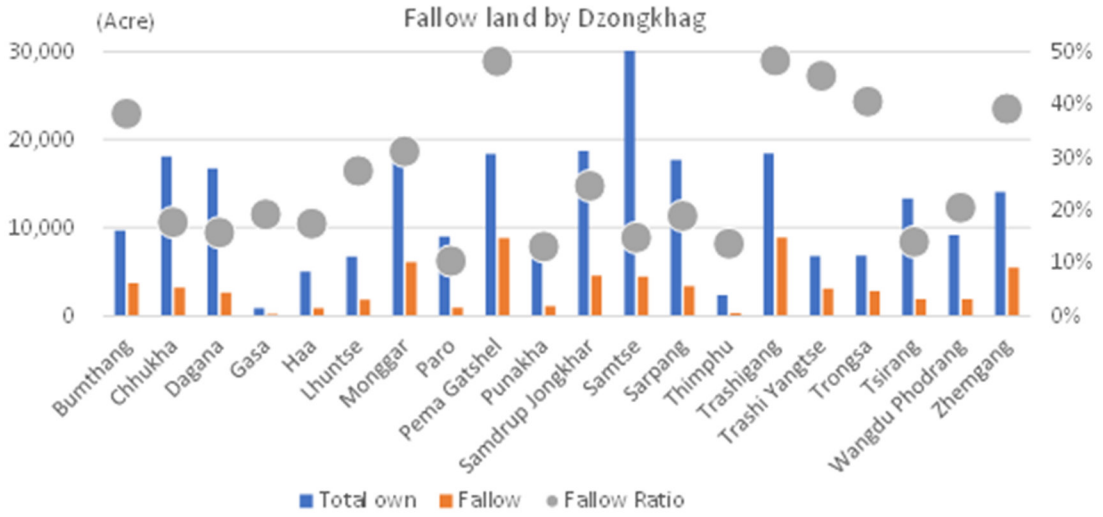


Figure 3-2 Area and Ratio of Fallow Land by Dzongkhag (Districts)

Source: RNR Statistics 2016

The following issues from the perspective of farmland and agriculture infrastructure can be recognized in promoting the reversion of fallow land.

a) Land information on fallow land

The degree of difficulty in recovering abandoned land as farmland varies greatly depending on the period of non-cultivation, and this information is essential for examining and planning revival plans for fallow land. For this reason, it is necessary to clearly distinguish between fallow or interrupted cultivation and abandoned cultivation, as well as to understand the status of use, including information on the non-cultivation period, in accordance with the mapping of the location of fallow land. In Bhutan, there is currently no clear definition of "fallow land," and there is no distinction between short-term fallow or temporary interruption of cultivation for the purpose of rotation and medium- to long-term abandonment of farmland. This makes it difficult to effectively implement these revival plans.

b) Matching fallow land with those who wish to use it

In order to promote the revival of abandoned farmland, three parties are needed: the information, the producer that will be the actor in the field, and the coordinating entity for the entire process, but sufficient organizations and implementation systems have not been formed for each of these.[12]

c) Legal arrangement on reuse of fallow land

The legal provisions of the current Land Act of 2007 have been formulated with urban residential development in mind, which has the adverse effect of promoting land fragmentation and increasing abandoned land. For example, the Bhutan Land Act of 1979 had a provision that if a family did not own more than five acres of land, no land transactions would be allowed, but this provision was removed in the Land Act of 2007, and land fragmentation is occurring in the form of land transactions.

In addition, the current land lease terms and conditions are dominated by landlord-dominant contracts, which allow for short contract terms, easy revision of lease rates, and contract termination. This has discouraged farmers who want to utilize the leased land from making long-term management plans and investments in farmland improvement, agricultural infrastructure, and related facilities.

d) Lack of support schemes for reviving fallow land

A support schemes for investment in land development, agricultural infrastructure, and related facilities, is limited and uneasy to access. Furthermore, a comprehensive support package that combines various types of support such as business start-up support, farm management guidance, technical extension of cultivation and distribution and marketing support is strictly limited.

[12] There is a need for a mechanism to promote the entry of new producers by matching the needs of farmers/farmer groups and private companies who wish to farm on available fallow land, based on organizing the distribution and conditions of fallow land. The National Land Commission Secretariat (NLCS) and the MOAF have established a task force on "Fallow Land Bank" and are currently working on the specific concept and framework of the bank. Under the task force, four Dzongkhags, i.e., Trongsa, Trashigang, Tsirang, and Wangdue, have been selected as pilot districts, and several Gewoks have been selected in each Dzongkhags for inventorying fallow land. Cooperation and collaboration with such activities is extremely important when considering measures for fallow land problems through agricultural land improvement.

(2) Agriculture Land Improvement and Sustainable Land Management

a) Current situation

Currently, it is estimated that about 3 to 21 tons/ha of fertile topsoil is lost every year due to soil erosion caused by steep and fragile terrain and unsustainable land use (NSSC 2010). This has resulted in loss of original soil fertility and reduced land productivity, which affects the expansion of agricultural production and the realization of food self-sufficiency.

Implementation of Agriculture Land Development (ALD) and Sustainable Land Management (SLM)

For the implementation of ALD and SLM works and interventions, NSSC has the role of overall coordinating agency under the MOAF.

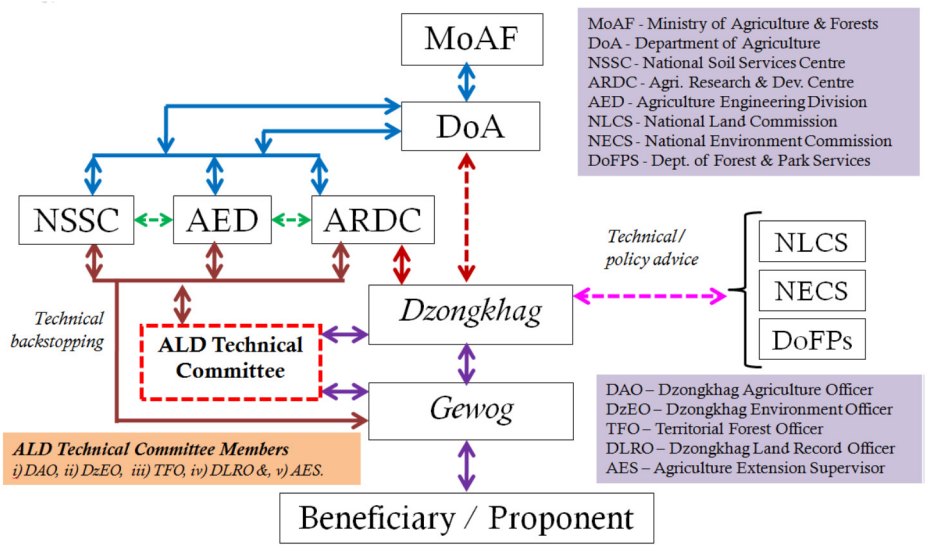


Figure 3-3 Framework of Implementation of ALD

Source: Agriculture Land Development Guidelines (ALDG)-2017

ALD, mainly terrace construction, is technically considered as part of SLM, but since the concept of SLM is currently being introduced, NSSC has divided the different types of works into the following categories for convenience in the implementation of the project.

Table 3-7 Contents of ALD and SLM Works and Interventions

ALD Works	SLM Works and Interventions
• Construction of new bench terraces and consolidation of existing narrow terraces, • Surface stone removal.	• Structural measures such as construction of counter stone band, orchard basin, etc. which will be applied where bench terrace work is difficult due to its steep slope, • Vegetative measures such as introduction of hedgerows, • Agronomic measures such as applying integrated plant nutrient management with farmyard manure (FYP), compost, vermicompost, bio-fertilizer, etc. • Agronomic measures such as improving soil cover and soil fertility by promoting legume crops.

Achievements of ALD/SLM

According to NSSC, the actual achievement of ALD, SLM and fallow land reversion projects implemented during 2018-2021 in the 12th FYP are 1,659 ha (4,100 acres), 1,161 ha (2,870 acres), and 516 ha (1,276 acres), respectively. Trongsa, Mongar, and Lhuentse District show the top performance in ALD, Samdrup Jongkhar, Trongsa and Mongar District in SLM, and Bumthang, Sarpang and Thimphu District in the fallow land reversion.

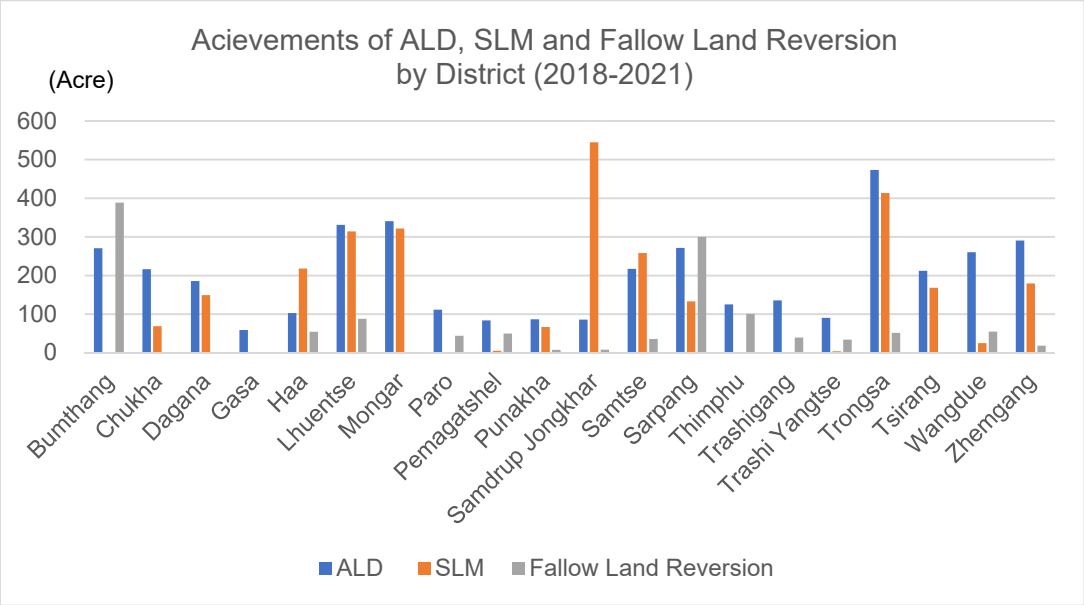


Figure 3-4 Achievement of ALD, SLM and Fallow Land Reversion by District (2018-2021)

Source: NSSC

Implementation Framework for ALD/SLM

"Agricultural Land Development Guideline (ALDG)-2017" has been formulated and applied in the implementation of ALD projects, which includes implementation arrangement, its framework and cost sharing system, implementation procedures, and technical guidelines of construction. Based on the challenges and lessons learned applying ALDG, the guidelines are currently being reviewed and compiled as "Sustainable Land Management: Guidelines and Best Practices", and are expected to be formalized by MOAF in the near future.

In the implementation of ALD projects, there is cost-sharing between the beneficiaries and the government. In the case of individual farmers (subsistence and semi-subsistence farmers) and farmer groups, the cost of construction equipment is borne by the government, while human labor is provided by the beneficiaries. By converting to the currency, approximately 32% of the total cost for terrace construction, which is estimated roughly 70,000 Nu./acre, is borne by the farmers, in case of hiring construction machinery belongs to the Central Machinery Unit (CMU).

Construction equipment used in ALD

ALD project is implemented with i) construction equipment from CMU under the DOA/MOAF, ii) construction equipment deployed by the CMU in each Dzongkhag (district), and iii) equipment leased from private companies. CMU and Dzongkhag-deployed construction equipment are used in the construction and maintenance of farm roads and ALD projects. Currently. CMU has 79 excavators, 20 of which are deployed in Dzongkhag. 7 of the excavators are medium-sized (13-ton class) and the rest are large (20-ton class), as they were originally developed for the purpose of constructing farm roads. As for the construction equipment deployed by Dzongkhag, it is operated under control of Dzongkhag and its plan, and the operation and maintenance costs are borne by Dzongkhag with CMU providing technical services for maintenance.

According to the achievement of construction results of 2018~2021 under the 12th FYP, out of the achievement of 1,659 ha (4,100 acre) of ALD project (terrace construction and terrace consolidation), 1,020 ha (2.52 acre) were constructed using CMU construction equipment, accounting for 61.5% of the total. The remaining 38.5% is considered to have been carried out by Dzongkhag -deployed machinery or leased from the private sector. The remaining 38.5% is considered to have been carried out by construction equipment deployed by the prefecture or leased from the private sector. Due to the large workload of farm road construction in rural areas, there are constraints on the use of Dzongkhag-deployed machinery for ALD projects, and private machinery is used more often.

The absolute number of machines that can be used for ALD projects and the lack of machines suitable for working on sloping land are issues that need to be addressed in order to accelerate ALD projects. In some cases, there have been problems with the accuracy of construction, such as the omission of topsoil treatment, in case of hiring private machinery, due to limited knowledge and experience in ALD.

The stone and gravel removal from the top and mid soil is an important step in the construction of terraces for ALD projects. In general, large stones/rocks are removed by excavators and small stones are removed manually during the terrace construction process. Currently, in Bhutan, stone picker machines for farmland are only being introduced on a trial basis at AMC and FMCL, but are not yet common.

b) Issues in ALD/SLM implementation

The following are some of the issues faced by the ALD/SLM project and the direction in which they should be addressed.

- Lack of construction machinery suitable for sloping terrain: In terrace construction, which is in high demand from beneficiaries, there are limited machines suitable for construction on the slopes that serve as sites. The slope of some of the cultivated land is over 20°, which is too steep and dangerous to be constructed by large excavators. In addition, the demand for terrace construction is very high, but at the same time, the high cost is currently a bottleneck.

- Mismatch of existing machinery to the site condition: The sloping terrain on which the terrace construction will take place makes it difficult for large machinery to enter and work on the terrain, and difficult to work with common stone removal machines. AMC has been developing stone removal machines suitable for work on slopes and narrow terraces, and prototypes have been tested but are still in development.
- Work know-how has not been sufficiently disseminated: ALD and SLM projects are new concepts for agricultural extension workers and machine operators and they often do not have sufficient accumulated knowledge and experience. As a result, there are some cases of inappropriate land management practices, such as the omission of topsoil conservation treatments or the installation of hedgerows that do not take into account the topography.
- Benefit of SLM has not been disseminated among farmers: SLM activities should be introduced across the board, but farmers' understanding of the content and benefits of activities other than land development through terrace construction is still not sufficiently widespread. Thus, there is little demand from beneficiaries for comprehensive SLM technologies other than terracing, such as vegetation measures with hedgerows and agronomic measures with land cover improvement and soil management.
- Inadequate ALD/SLM implementation plan due to lack of knowledge: The implementation of ALD/SLM is principally based on the application of beneficiaries (land owners). ALDG implementation framework stipulates that F/S should be carried out by agricultural extension officers within the process. However, in reality, due to the overload of work and limited knowledge and experience of the extension officers, the technical evaluation based on the guidelines and economic evaluation of farm management is skipped, although the necessary clearance process is confirmed.

3.2.3 Issues Related to Agricultural Input

Fertilizer and Agricultural Chemicals

Fertilizer inputs sill low

According to the RNR Census 2019, about 95% of all farmers use manure/compost. Manure/compost are the most accessible agricultural input[13] and the most important soil nutrient for farmers in Bhutan, who are often resistant to the use of chemical fertilizers.

[13] NSSC is working with ARDC to disseminate technology for farmers to produce their own compost (farm-yard manure - FYM) and to train them on how to make and ferment organic fertilizer using micro-organism (EM). In addition, a total of 113 bio-digester tanks have been constructed in each Dzongkhag to promote the production of bio-fertilizer by farmers. There is a high level of interest in organic fertilizers and bio-fertilizers among farmers, and an increasing number of new youth farming groups are starting to produce and use them.

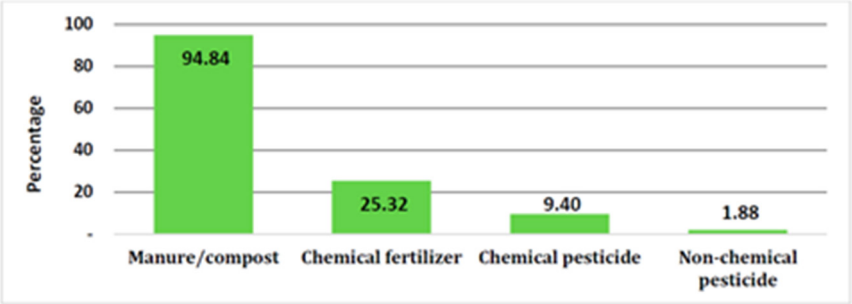


Figure 3-5 Proportion of Agricultural Input being used by Farmers

Source: RNR Census of Bhutan 2019

In Bhutan, the National Seed Center (NSC) is responsible for procurement and supply of chemical fertilizers, and the trend of chemical fertilizers used in agriculture since 2010 shows a slight increase over the last decade. According to the above census, 25.3% of farmers use chemical fertilizers, but the amount used per area is still low.

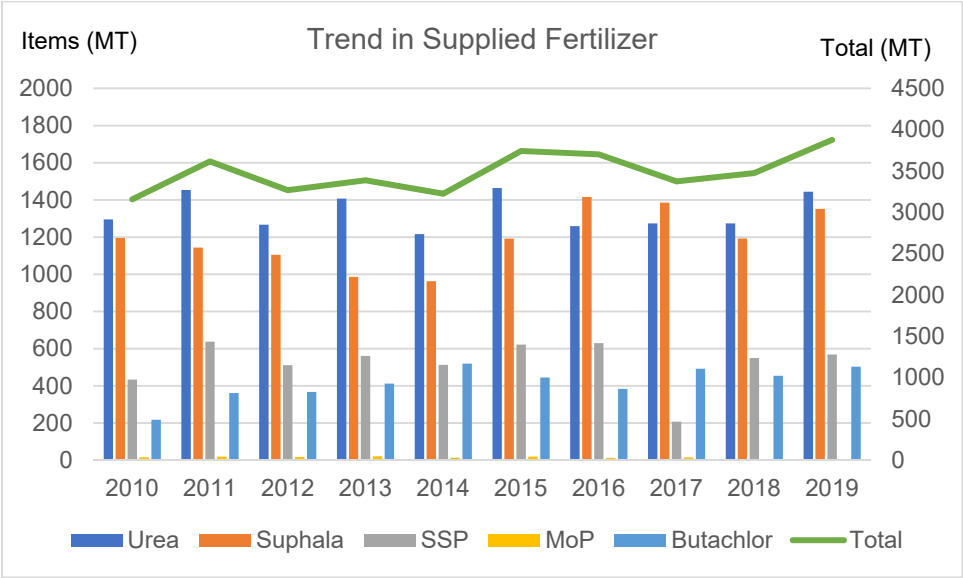


Figure 3-6 Trend in Supplied Fertilizer

Source: RNR Statistics 2010-18 and RNR Census 2019

BOX. Commercial Production of Organic Fertilizer

At present, about 477 MT/year of organic fertilizer such as poultry manure and vermicompost are produced by small to large scale production plants in the country. In addition, with the support of NSSC, Bhutan Organic Fertilizer is constructing a composting shed with a production capacity of 876 MT/year, Bhutan Board Private Limited 1,440 MT/year, and FMCL 40 MT/year. The commercial production of organic fertilizers is expected to expand significantly in the future due to strong demand from farmers and agricultural companies.

Research & development facilities for organic fertilizer are not yet established

For research and development of organic fertilizers and bio-fertilizers, NSSC is responsible for overall coordination, and works closely with the National Center for Organic Agriculture (NCOA) and ARDC for development and dissemination. Although the demand for bio-fertilizer development and production is increasing, there are no soil microbiology research facilities in Bhutan for fundamental research[14].

Limitation of pesticide application activities due to labor shortage

Plant protection using bio-pesticides and non-chemical methods generally requires more manpower for crop management than those using chemical fertilizers. There is a serious labor shortage in agriculture, and this is a major factor in the lack of interest and inhibition of the spread of bio-pesticides and non-chemical plant protection among farmers. In this sense, the labor shortage is one of the most important issues in plant protection too.

In addition, Gewog agricultural extension officers are key actors in the supply system and technical extension of pesticides as well as other activities in agricultural production and farmer support. The busy workload of agricultural extension officers is a major impediment to plant quarantine at the field level.

[14] NSSC is currently constructing a microbiology laboratory building. The building is expected to be completed in 2022, but there are no plans to procure research materials and equipment. Immediate deployment of equipment is required for the promotion of organic agriculture using bio-fertilizers and soil fertility management from the perspective of sustainable use of farmland.

BOX. Current situation of use of agricultural chemicals in Bhutan

According to the RNR census 2019, the percentage of farmer households using chemical pesticides is 9.4 percent. National Plant Protection Center (NPPC) manages all procurement and supply of chemical pesticides in Bhutan. The demand for various pesticides is aggregated from the Gewog agricultural extension officers to NPPC through the District Agriculture Officer (DAO) of Dzongkhag. There is no domestic production of chemical pesticides, and NPPC procures them from foreign countries such as India, stocks them, and supplies them to farmers through agricultural extension officers and Agriculture Support Service Representatives (ASSR) registered with NSC in each Gewog. This line has been the only line for distribution of pesticides in Bhutan[15]. The supply of pesticides for the period 2010-2011 to 2019-2020 is shown below.

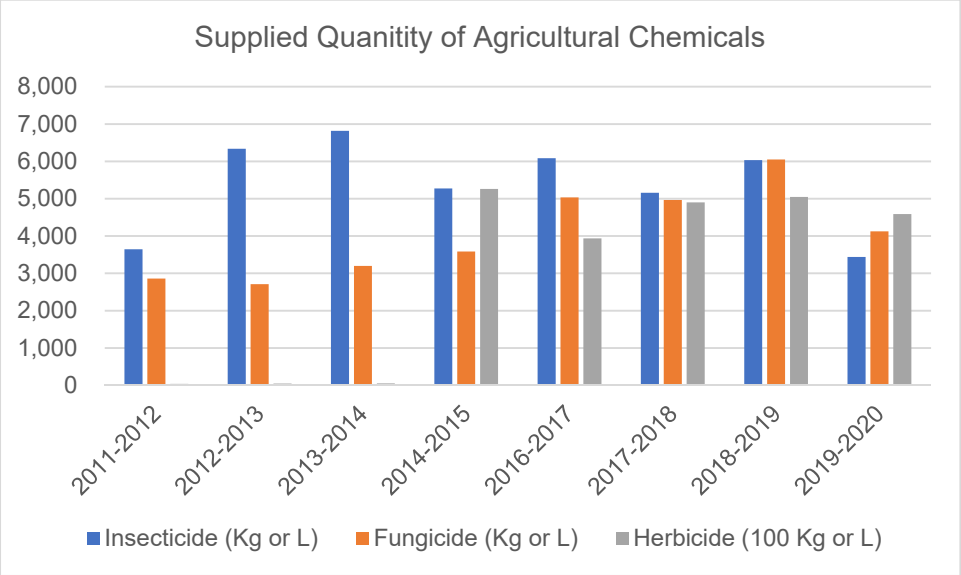


Figure 3-7 Supplied Quantity of Agricultural Chemicals

Remarks: Data of Herbicides before 2013-2014 is not available.
Source: NPPC

Under the policy of Organic Bhutan, NPPC has been developing technology for plant protection using bio-pesticides and non-chemical methods (physical pest control), but it has not yet become widespread because it takes time for commercialization and generalization. Through the supply of imported bio-pesticides and the dissemination of technologies for the appropriate and safe use of chemical pesticides in cooperation with ARDC, the use of chemical pesticides is being reduced and the shift to biological pesticides and non-chemical methods is being promoted[16].

(1) Farm Mechanization

Inadequate number of machines to meet farmers' demand and utilization constraints

The function of providing agricultural machinery services of Agricultural Machinery Center (AMC), which was established in 1983 to promote farm mechanization, was taken over in 2016 by Farm Machinery Cooperation Ltd (FMCL), which is responsible for technology development, standards development, and farmer training. FMCL handles sales, supply, repair, and maintenance of agricultural machinery, as well as hiring services for agricultural machinery. In terms of hiring services for farm

[15] The herbicide Butachlor was handled by NSC until FY2013-2014 but has been handled by NPPC since FY2014-2015.
[16] NPPC procures and supplies biochemical pesticides (neem oil), microbial protein hydrolysates, non-toxic chemical pesticides (TSO), as well as physical pest control devices such as adhesive insecticidal sheets (Stickers/Activators) and insect traps (Yellow light trap). In FY2019-2020, NPPC procured 1,288L of these non-toxic/bio-pesticides and supplied 6,321L in total.

machinery, mainly power tillers, there are two types of service: one is from the Farm Mechanization Service Center of FMCL and the other is using machinery deployed in Gewog.

FMCL calculates the hire cost considering the operation, maintenance, and renewal costs of the machines, but MOAF directs the service to be provided at a cost 45-50% lower than the actual cost considering the farmers' ability to bear the cost. The difference is covered by the government subsidy. Because of this, 58% of farmers consider the cost of FMCL's machinery services to be reasonable[17]. Although farmers seek FMCL services, which are less expensive than private agricultural machinery services (e.g., services provided by machinery owners in the village), they often say that they are not able to receive services when they need due to the limited number of machinery and seasonal concentration of needs, which can interfere with their farming plans.

Underdeveloped private service of farm machinery lease

Many farmers say that the high cost of using private services for machinery is putting pressure on their farm management[18]. On the other hand, this is considered as a result of the government's lease services, through the state own company, putting pressure on the private sector. In Bhutan's agricultural sector, the private sector is particularly underdeveloped in terms of services. This may be partly due to the fact that the principle of competition in the private sector is not strong in all value chains, including food production, distribution, and consumption.

[17] Monitoring and evaluation report on government hiring service, AMC, 2019

[18] According to the AMC report, 857 power tillers and tractors are deployed at Gewog level and 73 are deployed at FMCL centers. 47 of the machines deployed at Gewog level are out of order and the average number of working days per machine is 5.8 days (2018), which is extremely low. However, it is said that this was partly due to the fact that 353 units of the latest deployed equipment introduced with Japan's support were not fully operational immediately after deployment. However, even taking this into account, the number of operating days is still low. In addition, due to budget constraints, the number of full-time operators is limited to 103, and the rest are hired on a temporary basis. This is one of the reasons for the low utilization rate.

BOX. Current situation of use of farming machinery

The use of agricultural machinery has steadily increased in recent years, with the use of machinery for tillage work standing at 26% in 2019. However, as shown in the figure below, the status of tractor/power tiller use varies greatly from less than 5% to more than 80% in each Dzongkhag (districts). This is considered to be due to large differences in topographical conditions and the distribution of farmland types (paddy fields and upland fields/orchard fields).

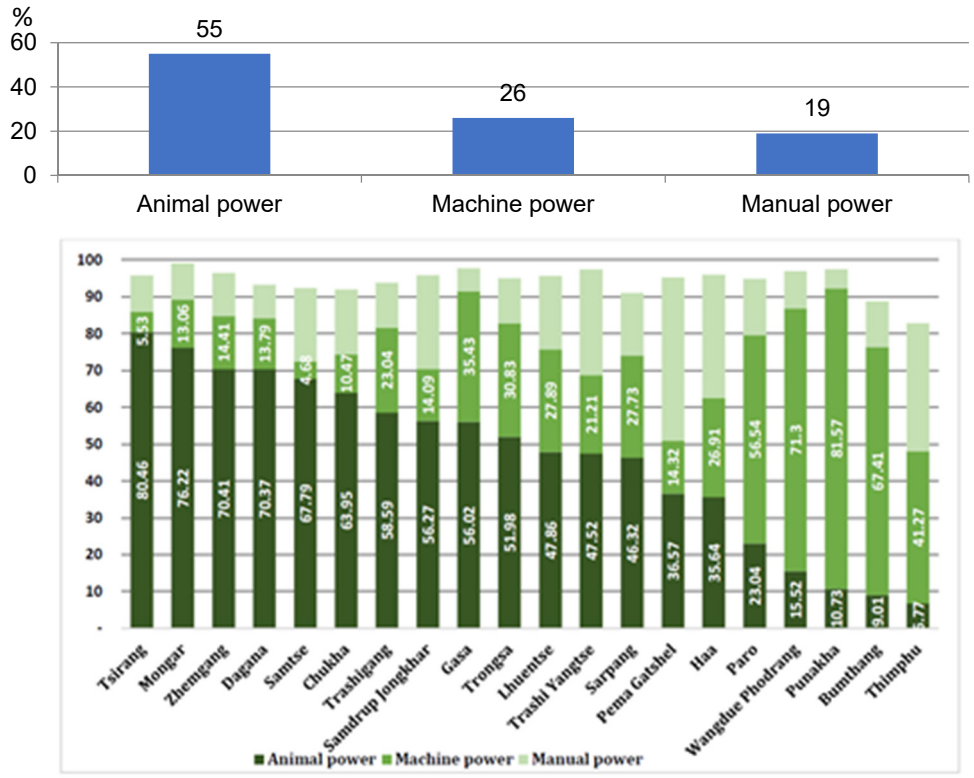


Figure 3-8 Percentage of Holdings Using Different Types of Power Sources to Till Their Land

Source: RNR Census of Bhutan 2019

The introduction of tractors/power tillers to tillage work is said to be capable of reducing rice production costs by 50% and labor input by 75%, and it will play a major role in improving farmers' productivity, profitability, and working environment. In the Study, the achievements of the AMC project by the government and JICA's support for agricultural mechanization project will be reviewed and the expected effects in reducing abandoned land and making effective use of farmland will be examined.

3.2.4 Challenges related to producers (farmers, agricultural cooperatives)

In Bhutan, communities have been forming informal farming groups for centuries. In 2001, the government launched the first Cooperative Act, and it was amended in 2009. The Act defines a farmer group as "a group consisting of three or more members who derive economic benefit from one or more economic enterprises related to the renewable natural resource sector.", and cooperatives are required to have at least 15 members and a bank account.

As shown in Table 3-8, the annual report of the DAMC shows an increase in the number of farmer groups and cooperatives registered throughout the year. However, as of 2011, after the amendment of the Cooperatives Act, 754 agricultural cooperatives (including farmer groups) had been registered, while the most recent registration in 2019 showed no increase in the number of registered organizations

(including farmer groups) as 580[19]. According to the interviews, this is due to the fact that some associations and groups are newly registered, while others become inactive and dissolve after a few years, thus the number of organizations has not increased.

Table 3-8 Number of Newly Registered Farmer Groups and Agricultural Cooperatives

	2016/2017	2017/18	2018/19	2019/20
Farmers Group	44	55	94	84
Cooperative		12	5	15
Total	44	67	99	99

Source: DAMC Annual Report 2017-2020

Through field research, interviews were conducted with farmer groups in four locations. The group in Paro has been active since 2014 and is able to participate in the market through a specific distributor, which is thought to be the reason why they are able to continue their activities. On the other hand, the other group in Paro used to do cooperative cultivation in greenhouses when the number of members was small, but as the number of members increased, it became difficult to distribute the labor equally, so they produce and sell their products individually, and group saving is only their joint activity.

It is said that the main reason for farmers to make such groups is to receive seeds and equipment from the government. On the other hand, various studies have shown that mutual trust and joint activities are important for cooperative and farmers groups to continue their activities. Therefore, even if receiving government support is their initial incentive for organizing, the benefits of collectivization must be realized through joint work and profit-sharing for the group to continue its activities and gain strength in the future.

[19] Report on the Evaluation of Farmers Groups and Cooperatives, DAMC, MOAF

Table 3-9 Activities of Farmer Groups Identified in the Survey

Group	Location	Established Year/ number of member	Major Activities/ Reason to make group
Hungrel Sanam Chirop	Hungreicc Gewog, Paro	Established in 2018 15 members (all female) (The group was reunited in 2015 with more members after having been a five-member group)	When this group consisted of only five members, they produced vegetables in a communal field using a greenhouse. However, as the number of members increased and some members did not work fairly, communal cultivation was stopped. Group Saving was carried out with a bank account for the group. Each member pays BTN.500 per month, and once a certain amount of money is saved, it is loaned to people inside and outside the group. By registering as a group, more seeds are distributed than by individuals by the extension officer.
Lamgong Tsheoesey Yorgan Tshogph	Lamhong Gewog, Paro	Established in 2014 18 members (13 female and 5 men)	1 acre of farmland is leased by BTN10,000 per year to produce vegetables. 2% of the total sales amount is saved in the group's bank account and the rest is divided among the members. The produce is sold to specific buyers with whom they do business for a long time, and the buyers bring it to the market for selling. Payment is made after the buyer sells the produce, and the payment for the group may be reduced if the buyer sells at a lower price than expected. The group is made up of farmers who have only a small area. Since the contract for the use of farmland is only for two years, the production is unstable.
Dandung Sanam Yarphel	Tsongsa	Established in 2021 8 members (4 female and 4 male)	The group leased 10 acres of land from a private person and converted it into farmland for vegetable production. The government provided support materials such as a greenhouse, seeds, organic fertilizer. The farmers got training at ARDC and produce Maize, Chilli, Millet, etc., and sold to the local community.
Pang Tshsley Desen	Pang Village, Nubi Gewog, Tsonga	Established in 2017 8 members (all female)	They produced vegetables at 0.32 acres of common land and on individual farms. They sold all to schools through the School Feed Program. The total harvest is around 6 to 7 MT. They delivered vegetables to the school every two weeks, and are earning BTM 30,000 to 40,000 per month for 9 months during the production season. The payment is deposited into the group's bank account. In the past, they made bottled chili pickles and sold it in the market, but due to the high transportation cost, they discontinued it and changed to School Feed Program.

The results of the study[5], which surveyed a sample of 30 cooperatives in 2018, showed that the number of cooperatives increased from 10 in 2010 to 57 in 2018 across the country. On average, a cooperative has 30 members and 4.9 years of activity. Among these cooperatives, those with high activity tended to have a higher level of education (years of schooling) for their leaders (6.1 years) than the average (5.1 years) and held 3.75 meetings per year, more than the average of 2.9. Conversely, cooperatives with poor activities tended to have an average education level of 3.71 years for their leaders and 1.9 meetings per year. Successful cooperatives were also found to have a higher level of government support.

The study also looked at the challenges of each cooperative, and the most critical challenge was market access. In rural areas, most farmers are subsistence farmers and there is no demand for agricultural products, so that farmers have to bear the high transportation costs and losses of agricultural

products to sell them. In addition, even organic products do not add value to the price, as this is the norm in the country. The next challenge is the lack of technology, including small-scale operations and poor mechanization. Another challenge cited by livestock associations is the religious prohibition of slaughtering in poultry farming, fish farming, and pig farming. The third challenge is organizational governance, and the study concludes that some degree of external support is needed.

In addition, a civil society organization named Horticulture Association of Bhutan (HAoB) has started working as an advocacy organization to represent farmers' views to the government. The organization was established in 2019 under the Bhutan Chamber of Commerce and Industry, but its activities were restricted by COVID-19 till recently.

The organization has more than 3,000 members, including individual farmers, 121 farmer groups and cooperatives, agro-processors, and distributors. In the members, it is included Agro-Logistic and Marketing Cooperative (ALMC), which seeks to form a nationwide network for efficient distribution of agricultural products, and private companies that provide agricultural advisory services.

The future plan of HAoB is to organize nationwide distribution by assigning a distributor to each Dzongkhag and Gewog and also a collector to the villages. In addition, HAoB conducts training programs, especially for youth and women.

3.2.5 Current Status and Issues Related to Agricultural Finance

Lack of Needs in Agricultural Finance

In 2019, the total outstanding loans in Bhutan's financial sector stood at Nu. 133.13 billion, of which 55.12% were corporate loans and 44.88% were non-corporate loans. Loans to CSI stood at Nu. 20.2 billion, accounting for about 15% of the total outstanding loans (5% to cottage industry and 10% to small industry). Loans to CSI are mainly provided by the Bhutan Development Bank Limited (BDBL.

According to an ADB study, the gap between demand and supply of CSI loans in Bhutan (2019) is estimated at Nu. 32.75 billion (about $436.73 million), and Nu. 24.89 billion (about $331.91 million) for rural CSI. The total number of CSI for which loans were approved was 22,064. The number of rural CSIs is estimated to be about 76 percent of the total CSIs based on the Bhutan Development Bank Limited (BDB) CSI loan portfolio for 2019 (see table below).

Table 3-10 Cottage Industry Financing Demand - Supply and Demand Gap Analysis (2019)

Total Number of CSIs		Total Loan Demand (Nu million)		Total Credit Supply (Nu million)		Supply Gap (Nu million)	
All	Rural	All	Rural	All	Rural	All	Rural
176,512	134,149	52,953.60	40,244.74	20,198.66	15,350.98	32,754.94	24,893.75

CSI = cottage and small industry.

Source: Rural Finance Development Project, ADB

On the other hand, a corporate survey[20] conducted by the World Bank found that agriculture-related firms use banks less than firms in other sectors. In other words, agricultural enterprises use banks

[20] World Bank, "Increasing Agribusiness Growth in Bhutan", Jan. 2017

less frequently to raise working capital and investment funds. This is due to the limited availability of financial institutions for corporate and agricultural lending and the fact that lending terms are not always attractive to farmers[21]. Furthermore, most of the funds needed are provided by government donations and subsidies. This difference is also due to the large number of micro-enterprises in the agricultural sector. Taken together, these factors suggest that agricultural enterprises (and individuals) are very reluctant to invest.

Box: Development Bank of Bhutan's loan facilities for producers and agribusinesses

The Bhutan Development Bank Limited (BDB was the only bank focusing on farmers until the establishment of the National CSI Development Bank (NCSIDB) in February 2020. Since 2010, it has made substantial efforts to offer credit to agribusinesses, initiating an Industrial Lending program to provide long-term finance and working capital for industrial and agro-based ventures. It has also introduced a Farmers Outreach banking program that sends field officers to visit farmers to disburse loans, collect payments, and make deposits and withdrawals. In providing loans to farmers, the BDB has also made an effort to use land as collateral and has developed some non-collateralized products based on solidarity principles, providing small loans to groups of three to seven farmers and even to groups of three or more small and medium enterprises.

Source: Bhutan Development Bank, Ltd. based on Key Informant Interview 2016.

Lack of Fund Procurement Method due to Low Needs in Agricultural Finance

Nonetheless, the access to finance for agricultural enterprises is increasing and perceptions of access to finance are improving: in 2015, 40 percent of agricultural enterprises identified lack of access to finance as the biggest obstacle to their business operations, compared to 37 percent of enterprises in other sectors.

[21] The value of property, age, and educational background are taken into consideration for the lending valuation of formal loans through banks. In other words, the value of real estate owned and households with higher social status have a higher upper limit for lending valuation, while the upper limit is lower for elderly and poorer households. This means that elderly people and poorer households with more children can raise more short-term funds without worrying about complex procedure and collateral (Wageningen University study, 2012).

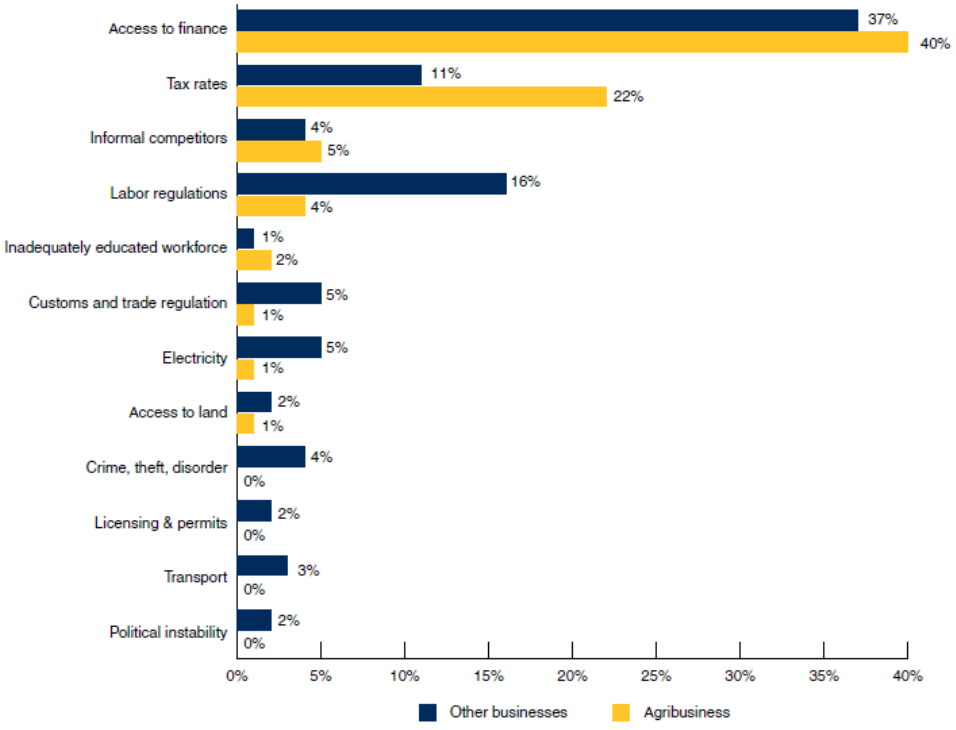


Figure 3-9 Business Barriers Perceived by Bhutanese Companies

Source: Bhutan Enterprise Survey 2015.

Labor Shortage and Less Know-How due to Inactive Agricultural Finance

As mentioned earlier, investment by agriculture-related firms and individuals is lower than in other sectors. Nevertheless, when firms do invest, agriculture-related firms are more dependent on the use of external financing (such as banks) than other sectors. According to the World Bank, agriculture-related firms reported using banks were null in 2009, but by 2015, about 20% of firms (with five or more employees) were using banks to finance their investments. On the other hand, the opposite trend was observed in other sectors, where the share of non-agricultural enterprises using banks to finance their investments decreased from 2009 to 2015, while the share of internally financed investments increased.

Access to bank financing is critical for agribusinesses to grow and induce innovation. For agribusinesses, access to banks for investment and working capital can lead to higher real annual sales growth rates and annual labor productivity growth rates.

The improved access to finance[22] implemented in response to the pandemic was a good direction for the future growth of agribusiness, but there is still room for improvement, especially in trade finance. The Bhutan Development Bank Limited (BDB), the main financial institution for agribusiness in Bhutan, is unfamiliar with issuing letters of credit, providing factoring, and handling foreign exchange transactions.

The BDB's current loan products emphasize cooperative management groups rather than individuals, and in some cases limit lending to individuals. For example, under the "Group Loan

[22] A series of financial measures, including the creation of the CSI Bank, start-up support by the bank, interest relief, and acceleration of online payments.

Lending Scheme," the BDB provides group loans at an interest rate of 10 percent, while individual loans are at 12 percent. Greenhouse subsidies for vegetable growers are also more favorable for group ownership than for individual ownership. The group subsidy is set at 40% of the capital cost at the Max., while individuals can only receive up to 20%[23].

The National Cottage and Small Industry development bank (CSI bank), another provider of rural finance, introduced an investment scheme for farmers and youth in October 2020.

CSI bank, as an investor, will provide up to Nu 500 thousand for potential agribusiness ideas, after which the aggregator will sell the products according to market demand. The farmer repays the loan after the harvest.

Table 3-11 CSI Bank's Loan Performance during the Corona Pandemic (2020.2-2021.10)

	Amount (Mil Nu.)	Amount(%)	Projects	Mil_Nu./ Project
Agriculture	604	33	2,801	0.22
Livestock	690	38	2,675	0.26
Manufacturing&Production	272	15	802	0.34
Seasonal Export	4	0	3	1.29
Services	123	7	417	0.29
Working Capital	36	2	60	0.59
Entertainment	78	4	72	1.08
Employee Incentive	7	0	15	0.48
Total	1,814	100	6,845	0.27

Source: NCDIDBL

On the fiscal and financial side, the bank has been giving priority to the non-formal agriculture and CSI sectors with low-interest rates and favorable loan terms. In the informal agriculture sector, from the opening of the bank in February 2020 to October 2020, the loan amount was about Nu 900 million, accounting for 56% of the total loan portfolio[24]. As of October 2021, the loan amount was about 1.3 billion Nu and 71% of the loan portfolio. This shows that the demand for financing in the agricultural sector has been growing rapidly over the past year as the economy recovers from the pandemic and for recovery from the damage.

3.2.6 Current Status and Issues Related to Risk Management and Agricultural Insurance

Inadequate Safety Net

Various risks in agricultural production are said to be a barrier to entry into the agricultural sector, especially for young people. Until now, the buy-back system has been used as a risk measure in agricultural production. The Buy-Back system is a system in which the government purchases

[23] With regard to financing the agricultural sector, providing balanced incentives to both individual and cooperative owners have the potential to make private agribusiness in Bhutan more diversified.

[24] ADB, Rural Finance Development Project: Report and Recommendation of the President、Nov. 2020 （https://www.adb.org/projects/documents/bhu-53307-001-rrp）

agricultural products at the lowest price when the products cannot be sold in the market because there is too much agricultural production and to oversupply. Under the COVID-19 situation in 2020 and 2021, it was not possible to export agricultural products, so a large amount of cabbage and other crops were purchased through the Buy-Back system, which became a major burden on government finances. As a result, it is being discussed to change the Buy-Back system from covering all crops to covering only mandatory crops[25]. In addition, the Buy-Back system allows farmers to obtain a guarantee from the government even if the price of their products plummets due to overproduction, and therefore they do not pay enough attention to the selection of crops to grow.

MOAF and the Royal Insurance Corporation of Bhutan Ltd (RICBL) devised the crop insurance policy at the end of 2016 to financially protect farmers. The government established the crop insurance system and is still working to strengthen policies. Despite this, a large number of farmers do not use crop insurance. Bhutan has also seen an increase in cases of extreme weather events[26].

Lack of Know-How on Political Design of Agricultural Insurance

In May 2021, the MOAF and the RICBL reached an insurance tariff deal. Farmers would be responsible for a portion of the crop loss, while the government would be responsible for the remaining 70%. The crop insurance scheme, on the other hand, appears to be outdated.

For such assistance, the system should be implemented to safeguard farmers against crop loss due to natural catastrophes, extreme weather, wild animals, or revenue loss due to agricultural market price changes. A farmer who is having difficulty with their plough should be certain that in the event of a calamity, they will at least be compensated. If agricultural insurance could be developed to cover only those disasters that have a significant impact on crop production, it would provide a minimum payment to the safety net and increase farmers' sense of self-reliance.

Crop insurance provided by RICBL covers crop damage caused by a) Weather, b) Landslide/rockslide/subsidence, c) Pest & Diseases, d) Natural fire and lightning, e) Forest fire, f) Damage to crops by wild animals. If the damage exceeds 5%, the farmer is covered by the full guarantee by Insurance. However, there are many restrictions not to be covered, such as damaged by theft or the damage occurred 14 days after harvest.

[25] https://thebhutanese.bt/in-a-revamped-buyback-system-moaf-will-specify-a-list-of-mandatory-products-agriculture-minister/

[26] The unseasonably strong rain has occurred in September-October 2021.The strong rains has harmed harvested paddies in the western, eastern, and central dzongkhags. Vegetable crops in the southern section of the country were also harmed by the rain. For example, according to the early report from Punakha Dzongkahg, the rain damaged almost 350 acres (about 141 ha) of paddy fields. In Paro, 793 acres (about 320 ha) were damaged, while in Samtse, roughly 500 acres (about 202 ha) were affected. After farmers experienced losses, many wished for insurance, but despite officials' efforts to educate them about crop insurance, the majority of farmers did not insure their crops.

Box. Crop Index Insurance - Examples from Other Countries

In northeastern Thailand, a weather index insurance against drought has been sold by SOMPO Thailand since 2010. The premium is paid to rice farmers when the cumulative rainfall for the three months from July to September, as announced by the Thai Meteorological Department, falls below a certain level. The weather index insurance is sold to the rice farmers who wish to purchase it as, when the farmer borrow money from the Bank for Agriculture and Agricultural Cooperative (BAAC), they pay a certain rate on the amount borrowed as an insurance fee.

In addition, the SOMPO Thailand also sells "weather index insurance" for drought risk to longan farmers in 2019 and to cassava farmers in 2021.

In Kenya, weather index insurance is sold with seed. By registering the insurance number on farmers' cell phones, the insurance company can identify the location of the farmer. And by matching the location with data from weather satellites, a system is set up to determine whether the insurance payment is necessary or not. If the weather satellite confirms that there was not enough rainfall during the germination period, the insurance money can be paid out early so that the farmer can start planting again in the same season.

3.3 Challenges in Food Logistics

3.3.1 Protocol for Examining Issues

Regarding Bhutan's challenges in food logistics, Figure 3-10 summarizes challenges in Bhutan's domestic market access while Figure 3-11 shows those in agriculture commodity export. The challenges are identified in reference with the items shown in Table 3-12 together with results of a series of interviews.

Table 3-12 Reference to Identify Challenges in Food Logistics

Year	Reference
2021	a. Data Collection Survey for Digital Promotion Policy in Bhutan (Second Interim Report), JICA b. Bhutan's Second Voluntary National Review Report on the Implementation of the 2030 Agenda for Sustainable Development, JICA c. RNR Marketing Strategy 2021, MOAF d. Monthly Statistical Bulletin, Royal Monetary Authority of Bhutan e. National Accounts Statistics 2021, NSB f. Report on Bhutan's External Trade, MoEA g. Guidelines on Cost-sharing Mechanism for the RNR Sector, MOAF h. Standard Operating Procedure for Export of Apple, Orange, Vegetables. Cardamom and Ginger by Private Exporters, BEA i. Procedure for export of RNR produce via Phuentsholing* j. Annual Report 2020, FCBL
2020	k. Food Security Strategy "with special focus on enhancing winter vegetable production", MOA l. Online Research of Organic Markets Prospects for Bhutan, MOAF m. Future Trade Facilitation of Agriculture Produce, FCBL
2019	n. The Project for Formulation of Comprehensive Development Plan for Bhutan 2030, JICA o. The Twelves Five Year Plan 2018-2023, GNH p. Bhutan country strategic plan (2019-2023), WFP q. B CO-OP (Bhutan Co-Operative) Shop Operation Guideline 2019, MOAF
2018	r. RNR Marketing Policy 2018, MOAF

* Since the issuance year is not specified, noted with when JICA Survey Team obtained the material.

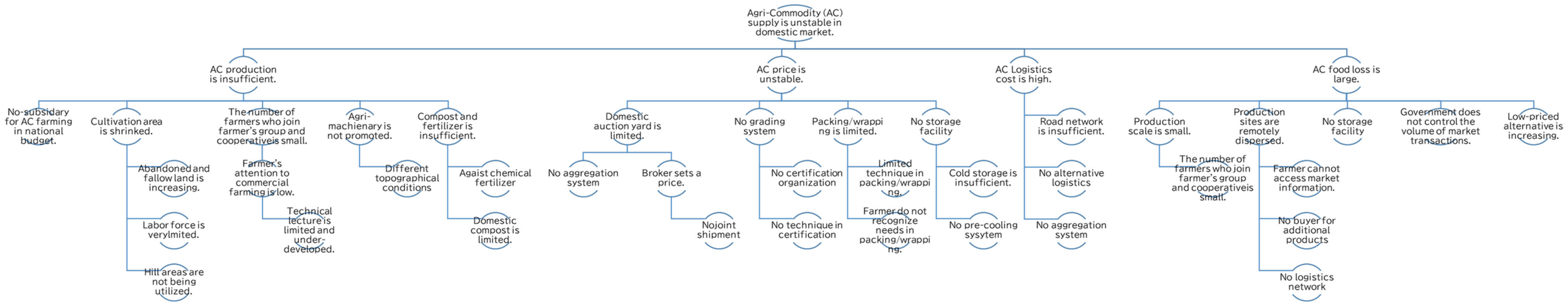


Figure 3-10 Challenges in Domestic Market Access

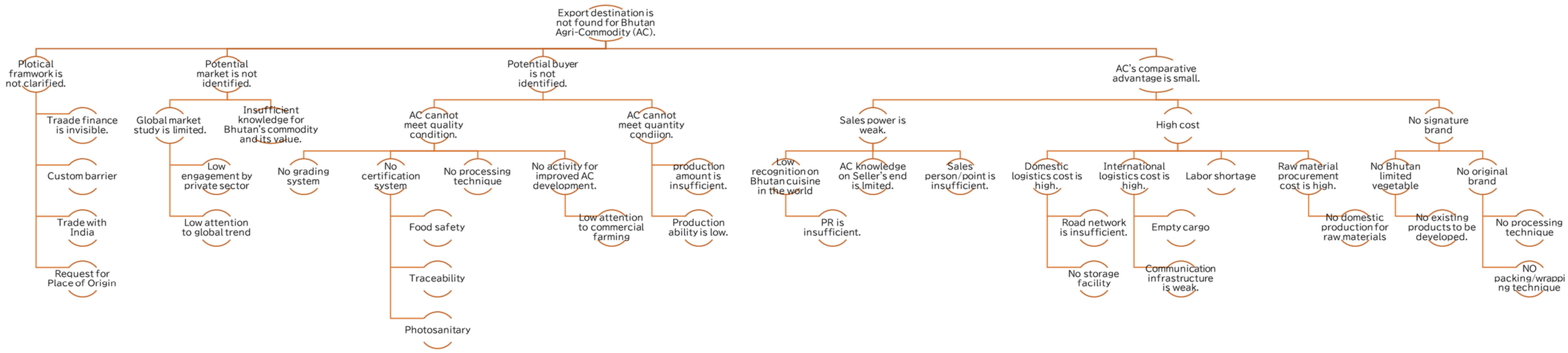


Figure 3-11 Challenges in Agriculture Commodity Export

3.3.2 Challenges in Domestic Market Access

Agricultural Commodity Supply Chain and Domestic Market Access

a. Concept of Supply Chain

This section summarizes the system of distribution and trade of agricultural products in Bhutan, referring to the value chain of potatoes in a survey conducted by UNDP in 2016 (Figure 3-12). Farmers (Producers) use traditional cultivation methods for production. While some farmers use the highest grade of seed from the previous year as seed stock for sowing, many farmers do not renew seed for economic reasons (Input). This low seed renewal rate is one of the causes of low productivity. In addition to seed renewal, there is a need for technology dissemination related to farm equipment, irrigation adoption, fertilizer application, and bird and animal damage prevention, for which government agencies are providing support (Production).

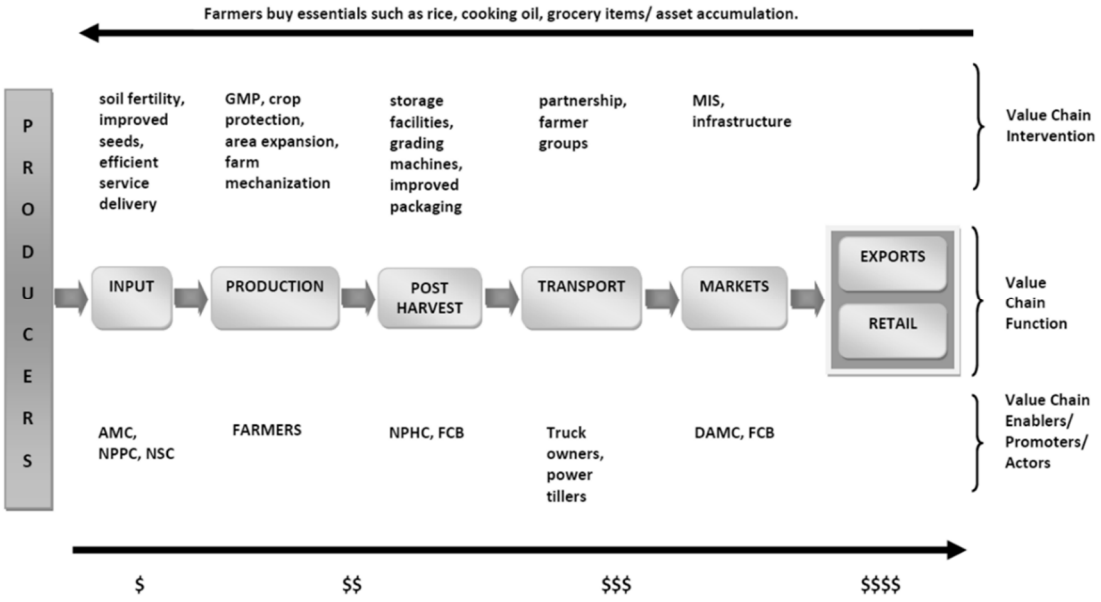


Figure 3-12 Potato's Value Chain Map

Source: UNDP, Value Chain and Market Analysis of Renewable Natural Resources Products Report, 2016

To reduce post-harvest losses (Post Harvest), efforts by institutions such as the National Postharvest Center and the Agricultural Machinery Center need to be expanded to construct appropriate storage and sorting facilities, and to consider transportation bags to reduce losses due to damage. In order to promote global trade, it is also necessary to review FCBL responsibility in terms of the legal framework for exports.

As shown in Figure 3-13, in marketing agricultural products, it is important to organize the marketing mix, which consists of product policy, price policy, distribution policy, and sales promotion policy, as well as to conduct research on consumer trends. For example, in terms of price policy, it is necessary to establish a collection system as well as a hard infrastructure to reduce transportation costs.

By contracting with transportation companies in each region, stable transportation costs can be achieved. Crops with reduced transportation costs will be able to be sold in the market while maintaining price competitiveness. In terms of sales promotion policy, it is necessary to consider a branding strategy for a targeted commodity in order to increase additional value.

DAMC, BEA, and FCBL will also play a critical role in global marketing of Bhutanese agricultural commodities. The following section summarizes challenges related to improving access to domestic and global markets for Bhutanese agricultural commodities, based on the concept of the agricultural product marketing mix.

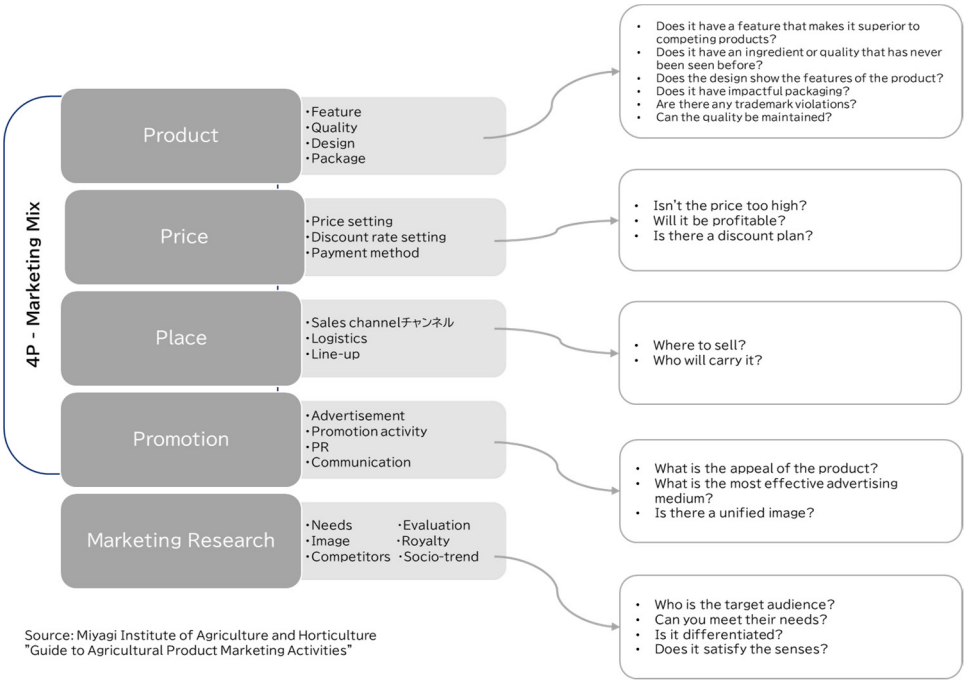


Figure 3-13 Agricultural Commodity Marketing Mix

b. Current Condition and Challenges in Market Access

Underdeveloped Market

In Bhutan, agricultural products are generally sold at the public markets in each dzongkhag. Although DAMC is promoting the establishment of direct sales points, such as B-COOP, managed by farmer groups, there are not many of them. However, many of the stores experience a large loss due to the excessed inventory of daily necessities under a franchise system, where individuals or groups manage stores by procuring goods from FCBL. As a result, their sales conditions vary from store to store as to whether or not agricultural products are sold.

The operation of the public market also differs from Dzongkhag to Dzongkhag. In Punakha Dzongkhag, the public market is held only once a week, so the individual farmers leave their houses at 3:00 in the morning to sell their produce at the market. On the other hand, the market in Tongsa Dzongkhag opens every day. Vendors at the market is also fixed so the farmers sell their produce to

those vendors. In both places, there were no warehouses or other storage facilities. The farmers in Punakha usually price down the vegetables that they were not able to sell in a day to wholesalers.

Other than those markets mentioned above, there are DAMC sales stands where neighboring farmers can sell their produce. However, it is apparent that access to markets for farmer is very limited, and it empowers brokers to control the commodity price.

The auction yards (four in total over the country) operated and managed by FCBL, are basically the contact points for export. Figure 3-14 and Figure 3-15 show the location of each facility under FCBL's jurisdiction. In the case of oranges, cardamom, areca nut, ginger and other crops are generally sold to buyers before harvesting, and harvesting is left to the buyers.

As mentioned above, market access is extremely limited due to the small number of markets, the uneven distribution of markets in certain regions, and the lack of available means of transporting agricultural products.

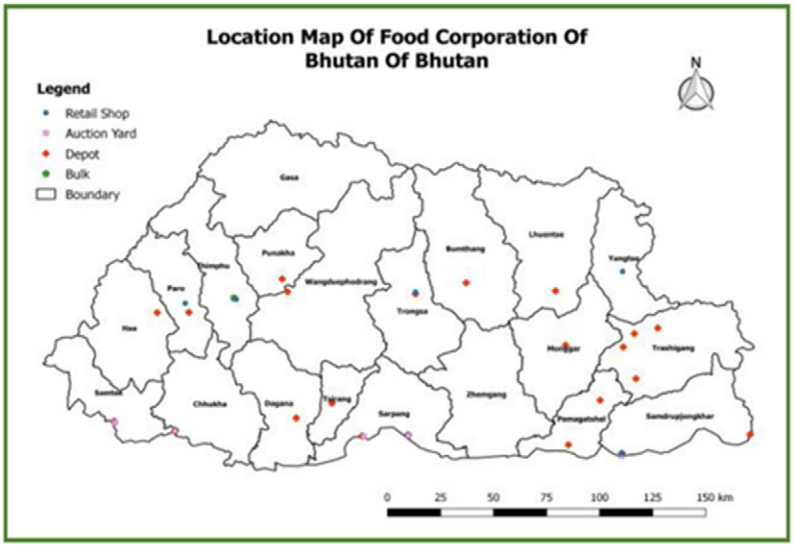


Figure 3-14 FCBL's Facility Location (excl. Farm Shop)

Source: FCBL (2020), Annual Report

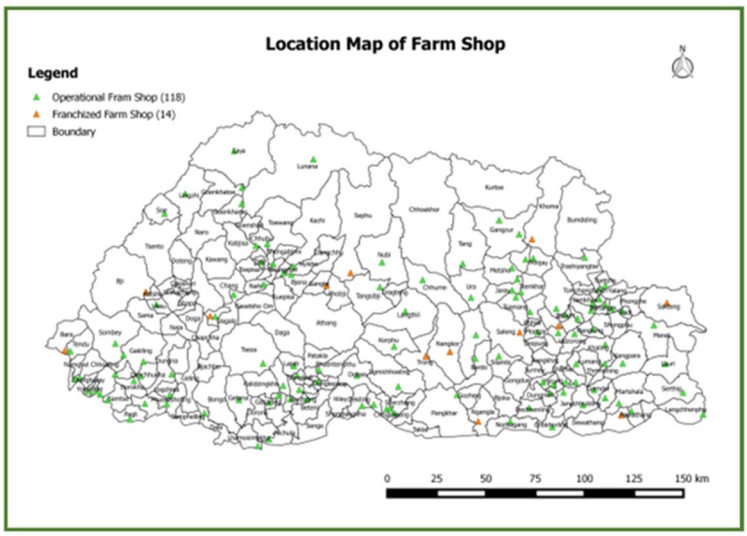


Figure 3-15 FCBL Farm Shop Location

Source: FCBL (2020), Annual Report

Under these circumstances, MOAF has pointed out the following issues that need to be addressed immediately to improve agricultural product marketing: 1) regional agricultural product production requirements, 2) production systems that meet demand, and 3) establishment of collection points.

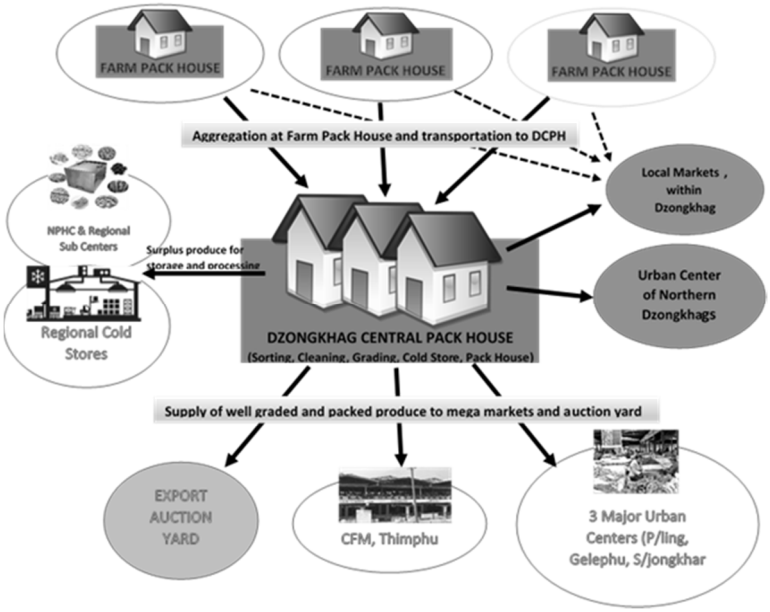


Figure 3-16 Overview of Dzongkhag Collection House

Source: MOAF (2020), Food Security Strategy

In the Food Security Strategy (draft) prepared by DOA, the expected performance of Dzongkhag collection house is introduced as a strategy for fresh vegetable production in winter as a COVID-19 measure (Figure 3-16). First, a central pack house in Dzongkhag and a cluster pack house in Gewog

will be established. They will perform as aggregation points. The dzongkhag packhouses will be equipped with facilities for cleaning, sorting, grading, and packing.

According to various documents, several measures have been taken by the stakeholders in the past to establish collection points to improve distribution, but the results have not been readily apparent. This is due to the lack of smooth coordination between central and local governments and stakeholders, lack of infrastructure, and farmers' lack of awareness about commercial farming.

However, the essence of the problem is that even if such a facility is built, it must be further distributed to CFM and Urban Center, which are the final distribution points. Naturally, this is a costly process, and this will reduce the competitiveness. The following is an example of a "Michi-no-Eki" in Japan, which has a series of functions described above, as well as an attraction for consumers.

Box. Example in Japan (Michi-no-Eki)

In Japan, there are more and more cases where local agricultural products and unique processed products with local characteristics are incorporated into tourist routes as tourism resources. In this case, there are some creative operations to attract visitors, such as local product exhibitions, celebrity performances, and the installation of rice polishing machines and laundry facilities. As with the establishment of collection points, it is essential to cooperate with local governments and communities and to operate in an integrated manner.

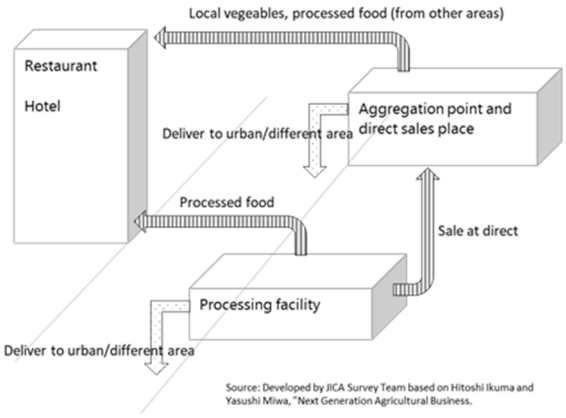


Figure 3-17 Complex Logistics Facility (Image)

Considering the long travel distance and time in Bhutan, it is worth to consider setting up agricultural product collection, sales, and processing facilities with accommodation facilities along the main road. By fostering local varieties in each region, and providing spaces where people can fully enjoy the traditions, history, local climate, and food culture of Bhutan, one can expect to promote local production for local consumption, and differentiate Bhutanese products from inexpensive imports (Figure 3-17).

Agricultural Commodity Processing

Processing capacity is still immature in Bhutan, which needs additional support for further development.

a) Insufficient Function and Processing Skill at National Post Harvest Center (NPHC)

For the development of processed agricultural products, the National Post-Harvest Center (NPHC) [27]has been established in Paro to develop products, analyze the ingredients of processed products, conduct research on processing technology, maintain equipment in response to requests from farmers and companies, and provide training upon request. The center has a 100 MT cold storage facility.

The cold storage facilities at NPHCs are mainly used by farmers and private companies for storage of apples. The storage fee is BTN3 per box per day. The price of apples, on the other hand, is BTN 450-500 per box during the peak season from August to November, but it rises to BTN 1,500 to BTN 2,000

[27] The center has sub-centers in Mongar, Degana, Pemagatchel, and Zhemgang Dzongkhag. These sub-centers will basically carry out the same duties as the headquarters NPHC. The Mongar sub-center is also a processing center of Bhutan Agro Industry Limited (BAIL), a state-owned enterprise, while the other three locations are also engaged in the production of agro-processed products by farmers who bring in their produce.

during the off-season. Therefore, profit is secured even when paying BTN 90 per month for storage service. There is a private company in Paro, Satsam Cold Storage, and NPHC has set the storage fee at the same level as Satsam so as not to put pressure on Satsam.

However, the use of cold storage facilities is almost limited to apples, and there is room for improvement in the storage technology for vegetables, etc. Due to the imbalanced production caused by COVID-19 and the weather condition, cabbage production greatly exceeded the demand this year, so the government implemented a buy-back program. In 2021m NPHC was instructed to develop new processed products using these cabbages, and tried to make kimchi, but without success, a large amount of salted cabbage is still in storage.

Delayed Development of Packaging

Most of the packaging materials are imported, and the material cost is even higher than the content due to the small scale of production. Therefore, if the packaging is good enough to compare with imported processed agricultural products, the price will be relatively high.

For example, potato chips are originally packaged in aluminum to block out sunlight because the oil in the chips deteriorates, but if Bhutanese manufacturers use this packaging, the price will be higher than that of imported products from India and Thailand, and the chips will never be competitive. Thus, inexpensive packages are used, but these packages allow light to penetrate the products, which causes them to deteriorate more quickly and shorten their expiry date. For this reason, many Bhutanese products for domestic consumption are wrapped with low-cost material.

Box. Development of Private Business – Case 1

In Mongar region, there are youth groups undertaking food processing activities financed by IFAD. Case 1 is a daily product activity supported by RAMCO.

Staff	Seven Female
Raw Material	Milk (39Nu/L)
Product	Raw Milk (55Nu/L), Yogurt (20Nu/100ml), Cheese (200Nu/kg) Butter (460Nu/kg)
Sales Point	Mongar, School
Profit (Net)	700,000 Nu/year
Remark	• 30% of profits are used for maintenance and management costs, and the remain is allocated as salary • Stable supply of raw materials (milk) • Little fluctuation in the price of dairy products

Raw milk packing machine

Cryogenic sterilization machine

Cold storage for fermentation

Box. Development of Private Business – Case 2

Case 2 is a youth group to produce candies and sweets, supported by RAMCO (IFAD) and CARLEP. The group seeks a financer for packaging mechanization.

Staff	Three Male
Raw Material	Wheat, Quinoa, Fruits, Sugar etc.
Product	Candy, sweets
Sales Point	Mongar, Thimphu, Paro
Profit (Net)	500,000 Nu/year
Remark	• A part of profits is used for maintenance and management costs, and the remain is allocated as salary • Seeking a financer for packing automation • The raw materials are certified by BAFRA.

Processing area (CARLEP)

Food dryer (CARLEP)

Baking machine(CS)

Refrigerator (CARLEP)

Product (Candy and Yogurt)

Food Loss

Food Loss Measure – Just Started

Drying and storing seasonal crops for the next season, properly packaging and packing crops, and reducing damaged vegetables through improved harvesting techniques will greatly contribute to reducing food losses and increasing domestic food self-sufficiency.

MOAF plan to implement capacity building of NHPC and regional centers in the future, but what is also important here is the close collaboration among stakeholders. Although the roles and

responsibilities of the stakeholders in the field of agricultural product distribution seem to have been clarified, it was pointed out that the system of cooperation among the stakeholders for cross-sectoral issues is insufficient.

It is also important to consider incorporating actions for food and agricultural product recycling, such as the Food Recycling Law and certification systems for recycling, which have not been confirmed by the information collected so far.

Recycling loop certification[28] leads to increased corporate and product value, and can be introduced as a branding approach. However, there are no companies in Bhutan that are involved in this type of business. It can be expected that young people to start businesses and create new employment opportunities.

Box. Food Loss

According to RNR announcement as of February, 2021, the post-harvest losses for irrigated rice and maize are about 1,787 acres (6%) and 4,754 acres (13%), respectively, in terms of harvested area. The dzongkhags with the highest post-harvest losses in irrigated paddy were Samtse (24%), Sarpang (12%) and Tsirang (10%). In Maize production, the order was Samtse (13%), Monggar (12%), and Sarpang (12%) (Figure 3-18).

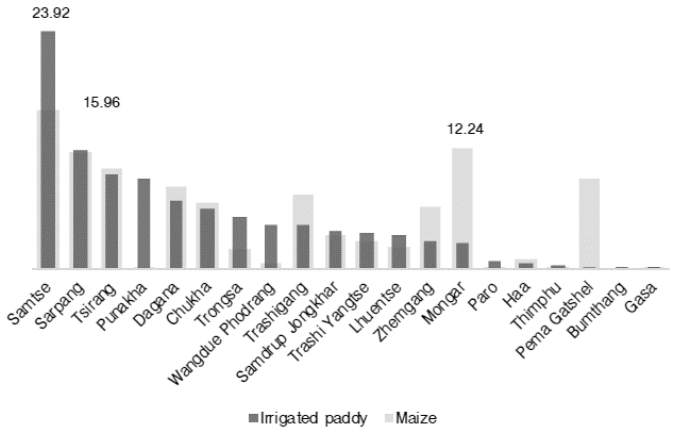


Figure 3-18 Post-Harvest Loss of Food Crops (Rice and Maize) by Dzongkhag

Source: RNR Statistical Release, Feb. 2021

Post-harvest losses for major vegetables are calculated to be 5% for chili, 3% for cabbage, 3% for cauliflower, 4% for asparagus, and 4% for potatoes (Figure 3-19). By Dzongkhag, there are places where 30-50% are accounted for as post-harvest losses, especially in turban areas.

The production of cardamom and ginger, both commodity crops, have post-harvest losses of up to 48% and just over 45% respectively. In the country, out of the 16,415 acres of sown areas for cardamom, about 800 acres (about 5%) were lost.

[28] Ministry of Agriculture, Forestry and Fisheries, "Outline of the Reuse Business Plan Approval System"

For chili, out of 3,718 acres of sown area, about 194 acres (5%) worth was lost, with the highest losses in Monggar (19%), Lhuentse (13%) and Wangdue Phodrang (13%). For cabbage, out of 1,791 acres of sown area, about 54 acres (3%) worth of cabbage was lost at household level. Across the Dzongkhags, Paro (49%), Ha (8%) and Mongar (6%) were significant. For cauliflower, about 24 acres (3%) of the 875 acres sown were lost, with higher losses in Dagana (16%), Mongar (15%) and Sarpang (9%). For asparagus, out of 765 acres of sown area, about 14 acres (4%) worth was lost at household level. In the entire Dzongkhag, Monggar (34%), Sarpang (11%), and Lhuentse (9%) were the largest in that order. In potato, out of 10,764 acres sown, about 422 acres (about 4%) were accounted for as post-harvest losses. By Dzongkhag, Trashigang (20%), Monggar (19%), and Wangdue Phodrang (13%) are the largest.

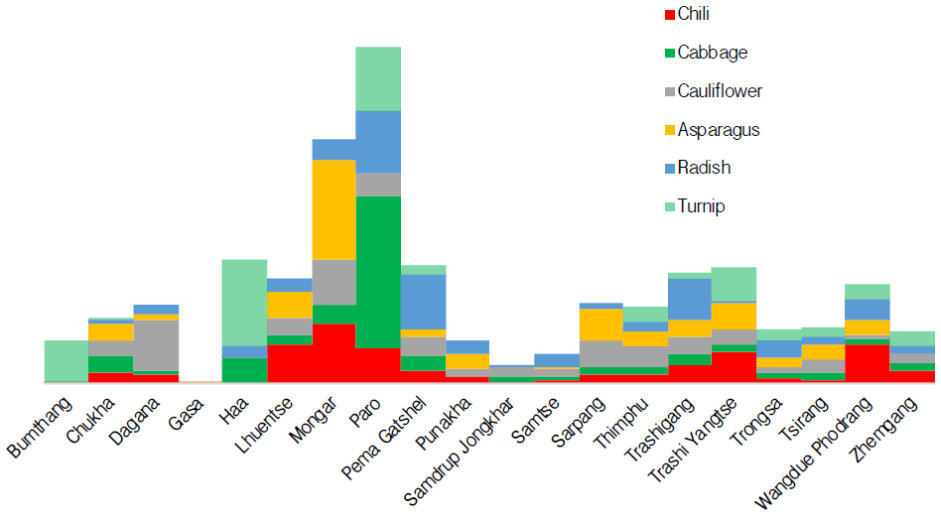


Figure 3-19 Post-Harvest Losses by Dzongkhag and Vegetable

Source: RNR Statistical Release, Feb. 2021

The production of cardamom and ginger, as the major commodity crops, have post-harvest losses of up to 48% and just over 45% respectively.

For oranges, a study found that 45% of the total harvest was post-harvest loss, and 9.37%, 6.76%, 3.63%, and 5.9% were lost in transportation from the field to the collection point, sorting, grading and boxing, and market transportation, respectively[29]. In addition, losses due to bird damage, insect damage, diseases and growth disorders are 1.03%, 1.42% and 11.63% respectively. However, since farmers currently sell their produce to middlemen before harvesting, the handling of produce by middlemen needs to be improved to reduce these losses. It is also reported that 42.94% of apples are damaged after harvesting, and 12.78% of the total harvest is not sold in the market, resulting in losses[30].

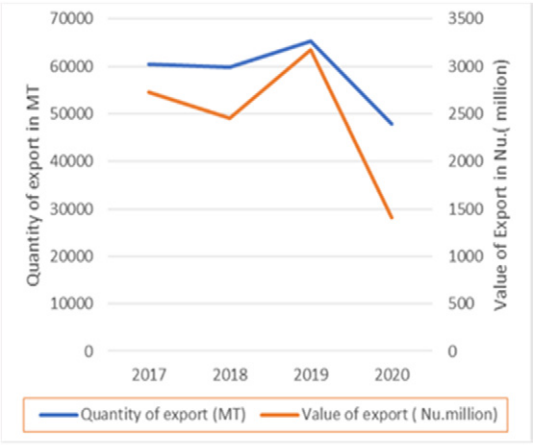
[29] Postharvest Damage and Losses of Mandarin Fruits in Bhutan, Tobgay et al. 2019. Bhutanese Journal of Agriculture 2(1) 97-106
[30] Post- harvest Damage and Loss of Apples in Bhutan (Thimphu and Paro), Rinchen et al. 2019. Bhutanese Journal of Agriculture 2(1) 159-167

3.3.3 Challenges in Agricultural Commodity Export

India's one-sided trade structure

In the Enabling Trade Index (2016) published by the World Economic Forum, Bhutan ranks 92nd out of 136 countries. Bhutan's tariff system, which has been recognized by the World Economic Forum for its clarity and lack of complexity, is positioned as a challenge to achieving competitiveness in promoting foreign trade.

Bhutan began exporting agricultural products about 40 years ago, and although the destinations of these exports are diverse, the majority of them are with India. According to FCBL, for exports to India over the last four years (2017-2020), potatoes have been found to be the most profitable in terms of export volume, but spices have been the most expensive in terms of export value. In terms of the overall performance of agricultural exports, the average growth rate of export volume and export value was 4% and 10%, respectively, until 2019, but with the entry into force of trade control measures following the COVID-19 pandemic in 2020, export volume and export value declined by 27% and 56%, respectively, in the same year (Figure 3-20).



Source : FCBL

Figure 3-20 Trend in Agriculture Commodity Export

Insufficient Skill in Trade Practice

DAMC, FCBL, and BEA play key roles in Bhutanese agricultural exports. FCBL collects all vegetables from the farmers at designated consolidation centers and collection points, from where FCBL delivers them to the auction yard and transships them to the buyers, etc. BEA is responsible for collection and delivery of apples, citrus, ginger and cardamom, and DAMC is in charge of overall support. On the other hand, according to the DAMC, individual farmers are allowed to export own products, so the exact total amount and value of the export products are not known well. The informal export of agricultural products in Bhutan gives the impression of being a buyer's market (India is taking the lead.) due to technical limitation in the fields shown below[31].

- Technology for quality control of cargo in trade (packaging, packing)
- Price assessment technology based on the quality and quantity of commodities
- Required standards for domestic cultivation and distribution, which are factors in determining the price of commodities
- Sorting and weighing technology for agricultural products by quality
- Advanced know-how on trade management (see Box below for an example)
- Technology for external negotiations between the government and private sector regarding exports
- Lack of technology and facilities for storage and processing of agricultural products in Bhutan

[31] As a concrete example, Bhutanese transporters (truck drivers) earn a profit only when transporting large volumes of goods for Indian traders. There are many cases of traders cooperating with Indian traders to earn additional profits.

Due to the conditions above, Bhutanese resources are flowing out to India at inappropriate prices.

Box. Practice of Bhutan Trade Administration

In 2017, Government of India has adopted the necessary requirements to process all exports to India using Indian Custom Electric Gateway (ICEGATE) system, as part of the Government of Indian's goods and services tax system introduced in the year. Therefore, all Land Custom Stations (LCSs) between Bhutan and India should apply this ICEGATE. On the other hand, the Plant Quarantine Order 2003 (PQO 2003) of India had stated that all export agricultural products to India must be listed in PQO 2003 of India, and imported from specific LCSs after conducting Pest Risk Analysis (PRA) by the NPPO India, National Plan Protection Organization of India). However, since there is no mention of agricultural imports from Bhutan in the PQO 2003, legally it is no longer possible to export agricultural products from Bhutan to India.

Therefore, BAFRA, Bhutan's domestic plant quarantine organization, and the NPPO Indian jointly conducted pest risk analysis, and the following 14 agricultural produces have now been gazette in the PQO 2003 of India, and can be exported without any problems once the procedures are completed. The process is still underway to add subsequent agricultural products to the PQO.

Items	Special condition of import by India	Formalization year
Asparagus	Free from: ・quarantine weed seeds, soil and plant debris The commodity shall be washed with clean water before packing. The above condition shall be endorsed on Phytosanitary Certificate issued at the country of origin/re-export	2017
Large Cardamom	Nil	2018
Mandarin	Free from: ・Rhynchocoris poseidon	2020
Apple	Free from: ・Byturus tomentosus ・Marssonina coronaria	2020
Potato	Free from quarantine weed seeds, soil and other plant debris	2020
Ginger	Free from soil	2020
Areca nut	Nil	2020
Cabbage, Cauliflower, Chili, Carrot, Soybean, Beans, Snow pea	Free from soil	2021

Source: BAFRA

In order to carry out legal export in accordance with the above, agricultural products, especially potatoes, need to be cleaned and packed for export, and also need to get a phytosanitary certificate issued by BAFRA. At present, however, there is a shortage of warehouses and other facilities to collect such agricultural products to be exported, and BAFRA officials are responding by visiting the places where they are being washed to conduct simple inspections.

In addition, many agricultural products are still being exported without through the proper procedures, as although PQO India have been in effect since 2003, they were not actually in operation. However, once the Indian side's response will be strengthened in the future, it will be necessary to increase the number of facilities, etc., to cope with this.

Vulnerable Supply Chain

Data collection summarizes import and export transactions for the past three years (2018-2020). Referring to the data for 2020, due to the impact of the COVID-19 pandemic, only Cordyceps and other medicinal herbs are exported to trading countries except for some regions. Although exports of agricultural products to some regions have been realized, the volume is limited.

The slow growth in agricultural exports is due to a combination of problems with domestic distribution in Bhutan, as shown in Figure 3-10, and problems with export promotion, as shown in Figure 3-11. In order to develop valuable products for overseas markets, it is essential to identify potential markets and buyers for Bhutanese agricultural products, and to make systematic decisions regarding targeting and branding.

For this organizational decision-making, MOAF conducted an online survey on organic agriculture in 2020[32], and introduced the attitude and current status of potential markets in Europe, the Middle East, and Asia toward organic agriculture for each agricultural product. The latter half of the report suggests the potential of pesticide-free Bhutanese agricultural products, and recommends that they are certified as organic products in accordance with the guidelines set by the International Federation of Organic Agriculture Movements (IFOAM). At the same time, the report mentions the need to consider measures to deal with phytosanitary, grading, and mass standards.

In Bhutan, the general idea is that domestic vegetables are organically grown and safe, while Indian vegetables are cheap and look good but are not safe because of the use of chemical fertilizers and pesticides. However, here is a fact that even if organic certification is obtained domestically, it is difficult to add value because it is weakly differentiated from other agricultural products. Therefore, in order to increase the added value of organic agricultural products, export promotion is essential.

Figure 3-21 shows a PESTEL analysis of the external environment surrounding the food industry today. It confirms that the COVID-19 pandemic has led to a demand for food convenience and safety, as well as a demand for foreign cultures to stay home. There is also a growing awareness of global issues such as carbon offsetting and reduction of food loss / food waste in the food chain and food production.

[32] Market Information and Research Division, DAMC (2020), Online Research of Organic Markets Prospects for Bhutan

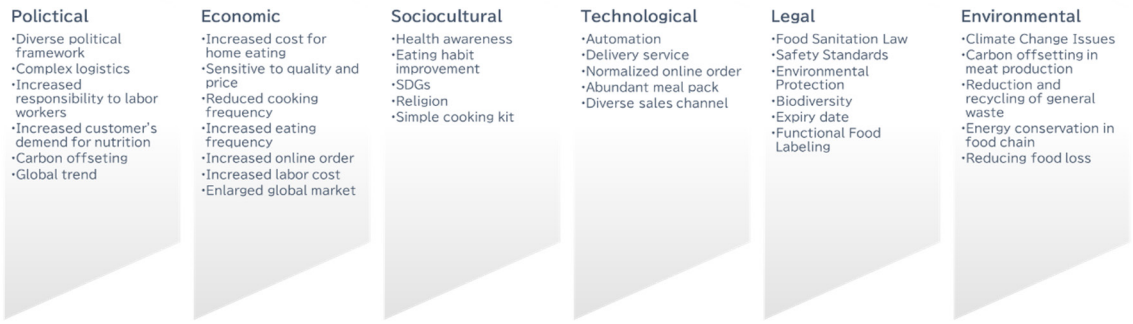


Figure 3-21 PESTEL Analysis – Food Industry (Global)

Figure 3-22 is a PESTEL analysis of the food industry in Bhutan from the perspective of the country's semi-governmental and private companies. On the political front, the promotion of privatization of the food industry, including the promotion of bargaining power with India and employment of young people, is an issue that needs to be addressed on a national basis. On the economic front, in light of the recent increase in labor costs and limited market access, investment activities to strengthen the infrastructure of industrial infrastructure are expected, and proactive efforts by public institutions will be necessary here as well.

On the social and cultural front, the universality of traditional cuisine and the lunch box culture can be cited as characteristics. In terms of technology, while the improvement of food packaging and wrapping technology is an issue, the market access for buyers is not bad, as electronic payment is customary and e-commerce sites are being established based on the high smartphone penetration rate.

In terms of the legal and environmental aspects, the national policy that 70% of the country's land area is forested, guidelines on food safety and security, environmental protection, and the national development plan for biodiversity are legal factors that should be considered.

Figure 3-22 PESTEL Analysis – Food Industry (Bhutan)

3.4 Current Status and Challenges of Nutrition Intake

3.4.1 Current Status and Challenges of Nutrition Intake

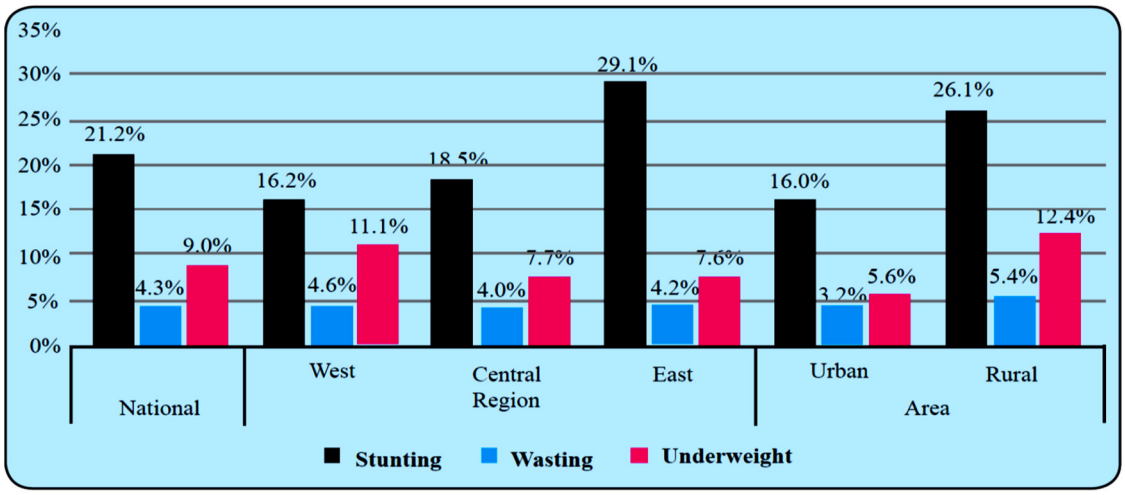
The Bhutanese people are exposed to the triple burden of malnutrition[33]: under-nutrition, micronutrient deficiency, and over-nutrition. The following section describes the current status of each of the triple burden issues.

(1) Undernutrition

The National Nutrition Survey conducted in 2015 found that 21% of children under five years old were stunted, 4% were wasted and 9% were underweight. Although there has been an improvement in each of these figures compared to the 2010 survey results, the rate of stunting[34] is still high by global standards, and actions are required to continue.[35] In particular, more input is needed in rural areas, as the nutritional status of children in rural areas tends to be worse than in urban areas.

Poor nutritional status of children of 6 to 23 months old suggests that more attention on the contents and feeding practices of complementary food should be paid. Although the national average for the proportion of children who are fed with complementary food is high at 86.9%, there are differences in the rates between regions. For instance, in the Central Region, only 70.3% of children are given complementary food. In addition, the national average for the proportion of complementary food consisting of four or more food groups is only 15.3%, and the national average for the proportion of complementary food with iron-rich food items is only 16.6%, indicating not many children have balanced diet. . This tendency is worse in rural areas.

[33] National Nutrition Strategy and Action Plan 2021-2025, Nutrition Program, Ministry of Health, Bhutan:2021.
[34] Stunting is a condition in which a child is short for his or her age and occurs when a child is chronically undernourished during the first 1,000 days of life, from conception to the age of two. Stunting can have lifelong effects on a child's physical and mental development, especially cognitive development, and can hinder their learning and income potential in later life. Avoiding undernutrition during the first 1,000 days of life is, therefore, important not only for the individual child, but also for the economic and social activities of the country.
[35] UNICEF, the World Health Organization, and the World Bank Group evaluate countries on a six-point scale according to the percentage of stunting in children under 5 years old. The six levels are: extremely high (more than 30%), high (20% to 30%), medium (10% to 20%), low (2.5% to 10%) and very low (less than 2.5%). (UNICEF. WHO. World Bank Group. 2021. Joint Child Malnutrition Estimates)



Source: MoH. 2015. National Nutrition Survey

Figure 3-23 Malnutrition among children under five years old by region

Table 3-13 Nutritional status of children under five years old (Bhutan)

Stunting (%)				Overweight (%)				Wasting (%)			
2012 value	2020 value	2020 threshold	Progress Assessment	2012 value	2020 value	2020 threshold	Progress Assessment	Year	Value	Threshold	Progress Assessment
30.2	22.4	**High**	On track	6.1	5.1	**Medium**	Off track (Some progress)	2010	5.9	**Medium**	Assessment not possible

Source: United Nations Children's Fund (UNICEF), World Health Organization, International Bank for Reconstruction and Development/The World Bank. Levels and trends in child malnutrition: key findings of the 2021 edition of the joint child malnutrition estimates. Geneva: World Health Organization; 2021.

In addition, the aforementioned 2015 National Nutrition Survey revealed a correlation between dietary diversity and household economic status, confirming that wealthier households are better able to ensure dietary diversity. Therefore, poverty reduction can contribute to improving the nutrition status of the population.

(2) Micronutrient Deficiency

Symptoms that may be due to micronutrient deficiency are particularly prevalent in children and women. The 2015 National Nutrition Survey confirms the need to continue addressing anemia, although there has been some improvement in the prevalence during the last decade: 44% of children under five years old, 31% of women aged 10-19, and 35% of women aged 15-49 are reported to be anemic, with higher rates in urban areas.

The 12th Five Year Plan 2019-2023 also points out that vitamin deficiency symptoms are common among the population, with cases of vitamin B1 and B12 deficiency, in particular, being recorded every year since 1988. In schools, intermittent outbreaks of mouth ulcers among pupils have been recorded

and, when they occur, the symptoms have been treated with vitamin supplements. Although there are various hypotheses, the cause has not been identified yet.

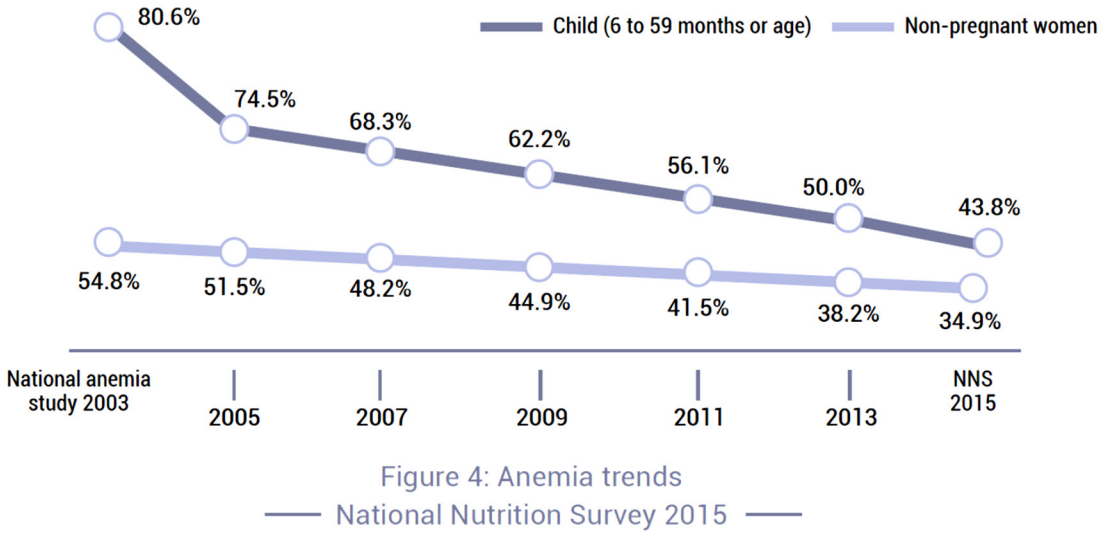


Figure 3-24 Trends in the Proportion of Women and Children with Anemia

Source: MoH. 2021. National Nutrition Strategy and Action Plan 2021-2025

(3) Over-Nutrition

In Bhutan, the number of cases of Non-Communicable Diseases (NCDs) has been increasing in recent years and is thought to be due to poor nutrition caused by changes in lifestyle and eating habits, and lack of exercise. The Ministry of Health (MoH) has reported that 71% of all deaths in Bhutan in 2019 were due to NCDs such as hypertension, cardiovascular diseases, cancer, and diabetes[36]. As a result of national efforts of fight against NCDs since 2009, the proportion of cases of hypertension and diabetes has been decreasing. Meanwhile the proportion of people consuming enough fruit and vegetables has been also decreasing, according to a comparison of the MoH STEPS survey results in 2014 and 2019 (Figure 3-25) and the proportion of adults who are overweight or obese has increased (Figure 3-26).

[36] Health Management and Information System (HMIS), MoH. 2019.

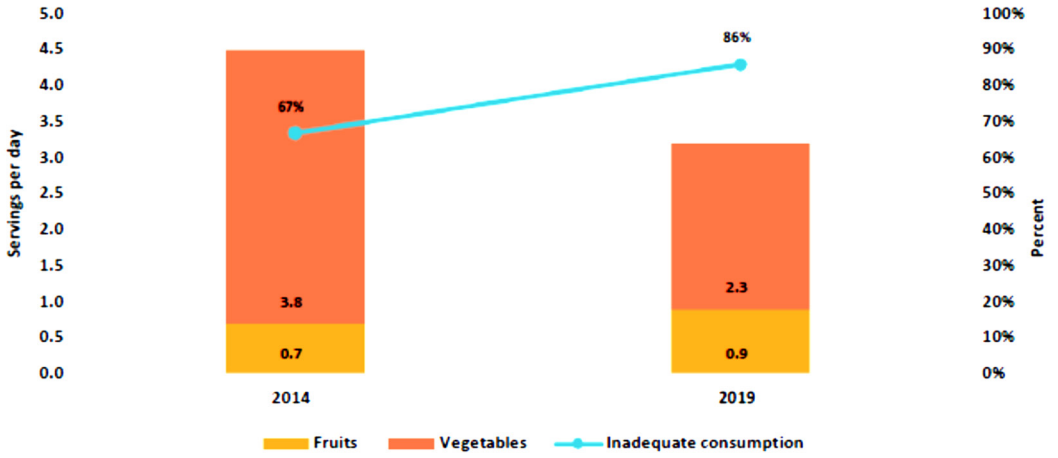


Figure 3-25 Fruit and Vegetable Consumption Trends Among Adults Aged 18-69 Years between 2014 and 2019

Source: Department of Public Health, Ministry of Health, (2020).

Non-communicable disease Risk Factors: Bhutan STEPS Survey 2019, Thimphu.

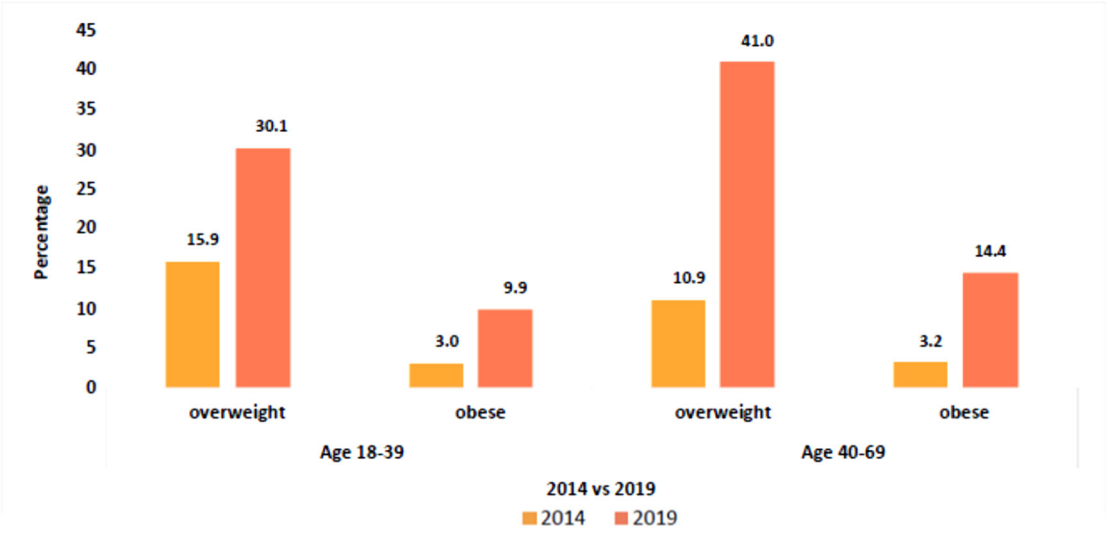


Figure 3-26 Comparison of the Proportion of Overweight and Obese People in the Adult Population Aged 18-69 between 2014 and 2019

Source: Department of Public Health, Ministry of Health, (2020).

Non-communicable disease Risk Factors: Bhutan STEPS Survey 2019, Thimphu.

In Bhutan, medical services are free of charge, but advanced medical care is not provided in the country. Therefore, patients who require advanced medical care, including those with advanced NCDs, are referred to medical facilities in India at the government's expense.

In 2006-2007, 529 patients were referred to Indian facilities at a cost of Nu. 81 million, but in 2012-2013, the number has risen to 1,047 patients at a cost of Nu. 180 million[37]. From the point of view of state finances, there is an urgent need for measures to prevent and control NCDs.

3.4.2 Current Situation and Challenges of Food Waste

The amount of food waste from households and vegetable retailers is not particularly high at present. However, with proper storage and processing of food at the producer, distribution channel, and consumer levels, it is possible to reduce the amount of food wasted further.

According to the United Nations Environment Programme, each Bhutanese person wastes 79 kg of food per year. This figure is not particularly high when compared to the average of 76 kg per person per year in upper-middle income countries, although it is not easily comparable due to differences in statistical methods between countries. However, it is higher than the annual per capita waste in South Asian countries and Japan (64 kg per capita per year), and there is room for improvement.

Table 3-14 Household food waste by country (Bhutan, Japan and South Asian countries)

Country		Household food waste estimate		Confidence level in estimate
		(kg/capita/year)	(tones/year)	
Bhutan		79	60,000	Very low
Upper middle-income countries		76	N/A	N/A
Japan		64	8,159,891	Medium
Other South Asian Countries	Afghanistan	82	3,109.153	Very low
	Bangladesh	65	10,618,233	Medium
	Bhutan	79	60,000	Very low
	India	50	68,760,163	Medium
	Iran (Islamic Republic of)	71	5,884,842	Very low
	Maldives	71	37,688	Very low
	Nepal	79	2,249,412	Very low
	Pakistan	74	15,947,645	Medium
	Sri Lanka	76	1,617,738	Medium

Source: United Nations Environment Programme (2021). Food Waste Index Report 2021. Nairobi

[37] The Multi-sectoral Action Plan for the Prevention and Control of Non-communicable Diseases in Bhutan (2015-2020). Royal Government of Bhutan 2015

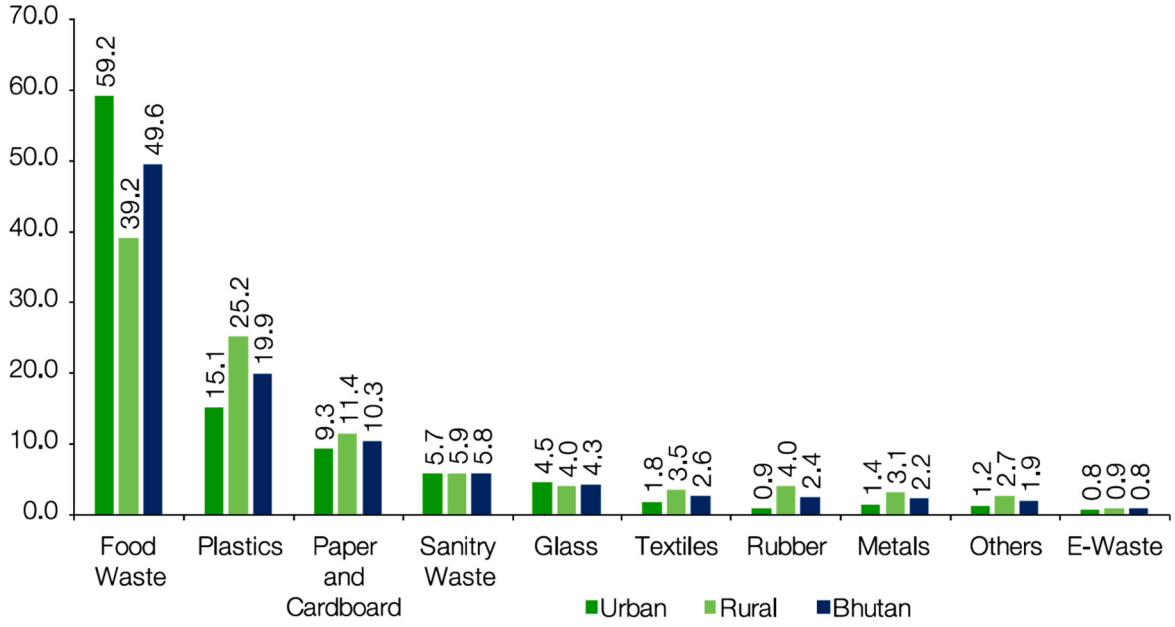


Figure 3-27 Composition of Household Waste

Source: National Statistics Bureau. 2019. Nation's Waste on the Scale: NATIONAL WASTE INVENTORY SURVEY

Bhutan's first waste survey was conducted in 2019 (National Waste Inventory Survey). About 81,000 kg of waste is generated daily by households across the country, with 0.7 kg of waste per household daily in urban areas and 0.4 kg of waste per household daily in rural areas. Food waste accounted for about 59.2% of total household waste in urban areas (0.41 kg per household daily) and 39.2% in rural areas (0.16 kg per household daily) (Figure 3-27).

In the schools visited by the JICA Survey Team in Trongsa and Thimphu, it was observed that the leftover food from school meals is recycled as feed for pigs kept at the school or by nearby farmers. This type of recycling is also an effective way of reducing food waste.

3.4.3 Current Status and Challenges of the Bhutanese Government's Approach to Nutrition

(1) Promoting Behavior Change

The triple burden of malnutrition can be attributed to the fact that the public is not sufficiently informed about nutrition and how to improve it. It is important that people who are currently experiencing the triple burden of malnutrition change their dietary habits. In order to achieve this, it would be effective to apply Social and Behavior Change Communication (SBCC), which has been developed and applied as a tool for infection prevention in public health.

The National Nutrition Strategy and Action Plan 2021-2025 also includes the development and promotion of an SBCC strategy in its Action Plan, and as of 2021, RGoB, led by the MoH, MoE and MOAF, is trying to develop an SBC strategy with technical support from the WFP.

On the other hand, the ongoing Food Security and Agriculture Productivity Project (FSAPP) with support from the Global Agriculture and Food Security Program (GAFSP) and the World Bank. The DOA-MOAF, with technical support from FAO and others, already developed a Behavior Change Communication (BCC) strategy and materials in collaboration with the MoH, MoE, BAFRA and ICTD-MOAF. The MoE and MoH have also been practicing nutrition education to the beneficiaries of their ministry's services in school education and in health centers and hospitals, respectively, and have developed and used the materials. For future development of an SBCC strategy and materials, it will be important to build on the existing strategies and materials, making necessary improvements and updates, and to harmonize the content of the materials so that all RGoB ministries and agencies can use them as needed.

The opportunity for awareness, knowledge, concrete and feasible measures and the social norms can be pushing factors for behavior change. As the first step for behavior change, the target populations should have an opportunity to look back objectively at their current practices and recognize that some or all of their practices need to be improved. After having such an awareness, it is also important that they have concrete and feasible means for improvements, together with knowledge of the reasons why they should do it. The existence of social norms which acknowledge the changed practices as good behavior will also encourage the people to change their behavior.

In order to prepare the social norms, SBCC not only for the target populations but also for all the population should be taken. Because, even if mothers are responsible for making their children's complementary food, they may not have the decision-making power to decide what ingredients to buy. Likewise, those adults who are reluctant to change their diet and lifestyle, if their children suggest, may be motivated for required changes.

A sample of the school lunch served at Wangbama Central School. From the front: white rice, fried egg, potato, and cheese curry (kewadatsi) and chickpea soup (dal).

(2) School Feeding Program

RGoB has been promoting the provision of school meals with locally produced foodstuff since 2012. After the transitional period of the handover of the program from the United Nations World Food Programme (WFP) to RGoB, which was concluded in 2018, the number of schools served with the School and Hospital Feeding Program (SHFP) of RGoB has been increasing every year. As of 2019, a total of 86,913 pupils (41,737 boarding pupils eating three school meals a day, 25,940 commuting pupils eating two school meals a day and 19,236 pupils eating one school meal a day[38]) were eating school meals every day. In the 2020-2021 school year, 162 new

[38] MoE. 2020. Annual Education Report 2019 – 2020. According to WFP, a total of 102,000 pupils have already benefited from the project as of 2021.

schools were supplied by 281 nearby farmer groups, and 167 schools already in the program renewed their growing and supply contracts with a total of 343 nearby farmer groups[39].

However, the current system does not promise its sustainability. SHFP, launched by the Prime Minister's Government Executive Order dated 18 September 2019, uses student stipends to purchase food. In order to meet the nutritional requirements of the students, schools strive to have the necessary ingredients to prepare school meals according to the menus designed by MoE and MoH. However, due to budgetary constraints, not all required fresh produce can be purchased from nearby farmer groups at the same or better prices than those at local markets. Rather, some ingredients are bought at lower prices than those at the local market. Or some ingredients are cut back to meet the ends. In other words, schools are not always an attractive market for farmer groups who are able to ship their produce to nearby markets by themselves. To secure the supply of perishable food items to the schools, some farmers are persuaded to contribute to schools as a way of fulfilling their social responsibility. On the other hand, although schools keep trying to provide school meals, as a result of cutting back on ingredients, meals may not meet the nutritional requirements of students any more[40].

Following a proposal from MoE, in January 2020 the RGoB increased the monthly stipend for school meals per student by 50% to support the purchase of produce of local farmer groups. The table below shows the monthly amount of the stipend after the increase and the percentage of the amount paid to FCBL and local farmer groups. No further increase in stipend is expected for the next few years, and both schools and farmer groups are required to have skills to manage their businesses within the current amount.

Table 3-19 Monthly Stipends per Student and Their Breakdown

Type of schooling	Meal frequency	Stipend/ Student/ Month（Nu.）	Payment proportion to FCBL（Nu.）	Payment proportion to Farmer Groups/ FMCL/ BLDCL（Nu.）
Boarding	3 meals/ day	1,500	600	900
Day schooling	2 meals/ day	1,000	400	600
	1 meal/ day	500	200	300

Source: DAMC-MOAF

[39] MOAF. 2021. School and Hospital Feeding Program Annual Report 2020-2021

[40] The schools we visited reported that eggs, meat, and fruit were served only once a week, although they are supposed to be served three times a week each, according to the menu set by the Ministry of Education and the Ministry of Health.

The agencies involved in SHFP, and their roles are shown in Table 3-20. MoE, in consultation with MoH, determines the nutritional requirements of the students, and FCBL, a state-owned company, purchases 9 non-perishable products, including fortified rice and oil, in bulk and delivers them to the schools on a quarterly basis. On the other hand, it is recommended that schools purchase fresh produce directly from local farmer groups through contract farming. Only those crops not produced by local farmer groups are purchased by FMCL, and those livestock products which are not produced by local farmer groups can be purchased by BLDCL. Both FMCL and BLDCL are expected to deliver the ordered food items to schools[41].

Fortified rice and oil provided by FCBL

Table 3-20 Division of Labor between Agencies Involved in SHFP

Agency	Terms of Reference
DOA	1. DOA shall Assist FGs/Coops/FMCL farms in developing a production plan for fulfilling the SHFP requirement of fruits & vegetables. 2. DOA shall provide production inputs and technical support for off-season production and protected cultivation of vegetables for the FGs/Coops, LUC, youths, and private parties involved in commercial farming. 3. DOA shall provide inputs and technical support to the FGs/Coops, LUC, youths, and private parties for the processing of fruits and vegetables into dried/frozen/dehydrated products. 4. DOA shall undertake capacity development of farmers/extensions or other parties involved in commercial farming mainly focused on off-season and protected vegetable production techniques. 5. DOA shall provide information on the production status of fruits & vegetables to the concerned agencies. 6. DOA through the DAOs and the Gewog Extension officers shall monitor the production farms to assist the BAFRA officials in verifying the origin of the produces being supplied. 7. The concerned Gewog Extension Officers shall countersign the Certificate of Origin for the fruits and vegetables being supplied to the schools and the hospitals.
DAMC	1. DAMC shall identify potential schools/hospitals and FG/Coops for the linking program in close collaboration with MoE and MoH. 2. DAMC shall conduct preliminary Business to Business (B2B) Meetings. 3. DAMC shall draw a Contractual Agreement between the FG/Coop and Schools/hospitals. 4. DAMC shall share Contractual Agreement with the agencies concerned for them intervention and support. 5. DAMC shall monitor the progress of the linking program. 6. DAMC shall build the capacity of FGs/Coops. 7. Wherever required, DAMC shall mobilize and form new FGs/Coops. 8. DAMC shall provide transportation support based on critical needs during the initial phase. 9. DAMC shall provide support such as packaging materials. 10. DAMC shall provide financial support for infrastructure requirements to FGs/Coops.

[41] In the fiscal years 2019-2020 and 2020-2021, both FMCL and BLDCL received budgetary allocations for the development of the structures and facilities required for the implementation of the School and Hospital Feeding Programme. However, there was no budgetary allocation for the implementation of the program in 2021-2022 to the two state-owned enterprises

Agency	Terms of Reference
DAMC as Nodal Agency	1. DAMC shall be the first point of contact for all matters related to the feeding program. 2. DAMC shall facilitate program coordination (follow-up meetings, development of guidelines, visits) related to schools/Hospitals feeding programs. 3. DAMC shall review the program annually and generate a report with recommendations. 4. DAMC shall coordinate any ad hoc activities that are not reflected in the ToR of other agencies. 5. DAMC shall ensure demands from schools & hospitals are communicated well in time to the line departments (DOA & DOL) and SoEs (FCBL, FMCL & BLDC).
DOL	1. DOL shall assist and coordinate with Dzongkhag Livestock Sector & BLDCL in developing a production plan for fulfilling the schools and hospitals feeding requirement of Livestock commodities on a regular basis. 2. DOL shall provide technical and administrative support to the Dzongkhags, youths, SOEs & private parties involved in commercial farming for the production of livestock commodities for supply to schools and hospitals. 3. DOL shall coordinate farm inputs support to Dzongkhags, youths, SOEs & private parties for the production of livestock commodities. 4. DOL shall develop the capacity of farmers/extensions or other parties involved in commercial farming for increasing production. 5. DOL shall part take in monitoring and evaluation of the schools and hospitals feeding program in collaboration with relevant agencies. 6. DOL shall liaise with relevant stakeholders to fulfill the demand for livestock commodities of the schools and hospitals. 7. The concerned Gewog Extension Officers shall countersign Certificate of Origin for the livestock products being supplied to the schools and the hospitals.
SHND, DoSE, MoE	1. SHND shall be the nodal agency under the MoE for the supply of food items to the schools. 2. SHND shall secure the required budget for the purchase of food items and process-related payments to Food Corporation of Bhutan Limited (FCBL) /schools in time. 3. SHND shall submit the annual list of schools along with student beneficiary numbers to all concerned agencies. 4. SHND shall put up a bi-annual requisition for food items to the MOAF/FCBL. The requisition must be submitted at least six months in advance for effective production planning. 5. SHND shall facilitate the linking of FGs/Coops to the schools. 6. SHND shall provide administrative support to the MOAF, and other relevant agencies involved in SHFP. 7. SHND shall monitor the timely supply of food to schools and provide feedback to FCBL, MOAF, and other stakeholders. 8. SHND shall issue quarterly Food Release Note (FRN) to the FCBL for the supply of food items to the schools. 9. SHND shall ensure that all basic amenities are put in place at the schools for effective and successful implementation of the SHFP.
BAFRA	1. BAFRA through its field officers based in the Dzongkhags shall be responsible for regular monitoring of the quality of the food supplies being made to the schools & hospitals. 2. BAFRA shall verify and issue the Certificate of Origin for the food items to ensure that local produces are being supplied. 3. BAFRA shall inspect the store and the kitchen conditions at the schools and hospitals on a regular basis.
MoH	1. MoH shall ensure the successful implementation of the action plan in the health facilities. 2. MoH shall provide compiled total food quantity requirement projection every six months to the MOAF. 3. MoH shall provide weekly food demand requests through its health facilities to their respective food suppliers. 4. MoH shall provide feedback on the acceptability of the food items. 5. MoH shall provide feedback and participate in the review of the action plan.
DoEHR	1. DoEHR shall facilitate and assist in engaging youths in the agriculture sector with collaboration with Dzongkhag Administration under LUC, Youth groups, and through SoEs.
FCBL	1. FCBL shall continue to supply non-perishable items. 2. FCBL shall make concerted efforts in making supplies with local produce wherever possible to substitute imports.

Agency	Terms of Reference
	3. FCBL shall import the deficit supplies upon approval from the nodal agency within the MOAF. 4. FCBL shall provide cold chain services (cold stores & refrigerated vans). 5. FCBL shall ensure a timely supply of quality food items. 6. FCBL shall work in close coordination with all relevant agencies.
BLDCL	1. BLDCL shall focus on supplying quality livestock inputs to individual farmers, groups, and cooperatives to replenish as well as increase production. 2. BLDCL shall facilitate the marketing and mobilization of livestock products (Meat, Eggs, and Dairy Products) from source to distribution points. 3. BLDCL shall ensure appropriate and required cold chain facilities and logistics are in place from source to distribution centers. 4. BLDCL shall strengthen and engage in contract farming and other contractual agreements with the farmers, youths, relevant SoEs, and government agencies. 5. BLDCL shall facilitate and expedite in developing competitive pricing for all stakeholders. 6. BLDCL shall liaise with relevant stakeholders to fulfill the demand for livestock commodities.
FMCL	1. FMCL shall collect and supply fruits and vegetables from agricultural producers within Dzongkhag or inter Dzongkhag. 2. FMCL shall supplement the seasonal deficit requirement of farm produce through its farms. 3. FMCL shall study & process means for value addition and processing for off seasonal supply. 4. FMCL shall supplement off seasonal requirements through contract farming with agricultural producers and its own farms.

Source: DAMC-MOAF

The JICA Survey Team visited two schools in Trongsa district (Serubling Central School and Taktse Central School) and one school in Thimphu district (Wangbama Central School) and interviewed teachers, students, cooks, and leaders of the farmer groups supplying the schools. The interviews showed that the reality of school feeding varies from Dzongkhag to Dzongkhag. Even though livestock products of local farmer groups are available, some schools are not allowed to purchase livestock products from farmer groups being encouraged to buy products from BLDCL. In one Dzongkhag, schools are allowed to buy food only from those farmer groups existing in the same Gewog, while in another Dzongkhag, one farmer group supplies produce to several schools spread over several Gewogs. It was also observed that the school meal menu varies from school to school, as shown in the photo on the right.

Mess Menu
Sherubling Central School

Sl.No.	Day	Breakfast	Lunch	Evening Tea	Dinner
1	Monday	Rice, Rajma Dal	Rice, mixed Vegetable, Milk	Seasonal Fruit	Rice Potato fried with Chana
2	Tuesday	Rice mixed with Spinach and Chana	Rice, Meat and Mixed Vegetable Curry, Pumpkin Soup (Soya Chunk) with Mixed Vegetables for Vegetarian	Milk Tea	Rice, Mixed Vegetable with Dal
3	Wednesday	Rice mixed with Egg and Carrot	Rice, Slippery gourd and potato Datshi and Dal	Milk Tea	Rice, Chana and Saag Curry and Potato with Spinach Soup
4	Thursday	Rice, Cabbage, Carrot Chana Fried Rice	Rice, Egg Curry, stirred fried vegetables with Dal	Milk Tea	Rice, Pumpkin, Potato, Broccoli curry with Dal
5	Friday	Soya Chunk fried rice with Milk	Rice, Chana and Spinach curry with Dal	Milk Tea	Rice, Stirred fried mushroom & cabbage with Dal
6	Saturday	Rice Rice, Lentils and Spinach	Rice, Mixed Vegetables with Rajma Dal	Milk Tea	Rice, Mixed Vegetable and Dal
7	Sunday	Rice mixed with Egg and Cabbage with Soup	Rice, Mixed Vegetable Curry, Pumpkin mixed with Dal	Milk Tea	Rice, Mixed Vegetable curry with Dal

Recommended Standard Menu based on the Nutritional content analysis: 2021

Meals	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Breakfast	Cabbage fried rice with Milk/Yoghurt	Mixed vegetable fried rice with boiled egg	Chana fried rice with soup	Mixed vegetable fried rice with boiled water	Mixed Carrot & Spinach fried rice with & Soup	Mixed vegetable & soya chunk fried rice & boiled water	Mixed vegetable Fried rice, boiled water
Lunch	Rice, Mixed vegetable, & Dhal	Rice, Chicken/fish & Panner & Dhal	Rice, stir fried vegetables & Dhal	Rice ,Egg curry/ mushroom/stir fried vegetables & Dhal	Rice, Beef/Pork& Panner & Dhal	Rice, mixed vegetables, & Dhal	Rice, fried egg Mushroom/mixed vegetables, & Dhal
Dinner	Rice, Mushroom Datse & Dhal	Rice, mixed vegetable & Dhal	Rice, Kewa/beans Datse, & Dhal	Rice, mixed Vegetables, & Dhal	Rice, mixed Vegetables, Soya chunk, & Dhal	Rice, Aludam, & Dhal	Rice ,Mixed vegetable & Dhal
Evening Tea	Milk tea						

Note: Fruits will be served every week (Banana/Cucumber/Water melon/Apple/Oranges)
Yoghurt & Milk will be served alternative in a ~~month~~ Week

VICE PRINCIPAL
Wangbama Central School
Thimphu Dzongkhag

The Weekly School Meal Menus of Serubling Central School, Trongsa Dzongkhag (above) and Wangbama Central School, Thimphu Dzongkhag (below)

In preparation for the new school year starting in February, each school signs an annual cultivation and supply contract with the farmer groups in October every year. Table 3-21 shows the details of the contracts for the 2022 academic year with the farmer groups of Sherubling Central School and Taktse Central School in Trongsa Dzongkhag. It illustrates that the unit price of each vegetable as well as available vegetables differs from Gewog to Gewog, even within the same Dzongkhag.

The contract agreements are renegotiated and renewed on annual basis. The unit price to be paid by the school for each crop is fixed through the following school year (February to December) by signing the contract by both parties. The crop prices are not affected by fluctuation of market prices during the same period. Whether the Farmer Groups get benefit from the fixed prices or not depends on the circumstances.

Table 3-15 Contracted Price per Crop in Two Schools in Trongsa District (2022)

No.	Item	Agreed price (Nu./kg) at Sherubling CS	Agreed price (Nu./kg) at Taktse CS	Price at the Trongsa District Market as of November 4, 2021 (through Hearing from the vendors) (Nu./kg)
1	Potato	40	40	40
2	Cabbage	25	24	40
3	Radish	12	24	50
4	Green Chili	80	120	100
5	Cauliflower	55	44	N/A
6	Brinjal	35	24	N/A
7	Beans	55	60	N/A
8	Broccoli	55	60	100
9	Pumpkin	18	20	50
10	Saag	25	24	20
11	Ginger	150	110	200
12	Garlic	150	N/A	400
13	Coriander	100	100	100
14	Squash	12	10	N/A
15	Carrot	45	40	50
16	Peas	40	40	N/A
17	Pointed Cord	25	20	N/A
18	Onion	70	N/A	80
19	Tomato	80	N/A	100
20	Egg (Carton)	2310	220*	2800
21	Butter	400	220*	N/A
22	Cheese	60	44	N/A
23	Dry Chili	1100	N/A	750
24	Chicken	N/A	N/A	N/A
25	Fish	N/A	N/A	N/A
26	Boneless Beef	N/A	N/A	N/A
27	Pork	N/A	N/A	N/A
28	Cucumber	35	20	N/A
29	Orange (pon)	150	N/A	150
30	Garlic leave	90	40	N/A
31	Spring Onion	90	40	100
32	Green Chili (small)	150	120	N/A
33	Banana (Dozen)	100	N/A	150
34	Plum	100	N/A	N/A
35	Peach	200	20	N/A
36	Ground Apple	65	40	N/A
37	Persimmon	N/A	N/A	100
38	Pear	180	N/A	N/A
39	Watermelon	80	N/A	N/A
40	Guava	150	N/A	N/A
41	Apple	150	N/A	150
42	Papaya	N/A	N/A	N/A
43	Milk (Liter)	60	44	N/A
44	Lady Finger	N/A	N/A	N/A
45	Yogurt (700 ml)	30	20	N/A
46	Oyster Mushroom	N/A	N/A	N/A
47	Local Paneer	N/A	440	N/A
48	Lettuce	N/A	20	N/A
49	Turnip	N/A	10	N/A
50	Bitter Gourd	N/A	N/A	N/A

Source: Serubling CS, Taktse CS, and hearing at the Trongsa Dzongkhag vegetable market

The framework of farmer groups is highly elastic or flexible, and there may be several sub-groups within a farmer group, and the supply of agricultural produce to schools may actually be carried out on a sub-group basis. In some cases, when a farmer group is unable to supply the required crops a school for some reason, the farmer group communicates with other nearby groups and fulfills the contract by borrowing or buying the produce of others.

(3) Multi-Sector Coordination Function

The major nutrition-related policies and plans of RGoB over the past ten years are shown in Table 3-16. The government's policies and plans consistently advocate the need for multi-sectoral initiatives to improve nutrition, and so far, several initiatives have been concurrently implemented by several multi-sectoral government ministries and agencies. However, there remains room for improvement in the coordination mechanism if it is to be more effective and efficient.

The nature of the nutrition sector requires the consolidation of efforts of different ministries and agencies. This has resulted in which institution is responsible for impact, results, or progress of the entire sector is not always clear, although the distribution of roles among the ministries and agencies are clear.

Likewise, the coordination mechanism between these task forces and technical committees remains informal or does not exist. In general, nutrition improvement programs involve several ministries and agencies, and for each program or plan, a task force or technical committee tends to be formed with relevant ministries and agencies, under the chair of the ministry in charge.[42]. Each task force or technical committee meets several times a year to review progress and challenges of the program or plan, and to reach a consensus on future plans. Due to the limited number of government officials, the same officers attend the meetings of different task forces. They may facilitate the coordination and collaboration among different task forces informally, however, there is no official mechanism to coordinate among different task forces and technical committees.

In 2021, the National Nutrition Strategy and Action Plan (2021-2025) (NNSAP) was formulated under the leadership of MoH, and a new task force was established to implement NNSAP. This new strategy is a comprehensive response to the nutrition sector of Bhutan. Some activities listed in NNSAP already have the ad-hoc task forces, but the relationship and coordination mechanisms between these existing task forces and the NNSAP task force are not clear.

[42] National Nutrition Task Force、School and Hospital Feeding Program Technical Committee、School Agriculture Program Task Force、Food Fortification Task Force、SBCC Task Force がある。

Table 3-16 RGoB Policies and Plans Related to Nutrition Improvement

No.	Relevant Policy, Strategy, Plan	Year of publishment	Institution in charge	Outline
1	National Policy and Strategic Frame-Work on Prevention and Control of Non-Communicable Diseases	2009	RGoB, MoH	The policy covers the period of the 10th Five Year Plan and sets out measures to achieve the following five objectives. It clearly states that multispectral efforts are required to achieve these objectives. (1) To raise awareness of NCDs and advocate for their prevention and control; (2) To promote specific measures and interventions to reduce major risk factors for NCDs namely: harmful alcohol use, tobacco consumption, unhealthy diets, and physical inactivity and their determinants among the population; (3) To promote effective partnerships for the prevention and control of NCDs including injury control and safety promotion; (4) To develop appropriate treatment and rehabilitation facilities with necessary skilled human resources, and (5) To scale up research for prevention and control of NCDs and their risk factors.
2	Food and Nutrition Security Policy of the Kingdom of Bhutan, 2014	2014	RGoB	"All people living in Bhutan at all times have physical, economic, and social access to safe and adequate nutritious food for a healthy and active life contributing to the realization of Gross National Happiness" In order to achieve the above vision, the activities and methods are defined according to the four pillars of food security (Availability, Access, Utilization and Stability). With regard to the Utilization pillar, which is particularly relevant to the nutrition sector, the report states that nutrition education and awareness-raising activities will be conducted to convey the importance of ensuring appropriate eating habits and dietary diversity, and to promote the dissemination of appropriate dietary content and methods to mothers and children.
3	The Multisectoral National Action Plan for The Prevention and Control of Noncommunicable Diseases [2015-2020]	2015	RGoB	It is a national plan for the prevention and control of NCDs, developed under the auspices of WHO, and aims to "Attainment of the highest standard of physical, mental and social wellbeing for all Bhutanese by adopting healthy lifestyles and reducing exposures to risk factors that contributes to NCDs". The Bhutan Health Promotion Board (BPHB) is responsible for this plan and says that for the prevention and control of NCDs multi-sectoral effort is needed, with the lead of MoH. BPHB specifically asks MOAF to contribute to improving public access to fruits and vegetables.
4	National Health Promotion Strategic Plan 2015-2023	2015	MoH	The plan is designed to promote health and wellbeing at all ages in the country and advocates raising awareness among all the population from parliamentarians to community residents to prevent NCDs and improve nutrition.
5	Twelfth Five Year Plan 2018-2023 （Volume I & II）	2018	GNHC	MOAF will be in charge of food and nutrition security and will work to increase production, while MoE will contribute to improving the nutrition of children and students through school feeding; the MoH will work to improve the health, water, and sanitation to improve nutrition.

No.	Relevant Policy, Strategy, Plan	Year of publishment	Institution in charge	Outline
6	Comprehensive Development Plan for Bhutan2030	2019	Ministry of Works and Human Settlement	The Plan states that the Government will promote the importance of nutrition as well as the diversification of diet. Since the nutrition improvement is important for Bhutan's national policy and the SDGs, the plan promotes the revision of dietary habits of the population. o
7	Food and Dietary Guidelines for School-Aged Children in Bhutan	2019	MoE	These food and dietary guidelines for school meals and individual family meals for children aged 4-17 years explain the nutrients and nutrient functions of each of the main food groups. It also provides detailed information on micronutrients, the recommended daily intake of each food group and its calorie and protein content. The guidelines are comprehensive and include information on food hygiene.
8	Accelerating Maternal and Child Health Policy 1000 Days Plus	2020	MoH	A policy to promote cash transfers to eligible pregnant and nursing mothers to increase pre- and post-natal health check-ups, immunization rates for newborns as well as to promote breastfeeding. The policy also promotes nutritional counselling during antenatal check-ups and the supply of micronutrient powders to infants.
9	National Nutrition Strategy and Action Plan (2021-2025)	2021	MoH	It is a five-year strategy and action plan that aims to improve the nutritional security of people at high risk of malnutrition, including children, women, adolescents and girls, and older people, through multi-sectoral efforts to achieve national or global targets of nutrition for all age groups by 2025. It aims to achieve its objectives through the achievement of eight strategic outcomes. The National Nutrition Task Force, comprising representatives of relevant agencies, is the governing body for the implementation of the Strategy and Action Plan.
10	Bhutan National Pathways Food Systems for Gross National Happiness Transformative Pathways for Bhutan	2021	MOAF	A strategy document submitted by MOAF to the UN Food System Summit in September 2021, which aims to achieve a carbon-neutral, environmentally friendly, impact and climate-resilient and performing food system by 2030. To achieve this goal, it sets out eight pathways and lays out a list of priority activities to be implemented between 2022 and 2024. In particular, the sixth pathway, BOOST NUTRITION POSITIVE INITIATIVES, calls for the promotion of locally produced and locally consumed school meals, the promotion of fortified crops, and education to change people's behavior.

Source: JICA Survey Team 2021

3.4.4 Interventions from Development Partners

WFP is one of the major development partners intervening in the agriculture, food system, and nutrition sectors of Bhutan. Since the scope and direction of WFP's assistance in these areas are similar to this JICA survey, JICA and WFP will keep exchanging information in the formulation of new projects and seek a clear division of labors.

Since the end of food supply for the school feeding project in 2018, WFP has been engaged in a strategic restructuring and deliberately shifting its position to a technical advisor to RGoB. WFP's planned activities in Bhutan from 2019 to 2023 are shown in the table below.

Table 3-17 Activities of UN-WFP in Bhutan

Related Country Strategy/ Plan		**United Nations Sustainable Development Partnership Framework for Bhutan 2019-2023** ◆ OUTCOME ONE: Enhanced access to and use of reliable and timely data for inclusive and evidence-based policy and decision-making ◆ OUTCOME TWO: Vulnerable and unreached people access and receive quality health, nutrition, protection, education, water, sanitation, and hygiene services
		WFP Country Strategic Paper 2019-2023 ◆ Strategic outcome 1: School-age children, women and vulnerable groups in Bhutan have improved nutrition in line with national targets by 2023 ◆ Strategic outcome 2: The government has strengthened its capability to address food security and nutrition challenges and prepare for and respond to crises, including those resulting from climate change, by 2023
Ongoing Project	Name	The transition to the National School Feeding and Nutrition Programme
	Period	2019 to 2023
	Target areas	N/A
	Financing Organization	KOICA, Australia, Canada, Prívate Sector
	Technical Assistance Organization	WFP
	Government Institutions	[LEAD] School Health and Nutrition Division (SHND) of the Ministry of Education [COLLABORATORS] ◆ Ministry of Agriculture and Forests (Department of Agriculture and Department of Agricultural Marketing & Co-operatives) ◆ Ministry of Health (Nutrition Division) ◆ Bhutan Agriculture and Food Regulatory Authority (BAFRA) ◆ Food Corporation of Bhutan Ltd (FCBL)
	Total Budget	USD 4 million
	Purposes	To address the double burden of malnutrition by focusing on the reduction of micronutrient deficiencies, as well as over-nutrition and non-communicable diseases (NCDs) related to poor diets, alcohol, tobacco, and lack of physical activity
	Expected Outputs/ Components	◆ Quality of education is enhanced through safe and healthy schools that have the required infrastructure and tools to implement a School Nutrition Programme with improved school meals and integrated nutrition and health education. ◆ Farmers (men and women) linked to the school meals market have increased income and provide fresh food to diversify the school meals menu. ◆ Improved dietary and health practices among students to contribute to addressing the proliferation of non-communicable diseases in Bhutanese schools, their family, and the community.
	Remarks	◆ The project introduces the Menu Optimizer Tool that through an algorithm calculates the most nutrition-rich menu at the lowest cost and with the highest proportion of local food. ◆ WFP will also launch a digital game-based learning platform to support more interactive and engaging nutrition and health education for schoolchildren. ◆ WFP initiated a partnership with the World Bank, the International Fund for Agricultural Development (IFAD), and the United Nations Food and Agriculture Organization (FAO) to strengthen the Government's capacity to link smallholder farmers to schools

Source: WFP 2019

An evaluation consultant team was hired in October-November 2021 to assess the results of WFP's transformation from 2019 onwards and to develop a strategy for future activities. The evaluation report is expected to be published in April 2022, but as of November 2021, the following four activities have been proposed as necessary to improve the agriculture and food system of Bhutan.

(i) Promotion of DX in market information services

(ii) Strengthening the functioning of farmer groups (including empowerment of women's groups)

(iii) Strengthening the value chain, including support for entrepreneurship.

(iv) Strengthening the supply chain through enhanced transport and market facilities.

Cooking at Taktse Central School, Trongsa. Firewood is also purchased. The kiln is set up in a building with no walls to prevent smoke build-up.

Since the contents of these proposals presented by the evaluation team are similar to those presented by the JICA Survey Team in terms of both the target and the direction of future support, it is necessary to coordinate roles and cooperation between WFP and JICA.

Regarding the SBCC, WFP is in the process of hiring a consultant and will develop the SBC strategy in consultation with MoH, MOAF, and MoE.

The school meal menu optimization tool, PLUS, has already been piloted in 3 Dzongkhags (Zhemgang, Trongsa, and Wangdue) in 2021 and will be introduced in Haa from now on. It was reported that the introduction of the tool has made it possible to cut the budget by 15% while maintaining the diversity of the school lunch menu and that the results of the application on the ground have been positive.

WFP reported that the success and continuation of school feeding depend on: (1) infrastructure, including kitchens and food storage; (2) continued use of fortified foods; (3) the Tarayana Foundation, a Bhutanese NGO that is responsible for raising awareness among the population; (4) PLUS; (5) SBCC; (6) strengthening the capacity of government agencies; (7) Strengthening the supply chain; (8) Establishing an M&E system; and (9) Reflecting lessons learned from the field in policy and strategy.

Box: WFP's school meal menu optimization tool: PLUS

The WFP has an ad-hoc project to develop and apply PLUS, an online software for school meal menu optimization. Bhutan is one of the first countries to apply it in the world. WFP is working with MoE on the project with a plan to expand the project coverage over the country.
PLUS uses an algorithm to calculate the menu with the greatest nutritional value at the lowest cost while utilizing as much locally produced food as possible. It is expected to not only reduce the cost of school meals nationwide, but also revitalize local economies by promoting agriculture, increasing food self-sufficiency, and improving children's nutrition, through the application of this tool.

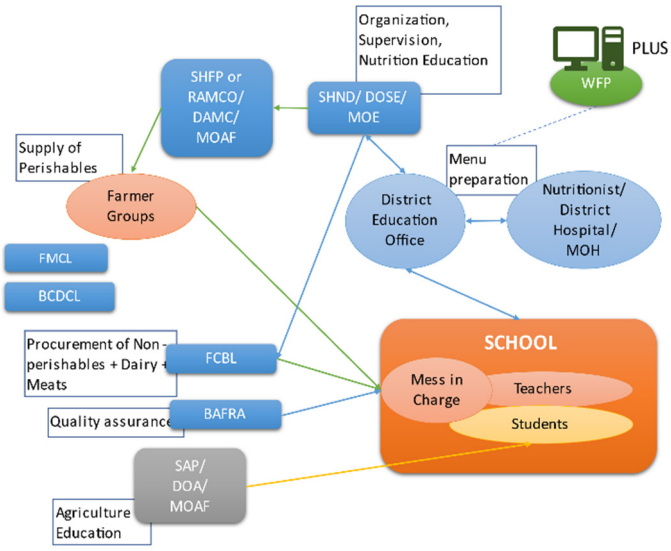


Figure 3.4.3 PLUS-based school meal delivery system
Source: JICA Survey Team. 2021.

3.5 Issues regarding the promotion of innovation in the agricultural sector

3.5.1 Policies for Promoting Innovation

This section summarizes past policies for promoting innovative technologies with a particular focus on the use of ICT.

The first plan for Bhutan's overall information technology policy was the "Computerization Master Plan 1997-2000", formulated in 1996, and "Bhutan, 2020", published in 1999, was the first to present the concept of Gross National Happiness (GNH). The "Bhutan Information Technology Strategy (BITS)," formulated in the same year as the "Bhutan, 2020", showed specific informatization issues and policies of the governments and private institutions in each sector.

The Ministry of Information and Communications (MoIC) was established in 2003 and released the Bhutan Information and Communications Technology Policy and Strategies (BIPS) in the following year. It advocates that ICT technology should be used to (1) promote good governance, (2) create a culture of free information sharing, and (3) create an environment for the use of advanced technology (revised in 2009).

In 2014, the e-Government Master Plan was in place to complement the 11th Five-Year Plan (FYP), and the e-Gov Program Management Office was established within MoIC to build governance. However, in the 12th FYP released in 2018, more attention was paid to creating ICT-based jobs, including entrepreneurship, and the use of ICT to improve the youth unemployment rate.

The application of ICT in the Ministry of Agriculture and Forests in the 12th FYP includes improving statistical systems such as the RNR census, uniformity of advisory and guidance services by extension officers, and use in dealing with all other related problems to agriculture. The identification

of specific issues and solutions are outlined in the Bhutan E-RNR Masterplan released in 2016 by the E-RNR Masterplan Task Force organized by the Ministry of Agriculture and Forests (MOAF), MoIC, FAO, and ITU. Under the slogan of "Achieving sustainable growth of the RNR sector and improving the socio-economic well-being of the people and the nation through the use of ICT by 2023," the document lists 12 specific ICT application issues and 36 comprehensive ICT solutions for the sector's challenges.

In addition, in its "Food Systems for Gross National Happiness Transformative Pathways for Bhutan" released in September 2021, MOAF listed "utilization of digital tools" as one of the eight pathways for building food systems. This prioritizes developing advisory services for agricultural technologies, early warning systems for disasters and pests' diseases, dynamic platforms for optimizing marketing systems, and strengthening statistical information.

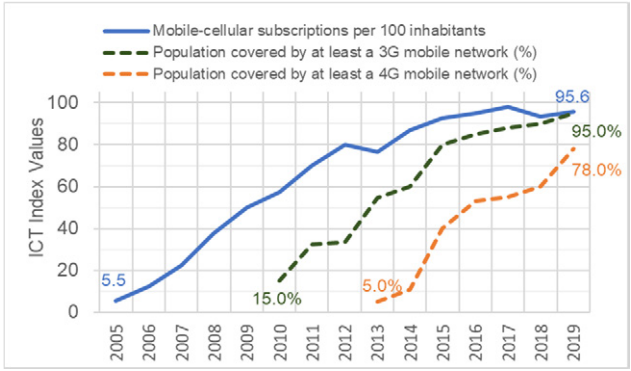


Figure 3-28 Mobile phone penetration rate and 3G-4G band coverage rate

Reference: ITU 2020

Table 3-18 Six Prioritized Actions in the E-RNR Masterplan

No.	Name	Description
1	Integrated Natural Resources Management Information System	Many types of data for agriculture such as land use, land cover, land degradation, soil map, land fertility, forest resources use, irrigation details, farm roads, etc. will be available with GIS data including high-resolution satellite images.
2	E-RNR Extension and Advisory System	To keep the reliability to the extension workers from farmers, any type of communication methods from paper-based, telecommunication, email to video-chat) will be available, which will support the monitoring activity of the farmer's cooperatives or other groups through the consulting. It will include the paid service.
3	Online RNR marketplace and Supply Chain Management Information System	This system will provide the e-market/mobile market, market information, and payment transaction systems for the national and international markets. It will also create a database for the storage and transportation providers.
4	M-banking/ Online transaction for agriculture services	Mobile Banking / Online Transaction systems related services for any agricultural input. A credit rating mechanism can be also developed.
5	RNR helpline	Technical advisory system using ICT tools such as specific applications, SMS, and email
6	Agrometeorological Information Services	Mobile applications to access weather information specialized to farming activity.

Reference: Bhutan E-RNR Masterplan (Bhutan E-RNR Masterplan taskforce, 2016)

3.5.2 Application Status and Issues on ICT and innovative technologies in Agriculture

(1) Status on ICT Development

As a result of the policies mentioned above, we will review the changes in indicators related to ICT penetration in Bhutan. The number of cell phone subscriptions per 100 people in 2005 was 5.5, but

by the end of 2019, it was 95.6, and 95.0% of the population now has access to 3G or higher broadband (78.0% for 4G). As of 2017, 71% of the urban population and 29% of the rural population had internet access at home, which is very different by location. In the field survey, it was confirmed that most of the farmers owned a smartphone. On the other hand, smartphones are primarily used only for voice messaging such as WeChat. The use of print information (browsing the Internet and exchanging text using SNS) is considered possible only for a limited group of people.

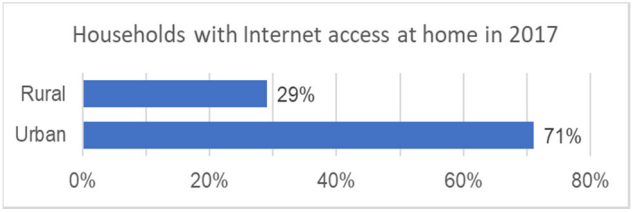


Figure 3-29 Percentage of homes with Internet access

Reference: ITU 2017

In addition, as a result of the promotion of ICT in the financial sector, the rapid penetration of mobile/internet banking payments in the country can be observed since 2018. According to the annual report of the Royal Monetary Authority of Bhutan (2020), the daily transaction limit has been revised (raised from 100,000 to 200,000 Nu (about 150,000 to 300,000 JPY) per day) in response to the preferences of the users, and mobile/internet banking is expected to become more prevalent in the future. Also, bank branches are expanding into rural areas, indicating that as long as people have an account, they can make payments using their mobile phones.

(2) Status of ICT human resource development

According to the annual report (2018-2019) published by the Department of Information Technology and Telecommunications (DITT) in MoIC, there are 2,616 human resources working in the IT sector in Bhutan, including 309 civil servants (of them, 10 employees in MOAF).

There is no data regarding the number of ICT human resources except for the report above. However, the Ministry of Education (MoE) intends to develop many human resources with ICT skills by providing ICT classes for students from Pre-Primary (PP) to Grade XII. According to an interview with the Gyalpozhing College of Information Technology (GCIT), about 80 graduates each year tend to work for overseas companies, and there is a need to expand the domestic market for IT and foster entrepreneurs.

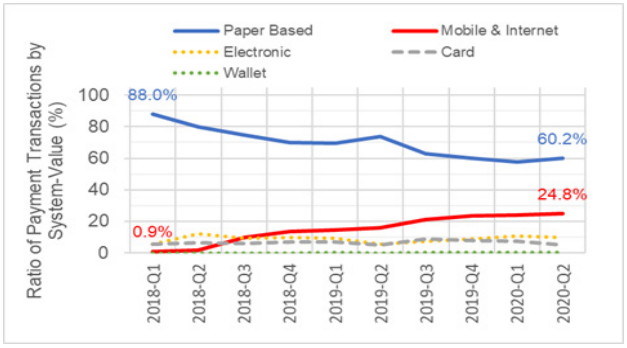


Figure 3-30 Trends in the percentage of payment methods used

Reference: RMA Annual Report 2020

Although most students in Bhutan aim to become civil servants, the number of new graduates seeking employment as government employees in the IT field in 2021 was only 15 (those are all by MoIC, and employment in ICTD, MOAF is about one person every five years). However, the number of employees in the MoIC which deals with ICT, is on a particular upward trend, with 133% (734) more

employees than in 2008 (Civil Service Statistics 2020). In addition, no impact of COVID-19 can be seen regarding the change in the number of civil servants.

Box: Gyalpozhing College of Information Technology (GCIT)

Established in 2017 in Mongar, this 304-student technical college currently offers two four-year programs, the BSc of Computer Science (BCS) and the BSc of Information Technology (BIT). BCS offers practical skills such as cloud computing, artificial intelligence, cyber security, information literacy, basic programming, IoT, and web application development (provided in cooperation with Mountain Hazelnuts Venture). With the help of an external consultant, classes on blockchain, deep learning, and big data processing will also be offered. On the other hand, BIT specializes in the use of computer technology in the media, providing technology for digital media development and computer graphics.

In the field of ICT in agriculture, the school is working with the Agricultural Research and Development Center (ARDC) to develop an automatic water supply system with IoT technology, an automated wildlife recognition system with AI image recognition, and electric fences with an alarm function for abnormalities.

The school aims to produce students with a technopreneurship spirit through technological innovation, providing them with practical technologies in both programs. In addition, the establishment of a start-up center is planned to support students' enterprises.

In addition, the university offers digital fundamental literacy courses of up to 30 days at a low cost for the general public, especially training for low-income groups such as farmers (9 students were taking the course at the time of the visit in November 2021). Likewise, GCIT also accepts employees of private companies for initial training (Bhutan Agro Industry Limited was receiving training at the time of the visit).

Box: College of Natural Resources (CNR)

It is an agricultural technology university located in Punakha with 1,017 students (as of 2021), offering practical skills (2 years) and academic expertise (2 years) related to the work of MOAF, such as Organic Agriculture, Forestry and Animal Science. In addition, the BSc in Sustainable Development and BSc in Environment & Climate Studies provide students with a wide range of knowledge and information analysis skills with an awareness of sustainable development (BSc in Agriculture will be discontinued in 2020 and integrated into BSc in Organic Agriculture).

With the improvement of youth unemployment and the growing need for food processing technology, the Food Science and Technology program was established in 2016. This program develops practical technologies with processing machinery in cooperation with agencies such as Bhutan Agro-Industries Limited the National Post Harvest Center. In 2017, the Agro-based Entrepreneurship Development and Incubation Centre (AEDIC) was established as part of the agribusiness entrepreneurship support program. AEDIC provides technical training (e.g., mushroom cultivation) and lectures on business financial management for students and graduates for about three months and introduces development banks such as CSI Development Bank and BDB as funding sources. However, the effects of these entrepreneurial support programs are small, and further improvements are needed.

(3) Status of ICT technology use within MOAF

Most of the applications and web systems used by MOAF are ordered by the Information and Communication Technology Division (ICTD) to domestic or Indian companies and are developed and operated by the officers in each specialized department and ICTD. The applications section of the ICTD

is responsible for maintaining and managing all applications developed by the ministry. However, only a limited number of staff are available for maintenance and management: four in System Administration, two in Network Service, one in Application Services, and one in Support Services.

The list of systems for the RNR sector used within MOAF is shown in the Table below.

Table 3-19 Major ICT Systems applied in Agricultural Sector

Name	Dept.	Expected User	Description
ePest Surveillance System	DOA (NPPC)	Government Officer	Reporting system of the damage by pest, weed, wild animals, etc. Data is collected by Gewog extension officer.
Agriculture Market Information System	DAMC	Citizen	The database of the price of food commodities in the national market.
e-RNR Crop Advisory App	ICTD (DOA)	Government Officers & Citizen	Repository of information on good agriculture practices in farming from land preparation to harvesting. Apps developed by Indian companies, and contents created by ICTD.
Mobile Operational Data Acquisition (MODA) Platform	PPD	Government Officer	Agricultural Data Platform collected by mobile devices, which WFP develops.
Agromet Decision Support System	DOA	Government Officers & Citizen	Supporting when to plant and harvest based on the local weather information from NCHM. It is not in the functional stage.
Laboratory Information & Management System	BAFRA	Government Officer	Database of the result of food testing for government officers

Reference: JICA Survey Team

In the above Table, we describe the system functions and issues related to the use of 1) ePest Surveillance System, 2) Agriculture Market Information System, 3) e-RNR Crop Advisory App, 4) MODA platform, 5) Estimation of Paddy Area by Google Earth Engine, and 6) Agromet Decision Support System.

f) ePest Surveillance System

The system was developed in 2015 in collaboration with a Bhutanese IT company, NPPC, and the Government of India. The system aims to provide appropriate advice to farmers on dealing with pest damages and alert the farmers near the damaged farmlands. However, as of November 2021, this system has not been fully utilized. The reasons for this are considered to be the following three:

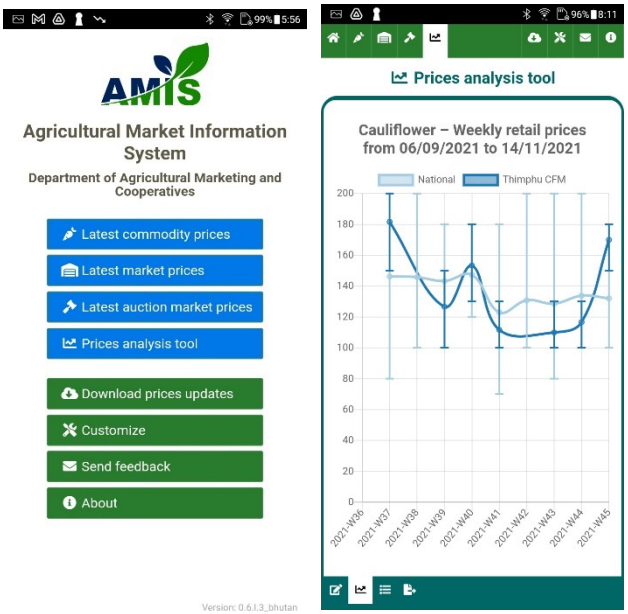
1. The system is not always used as a database due to frequent inadequacies in the system.

2. The accuracy of reporting by extension officers is not stable.

3. Farmers do not report to extension officers and NPPC when pests and diseases occur in many cases.

g) Agriculture Market Information System (AMIS)

It is a platform that provides weekly price information to extension officers and the general public on 40 major agricultural and livestock products in 26 domestic markets and potato and ginger prices at four auction sites. In the future, DAMC plans to provide more information such as volume and quality of produce handled at each market. In Bhutan, market information is communicated chiefly from person to person over the phone, and distributors throughout the country rely on their networks (information obtained over the phone) for purchasing and transportation. The market information is rarely available to the public, and the accuracy of the information is poor. As a result, adjusting the distribution volume for each Dzongkhag is usually done only after an excess or shortage has occurred. Since there is no soft platform on market information except for this system, its spread is expected to have a significant impact. It is also expected to optimize distribution, stimulate competition, and revitalize the agricultural sector by promoting real-time market information.

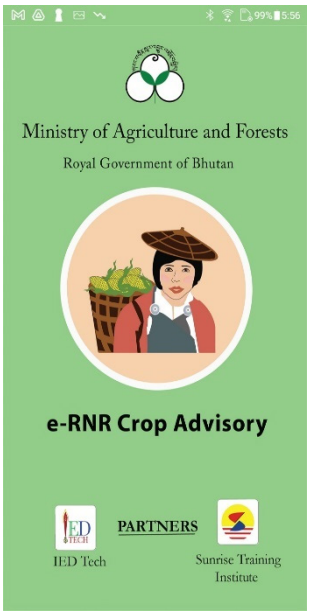


AMIS (Mobile Apps)

On the other hand, both the web and the mobile application (Android only) are designed to be simple and easy to use, but as of October 2021, the number of downloads of the mobile application is only 500+, which poses a challenge for its diffusion. The possible reasons for this are as follows:

1. The ideal way to collect information is by DAMC officers, but Gewog extension officers do the price survey in local markets because the DAMC officers are not assigned to each market. Although Gewog extension officers were trained, they could not conduct sufficient price surveys due to their other responsibilities, resulting in low frequency and quality of price information in local markets. (a comparison with the results of price information verification in the central market conducted by the JICA Survey Team in October 2021 showed that the prices in the market were the same as those provided by AMIS, which indicates that only the information collection capacity in local markets is low).

2. Many farmers own smartphones, but their only use is for voice chatting on SNS applications, and they are not even able to browse web information or collect information using applications. They also do not see the benefit of using it because they do not know how to utilize price information.



e-RNR Crop Advisory (Mobile App)

h) e-RNR Crop Advisory App

It is an application that provides video information on best practices in cropping technology for each crop and was developed in 2020 to homogenize the extension ability of gewog extension officers and to provide information to farmers. Information is provided for four crops, including tomato and pepper, and the number of supported crops will increase in the future.

The dissemination of this system to extension officers is progressing, but the dissemination to farmers is not sufficiently advanced for the same reasons as for AMIS, and the number of downloads of the mobile application is about 500+ as of October 2021.

i) Mobile Operational Data Acquisition (MODA) Platform

It is an information platform developed with the support of WFP, which enables mobile-based remote information collection (online/offline) and transmission to the server (online only) using the Open Data Kit (ODK). This system is being used to collect and utilize a wide range of information on the RNR and livestock sectors with the aim of centralized management. The Policy and Planning Division (PPD) of the MOAF, rather than the ICTD, is responsible for the system's operation, compilation, and verification of information. The information is collected and sent to the server by each Gewog extension officer, which is then checked by Dzongkhag officers and PPD officers, respectively. As of November 2021, Gewog extension officers in 17 Dzongkhags were trained to collect information, and the others in the rest of 3 Dzongkhags (Sarpang, Samtse, Samdrup Jongkhar) will be trained after the restriction protocol for COVID-19 is softened. Therefore, the system for agricultural information (as shown in Table 3.5.3) is operational under 17 Dzongkhags.

Mobile survey form in MODA

The merit of this system is not only that we can use the data as an integrated agricultural information platform, but also that we can use the data as real-time information especially for plant/harvested area for each crop, the use of input amounts such as fertilizer, and the damaged area by diseases/wild animals. However, this system should be improved in terms of the following aspects;

1. Gewog extension officers are in charge of collecting most of the information shown in the Table below regardless of their time restriction due to their other duties. As a result, the accuracy and frequency of the report are insufficient.

2. Mapping survey locations is possible, but it is not used due to the above problems.

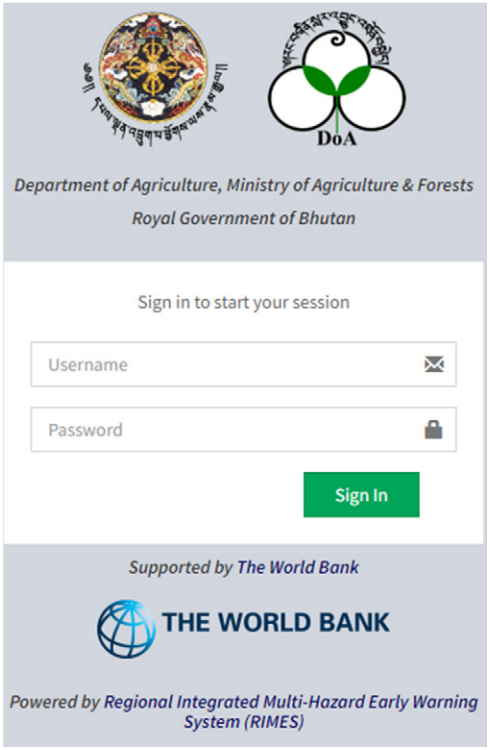
Table 3-20 List of information related to the RNR sector collected by MODA Platform

No	Name	No	Name
1	Agriculture Infrastructure report	10	Crop damaged report
2	Electric fencing installation report	11	Crop cut report
3	Farm machinery and equipment inventory report	12	land use report
4	Farm road construction and maintenance report	13	Crop production report
5	Irrigation facility construction and maintenance report	14	Land development and consolidation report
6	Input distribution report-Fertilizer	15	Farmers group and cooperative report
7	Input distribution report-Green House	16	Farmer's training report
8	Input distribution report-Seeds	17	Household list report
9	Input distribution report-Seedlings	18	Agriculture Infrastructure report

Reference: JICA Survey Team

j) Agromet Decision Support System (ADSS)

The ADSS was developed under the auspices of the World Bank (Hydromet Services and Disaster Resilience Regional Project) and started to be operational in March 2021. It is a web application that supports farmers' decision-making on cultivation, fertilization, transplantation, sowing, pesticide application, and irrigation for each crop by using local weather information (including forecast information) obtained from the National Center for Hydrology and Meteorology (NCHM) and the Regional Integrated Multi-Hazard Early-warning System (RIMES). It is expected to decrease simple losses, such as post-harvest losses due to rainfall during drying, as well as reduce the risk of abnormal weather conditions, such as monsoon season shifts. At present, the project is not yet at the stage of utilization, and demonstration tests are being conducted in Paro and Sarpang Dzongkhags in collaboration with ARDC, NPPC, and NSSC.



ADSS (Web App)

The following table shows the ICT systems and agricultural technologies being developed for the RNR sector by the relevant agencies of the MOAF, including ICTD. Of these, 6) Smart Irrigation System, 7) Hydroponics, 8) Plant Protection Product Information System, and 9) Bhutan Biosecurity and Food Safety System are described in detail.

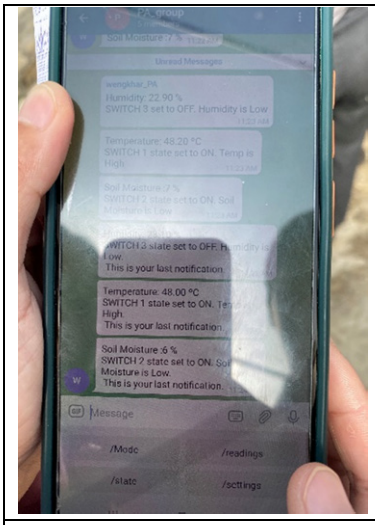
Table 3-21 List of ICT systems and technologies for the RNR sector under development by MOAF

Name	Dept.	Expected User	Description
Smart Irrigation System	ARDC	Farmer	Watering and temperature adjustment can be automatically/remotely done with temperature, humidity, and soil moisture sensors.
Hydroponics	ARDC	Farmer	Farming technique with nutritious water, which enables farmers to cultivate crops without soil
Bio-Acoustic System	ARDC, NPPC	Farmer	Bio-Acoustic equipment to drive wildlife away. It was expected to become the alternative to electric fencing, but it is not very practical for wild animals.
Registration of Famer groups & Cooperatives	DAMC	Government Officers & Citizen	The system can record the FGs & Cooperatives but also monitor them.
Plant Protection Product Information System	DOA	Government Officers & Citizen	Online system for procurement of plant protection products for agencies
Bhutan Biosecurity and Food Safety System	BAFRA	Government Officers & Citizen	System digitizing all the processes to citizen service processes under BAFRA for the clearance of import/export food

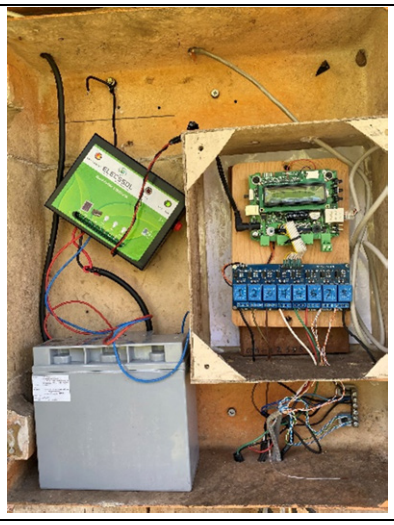
Reference: JICA Survey Team

k) Smart Irrigation System

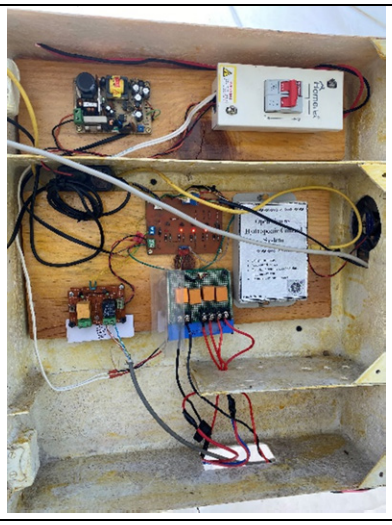
The system is developed and operated by ARDC Wengkhar and utilizes open-source systems such as OpenSprinker and Dataplicity so that anyone can modify and improve the system. The IoT sensors can record various data types such as temperature, rainfall amount, humidity, soil moisture, EC, and pH. Those data can trigger switching irrigation pumps on and off or periodically supply water based on specific values as thresholds. Users can browse the values obtained from the IoT sensors with a smartphone anywhere there is an internet connection, and the information can be obtained and turned on and off with a single touch using SNS applications such as Telegram. In Bhutan, where farmland is often remote from residential areas, this system is expected to reduce farmland management workload significantly.



One-touch acquisition of farmland sensor information using a mobile phone



Web-based remote-control system (OpenSprinkler with Raspberry Pi)



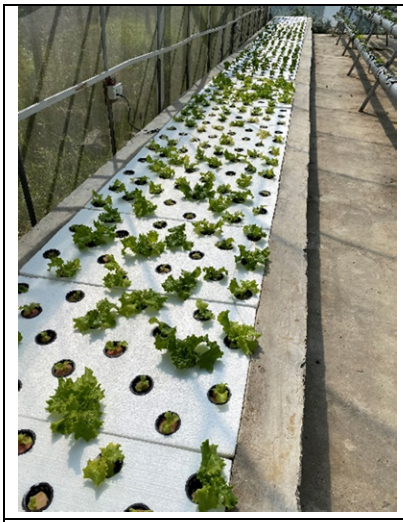
Web-based remote-control system (Dataplicity with Raspberry Pi)

l) Hydroponics

ARDC Wengkhar is researching hydroponics with funding from CARLEP. The most significant advantage of hydroponics is that it does not require soil to grow in any location. In other words, it is possible to ignore the country's conditions, where the average farmland size is small and scattered, and it is possible to plant in locations with good market access. Thus, hydroponics enables to cover for the disadvantages of agricultural development in Bhutan.

In addition, since year-round production is possible as long as the environment is sufficiently temperature-controlled, it can contribute significantly to the stable supply of vegetables such as tomatoes and lettuce and fruits such as strawberries.

Although it is still under the experimental stage, once the production technology is established and profits are stable, it is expected that the number of young farmers will increase as the next generation of agriculture. ARDC Wengkhar has published a training manual for the spread of hydroponic farming in March 2021.

		
Hydroponics (Deep Water Culture)	Hydroponics (Nutrient Film Technique)	Hydroponics (Sprinkler based Vertical Tower System)

m) Plant Protection Product Information System, and

n) Bhutan Biosecurity and Food Safety System

Both of the above systems are services for citizens and will digitize the procedures for farmers to apply for fertilizers and seeds and for traders to import and export food. Both systems are planned to be operational by the end of this fiscal year (June 2022). They are expected to reduce the burden on citizens and government employees who handle the procedures.

(4) Use of ICT technology by the private sector in the RNR sector

The Enterprise Survey Report conducted by the World Bank in 2016 confirms that companies in the RNR sector have lower utilization of IT and ICT technologies compared to other sectors. For

example, only 1 in 100 companies in the agriculture sector has a website, compared to 1 in 6 companies in other sectors. It was also observed that few companies use email as a means of communication, and the private sector in the agricultural sector mainly communicates through phone calls, even though many individuals have smartphones.

However, based on the results of the current field survey, the companies listed in the table below are confirmed to be developing their businesses using ICT technologies. In this section, the three organizations shown in the table below are described, respectively.

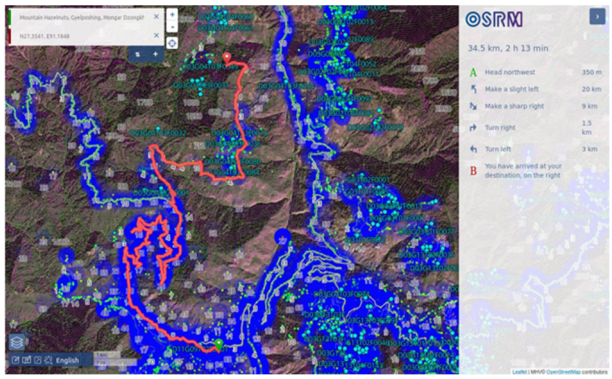
Table 3-22 List Of ICT Systems Used and Developed by Private Companies for RNR Sector

Company Name	System/App Name	Expected User	Description
MHV	Field Companion	Field Officer	Mobile app for multiple purposes in field activities
FCBL	Farmers' Online Market System	Citizen and Farmer	A simple platform to connect sellers and buyers
Bhutan Smart Shop	e-Commerce System	Citizen	Bhutan's first e-commerce shop of vegetables and fruits for citizens in Thimphu.

Reference: JICA Survey Team

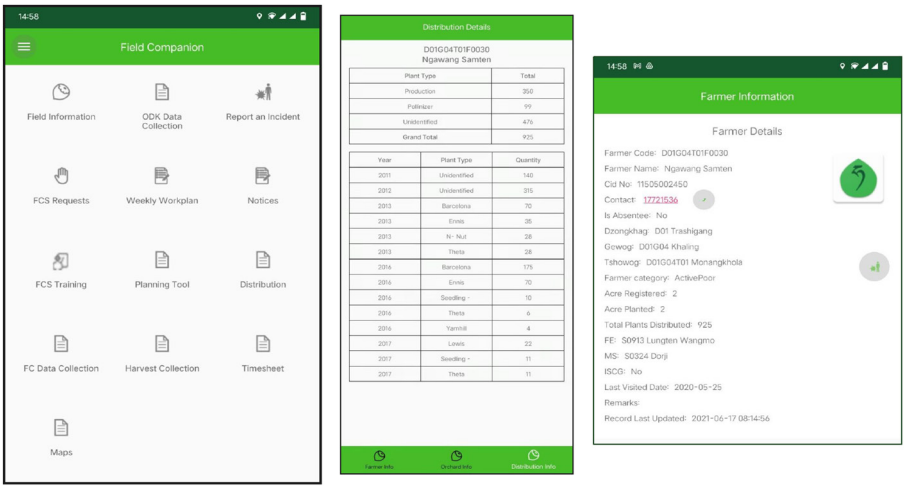
a. MHV: Field Companion

Mountain Hazelnuts Venture (MHV) is the first private company in Bhutan to be established with 100% foreign capital. The company distributes hazelnut seedlings and fertilizer to farrow land for free. The company earns profits by mainly exporting processed hazelnuts obtained from the farmers and processed by their facilities. The company is also a social enterprise focused on the triple bottom line of revitalizing rural communities, preserving ecosystems, and providing adequate returns to stakeholders. By planting 10 million trees, the company has contributed to reducing soil erosion, improving the income of 15,000 small-scale farmers, and providing the largest number of opportunities to work in Bhutan.



Logistic (Navigation) System with GPS tracking

Field Companion, a mobile application developed by the company, was created to improve the efficiency of the staff in charge of cultivation guidance in the field and make the information related to the record of hazelnut cultivation transparent. The application uses GPS tracking records and displays them on the Open Street Map, enabling navigation along farm roads that is not recognized on the map. As with the MODA platform, the ODK tool can be used to digitize field survey results even in remote areas outside the internet environment.



Field Companion (Mobile app)

o) FCBL: Farmers' Online Market System

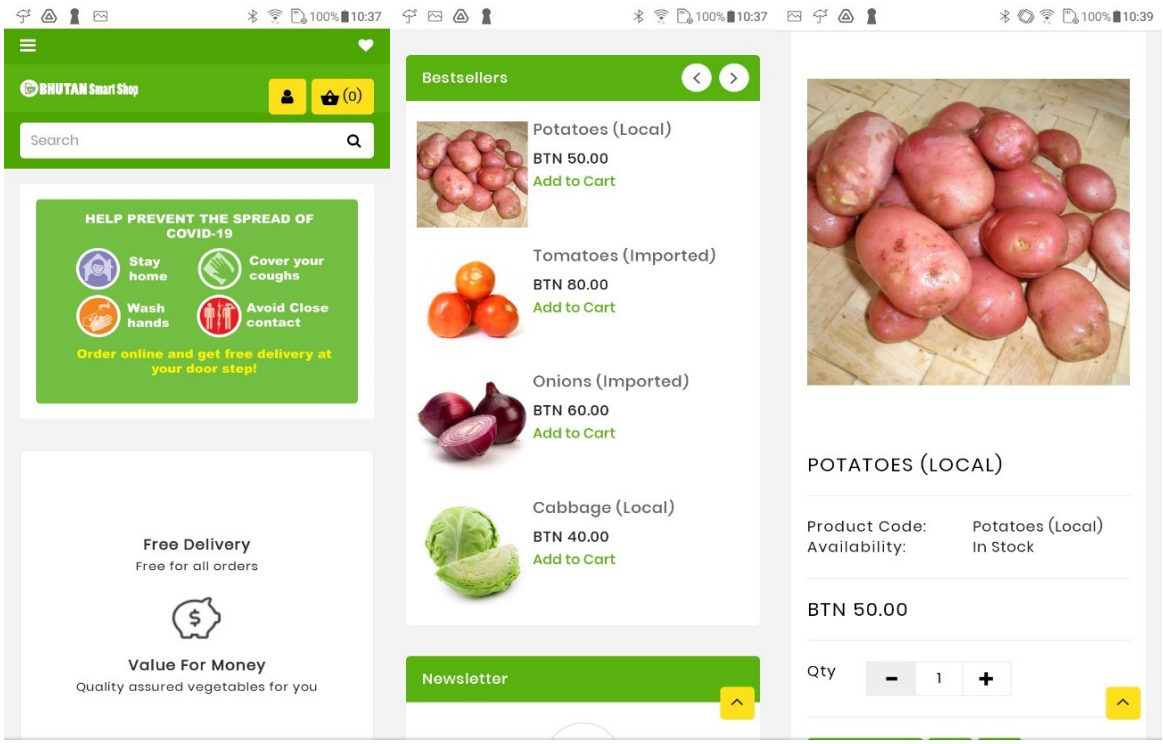
Food Cooperation of Bhutan Limited (FCBL) is an agricultural products distribution and marketing service company headquartered in Phuentsholing. FCBL has four warehouses, 21 estate stores, and four retail outlets across the country and is responsible for stockpiling food (50% of the national 3-month supply of rice, pulses, and oil), stabilizing food prices through quick transactions, and facilitating school feeding programs with government subsidies.

The Farmers' Online Market System is an agricultural product trading app that directly connects producers and consumers. It was jointly developed by FCBL and the Royal Stock Exchange of Bhutan (RSEB) in response to the need to develop a non-face-to-face trading system in the wake of COVID-19. It is designed to be simple to prioritize ease of use for users, but there are many cases of unsuccessful transactions of agricultural products, which poses a challenge for its widespread use.

p) Bhutan Smart Shop: e-Commerce System

It is the only store in Bhutan that combines an Internet store specializing in agricultural products with a physical store, offering free delivery of vegetables and fruits within Thimphu. The price is determined considering the assumed volume of distribution and logistics cost based on their own networks. Therefore, they do not rely on the market prices very much because they are unstable and easy to fluctuate (according to the current market price decision rule, prices are empirically determined based on the volume of products being displayed in the market).

Based on the experience of the National Vegetable Management Taskforce, which was formed in the wake of COVID-19, a nationwide network of distributors and producers (Agro-Logistic and Marketing Cooperative, ALMC) has been formed to establish an efficient distribution system and to train farmers in post-harvest processing. The ALMC currently has 51 members, who are dispersed throughout the country. In addition to the Bhutan Smart Shop mentioned above, an ALMC Outlet store has also been set up in Thimphu to sell the agricultural products collected from all over the country.



E-Commerce shop specializing in agricultural products (Bhutan Smart Shop)

3.5.3 Challenges for the use of ICT systems and advanced agricultural technologies

(1) Insufficient ability to execute information collection

Table 3-23 summarizes the possible fields of application of the ICT systems and agricultural technologies introduced in the previous section, which confirms these technologies are distributed in a wide range on the value chain. In particular, based on the results of the survey, the dissemination of the Agricultural Market Information System will have a significant impact on each sector of the Value Chain, since it can promote market efficiency and distribution optimization. On the other hand, however, the problem is that most of these technologies are not at the practical level. There is a common reason why the MOAF applications are not practical, and it can be attributed to the low quality, variety, and frequency of the information provided. The reason for this is also common, and the first reason is the lack of implementation capacity of Gewog extension officers who are responsible for collecting information.

Table 3-23 Fields of application of various ICT systems and advanced agricultural technologies in VC

	Technology	Cropping Plan	Input	Culti-vation	Distri-bution	Marketing	Branding	Buyer	Others
Governments	1) ePest Surveillance System		○	○					
	2) Agriculture Market Information System	○			○	○	○	○	
	3) e-RNR Crop Advisory App		○	○					
	4) MODA Platform								○
	5) Agromet Decision Support System	○	○	○					
	6) Smart Irrigation System			○					
	7) Hydroponics		○	○					
	8) Plant Protection Product Information System								○
	9) Bhutan Biosecurity and Food Safety System								○
Private	10) Field Companion	○	○	○	○				
	11) Farmers' Online Market System				○	○	○	○	
	12) e-Commerce System				○	○	○	○	

Reference: JICA Survey Team

While the number of Gewog extension officers nationwide as of November 2021 is 205, equal to the number of Gewogs, there are 66,175 farming households, including cooperatives that need support, so the average number is of farmers supported per extension agent is over 300. In addition, Bhutan's unique topographical conditions make it difficult to provide efficient support to farmers, as farmland tends to be scattered in remote areas. Mountain Hazelnuts Venture, which is implementing efficient extension activities using ICT in Bhutan, has about 150 farming households per 1 extension officer (bimonthly visits), which indicates that it is very challenging to implement the extension officers' activities are responsible for under the current system.

Despite this situation, requests for information gathering from all departments within the MOAF are concentrated on the Gewog extension officers due to the absence of personnel in other departments who can collect information in rural areas. Table 3.5.7 shows the results of interviews on the work items that Gewog extension officers are responsible for, including collecting information for NPPC, NSB, PPD, and DAMC and their primary role as extension activities farmers.

In fact, among their activities, the collection of prices for agricultural products for AMIS is not sufficiently done and therefore is not functioning well. In addition, the information provided by the MODA platform is not being utilized well because accurate information is not available on the server, especially for spatial information. It suggests the need to improve the information gathering capacity of

Gewog extension officers by improving their work efficiency, although the increase in the number of human resources to collect information is also necessary.

Table 3-24 Tasks that Gewog extension officers are responsible for

No.	Item	Related Department	Remarks
1	Planning agricultural development to determine the budget	DOA	Based on the production policy from the DOA, Gewog extension officers suggest crops for plantation
2	Supply inputs such as seeds, fertilizer, greenhouses, and seedlings	DOA	Functioning as sales contacts through DOA
3	Supply electric fences	NPPC	Functioning as sales contacts through DOA
4	CB to farmers in pest control	NPPC	Mainly done in ARDC
5	Technical support in farming	NoA	
6	Survey of H/H for RNR census	NSB	
7	Survey of H/H for MODA	PPD	Administrative data in 17 fields
8	Survey of H/H for a pest report	NPPC	Based on the demand of farmers
9	Monitoring infrastructure such as roads, irrigation channels	DOA	
10	Help in farmers' groups & Cooperatives	DAMC	Complying with the government support for unionization, gewog extension officers work as the point of contract
11	Marketing (linking farmers to traders and schools)	DAMC	Based on the instruction from DAMC
12	Commodity Price Survey	DAMC	26 market for 40 commodity prices & 4 auctions, updating once in a week for AMIS

Reference: JICA Survey Team

Table 3-25 Number of agricultural holdings by type in Bhutan

Holding type	Urban	Rural	Total	Urban	Rural	Total
	(Number)			(Percentage)		
Household	316	65,754	66,070	0.48	99.52	100.00
Private Ltd Company	4	21	25	16.00		100.00
Groups/Co-operative	1	104	105	0.95	99.05	100.00
Monastery	0	92	92	-	100.00	100.00
Others	11	284	295	3.73	96.27	100.00
Total	**332**	**66,255**	**66,587**	**0.50**	**99.50**	**100.00**

Reference: RNR Census of Bhutan 2019

(2) Insufficient amount of information provided by ICT systems

As a result of the field survey, the JICA survey team found that ICT dissemination is lagging, especially in market information. This is because information related to products' prices and availability in each market is conveyed from individual to individual by phone, and supply forecasting, such as planted area and harvested area, are not disseminated. In addition, if data pertaining to the inventory of market warehouses becomes available, it will be possible to obtain information on the sales volume for

each market, and data on demand will be accumulated. It will enable demand forecasting, which has been known empirically as tacit knowledge, so farmers can select cultivating crops based on the demand with shared information.

Another important item is the location of farmlands. It is well known that farmland in Bhutan is scattered, that the area of farmland held per farmer is small, and that many farmlands are in steep condition, but this has rarely been shown in objective data. The creation of a database of farmland locations will not only make extension planning more efficient but will also make it easier to select priority farmland for development, plan more specific countermeasures against damages by wild animals and natural hazards, and facilitate the transition to precision agriculture using remote sensing technology in the future. Establishing farmland boundaries requires a heavy deal of labor, but it is desirable to proceed when RNR census survey is carried out using drones and other equipment.

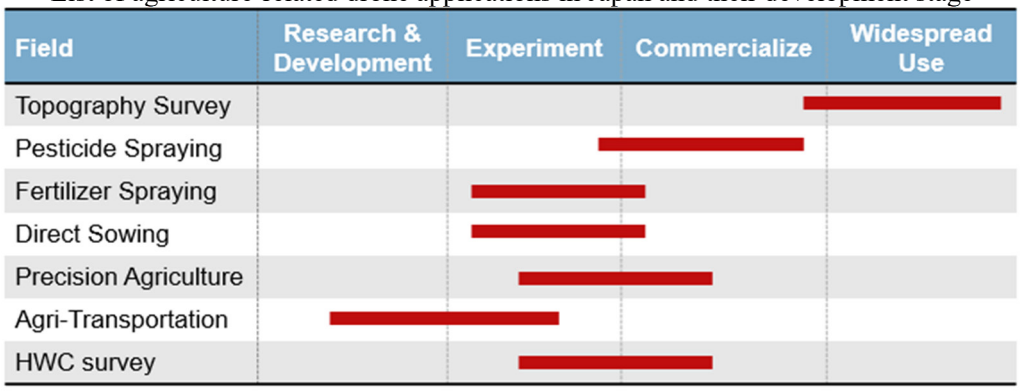
Since some of the above information (cropped area and harvested area) are already collected in the MODA platform, it should be relatively easy to convert market information into soft data by linking with this information. However, it should be noted that the information collection capacity described in (1) above has been sufficiently improved before improving the varieties of information.

Box: Case Studies of Drone Applications in the Agricultural Sector in Bhutan

The use of drones in Bhutan is strictly restricted for national security reasons, and in principle, private companies are not allowed to operate drones for their own purposes. Drones are only allowed to be utilized for government projects, but even then, flying outside of visual range is prohibited (flying is only permitted within a range of 50 meters horizontally and 90 meters vertically from the operator). Furthermore, with a maximum payload weight of 6kg, spraying pesticides has many disadvantages, which is the most common use of drones in Japan. Due to the above regulations, the MOAF has only one drone (for forest management), and its use for agricultural purposes has not been considered, even with demonstration tests.

The potential and impact of drone use in Bhutan are significantly high, so drones are desired in many fields. As of November 2021, the regulations regarding the use of drones are being revised, and it is expected that the field of drone use will expand.

List of agriculture-related drone applications in Japan and their development stage



(3) Lack of understanding of ICT systems among users

Private agribusiness companies, including producers, do not fully understand the benefits and risks of using ICT systems. Many farmers prefer crops that are easy to produce (that they have experience in producing) to those that can be sold at a higher price, and they also tend to bring their products to the market and sell it immediately after harvest. Those are common behaviors to avoid risks. However, business management and financial literacy training are essential because commercial farming using ICT equipment and advanced agricultural technologies requires a certain initial investment and a long-term perspective and tolerance for risks. Therefore, training in business management and financial literacy is essential. It will also lead to support for the formation of cooperatives, which will strengthen the agricultural production structure, which is the foundation for the use of ICT systems with a synergistic effect.

Chapter 4 AGRICULTURE PROMOTION PLAN

4.1 Directions on Food Self-sufficiency and Improved Nutrition

4.1.1 Breaking out of the Structural Vicious Cycle

Since around 2010, Bhutanese agriculture has been shifting from subsistence-based agriculture to commercial agriculture by improving productivity, but the shift has not yet been sufficient. As described above, there are various problems in production, distribution, marketing, and consumption, and these problems affect each other.

As in other developing countries, the challenges in the agricultural sector consist of low productivity due to lack of technical skills of farmers and limited access to inputs such as seeds, lack of agricultural infrastructure such as irrigation, and inadequate distribution and market facilities such as warehouses and markets.

In addition, Bhutan's characteristic problem is the high-cost structure caused by the "small-area cultivation" due to the steep terrain and the resulting "small-lot shipment. Furthermore, Bhutan's policy is to promote "Organic Bhutan" and use organic fertilizers instead of chemical fertilizers, so productivity is not as high as in other countries. In Bhutan, forests over 70% of the country's land area is maintained through the policy of avoiding development that would destroy the natural environment. It has led to an increase in wildlife damage due to the proximity of cultivated land and wildlife habitats.

On the other hand, as a result of raising the level of education in general households due to the improvement of the education system, there is a "youth problem" where young people are leaving the rural areas for the cities in search of better jobs, and a decrease in the working population in agriculture, the primary industry. Since the population is small originally, the impact of these population outflows is more pronounced in rural areas. As a result, the amount of abandoned and unused land is increasing, which in turn spurs wildlife damage to agriculture, which in turn leads to a vicious cycle of abandonment due to reduced income.

A characteristic problem of Bhutanese agriculture is that domestic agricultural production, which is in a high-cost structure due to these issues related to production and distribution, is in a state of competition with cheap, tariff-free imports of agricultural products from India. As a result, farmers are affected by the price of agricultural products in India, and sometimes when India has a good harvest, low-priced imported agricultural products dominate the market, making it difficult to sell domestic agricultural products. This hampers the development of the agricultural sector. In the same way, the cost of processing agricultural products is high due to small-lot production and the current dependence on imported packaging materials, making it difficult to compete with imported products.

In the interviews conducted during the Survey, many of these voices were heard that Bhutanese agriculture will decline in the near future if this trend continues. However, there is no easy to promote agriculture in Bhutan and achieve food self-sufficiency by solving the problem of Bhutanese agriculture of "high prices for agricultural products and processed products". Therefore, based on the lessons

learned from the impact of COVID-19, it is necessary to address the vicious cycle described above by aiming to create an environment in which farmers can take the initiative to maintain and expand production by ensuring adequate income for their labor and a working environment. In order to achieve this, it is necessary to establish a method of sustainable land use of available farmland, to shift to efficient and market-oriented agriculture, and to take measures to reduce the production and marketing costs of agricultural products throughout the country by developing a post-production market and distribution system. In addition, given the limited size of the domestic market, it is necessary to promote exports as well in order to expand the market.

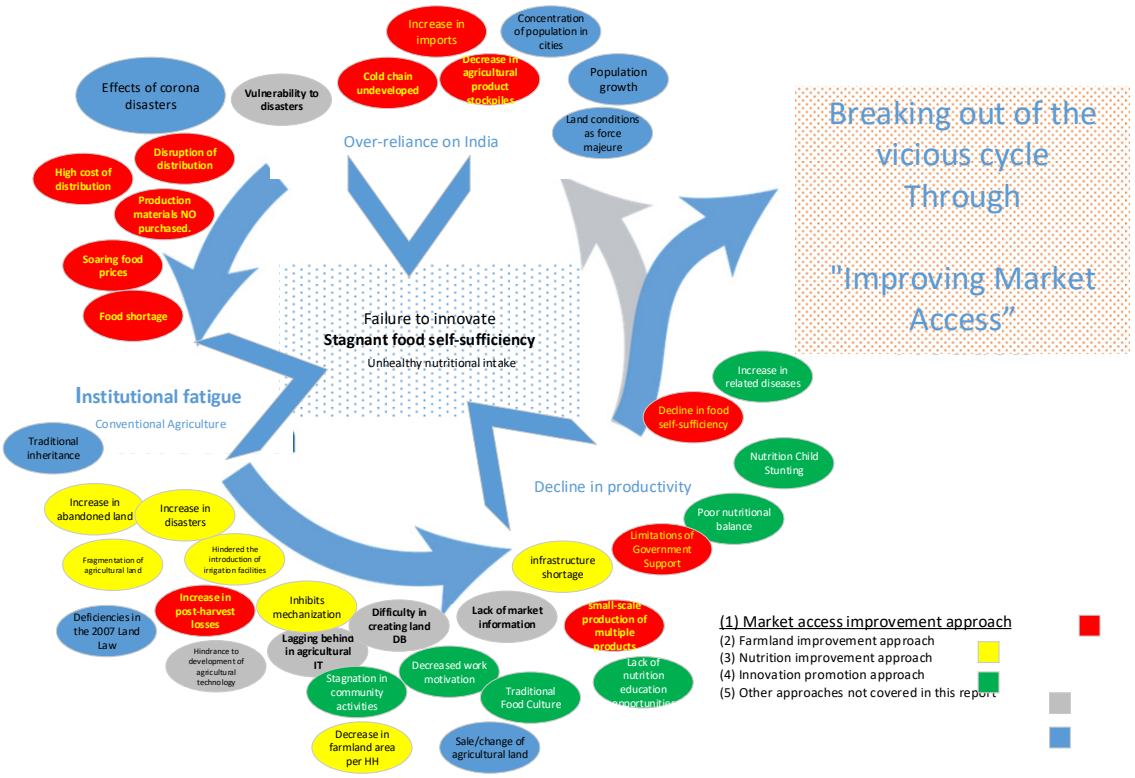


Figure 4-1 Images of Breaking out of the Vicious Cycle through Market Access Improvement Approaches

4.1.2 Impact of COVID-19 Disaster

As described in Section 1.1, "temporary issues" due to the impact of COVID-19 and the resulting "institutional changes" will be organized for consideration of future measures.

Table 4-1 Impact on Agriculture Sector of COVID-19 Disaster

	Temporary issues	Institutional changes
Production	Increased domestic demand for agricultural products due to bans and restrictions on imports of Indian products. Shortage of imported seeds. Mediation of urban and peri-urban farmland for the unemployed.	Production/supply of fresh vegetables over time, regardless of the season, was promoted through providing plastic greenhouses, etc.
Processing and distribution	Disposal of fresh vegetables due to domestic distribution disruption and export ban. Stagnation in distribution due to a reduction in the labor force from India and other countries. Overproduction due to unbalanced production in 2020 in response to prices after COVID-19 and the resulting Buy-Back system activation.	The distribution networks such as HAoB (Horticulture Association of Bhutan) and ALMC (Agriculture Logistic -Marketing Cooperative) that will cover the supply and demand of food in the country have led to create partnerships between producers and distributors. In particular, a system of cooperation between producers and distributors in vegetable cultivation has begun to be established.

Marketing	Temporary price increases, mainly due to domestic food supply concerns. Awareness of concerns about fresh food shortages during the winter season, and production adjustments by the government.	Promotion of approach from distributors to producers. Developed and started operation of Farmers Online Market system, which allows FCBL to buy and sell on the web.
Nutrition	The government has distributed seeds, greenhouses, and other inputs to encourage vegetable cultivation, which has made it easier for farmers to enter the school feeding program. Vegetable prices have risen, and farmers are no longer willing to sell vegetables to schools at low prices.	Increased interest in food due to the widespread belief that a well-balanced diet strengthens the immune system.

4.1.3 Details of Assistance from Other Donors

World Bank

The World Bank's Country Partnership Framework (CPF) for Bhutan, taking into account the impact of COVID-19, proposes the following as a five-year framework for 2021-24. Promotion of inclusive and sustainable development through job creation and increased equality, and the strategic focus areas are to promote job creation in terms of both supply and demand, focusing on "human resources" and "resilience". The report also calls for the use of digital technology in strategic priority areas.

This "resilience" is broadly categorized into "economic resilience" and "environmental resilience. The agricultural sector program is categorized under "economic resilience. The following are some of the projects currently being implemented.

Table 4-2 Projects currently implemented by WB in Agricultural Sector

Project	Fund/ Period	Activity
Food Security and Agriculture Productivity Project（FSAPP）	US$ 8 million 2017-2023	Development of irrigation facilities, improvement of water use, development of market facilities, agricultural mechanization, and extension of production technology
Bhutan Youth Employment and Rural Entrepreneurship Project	US$1.25 million（JSDF） 2017-2021	Training of non-employee youth aged 18-35 in rural areas and funding of Nu. 350,000 for 200 good business proposals.

Source: Country Partnership Framework　FY2021-24

International Fund for Agricultural Development (IFAD)

IFAD's Country Strategy Note, developed in 2018, supports poor rural people in Bhutan to achieve greater food security and improved incomes while ensuring environmental sustainability. IFAD's activities are being implemented in line with the government's five-year plan, and are currently targeting six eastern districts with high concentrations of the rural population and food insecurity, with an emphasis on engaging women and youth.

Table 4-3 Projects currently implemented by IFAD in Agricultural Sector

Project	Fund/ Period	Activity
Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP)	US$ 32 million (IFAD: US$ 9.3 million, ASAP: US $ 5 million, RGoB: US $ 5.8 million, FCBL: US $ 5 million[43], Beneficiaries: USD 0.7 million, Gap USD 6 million.）2015-2022	In order to shift agriculture towards sustainable value chains and market-oriented production, vegetable and dairy production were promoted as part of the "promotion of market-linked agricultural production," supported farmer groups, cooperatives, and individual agricultural entrepreneurs as part of the "development and marketing of value chains," and built dairy farms. Capacity building was carried out in the area of "organizational support and policy development".

Source: CARLEP Homepage, https://www.carlep.gov.bt/

World Food Programme（WFP）

WFP is a major donor agency in the field of food systems and nutrition. Food aid in the school feeding program ended in 2018, and WFP is now working as a technical advisor, providing technical assistance on agriculture, food systems, and school feeding. (See section 3.4.4)

In addition, the Mobile Operational Data Acquisition (MODA) Platform is being developed as an information platform for the agricultural sector, and information related to the RNR sector and livestock sector is being centrally managed and made available to government officials. (See Section 3.5.2 (3))

4.1.4 Direction of Japan's Support

Country Assistance Policy

The country assistance policy for Bhutan was formulated in May 2015. The Basic Policy of Assistance (Major Target) is to " assistance for self-reliant and sustainable nation building with a good balance of rural and urban areas," and it aims to improve living standards by supporting the realization of self-sustaining economic growth, the revitalization of rural areas so that people can earn a living, and the expansion of social infrastructure and services in rural areas.

The Priority Areas (Medium Targets) are 1) sustainable economic growth and 2) reduction of vulnerability. In the area of 1) sustainable economic growth, the government will help improve the livelihoods of rural areas by developing basic infrastructure in rural areas to reduce the economic and social disparities between urban and rural areas, and by building local administrative capacity to improve basic social services in rural areas. It will also support industrial development and employment expansion by developing infrastructure for industrial development. In the area of 2) vulnerability reduction, the government will support the response to environmental problems and climate change through urban environment improvement, climate change countermeasures, and disaster prevention.

[43] After Mid term review, engagement of FCBL was found irrelevant as the focus of the project more on pro-poor and not on stimulating the commercial ventures.

Table 4-4 Japan's Support in Agricultural Sector

Project	Type	Period	C/P Agency
Strengthening Farm Mechanization Project Phase II	TCP	2014.8～2018.8	AMC, FMCL
Integrated Horticulture Promotion Project in the West Central Region（IHPP）	TCP	2016.1～2021.6	DOA, ARDC-Bajo
Project for Capacity Enhancement on Irrigation Planning, Design, and Construction Management	TCP	2020.10～2025.9	DOA, AED, ARDC, MoWHS
The Project for Improvement of Farm Machinery for Hiring Services of Tillage	Grant	2016.1（GA）	AMC ,FMCL
The Project for Improvement of Farm Machinery for Hiring Services of Tillage (Phase 2)	Grant	2020.3（GA）	AMC, FMCL
The Project for Improvement of Machinery and Equipment for Construction of Rural Agricultural Road （Phase 3）	Grant	2016.3（GA）	CMU, MOAF
Regional Agribusiness Promotion by the Value Chain Building in Asian Region	Knowledge Co-Creation Program (KCCP)	2021.6～2024.3	MOAF
Project for improvement in conditions of mushroom cultivation farmers in the western region of Bhutan	Grass-Roots (Partner)	2016.7～2019.7	National Mushroom Center (NMC), MOAF
Grant Assistance for Grass-Roots Human Security Projects in Agricultural Sector (National Mushroom Center (NMC, Irrigation)	Grass-Roots (Grant)	2019.11	NMC
Regional Development Project for Organic Agriculture with Local Circulation in Bhutan	Grass-Roots (TA)	2016.10～2019.10	National Organic Program、ARDC
Promoting Sustainable Livelihoods in Shingkhar (Ura, Bumthang) Through Income Generation and Collective Activities	Grass-Roots (TA)	2018.4～2021.2	Shingkhar Welfare council
Capacity Building of Poultry Farmers focusing on Effective Microorganisms Farming	Grass-Roots (TA)	2019.1～2022.2	DOL/MOAF, Tsirang Poultry Farming Cooperative
Human resource development and introduction of new technologies to improve apple production, productivity and processing.	Grass-Roots (TA)	2015.3～2018.9	MOAF, Royal University of Bhutan (Faculty of Agriculture)
Preparatory survey on BOP business for improving rural livelihoods by skill transferring Japanese organic mushroom production method final report	SDGs Business Supporting Surveys	2014.10～2016.4	-
Feasibility Survey for SDGs Business on Quinoa Production and Sales to Improve Income of Small-scale Farmers and Nutritional Balance of Local People	SDGs Business Supporting Surveys	2017.11～2019.9	-
SDGs Business Model Formulation Survey with the Private Sector for Organic Shiitake Mushroom Cultivation with Raw Wood by Low-Cost Business in Bhutan	SDGs Business Supporting Surveys	2021.4～2022.3	-
Verification Survey on Introduction of Organic Red-beans Cultivation and Crop Rotation to Small-scale Farmers	SME Partnership Promotion Survey	2021.7～2022.8	-
JOCV in Agriculture and Rural Development Sector	Volunteer		

Source: Country Assistance Policy for Bhutan (2015), Rolling Plan (2018), JICA Homepage

Direction of Japan's Future Support

Since the current 12th Five Year Plan has become difficult to realize due to the impact of COVID-19, the MOAF has established a Bhutan National Pathways as shown in 3.1.3. It is expected that the next 13th Five Year Plan will also be based on this National Pathways, and will be in line with the higher plan, the 2030 National Comprehensive Development Plan.

Based on Bhutan's higher plan, aid trends of other donors, local issues, and the direction of JICA's support, the following vision has been established as a direction for Japan's future support. The outline of this study is shown in Figure 4-2.

"Towards food and nutrition security in long-term, promoting Market-Oriented Agriculture and sustainable land use through providing opportunities where a farmer can access a better value chain together with adequate information"

In order to concretize the direction, the following will be taken into consideration:

- To contribute to the elimination of the imbalance between urban and rural areas.
- Adequate income will enable farmers to maintain sustainable agricultural production activities.
- Create new employment opportunities for young people and the unemployed, or support entrepreneurship.
- Contribute to the sustainable development of the agricultural sector, taking into account food security.

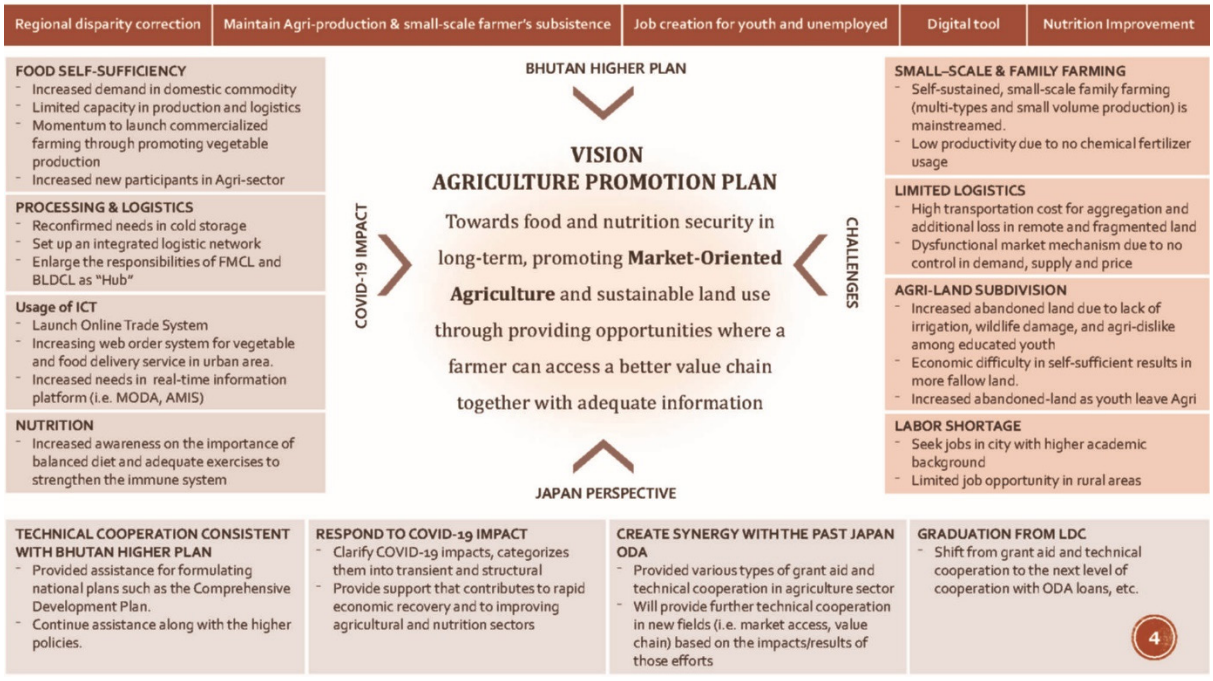


Figure 4-2 Study Policy on Agricultural Promotion Plan

4.2 Promotion Plan

4.2.1 Potential Cooperation Activities in Sectors

Market Access

This section summarizes the issues in the market marketing field.

- Agricultural production in Bhutan is generally carried out in small-scale and at dispersed locations, then each farmer has access to a market individually. There are a few collections or storage facilities, and several FCBL auction houses for exports are located in the southern part of the country. As a result, the production and distribution of agricultural products are in small-scale.
- Due to the high cost of transportation to collect such small lots of domestic produce, their prices are not competitive with cheap imported products in large consumption areas such as Thimphu. Agricultural product traders prefer imported agricultural products, which are cheaper and provide a more stable supply.
- Because the production period is limited by natural conditions, there is an imbalanced distribution of surpluses and shortages even in the same region. Therefore, improving the distribution network from local production areas to the domestic market is a challenge. In addition, since the scale of demands in the domestic market is not enough due to its population in Bhutan, it is necessary to promote exports and develop agro-processing.
- There is a tax-free memorandum between Bhutan and India, and agricultural products are imported from India to Bhutan without tariffs. At present, considering the need to secure fresh vegetables in the winter and self-sufficiency in rice and other grains, Bhutan cannot take measures to impose tariffs on imported agricultural products from India in order to develop its agricultural industry. Therefore, strategies and measures are needed to market Bhutanese agricultural products against cheap agricultural products from India.
- Even with Organic production certification, it is difficult to add value domestically, so it is necessary to promote exports.
- An eligible market in rural areas is school lunches (fully paid for by the government).
- The development of agricultural cooperatives is recommended as a tool for market access in rural areas, but there are not enough activities yet. Those cooperatives that have joint shipments and are linked to markets through intermediaries have been able to continue their activities.

These issues, the main factors, and countermeasures were summarized, and the possibility of Japanese support for them was discussed.

Table 4-5 Possible Japan's Support for Improving Market Access

Challenges	Main factors	Development Approach	Possible Japan's Support	Expected Impact
Unbalanced demand and supply	• Seasonal bias in production by topography and natural conditions. • Lack of diversification in production. • Underdeveloped trading system. • Agro-processing is underdeveloped. • Family farming is dominant and farmers are not	• Promotion of market-oriented agriculture • Guidance on adjustment of production timing • Development of storage facilities and distribution system • Development and dissemination of storage technology at the farmer level • Improvement of storage facilities • Review of the buy-back system	• Promotion of Market-Oriented Agriculture through improving market access	• A vegetable collection, sorting, and storage system can be established at the Gewog level. • A model for agricultural production collection that can be disseminated in the country can be established.
			• Support on cottage and small level business incubation	• Start-ups in the agro-processing industry is supported.

	aware of the market. • Farmers are less sensitive to market demand due to the buy-back system. • Underdeveloped storage technology without facilities • Difficult access to markets • Storage facilities are underdeveloped • Highly influenced by imports from India	• Support for entrepreneurship in the agro-processing sector	• Promote and incentivize Good Agriculture Practices (GAP)	• Enhance farmer's productivity which meets market demand and safety standards
			• Post-harvest techniques Expert	• Develop long-storage technologies (ex, underground storage, indoor storage) and processing technologies that farmers can implement.
Limited logistic service and infrastructure at national/regional/ community level	• Limited markets • No facilities for collection and sorting of products • Under undeveloped distribution system, many intermediaries are involved	• Development of infrastructure to improve distribution, such as rural farm roads • Development of collection, sorting and storage facilities • Review FCBL role in export logistic • Review of pricing policies • Promotion of market-oriented agriculture	• Support to prepare master plan on establish Agri-products supply chain in Bhutan	• A master plan for the development of the supply chain for selected target crops will be developed.
			• Construction of Supply Chain Facilities in Bhutan	• Necessary supply chain facilities will be constructed together with building their operational capacity
			• Construction of Pack House at Pasakha	• Quarantine, cleaning and sorting of agricultural products for export to India will be made possible.
			• Strengthen Cooperatives specialist	• Promote the establishment of a joint shipment system for farmers.
Undeveloped strategy for export	• Difficulty in securing volume due to small-scale production and inadequate collection system • Dependence on exports to India • Lack of certification system • Lack of branding	• Review of policies for agricultural production • Review of the Buy-Back system to make it consistent with market-oriented agriculture • Promotion of certification through capacity building of BAFRA • Export promotion in collaboration with certified farmers • Research on global market demand,	• Capacity Building on DAMC and related agencies to promote export	• Formulation of a specific strategy for the export of Bhutanese agricultural products
			• Export promotion specialist	• Result of research on the needs of neighboring countries for export and the compatibility of Bhutanese products.
			• Branding Expert (OGOP)	• Establishment of an export brand

	• Lack of packaging technology	quality requirements, trends, brands, etc.	• Promotion of Organic Product	• Promote organic vegetable production and promote exports to reflect the added value in prices.

Sustainable Land Use

The challenges in the sustainable land use are summarized below:

- Severe topography, limited land resources, and increasing land fragmentation have resulted in fragmentation of farmland.
- Small plots dispersed on slope are disadvantageous for the introduction of farm mechanization and development of agricultural infrastructure, and working conditions are also difficult.
- Farmers' access to markets is weak, and subsistence or semi-subsistence farming is the mainstay, and agricultural production is not linked to higher farm income.
- The lack of increased farm income makes it difficult for farmers to invest in farmland and facilities such as irrigation facilities, land development, and introduction of farm machinery.
- Farmers are not motivated to farming, which adds to the labor shortage due to temporary and permanent migration.
- The labor shortage not only hinders the expansion of farm management and the shift to commercial farming, but also makes it difficult to conduct precise crop management and soil management, thus hindering the maintenance and improvement of productivity.
- As a result, the expansion of fallow land is progressing.

The following table summarizes these challenges, main factors, and development approach, and examines the possible Japan's support.

Table 4-6 Possible Japan's Support in Sustainable Land Use

Challenges	Main factors	Development Approach	Possible Japan's Support	Expected Impact
Increase in fragmented and underutilized agricultural land in urban areas	• Land is being fragmented • Dispersed small parcels of farmland that are not expected to generate income	• Mobilization of agricultural land by lending in collaboration with the activities of the Fallow Land Bank • Introduction of high value-added agriculture (horticulture, hydroponics, etc.) in peri-urban areas	Promoting Fallow Land Reversion through Support for Fallow Land Database and Capacity Development for Planning	• By organizing land information on fallow land, it will be possible to develop a regional fallow land reversion plan. • By supporting the activities of the Fallow Land Bank effectively, the rehabilitation and utilization of

				fallow land will be promoted.
			Support Program for Strengthening the Implementation System of SLM	• The achievement of ALD/SLM projects will be accelerated, the productivity of farmland will be maintained and improved, the income of farmers will be increased, the working environment will be improved, and the expansion of abandonment of cultivation will be deterred, and more fallow land will be reclaimed and revived.
Increase in abandoned farmland in rural areas	• Irrigation problem due to inadequate irrigation facilities and malfunctioning due to aging and natural disease • Outflow of labor force due to temporary and permanent migration to cities • Low workability and labor efficiency*1 due to harsh land terrains • Difficulty in investing in agricultural machinery and facilities due to low profitability*2 • Poor access to remote farmland accelerates *1, *2 • Decreased productivity due to soil degradation	• Mobilization of agricultural land by lending in collaboration with the activities of the Fallow Land Bank • Improvement of farmland conditions through ALD and SLM • Increase farmer's income and improve working environment by improving conditions of farmland • Maintaining and improving productivity of farmland through SLM • Strengthening the implementation system of SLM • Organizing land information on fallow land and utilize it for rehabilitation of farmland • Utilization of ICT for SLM and fallow land measures (integration of soil	Farming Village development Project for revitalizing rural area through reversion of fallow land	• By presenting a model of farm management using revived fallow land by youth groups, the momentum for the reuse of fallow land and new farming will increase.
			Development of fallow land database and planning capacity	• By organizing land information on fallow land, it will be possible to develop a regional fallow land reversion plan. • By supporting the activities of the Fallow Land Bank, the rehabilitation and utilization of fallow land will be promoted.
			Support Program for Strengthening the Implementation System of SLM	• The achievement of ALD/SLM projects will be accelerated, the productivity of farmland will be maintained and improved, the income of farmers will be increased, the working
			Improvement of Machinery and Equipment for ALD	

		and land information into fallow land information) • Development of soil monitoring system and introducing medium- to long-term soil conservation measures		environment will be improved, and the expansion of abandonment of cultivation will be deterred, and more fallow land will be reclaimed and reused.
			Assessing and Profiling Bhutanese Soil Biodiversity	• The organization of fundamental information for medium- and long-term soil conservation will be initiated, and human resources in this field will be trained.

Promoting Innovation in the Agricultural Sector

When considering the proposed support for ICT systems, the one that will have the most significant impact on the agricultural sector as a whole is the development and dissemination of the Agricultural Market Information System (AMIS). Compared to the conventional telephone-based communication between individuals, the speed of communication is much faster, and the information is more transparent, which encourages the optimization of production and distribution volumes. For example, as the number of distribution-conscious farmers and cooperations increases, post-harvest technology can be improved as a side effect.

However, for this to happen, the quality of price information related to AMIS must be sufficiently ensured in the first stage. Currently, the quality and frequency of price information in local markets collected by Gewog extension officers are not stable, so the first starget must be to improve this issue. Second, in addition to training on how to use the mobile app, training on how to use market information will be provided to users to create a receptive environment. Thirdly, the project aims to increase the variety of information that AMIS can provide by linking it to the information on the MODA platform, which was developed with the support of WFP, to enrich market information and form a real-time platform.

Since the market information is diverse, it is desirable that private agribusiness companies, including producers, be involved in developing the platform while understanding the required information by the private sector. A forum will be provided to support this activity where the government and private companies such as aggregators and cooperatives can exchange opinions.

Table 4-7 Measures to address issues in the field of innovation promotion and proposed support from Japan

Challenge	Cause	Development Approaches	Possible Japan's Support	Expected Impact
Lack of information quality to trust users (agribusiness companies, including farmers)	Lack of information collection and implementation skills of local extension agents who are responsible for collecting information in rural areas Lack of IT literacy and business (financial) literacy on the part of users	Strengthen the capacity of the ICT Division in designing and supervising the development of ICT systems to improve the work efficiency of local extension workers. (Strengthen capacity for development of farmer and extension worker database, mapping tools, activity reporting system, and crop and harvest reporting system) Training of personnel to conduct surveys on a primary database of farmers and extension workers (assuming young age group such as unemployed Graduates) Training of rural extension workers in the use of ICT systems Training of users to improve their literacy	Strengthen capacity development to collect and use agricultural information with ICT	The accuracy of the information collected by local extension agents will increase, and the application will become more widespread. As a result, market information propagation will become faster and more transparent, and the number of groups engaging in agriculture as a business will increase.
Lack of functionality in ICT systems (Existing functions alone do not directly benefit the users)	Lack of ICT human resources (unable to develop applications and information integration services using their human resources)	Strengthen the capacity of ICT Division (utilization of ODK tools, web application development, data scientist) Support linkage of ICT systems using MODA Platform Incorporation of distribution volume information (if there is a system to know the distribution volume to the market, such as warehouse management records)	ICT System Advisor	In collaboration with the MODA Platform, AMIS will utilize data related to cropping and harvesting and provide information related to distribution. This will further promote the use of market information and contribute to improving the business awareness of farmers in particular.
Lack of communication between developers and	Private companies involved in agribusiness have not been developed.	Publicize business plans and provide training for selected plans to become private sector aggregators, agricultural service	Support for the organization of private agribusiness companies,	Information sharing will be appropriate, especially for market information, and the number of

Challenge	Cause	Development Approaches	Possible Japan's Support	Expected Impact
users of ICT systems	There is no place to collect requests from the private sector for ICT, especially for market information.	providers, or agricultural entrepreneurs (entrepreneurship support) Establish a platform for the exchange of ideas between the government and the private sector. Identify new needs from social media text data analysis	including producers Basic Needs Survey in the regions by using ICT methodologies	ICT system applications will increase. Be able to identify needs for regional revitalization and propose a revitalization plan based on those needs.

Nutrition and Food Education

As seen in 3.4.3 above, RGoB is taking measures to address the triple burden of malnutrition in Bhutan. However, there is room for improvement in the modality through which these responses are implemented in order to ensure that they lead to better results, while making effective use of the limited government budget and personnel. With this regard, the Government of Japan can contribute to the improvement of the nutritional status of the Bhutanese people by supporting the RGoB's responses, as shown in Table 47.

Table 4-8 Measures to Address the Challenges and Possible Support from Japan in the Nutrition Sector

Challenges	Major causes	Measures (Possible activities)	Proposed support from Japan	Expected impact
The Bhutanese people suffer from the triple burden of malnutrition (under-nutrition, inadequate micronutrient intake and over-nutrition).	There are Bhutanese who do not have the knowledge and skills pertaining to improved nutrition.	3. To conduct the Social and Behavior Change Communication (SBCC) targeting to all the population. 4. To conduct SBCC to address the following symptoms by involving not only the actually suffered persons but also their families and communities ✓ Stunted children under 5 years old ✓ Women and children with symptoms of micronutrient deficiency (including anemia	The SBCC strategy which is under the development by MoH, MOAF and MoE with support from WFP will be implemented, and give feed-back to MoH, MOAF and MoE on impact.	Directly contribute to the reduction of the triple burden of malnutrition among the entire population of Bhutan. (The improved agricultural income may encourage farmers to improve their nutrition in accordance with what they have learned through the implementation of the SBCC strategy.)

		and glossitis) ✓ Non-communicable diseases in adult men and women (hypertension, diabetes, cancer, cardiovascular diseases, etc.)		
The system needs to be strengthened if locally produced and locally consumed school meals are to continue.	3. The amount of stipend is fixed and does not reflect inflation or the consumer price index. 4. The selling price in neighboring markets is often higher than the school's purchase price. 5. Some foods are not produced by neighboring farmer groups and are not available. 6. School meals may not meet the nutritional requirements of students, when schools cannot have all the ingredients as recommended. 7. The stipend is not sufficient when schools are located in remote areas and the cost of transporting food is high. 8. Some schools do not have an enough number of students for FGs to make profit by selling their produce. 9. The applied purchase rules vary from school to school.	1. To establish a monitoring system to assess the current situation. 2. To identify good practices and draw up lessons learned. 3. To produce a revised version of the current system based on the lessons learned. 4. To implement the proposed changes in pilot schools to demonstrate that they work. 5. To develop and update operational guidelines and manuals in line with the proposed changes.	Support for the strengthening "School Feeding Program"	1. Contribute to the reduction of malnutrition among students. 2. It will also contribute to improving farmers' access to markets.
Weak multi-sector coordination function	1. There are several task forces coordinating between the relevant institutions, but there is no coordination mechanism between the task forces. 2. All task forces are	4. To position the nutrition sector as a cross-ministry sector within the RGoB administrative system. 5. To clarify the scope of works of the	Nutrition improvement advisor	It can indirectly contribute to reducing the triple burden of malnutrition among the Bhutanese people.

	horizontal and there is no clarity on who is ultimately responsible.	Task Forces and the relationship between them. 6. To clarify the coordination mechanism between the relevant agencies in the nutrition sector.		

4.2.2 Agriculture Promotion Plan

Candidate of Agriculture Promotion Plan

The ideas of possible Japan's support in each field are sorted out. Based on them, model rural development projects combined the proposed activities in each field were discussed. These are summarized in Table 4-9 below.

Table 4-9 Candidate of Agriculture Development Plan

Category	Project title	Activities
Market Access	Promotion of Market-Oriented Agriculture through improving market access	To construct a post-harvest storage at Gewog and operate it for establishing joint shipping by surrounding farmers groups. It will be a model to achieve stable shipments of a certain quantity and to strengthen the value chain. In conjunction with the improvement of market access, market information will be utilized using ICT technology. Meantime, SBCC will be implemented, so that ultimately improved profits will lead to improved nutrition.
	Support to prepare master plan on establish Agri-products supply chain in Bhutan	In order to eliminate the imbalance between supply and demand on agricultural products, a master plan to develop post-harvest facilities which strategically improve the distribution of agricultural products in line with its production is formulated.
	Construction of Supply Chain Facilities in Bhutan	To construct necessary faculties for aggregation and distribution of products according to above Master Plan
	Capacity Building on DAMC and related agencies to promote export	To prepare detailed export promotion plan based on the investigation on the potential for cop exports other than India, primarily to ASEAN market and domestic production capacities. The plan will be prepared not only DAMC but through discussion with related institutions.
	Promotion of export of organic Product	To conduct survey on potential destination of export of organic products, strengthen mechanism on organic certification in BAFRA, and development of production systems through SLM, in order to promote export of organic agricultural products.
	Export promotion specialist	Provide advice on access to markets in neighboring countries with considering their market needs, and its compatibility with Bhutanese products through work with DAMC, FCBL and BEA
	Construction of Pack House at Pasakha	To construct a pack house at Pasakha near border in Phuntsoling, for conducting quarantine, cleaning and soring required for export and inspection on imported product.
	Promote and incentivize Good Agriculture Practices （GAP）	To educate farmers on production norms and standards that are met with market demands and acceptable by food safety standards of the market.

	Support on Cottage and small level business incubation	A system to provide technical and financial support for starting and developing agro-processing businesses in rural areas will be established and implemented as a pilot project.
	Branding Expert （collaboration with OGOP）	Improve attractiveness of the region together with Dzongkhag and Gewog government organizations, and disseminate such good practices to other regions
	Strengthen the Cooperative specialist	To support organizing agricultural cooperatives and their self-reliant in DAMC.
	Post-Harvest Techniques expert	Develops and train technologies for long-term storage of vegetables and agro-processing applicable at the farm level in NPHC.
Sustainable Land Use	Farming village development project for revitalizing rural areas through the reversion of fallow land	As a model for promoting the use of fallow land, a technological package to support the entry of newcomers as youth groups, etc. A high potential area to be used sustainably will be selected from fallow lands in Gewog, renewed them through ALD works. The project creates successful cases of highly motivated farmers using fallow land through technical guidance by agricultural extension officers and coordination with market sales.
	Support Program for Strengthening the Implementation System of SLM	To promote implementation of SLM through capacity development of agricultural extension officers and exhibiting construction equipment suitable for ALD work on slopes. It will also strengthen coordination of the SLM projects, its monitoring mechanism and its implementation through capacity development of the concerned parties and utilization of ICT support.
	Improvement of Machinery and Equipment for ALD	Based on the results of the pilot introduction of construction equipment suitable for ALD works, construction equipment for ALD works will be procured to accelerate the implementation of the ALD project.
	Development of fallow land DB and planning capacity	In addition to supporting the preparation of inventory database of fallow land including fragmented farmland, it will form a model district for land-readjustment facilitated by local government. At the same time, it will improve the capacity to prepare, implement, and monitor implementation plans for fallow land reversion by effectively using productivity information such as soil maps and land classification maps.
	Assessment and profiling of soil biodiversity	To conduct preliminary studies and preparations to conduct an assessment and profiling of soil biodiversity and ecosystem functioning in Bhutan for the conservation of soil fertility and maintenance of agricultural productivity in medium-long term.
ICT Agriculture	Support for the organization of private agribusiness companies, including producers	To establish a platform where the public institute to gather comments on requirement information and ICT from private sectors, agribusiness and producers. Assumed to be integrated into other activities (private sector support).
	Capacity development to collect and use agricultural information with ICT	In order to improve the type, quality, and frequency of market information and other information that is the basis of ICT systems, capacity of ICT division and Gewog extension officers is strengthen. Meantime, the IT and financial literacy of users will be strengthened in order to promote the use them.
	ICT System Advisor	To support the provision of data by AMIS that cropping and harvesting information provided by MODA Platform and its distribution data. This will further promote the use of market information and contribute to improving the business awareness of farmers in particular.

	Basic Needs Survey in the regions by using ICT methodologies	To provide new know-how to understand basic needs through social media (SNS). An expert will dispatch to the ICT Division, she/he provides new ways to understand the needs of consumers and advises to policy makers on how to reflect these needs in their policies. She/he will investigate the reasons for the lack of ICT adoption at the farm level.
Food security and nutrition	Combining Social and Behavior Change Communication (SBCC) into the activities	SBCC strategies will be linked to various project activities and implemented with targeted farmer groups and households in order to promote behavior change towards reducing the triple burden of malnutrition.
	Support for strengthening the “School Feeding Program”	Based on good practices, the school feeding program will be ensured as a system to improve for both students' low nutrition and inadequate intake of micronutrients and farmers' access to markets. The system will be disseminated nationwide.
	Dispatching Nutrition Advisor	Position nutrition as a cross-cutting field in the administrative system and strengthen its multi-sectoral coordination function.

Prioritization of Agriculture Development Plan

The candidates of agriculture development plan are evaluated with five aspects shown in below. With this evaluation, no candidate activities were evaluated as no effective or impossible to be implemented. Therefore, all activities mention in Table 4-10 becomes components of the Agricultural Development Plan.

Among the activities, priority activities are selected.

- Sustainable use of farmland and improvement of farmers' livelihoods
- Economic revitalization and job creation in rural areas
- Impact for surroundings
- Relevance of Japan's support
- Environmental and social consideration category

Table 4-10 Evaluation of Candidate of Agriculture Promotion Plan

Category	Project title	Sustainable use of farmland and improvement of farmers' livelihoods	Economic revitalization and job creation in rural areas	Impact for surroundings	Relevance of Japan’s support	Environmental and social consideration category	Priority
Market Access	Promotion of Market-Oriented Agriculture through improving market access	○	○	◎	○	B (Construction of simple building)	○
	Support to prepare master plan on establish Agri-products supply chain in Bhutan	○	○	◎	○	C	○
	Construction of Supply Chain Facilities in Bhutan	○	◎	◎	◎	B	
	Capacity Building on DAMC and related agencies to promote export	△	△	○	○	C	
	Promotion of export of organic Product	○	△	○	○	C	
	Export promotion specialist	△	△	○	○	C	
	Construction of Pack House at Pasakha	○	◎	◎	○	B	

	Promote and incentive Good Agriculture Practice (GAP)	○	○	○	○	C	
	Support on Cottage and small level business incubation	△	◎	◎	○	B (Construction of simple building)	
	Branding Expert (collaboration with OGOP)	△	○	○	○	C	
	Strengthen the Cooperative specialist	○	○	○	○	C	
	Post-Harvest Techniques expert	△	△	◎	○	C	
Sustainable Land Use	Farming village development project for revitalizing rural areas through the reversion of fallow land	◎	◎	○	○	B (Construction of simple building)	○
	Support Program for Strengthening the Implementation System of SLM	◎	△	○	○	B (Construction of simple building)	○
	Improvement of Machinery and Equipment for ALD	◎	△	○	△	C	
	Development of fallow land DB and planning capacity	○	△	○	○	C	
	Assessment and profiling of soil biodiversity	○	-	△	△	C	
ICT Agriculture	Support for the organization of private agribusiness companies, including producers	○	○	○	○	C	
	Capacity development to collect and use agricultural information with ICT	○	○	◎	○	C	○
	ICT System Advisor	○	-	○	○	C	
	Basic Needs Survey in the regions by using ICT methodologies	○	○	○	○	C	
Food security and nutrition	Combining Social and Behavior Change Communication (SBCC) into the activities	-	-	◎	○	C	
	Support for strengthening the “School Feeding Program”	○	△	◎	◎	C	○
	Dispatching Nutrition Advisor	-	-	○	○	C	

Legend：◎ Very high relations, ○ High relations, △ Limited relations, - Low or no relations

4.2.3 Proposed Implementation Plan

The implementation plan for the activities selected as high priority from the Agricultural Development Plan is described below.

Support to Prepare Master Plan on Establish Agri-products Supply Chain in Bhutan

a) Background (Challenges)

Due to its geographical features, agricultural production in Bhutan is dominant in the summer, and in the winter, cheap agricultural products imported from India meet the domestic demand. Through the lockdown and border blockade caused by COVID-19, increasing food self-sufficiency has become a government proposition. Therefore, it is needed that efforts to eliminate the imbalance between production and consumption, and to distribute horticultural produces, which produced in the southern

areas or by using greenhouses, to the consumption areas during winter. However, an integrated plan for the construction of facilities for washing, sorting, storage, etc., necessary for distribution of products has not been formulated.

b) Project Purpose

In order to mitigate the imbalance between supply and demand of agricultural products, a strategic facility improvement plan will be developed as a master plan for supply chain improvement.

c) Activities

① Review various plans for post-harvest processing of cleaning, sorting and storage for distribution of domestic horticultural crops and for export of agricultural products.
② Identify existing distribution and issues for each crop from surveys on domestic distributors, auction houses, BEA, etc., and organize the supply chain for each agricultural product along with the production plan.
③ Develop a marketing strategy for each crop.
④ Develop a master plan to improve distribution.
⑤ Formulate a plan for the development of a distribution monitoring system that can grasp the volume of agricultural production, demand, and distribution, which is necessary for improving distribution.

d) Target Area

Whole country

e) Counterpart Organization and other partners

DAMC, DOA, NPHC, FCBL, ICT

f) Proposal for Implementation

With regard to implementation of each activity proposed in the Agricultural Promotion Plan, it can be assumed that the activities will be positioned in this prepared “Master Plan on Establish Agri-products Supply Chain in Bhutan”, and they are going to be implemented step-by-step.

For example, it can be carried out large scale and effective activities if it will be a program that this preparation of Master Plan could be implemented as a technical cooperation project for loan-preparation, then followed by it, infrastructure development will be carried out by loan and capacity development for its operation will be carried out as technical cooperation project.

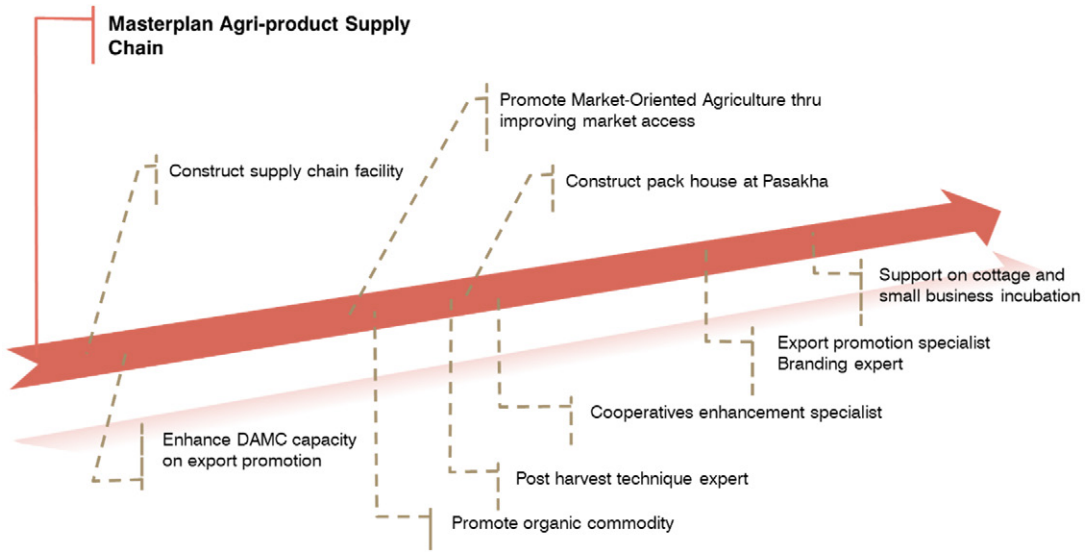


Figure 4-3 Logistic Improvement Model

Promotion of Market-Oriented Agriculture through Improving Market Access

g) Background (Challenges)

In Bhutan, due to the topographical characteristics of the country, agricultural production is carried out on small scale and in remote areas. Therefore, transportation and aggregation of products are major issues for farmers. In addition, due to the small scale of agricultural production, the development of agro-processing is also limited due to unstable supply of raw materials, resulting the market is not expanding. Therefore, the transition from subsistence agriculture to the next step requires the formation of local markets and the improvement of logistic distribution from rural areas to urban areas. In addition, the working population in agriculture sector is decreasing due to its undeveloped situation, then the percentage of female farmers and rate of fallow land is increasing. Then, measures that encompass these factors are required

In addition, the National Comprehensive Development Plan proposes the establishment of centers for education, commerce, and administrative services in a hierarchical structure as part of the "formation of a comprehensive service system using ICT. As a kinds of county center (GC) in the concept, a sales base for farmers and local traders will be set and create synergy with the above plan.

h) Project Purpose

A synergistic rural development model will be established by combining the enhancement of the value chain from production to marketing and processing. With the improving market access, as well as increasing farmers' income, improving nutrition, and attracting young people to the agricultural sector in rural areas will be integrated.

i) Activities

① In order to establish a distribution and sales network for major agricultural products in the

region, warehouses for storing collected agricultural products will be constructed in Gewog. A joint shipment system will be established using these warehouses.

② Encourage changes in farmers' attitudes and behaviors using the SHEP approach. So that farmers in the region can transform their agricultural production from subsistence farming to commercial farming and receive the benefits of improved market access through distribution and marketing networks.

③ As a measure to reduce the workload of Gewog extension workers, the project will improve technical extension using ICT. Volunteers cooperate to secure human resources to work in the agricultural sector.

④ Nutrition education by extension workers will be conducted in conjunction with technical extension to implement SBCC on diet and nutrition, and to encourage farmers to improve their income to improve nutrition.

j) Target Area

Three Gewogs in one Dzongkhag are assumed to be one unit. Three Dzongkhag will be selected as the target area. At present, Phunakha, Wangdue Phodrang, Dagana, Tserang and Mongar are considered as candidates.

k) Counterpart Organization and other partners

DAMC, DOA, Dzongkhag DAO, Gewog Extension Officer, HPD-DoPH-MoH, WFP

Farming village development project for revitalizing rural areas through the reversion of fallow land

l) Background (Challenges)

Employment opportunities in rural areas of Bhutan are limited, and due to the high level of education, young people and men are leaving rural areas to finding work. It led to a shortage of labor in agriculture sector, an increase in the rate of female farmers, and an increase in unused agricultural land. It is necessary to take measures to address these issues, to attract and retain young people in agriculture and related industries in rural areas, and to implement sustainable economic activities.

m) Project Purpose

To increase employment opportunities for young people in rural areas and to revitalize the agricultural sector, a technical assistance package combining measures against fallow land and support to start farming will be developed.

n) Activities

① To support new farming by youth groups, economically renewable farmland will be selected from fallow and unused land in the region, and appropriate agricultural land improvement (ALD) works and sustainable land management (SLM) technologies will be applied to maintain and improve the productivity of the farmland.

② To promote agricultural production by the new groups on that farmland.

③ To promote agriculture attractive to youth people by introducing contract farming under school feed program in early-unstable production period and also applying ICT systems to reduce the workload of farmers through remote control, etc.

④ To conduct training on market-oriented agriculture to develop capacity of farmers to utilize market information, to negotiate and cooperate with venders in the markets, transporters, and aggregators, and to enter the market.

⑤ SBCC activities on nutrition will be conducted in collaboration with WFP to encourage farmers to use improved their income for improving nutrition.

o) Target Area

Three Dzongkhag will be selected.

p) Counterpart Organization and other partners

NSSC, DOA, Dzongkhag DAO, Gewog extension officers, WFP

Support Program for Strengthening the Implementation System of Sustainable Land Management (SLM)

q) Background (Challenges)

Due to the harsh topography and limited land resources, farming in Bhutan is done in small plots dispersed on sloping land. It makes difficult to introduce agricultural machinery and to develop irrigation and other farming facilities. As a result, working conditions for farmers are also difficult. In addition, fallow land has become a major problem due to the labor shortage caused by young people leaving farming and the exodus of the rural population. Under these circumstances, many agricultural lands have been improved through the implementation of agricultural land development (ALD) projects such as terrace construction, but there is a need to accelerate the implementation of ALD projects. However, there is still limitations due to lack of construction machinery, especially those suitable for working on slopes. There is also a need to improve and maintain the productivity of farmlands by improving soil fertility and soil conservation through sustainable land management (SLM).

r) Project Purpose

By promoting the implementation of Agricultural Land Development (ALD) projects centered on terrace construction and soil conservation through Sustainable Land Management (SLM), the project aims to expand agricultural production by improving the productivity and working environment of farmland and to contribute to the promotion of the reclamation and utilization of fallow land.

s) Activities

① Strengthen the capacity of agricultural extension officers in agricultural land improvement (ALD) projects and sustainable land management (SLM) projects (technical guidance to farmers on ALD projects, assistance in project applications, and guidance on soil management through SLM after ALD projects are completed).

② Strengthen campaign activities for SLM in each Gewog.

③ To introduce and display construction machinery suitable for ALD work on sloping land (Medium and small excavators, gravel removal machines).

④ Strengthen the mechanism by enhancing the capacity of the concerned parties for coordination and monitoring of SLM projects.

⑤ Strengthen the capacity of SLM project implementation planning and promote efficient implementation by supporting the use of ICT in SLM projects (use of the national soil database, introduction of measurement-based soil nutrient assessment, and application development).

⑥ Equipment support and capacity development of NSSC staff and extension officers for soil nutrient assessment and monitoring to improve soil fertility management

t) Target Area

Capacity building of relevant personnel and support for ICT utilization will be targeted nationwide.

Introduce and display of construction equipment for ALD and construction exhibition will be covered by selecting a few Gewogs in the target provinces.

u) Counterpart Organization and other partners

NSSC/DOA-MOAF, Dzongkhag DAO, Gewog Agricultural Extension Officer

Capacity Development to collect and use agricultural information with ICT

v) Background (Challenges)

The MOAF has developed several ICT systems, such as AMIS and E-Crop Advisory, based on the E-RNR Master Plan, but these systems have not been sufficiently penetrated by users. There are two possible reasons for this. (1) The workload of local extension agents in charge of DAMC information collection is high, and they do not have enough time to collect information (lack of ability to implement information collection). As a result, there is a lack of variety, accuracy, and frequency of local market information, and the information itself, which is the key to ICT, is insufficient and lacks reliability. In addition to a lack of IT literacy, there is a lack of business (financial) literacy, which means that the benefits of using the system are not fully understood.

w) Purpose

To improve the ability of local extension agents to collect and implement information (to improve the practical efficiency of extension agents and to create more time for market information acquisition, as it is difficult to obtain market information efficiently and DAMC is understaffed and has low capacity to do so) and to increase the number of users of the system.

x) Activity

① Strengthen the capacity of the ICT Division to design and supervise the development of ICT systems to improve the work efficiency of local extension workers (Strengthen capacity to develop farmer and extension worker databases, mapping tools, activity reporting systems, and crop/harvest reporting systems).

② Training of personnel to conduct surveys on basic databases (assuming young people such as unemployed graduates)

③ Training of local extension agents in the use of the above systems.

④ Training of Farmers Group, Cooperative, and Aggregator to improve financial literacy to utilize market information.

y) Target Area

Nationwide

z) Counterpart

ICT Division, DAMC, DOA, and Gewog Extension Officer

Support for strengthening the “School (and Hospital) Feeding Program”

aa) Background (Challenges)

Since 2019, after completing the phased handover from WFP, the RGoB is implementing a school feeding program in form of local production for local consumption as a 100% state-funded program. The target schools are instructed to purchase all foodstuffs using government scholarships, especially fresh foods from nearby farmer groups and agricultural cooperatives. So that, this program is expected to contribute to improving domestic self-sufficiency, increasing farmers' income, and improving students' nutrition.

By the year 2021, it is said that the program has been introduced in about 300 schools in 18 Dzongkhag out of about 500 target schools nationwide. And it is expected to be expanded to all target schools.

However, there is room for improvement in the operation and management of the program. For example, there are reports of cases where certain fresh foods (meat, eggs, fruits, and vegetables) were not supplied as frequently as instructed by the MoE. Thus the nutritional requirements of the students may not be met. It has also been pointed out that as marketing and distribution improve in the future, it may become more difficult to ensure a stable supply of food from farmers to schools, as farmers will have more options in the market. In such an environment, teachers who negotiate with farmer groups are burdened with negotiations that become more difficult every year. In order for the program to be continued or expanded in schools across the country, it is necessary to understand and analyze the current situation and take necessary measures (e.g., changing the menu, ingredients, and suppliers, improving the budget setting method, etc.) to ensure the self-sustainability and development of the program.

bb) Purpose

The current School Feeding Program is revised in order to ensure the quality and the quantity of school meals with food stuff produced by local farmers through the year.

cc) Activities

① A unified monitoring system for the current School Feeding Program is established and implemented.
② Trial models to be tested in the pilot Dzongkhag are identified based on results of the monitoring.
③ Trials to improve the School Feeding Program is undertaken in the pilot Dzongkhag.
④ A National Plan to improve the School Feeding Program is developed based on results of the trials.

dd) Target Area

Selected 6 Dzongkhag （2 Dzongkhag each in Eastern, Central and Western Region）

ee) Counterpart

DAMC, DoA-MoAF, SHND-DoSE-MoE, District Agriculture Offices, District Education Offices

APPENDIX

APPENDIX-I Minute of the seminar on data collection survey

Objective	To conduct seminar on data collection survey carried out by the JICA study team for the Agriculture sector in Bhutan
Date	November 19, 2021
Venue	Conference Hall, Namgay Heritage, Thimphu (seminar deliberation and attendance by Zoom)
Participant	Find Participant List

SUMMARY

A half day seminar on the findings of the "Data Collection Survey for Agriculture with and post COVID-19" was held on the 19th of November 2021 in the conference hall of Namgay Heritage in Thimphu. The seminar was basically aimed at sharing the various categories of data that was collected by the JICA survey team and the team's collective proposal of possible support from JICA to enhance Agriculture in Bhutan with and post COVID 19 impact.

OPENING STATEMENT BY SECRETARY, MoAF

The seminar was declared open by a brief introductory and welcome note by Dasho Thinley Namgyel, Secretary of the Ministry of Agriculture and Forests. The Hon'ble Secretary briefly touched on the personal initiatives and selfless contribution made by late Dasho Nishioka to promote agriculture in Bhutan. Further, it was mentioned that dueto his efforts and personal commitment, Agriculture in Bhutan has developed considerably and much has been achieved ever since.

The secretary also highlighted that despite the crippling effect of the COVID pandemic across many sectors of business and developmental activities, the agriculture sector, in fact, has grown and done fairly well. And now, with the assistance of JICA, hopefully the agriculture sector will receive substantial technical support in the days to come.

WELCOME NOTE BY CHIEF REPRESENTATIVE, JICA BHUTAN OFFICE

The opening note by Dasho Thinley Namgyel was followed by an opening statement by Mr. Kozo Watanabe, Chief Representative of the JICA Bhutan Office. He welcomed the participants and appreciated that the agriculture sector in Bhutan has taken a forward step in such difficult times despite the hindrances and threat posed by the spread of the COVID-19 pandemic.

This survey is to see how we can improve the food security by enhancing or improving the productivity of agricultural products. It is also to assess the effect of the COVID-19 pandemic on the agriculture sector as a whole, and what changes could be introduced or brought about in order to improve agriculture methods that will increase productivity of agricultural products and eventually guarantee food security.

Therefore, in order to have a better understanding on the impacts of COVID-19 on agriculture, one component of the survey is to look at the effects of COVID-19 on agriculture and how JICA can assist or partner the Royal Government or the DOA to enhance productivity of agricultural products.

The result of the survey will also indicate how funds and assistance can be utilized effectively with the support of JICA or the cooperation and support of the Japanese Government. So, through this study and its findings, JICA hopes to develop long term relations and cooperation with the Royal Government in this sector.

WELCOME NOTE BY FIRST SECRETARY, EMBASSY OF JAPAN, DELHI

A brief welcome note was also conveyed by Mr. Hiroyuki Yamashita, First Secretary, Embassy of Japan, Delhi by Zoom. Mr. Yamashita also highlighted the assistance and support late Dasho Nishioka provided in the field of agriculture in Bhutan. In this respect Japan has a long history of assisting many countries in this field. Similarly, it was assured that Japan will continue to extend support to Bhutan in agriculture sector development.

PRESENTATION ON DATA COLLECTION SURVEY

The presentation was deliberated by Mr. Hiroshige, the deputy team leader. After a brief introduction of the data collection team members, Mr. Hiroshige made a comprehensive power point presentation of the overall process of the data collection method and its findings. In brief, the presentation outlined the methodology of the data collection, the numerous challenges and shortcomings the farming community faces, the possible areas where JICA's assistance and expertise could be useful and conceptually what kind of support projects could be materialized.

POST PRESENTATION NOTE OF THANKS

At the end of the illustrious and detail presentation made by Mr. Hiroshige, the Secretary and Mr. Watanabe consecutively thanked Mr. Hiroshige for explaining and presenting the findings of the survey in detail with clarity.

Mr. Watanabe highlighted that the introduction of ICT has many stakeholders besides DOA. The ICT data base, once set up, will consider nationwide distribution of data and technical assistance. The implication of establishing a large and extensive ICT program will benefit the entire country and will assist all user sectors.

The seminar was suspended for a tea break after the presentation and resumed with the question answer session. The views and interactions exchanged during the general discussion session can be summarized as follows.

GENERAL DISCUSSION SESSION

Before the start of the discussion, Ms. Mariko Tanaka, Representative of JICA Bhutan Office expressed the view that the survey team suggested many approaches and activities, which will be discussed among participants today. The next step after that is to prioritize the potential new projects, based on the findings of this survey, before deciding or selecting any new projects. She also reminded the meeting that the JICA had started providing the training in the market-oriented approach called SHEP.

In addition to the comments of Ms. Tanaka, Mr. Jun Kudo and Mr. Shin Suto, Project Formulation Advisers of JICA Bhutan Office also indicated the importance of ICT and introduction of market-oriented agriculture. In fact, there are already a few JICA assistance in the agriculture sector programs ongoing.

The JICA staff also indicated that in future, some of the projects must consider the importance of value chain as it affects all entities of agriculture. There are also opportunities for some of the project ideas to be merged or integrated into some of the ongoing JICA funded agriculture support programs.

The JICA Bhutan Office is keen to support any future agriculture related programs and will continue providing or extending required support to enhance agriculture production that will ensure food security.

COMMENT BY DAMC

The director DAMC, Ms. Kinlay Tshering, commented that DAMC already had a detailed discussion with the JICA survey team and most of the requirements that was put forth during the meeting were incorporated. She expressed her appreciation to JICA for assigning the survey team and the survey team for bringing out detailed survey data containing valuable information and numerous ideas on agriculture development.

In her following comments she touched on the subject of GAP, the certification of organic products, the introduction of ICT in agriculture, effective and appropriate mechanism for agriculture land development. She also expressed that due to the spread of COVID-19 and its effect on the country's GDP, it would not be possible for Bhutan to go ahead with the process of graduating from Grant-Aid object countries (IDA eligible countries).

Therefore, it would be highly appreciated if any of the project ideas and concept related to marketing infrastructure put forward by the survey team could be taken up as a priority grant aid project.

COMMENT BY, PPD, MoAF

Mr. Karma Tshering, Chief of PPD, made the comment on construction or establishment of proper market supply chain to improve the present marketing process or network. He also suggested that one of the projects could be aligned with the marketing strategy that the department has developed and that another project could take on board a component for fallow land development.

In fact, as there are many components that comprise the entire agriculture sector, it would be ideal and also convenient, if one main project is conceived with all the various components in it and the data base would be clubbed under one umbrella for better and efficient management.

Moreover, Mr. Karma Tshering mentioned necessity of integrated information system to cover both agricultural sector and livestock sector, as RNR information system.

COMMENT BY FCBL

The representative from FCBL, Mr. Naiten Wangchuk, commented that due to the current economic situation in the country, the implementation of the projects should be prioritized to improve food productivity. He also indicated that a study should be conducted to look into the food consumption habits of Bhutanese people and promote the importance and benefits of balanced diet.

It is also time to seriously look into cereal cultivation and advising the population to shift to consumption of cereal products which will automatically reduce consumption and import of rice. The shift towards cereal cultivation and consumption also gears towards food security.

COMMENT BY BAFRA REPRESENTATIVE

Mr. Jamyang Phuntsho of BAFRA indicated that there are some useful information BAFRA could share with the JICA survey team. Especially, BAFRA is seeking support for them to obtain organic certification by Japan Agriculture Society (JAS).

Bhutan has been trying to market the organic products to Japan but it requires the JAS certification on organic agricultural products. BAFRA may be able to act as the inspection organization to certify the products for export.

COMMENT FROM DOA

Mr. Wangda Dukpa from the Department of Agriculture indicated that the agriculture research unit, though started in the eighties, is still weak and requires support. Support would be welcome for the research program to study the value chain strengthening, implementation of ICT and introduce AI to enhance food production.

He also indicated that over the years the farming population has been decreasing due to the rural – urban migration of educated citizens. This would directly result in a reduction of agricultural food production and thereby cause food shortage. The best way to encourage the young generation to take up farming is to introduce the use of AI and smart farming methods.

He also indicated other areas such as farm mechanization and human-wild life conflict be tackled effectively and resolved so that people are encouraged to take up farming. The objective of food security should also look into the provision of Crop Insurance schemes so that farmers could be compensated for crop losses from natural calamities.

COMMENT FROM THE MINISTRY OF EDUCATION

Mr. Karma Wangchuk from the Ministry of Education commented that it is time to change the mind-set and eating habits of children, as the current trend is to eat fast food which is not healthy. In many cases farm products do not reach the schools on time or are wasted since most of the storage system in the schools are very old and dysfunctional. Therefore, support in setting up proper food storage units in schools would be helpful in providing better diet and feeding programs.

As the amount of stipend would not be increased, some schools are supplementing school meals through the school agriculture and environment program. There is need to grow more variety of products so that children can have different flavors and taste in their meals. Rice is provided in all the 3 meals a day. At present, efforts are made to diversify the food base, t served to children in the schools.

COMMENT BY THE MINISTRY OF HEALTH

Mr. Sonam Tobgay recalled the meeting that the National Nutrition Strategy and Action Plan covers all the ideas and activities to improve the nutritional status of the population. MoE and MoH have been collaborating to carry out activities together. The Collaboration between WFP and JICA would be welcome. Yet, there remain so many challenges in the nutrition sector, and detailed study may be required.

COMMENT BY ICT DIVISION, MoAF

Mr. Tenzin Dendup, ICT Officer from the ICTD indicated that most of the ideas of the ICT division were incorporated in the presentation as he had had several rounds of discussion with the JICA survey team. He indicated that one of the main themes from the ICT division was to have a list of recommendations from the user or farming groups to see how IT could be effectively used for farming. It would be worthwhile if the recommendation could take into account all the steps of farming starting from seedling inputs, cultivation, harvesting, post harvesting and marketing within which ICT could intervene positively.

DISCUSSION AND CLARIFICATION OF COMMENTS BY JICA SURVEY TEAM

In response to the various comments raised by the audience, Mr. Hiroshige responded with appropriate reasons and justification and also explained, where necessary, how the survey team would accommodate the issues or concerns raised by the participants so that the selected projects could benefit the greatest number of stakeholders.

Regarding the comments from BAFRA, the idea of export of organic agricultural products, not only to Japan, and BAFRA takes on the role of certification body is worth considering. In this case, it is necessary to develop a certification system for Bhutan and at the same time promote the production of organic agricultural products is indispensable. It is also necessary to conduct market research and clarify the export destinations for organic products. As a combination of these perspectives, Promotion of Organic Product is proposed in the project list.

Regarding consultations with other development partners, information was exchanged and discussions were held with the WFP and IFAD CARLEP project office through surveys.

It is agreed that strengthening research capacity is one of the most important key issues for Bhutanese agriculture. In the list of projects, the survey team is considering a support package for the Farming Village Development Project to help new groups of young farmers start up farming on abandoned land. The survey team believes that the introduction of new technology will be one of the keys to making agriculture more attractive to young people.

Mr. Hiroshige agreed with the need for an integrated information platform, as the RNR information system. On the other hand, MODA, currently being developed with WFP, will cover not only agriculture but also livestock, and it is expected that it works as an integrated information platform.

Mr. Hiroshige thanked for valuable comments, and he stated those comments would be examined and reflected in the final report as necessary.

COMMENT BY B.B RAI, APD-DOA

Mr. B B Rai, from the Agricultural Production Division of DOA, in his first comment indicated that the focus of the survey on production strategy seemed to be limited and it might require more attention.

In his second comment he wanted to know what the current process for fallow land conversion is. Since fallow land conversion depends on the willingness of individual land owners and the government for state owned land, such conversion may require policy inclusion as a component of the project so that implementation of the project is facilitated.

In addition, he opinioned that, if possible, a component of any of the approved projects from this survey, should involve youth people into the agriculture sector through the school agriculture program so that they are introduced to agriculture early on in life.

Ms. Mano, JICA HEAD OFFICE

Ms. Mano of JICA Head Office expressed her appreciation for giving her the opportunity to participate in the seminar and to get comments and suggestions from many sectors. JICA has continuously supported aquiculture projects in Bhutan and will continue collaboration with the RGoB and DOA in future and for future projects.

COMMENT FROM JICA BHUTAN OFFICE

Mr. Kudo from the JICA Bhutan Office indicated that there are difficulties in marketing of farm produces and needs to be overcome. The department (DAMC) and exporters have to seek for solution to overcome this hurdle or problem. Bhutan (DAMC) should consider developing strategic marketing

network to market large quantity of products to India or Bangladesh and also work on developing a tentative export growth rate of products.

DIRECTOR, DAMC

In response to the suggestion and comments made on the marketing strategy and inherent difficulties, Ms. Kinlay Tshering explained that in the past the department had been trying to streamline the export process to India as almost all the products are exported to India and few items to Bangladesh.

Currently, due to formalization of trade by Government of India, export of agricultural products from Bhutan had restrictions. Now the department is working on selecting products that can be marketed to India without the restriction and farm products that are shortage in India. When the department completes the data collection and compilation exercise then further information will be shared with the Ministry, Department of Agriculture and the growers.

The department is also working on formalizing a preferential trade agreement with the government of Thailand so we can market our products in Thai market and gradually move towards free trade. The department is also working on the export of few organic products, such as turmeric, soba, adzuki beans, etc. to Japan and hopefully by the beginning of 2022 the commodities should reach Japan.

COMMENT FROM JICA BHUTAN OFFICE

Mr. Suto of the JICA Bhutan Office thanked Ms. Kinlay for the explanation and also for the efforts made by the department. He suggested that since market analysis is also an important component of the farming business, the survey or future study should include market analysis besides other market study components.

COMMENT FROM BAFRA

The representative from BFARA indicated that the exports potential to send organic products to Japan and introduce them into the Japanese markets is an excellent idea and he applauded the DAMC for the efforts put in. However, the products cannot be marketed in Japan unless the certification is received from JAS. As processing the JAS certification is very complicated, BAFRA asked if collaboration with JAS is agreed and send an expert to BAFRA to fulfill gap to obtain the certification, so that Bhutanese organic products can find market in Japan.

COMMENT FROM JICA BHUTAN OFFICE

Ms. Tanaka from the JICA Bhutan Office, asked if the product for export to Japan was identified, what process or method the DAMC would take to get the farmer to grow the product. In other words, how will DAMC select/identify the farmer and where will it be grown?

COMMENT BY DAMC DIRECTOR

In response to the query by Ms. Tanaka, Ms. Kinlay Thering indicated that the department is working with various farmers associations and groups all across the country. In the event the JAS certification is received, DAMC will identify the farming groups or cooperatives with potential growers to engage in the cultivation of products that can be marketed to Japan.

In the process, the DAMC will initially guide and advise the farmers in selecting the commodities they should grow. This support and advisory services will be based on the product market potential in Japan and production potential of the farmer or farmer groups.

COMMENT BY DOA

To select crops to cultivate, different criteria, such as nutritional value, potential for export, etc. could be applied. The survey over the country has been ongoing to define key crops for each Dzongkhag, and the report will be prepared by Dzongkhag. A strategy will be made up based on such reports.

COMMENT FROM NSSC

Mr. Tashi Wangdi from the National Soil Service Centre indicated the importance of the component on the subject of soil study and soil biodiversity. He indicated that it was first necessary to study the soil health of any prospective farm land, including the development of fallow land or other types of land.

It would also be necessary to study the soil heath by checking the inherent parameters of the soil and assessing the soil condition and thereafter deciding to a particular type of crop. Another major challenge in the agricultural land development and the sustainable land management is lack of construction machinery suitable for land condition with the right type and size of equipment. Small and mid-size excavator is requested to be provided for terrace construction in the slop area.

Mr. Tashi Wangdi also highlighted that the centre aims to focus on soil biodiversity and infrastructure for a new soil testing laboratory is under construction and would require a range of testing equipment. In the process, the centre would also require assistance and support in capacity building. Although the centre aims to produce a national soil map by 2023 but curtail soil data is not available to create the soil system data base.

Mr. Kato, JICA HEAD OFFICE

Mr. Kato from the JICA Headquarters in Japan acknowledged the personal effort and interest taken by the secretary and other members of the Ministry to promote agriculture and engage the youth in farming. He further indicated that the first step towards formulating a project proposal is to carry out a survey.

According to him, the farming population in Japan is decreasing year by year, too, and therefore, he asked the secretary's views and opinion on the possible methods or measures that Bhutan would adopt in order to attract the Bhutanese youth towards farming and agriculture.

SECRETARY, MoAF

In response to the query on youth employment by Mr. Kato, the Secretary, Dasho Thinley Namgyel, opinioned that one possible option was to make agriculture profitable by venturing into high value products. Another option would be to resort to application of ICT and mechanize farming. The farm business should be technology driven so that the youth can realize that farming is profitable in a mechanized manner and with minimal hardship.

CLOSING REMARK BY JICA BHUTAN OFFICE

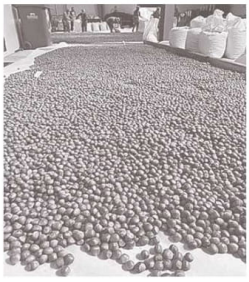
The seminar was declared closed with a thanking note delivered by Ms. Tanaka of the JICA Bhutan office. In her closing deliberation she thanked the participants for sharing their views and comments and clarified that the minutes of the meeting would be circulated to all participants in a draft form for further refinement or addition/modification of views, suggestions and recommendation for JICA funded projects that may take shape as a result of this seminar.

Ms. Tanaka also observed the suggestions and comments from participants on the topics such as irrigation, mechanization and soil study to check soil fertility. She particularly, took note of the comment made by the representative from MoH on nutrition and the need for coordination between different sectors.

Last but not the least, Ms. Tanaka conveyed a thankful note to the secretary for exposing the idea/objective to attract the youth towards farming and agriculture. JICA would like to have further discussions on this matter for future cooperation and projects.

END

APPENDIX-II Handout material of the seminar on data collection survey



PROJECT OBJECTIVE

- Collect and analyze data on food security and growth strategy in the agricultural sector including imports, under and after COVID-19
- Summarize Japan's support to resolve the issues.
- Timeline: May – Dec, 2021 (8 months)

2

Regional disparity correction	Maintain Agri-production & small-scale farmer's subsistence	Job creation for youth and unemployed	Digital tool	Nutrition Improvement

FOOD SELF-SUFFICIENCY
- Increased demand in domestic commodity
- Limited capacity in production and logistics
- Momentum to launch commercialized farming through promoting vegetable production
- Increased new participants in Agri-sector

PROCESSING & LOGISTICS
- Reconfirmed needs in cold storage
- Set up an integrated logistic network
- Enlarge the responsibilities of FMCL and BLDCL as "Hub"

Usage of ICT
- Launch Online Trade System
- Increasing web order system for vegetable and food delivery service in urban area.
- Increased needs in real-time information platform (i.e. MODA, AMIS)

NUTRITION
- Increased awareness on the importance of balanced diet and adequate exercises to strengthen the immune system

BHUTAN HIGHER PLAN

VISION
AGRICULTURE PROMOTION PLAN

COVID-19 IMPACT

Towards food and nutrition security in long-term, promoting **Market-Oriented Agriculture** and sustainable land use through providing opportunities where a farmer can access a better value chain together with adequate information

CHALLENGES

JAPAN PERSPECTIVE

SMALL-SCALE & FAMILY FARMING
- Self-sustained, small-scale family farming (multi-types and small volume production) is mainstreamed.
- Low productivity due to no chemical fertilizer usage

LIMITED LOGISTICS
- High transportation cost for aggregation and additional loss in remote and fragmented land
- Dysfunctional market mechanism due to no control in demand, supply and price

AGRI-LAND SUBDIVISION
- Increased abandoned land due to lack of irrigation, wildlife damage, and agri-dislike among educated youth
- Economic difficulty in self-sufficient results in more fallow land.
- Increased abandoned-land as youth leave Agri

LABOR SHORTAGE
- Seek jobs in city with higher academic background
- Limited job opportunity in rural areas

TECHNICAL COOPERATION CONSISTENT WITH BHUTAN HIGHER PLAN
- Provided assistance for formulating national plans such as the Comprehensive Development Plan.
- Continue assistance along with the higher policies.

RESPOND TO COVID-19 IMPACT
- Clarify COVID-19 impacts, categorizes them into transient and structural
- Provide support that contributes to rapid economic recovery and to improving agricultural and nutrition sectors

CREATE SYNERGY WITH THE PAST JAPAN ODA
- Provided various types of grant aid and technical cooperation in agriculture sector
- Will provide further technical cooperation in new fields (i.e. market access, value chain) based on the impacts/results of those efforts

GRADUATION FROM LDC
- Shift from grant aid and technical cooperation to the next level of cooperation with ODA loans, etc.

4

Support From Japan - *Discussion Purpose Only*

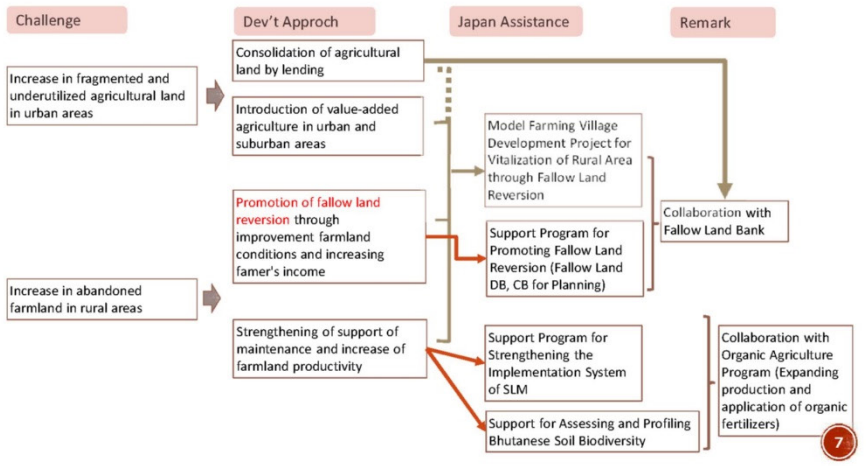
Market Access

Challenge	Dev't Approch	Japan Assistance	Remark
Unbalanced demand and supply due to small, fragmented, family-run farmer	Market-oriented farming Model/showcase for Agri. connecting production to market	Promotion of Market-Oriented Agriculture through improving market access	RNR Eco-Hub concept
			Winter vegetable promotion
Limited logistic service and Ifrastructure at national/regional/ community level	Policy framework on promotion in domestic agri-market	Support to prepare master plan on establish agri-products supply chain in Bhutan	Fallow Land Bank concept
	Along with marketing strategy, develop logistic facilities and invite private sector in the network	Construction of Supply Chain Facilities in Bhutan	RNR Marketing Strategy
		Post Harvest Promotion	
Limited destination and strategy for export, High dependence on India and severe transaction	Export strategy thru global market study, grading, branding, etc.	Enhance farmer's cooperative/ group	
		Capacity development on DAMC to promote export	
		Construction of Pack House at Pasakha	
Low capacity of certification for organic and un-matured domestic market	Development of Organic production Market to promote its value adding	Promotion of export of organic products	
		GAP certificate	

6

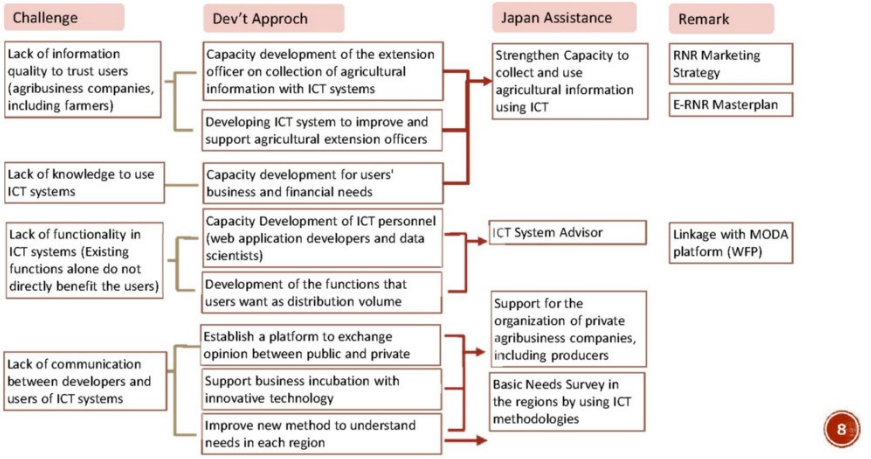
Support From Japan – *Discussion Purpose Only*

Sustainable Land Use



Support From Japan – *Discussion Purpose Only*

ICT Agriculture



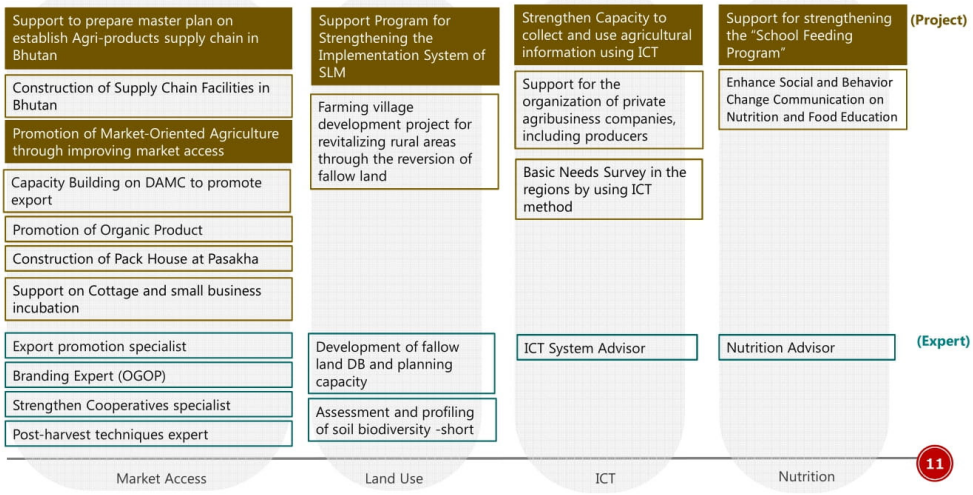
Support From Japan – *Discussion Purpose Only*

Nutrition

Challenge	Dev't Approch	Japan Assistance	Remark
Triple burden of malnutrition (undernutrition, micronutrient deficiency and overnutrition)	Enhancement of SBCC to all the citizens	To provide SBCC to FGs/Cooperatives in accordance with the SBC(C) Strategy that is being developed by MoH, MoE and MoAF with support from WFP.	• The Food Act of Bhutan, 2005 • Food and Nutrition Security Policy of the Kingdom of Bhutan, 2014 • National Nutrition Strategy and Action Plan (2021-2025) • White Paper on Bhutan School & Hospital Feeding Program (2019) • WFP's support to Nutrition in Bhutan (2019-2023)
Safer, cheaper, and nutritionally balanced school meals with local produce are not provided at all the schools.	Dissemination of lessons learnt from the good practices identified through the systematic monitoring.	Strengthen SFP (with the application of PLUS)	
Week coordination mechanism for nutritional improvement	Positioning nutrition as a cross-cutting sector within the national administrative system to strengthen its coordination among different ministries and task forces	Advisor in multisectoral Coordination for Nutrition (in view of the coordination with WFP and other development partners)	

9

AGRICULTURE PROMOTION PLAN



Support to Prepare Master Plan on Establish Agri-products Supply Chain in Bhutan

OBJECTIVE

In order to mitigate the imbalance between supply and demand of agricultural products, a strategic facility improvement plan will be developed as a master plan for supply chain improvement.

ACTIVITY

1. Review various plans for post-harvest processing of cleaning, sorting and storage for distribution of domestic horticultural crops and for export of agricultural products.
2. Identify existing distribution and issues for each crop from surveys on domestic distributors, auction houses, BEA, etc., and organize the supply chain for each agricultural product along with the production plan.
3. Develop a marketing strategy for each crop.
4. Develop a master plan to improve distribution.
5. Formulate a plan for the development of a distribution system that can grasp the volume of agricultural production, demand, and distribution, which is necessary for improving distribution.
6. Formulate priority projects to be developed with yen loans, and conduct F/S of facility plans.

COUNTERPART

DAMC, DoA, NPHC, FCBL

Targeted Area

Whole country

Master Plan for Supply Chain Improvement

FS on priority areas

Construction thru ODA Loan, Government Budget, other funds

12

Promotion of Market-Oriented Agriculture through Improving Market Access

OBJECTIVE

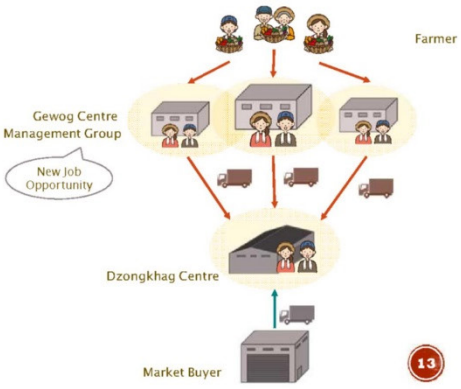
A synergistic rural development model will be established by combining the enhancement of the value chain from production to marketing and processing. With the improving market access, as well as increasing farmers' income, improving nutrition, and attracting young people to the agricultural sector in rural areas will be integrated.

ACTIVITY

1. In order to establish a distribution and sales network for major agricultural products in the region, warehouses for storing collected agricultural products will be constructed in Dzongkhag and Gewog. A joint shipment system will be established using these warehouses.
2. By promoting cooperation between farmers and local traders, the collection system in Gewog will be linked to sales. It makes the value chain thicker and stronger.
3. As a measure to reduce the workload of Gewog extension workers, the project will improve technical extension using ICT. Volunteers cooperate to secure human resources to work in the agricultural sector.
4. Nutrition education by extension workers will be conducted in conjunction with technical extension to implement SBCC on diet and nutrition, and to encourage farmers to improve their income to improve nutrition.

COUNTERPART

DAMC, DoA, Dzongkhag DAO, Gewog Extension Officer, HPD-DoPH-MoH, WFP



13

Support Program for Strengthening the Implementation System of SLM

OBJECTIVE

By promoting the implementation of Agricultural Land Development (ALD) projects centered on terrace construction and soil conservation through Sustainable Land Management (SLM), the project aims to expand agricultural production by improving the productivity and working environment of farmland and to contribute to the promotion of the reclamation and utilization of fallow land.

ACTIVITY

1. Strengthen the capacity of agricultural extension officers in ALD projects and SLM)projects (technical guidance to farmers on ALD projects, assistance in project applications, and guidance on soil management through SLM after ALD projects are completed).
2. Strengthen campaign activities for SLM in each Gewog.
3. Introduce and display construction machinery suitable for ALD work on sloping land (Medium and small excavators, gravel removal machines).
4. Strengthen the mechanism by enhancing the capacity of the concerned parties for coordination and monitoring of SLM projects.
5. Strengthen the capacity of SLM project implementation planning and promote efficient implementation by supporting the use of ICT in SLM projects (use of the national soil database, introduction of measurement-based soil nutrient assessment, and application development).
6. Equipment support and capacity development of NSSC staff and extension officers for soil nutrient assessment and monitoring to improve soil fertility management

COUNTERPART

NSSC/DOA-MoAF, Dzongkhag DAO, Gewog Extension Officer

Targeted Area

1. Whole country
2. Capacity building of relevant personnel and support for ICT utilization will be targeted nationwide.
3. introduce and display of construction equipment for ALD and construction exhibition will be covered by selecting a few Gewogs in the target provinces.

14

Strengthen Capacity to Collect and Use Agricultural Information

OBJECTIVE

To improve the capacity of Gewog extension officers to collect information, and to increase the number of users of the system.
Activities

ACTIVITY

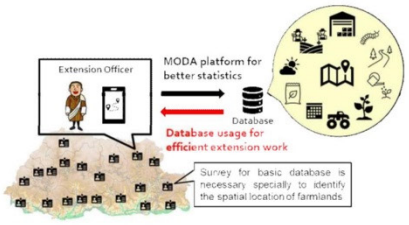
1. Strengthening the capacity of the ICT Division to design and supervise the development of ICT systems to improve the work efficiency of Gewog extension officers (capacity development for the development of farmer and extension worker databases, mapping tools, activity reporting systems, and crop/harvest reporting systems)
2. Training of personnel to conduct surveys on basic databases (assuming youth groups such as unemployed Graduates)
3. Training of Gewog extension officers in the use of the above systems
4. Training for Farmers Group, Cooperative and Aggregator to improve financial literacy to utilize market information

COUNTERPART

ICT Division, DAMC, DoA, Gewog Extension Officer

Targeted Area

Whole country



15

Support for strengthening the "School Feed Program"

OBJECTIVE

To strengthen the implementation details and structure of the government's "School Feeding Program"

ACTIVITY

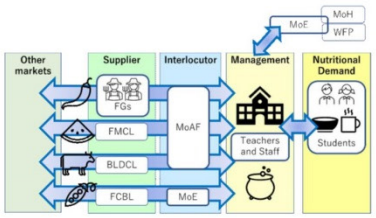
1. Establish a monitoring system for the program and conduct monitoring.
2. From the results of monitoring, identify good practices that are win-win for farmers and schools.
3. To identify measures to address the issues to maintain the standard menu and stabilized supply of vegetables. To develop a plan to strengthen the program implementation and system.
4. Implement the program based on the proposed enhancements in model regions and demonstrate its effectiveness.
5. Improve the relevant manuals and regulations to introduce the proposed enhancements nationwide.

COUNTERPART

DAMC, DoA-MoAF, SHND-DoSE-MoE, Dzongkhag Office

Targeted Area

Selected 6 Dzongkhag （East, Central, West x 2 Dzongkhag）



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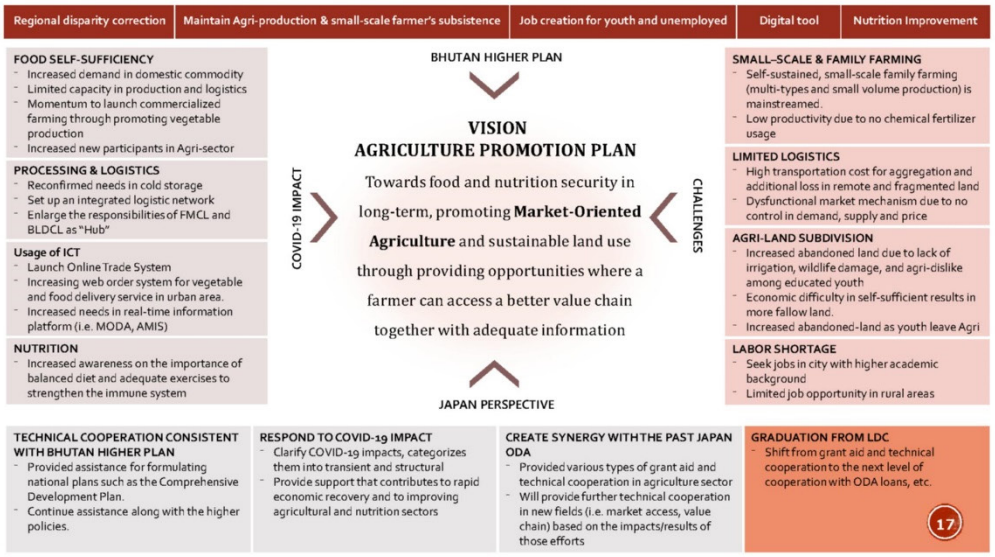
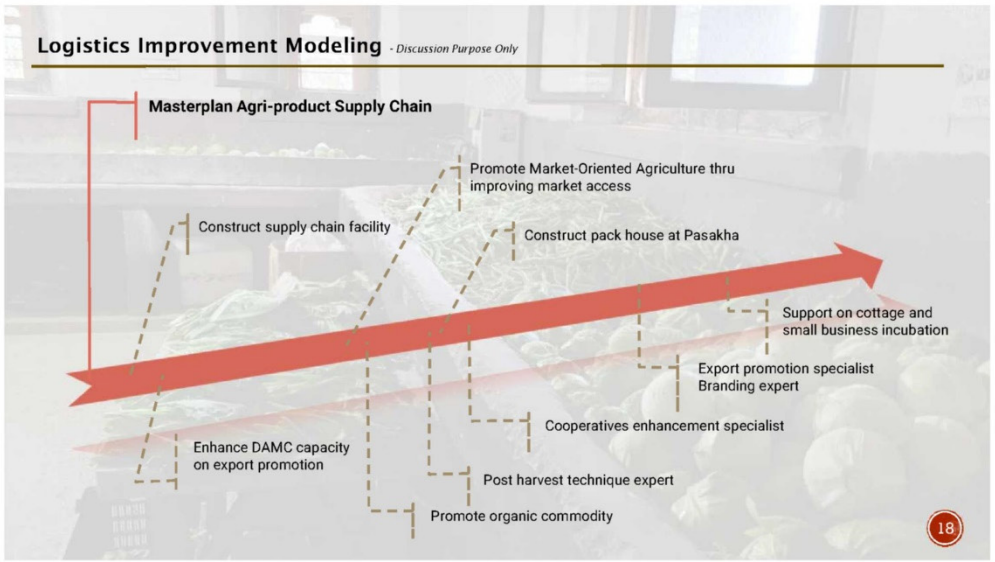

Regional disparity correction
Maintain Agri-production & small-scale farmer's subsistence
Job creation for youth and unemployed
Digital tool
Nutrition Improvement
FOOD SELF-SUFFICIENCY
- Increased demand in domestic commodity
- Limited capacity in production and logistics
- Momentum to launch commercialized farming through promoting vegetable production
- Increased new participants in Agri-sector
PROCESSING & LOGISTICS
- Reconfirmed needs in cold storage
- Set up an integrated logistic network
- Enlarge the responsibilities of FMCL and BLDCL as "Hub"
Usage of ICT
- Launch Online Trade System
- Increasing web order system for vegetable and food delivery service in urban area.
- Increased needs in real-time information platform (i.e. MODA, AMIS)
NUTRITION
- Increased awareness on the importance of balanced diet and adequate exercises to strengthen the immune system
BHUTAN HIGHER PLAN
VISION
AGRICULTURE PROMOTION PLAN
Towards food and nutrition security in long-term, promoting Market-Oriented Agriculture and sustainable land use through providing opportunities where a farmer can access a better value chain together with adequate information
COVID-19 IMPACT
CHALLENGES
JAPAN PERSPECTIVE
SMALL-SCALE & FAMILY FARMING
- Self-sustained, small-scale family farming (multi-types and small volume production) is mainstreamed.
- Low productivity due to no chemical fertilizer usage
LIMITED LOGISTICS
- High transportation cost for aggregation and additional loss in remote and fragmented land
- Dysfunctional market mechanism due to no control in demand, supply and price
AGRI-LAND SUBDIVISION
- Increased abandoned land due to lack of irrigation, wildlife damage, and agri-dislike among educated youth
- Economic difficulty in self-sufficient results in more fallow land.
- Increased abandoned-land as youth leave Agri
LABOR SHORTAGE
- Seek jobs in city with higher academic background
- Limited job opportunity in rural areas
TECHNICAL COOPERATION CONSISTENT WITH BHUTAN HIGHER PLAN
- Provided assistance for formulating national plans such as the Comprehensive Development Plan.
- Continue assistance along with the higher policies.
RESPOND TO COVID-19 IMPACT
- Clarify COVID-19 impacts, categorizes them into transient and structural
- Provide support that contributes to rapid economic recovery and to improving agricultural and nutrition sectors
CREATE SYNERGY WITH THE PAST JAPAN ODA
- Provided various types of grant aid and technical cooperation in agriculture sector
- Will provide further technical cooperation in new fields (i.e. market access, value chain) based on the impacts/results of those efforts
GRADUATION FROM LDC
- Shift from grant aid and technical cooperation to the next level of cooperation with ODA loans, etc.
17

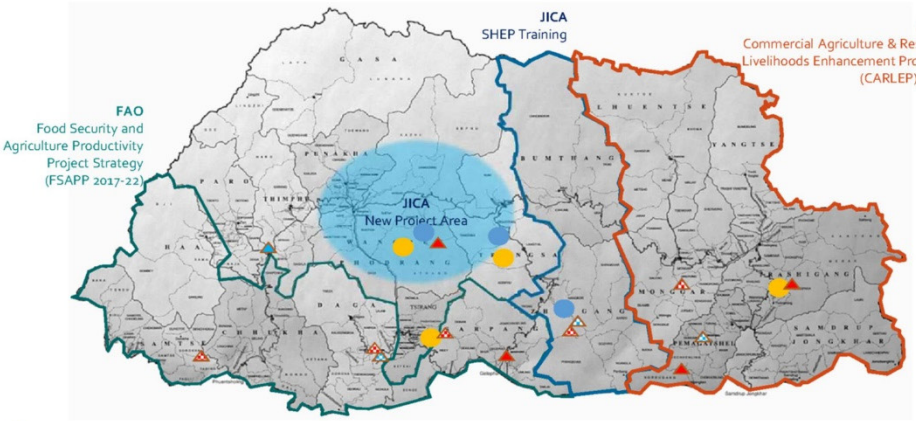

Logistics Improvement Modeling - Discussion Purpose Only
Masterplan Agri-product Supply Chain
Promote Market-Oriented Agriculture thru improving market access
Construct supply chain facility
Construct pack house at Pasakha
Support on cottage and small business incubation
Export promotion specialist
Branding expert
Cooperatives enhancement specialist
Enhance DAMC capacity on export promotion
Post harvest technique expert
Promote organic commodity
18

DIRECTION

Break out the vicious cycle with market access improvement

20

PROJECT CANDIDATE AREA



APPENDIX-III Narrative Summary of the PDM on Priority Projects

(1) Support to Prepare Master Plan on Establish Agri-products Supply Chain in Bhutan

Target Group: DAMC, DOA, NPHC, FCBL and ICT

Target Area: Whole country

Narrative Summary	Objective Verifiable indicators
Overall Goal Market-Oriented Agriculture is extended in whole country	-
Project Purpose	
In order to mitigate the imbalance between supply and demand of agricultural products, a strategic facility improvement plan will be developed as a master plan for supply chain improvement.	The master plan for supply chain improvement and plan for development distribution monitoring system are approved by the government.
Output	
1. Develop a master plan to improve distribution of agricultural products 2. Formulate a plan for the development of a distribution system that can grasp the volume of agricultural production, demand, and distribution.	1-1 Master plan is prepared 2-1 A plan for development of a distribution monitoring system is prepared
Activities	
1-1 To review various plans for post-harvest processing of cleaning, sorting and storage for distribution of domestic horticultural crops and for export of agricultural products. 1-2 To identify target crops to develop the supply chain for both domestic market and for export 1-3 To identify existing distribution and issues for each target crop through surveys on domestic distributors, auction houses, BEA, etc. 1-4 To develop marketing strategy for each target crops including their production plan and supply chain development. 1-5 To develop master plan to improve distribution of agricultural products. 2-1 To review existing database, information system and documents related to understand production of crops, its distribution and demands estimation on them. 2-2 To check the number and capacity of human resources to collect necessary data in the field. 2-3 To prepare design concept of a distribution monitor system that can monitor production of crops, estimate demands on them, and their distribution. 2-4 To prepare the training program to operate the distribution monitoring system including its budget estimation.	

(2) Promotion of Market-Oriented Agriculture through Improving Market Access

Target Group: Farmers group, youth in the same community and private distributors. Extension Officials

Target Area: Three Dzongkhag will be selected as the target area. At present, Phunakha, Wangdue Phodrang, Dagana,Tserang and Mongar are considered as candidates.

Narrative Summary	Objective Verifiable indicators
Overall Goal Market-Oriented Agriculture is extended in whole country	-
Project Purpose	
A synergistic rural development model will be established by combining the enhancement of the value chain from production to marketing and processing.	1. Farmers' sales amount is increased by XX% 2. Farmers' income is increased by XX %.
Output	
1. Establish a distribution and sales network for major agricultural products in the target district 2. Encourage farmers using the SHEP approach 3. Workload of Gewog extension officers are reduced 4. Nutrition education is conducted by extension officers	1-1 The established warehouse is functioned 2-1 The average selling price of agricultural products are increased 3-1 Mobile Apps to support extension officers are developed 3-2 number of person to support farmers in the region is increased 4-1 Farmers' diet is improved
Activities	
1-1. To determine the target agricultural products in the region 1-2. To conduct surveys on farmers' cooperative and group, trade and marketing 1-3. To determine the pilot project area with considering capacity of farmers' cooperatives and local traders 1-4. To formulate the structure to local value chain among farmers, traders and warehouse management group. 1-5. To construct warehouse 1-6. To conduct capacity development of warehouse management group. 2-1 To develop capacity of extension officers as a trainer for farmers 2-2 To conduct series of capacity development for farmers, including market research 2-3 To conduct joint meeting among farmers, traders and officials 3-1 To identify the work of extension officers and determine improvement plan 3-2 To develop improving measures like developing Mobile Apps by using ICT 3-3 To take action to increase man-power in agricultural sector in the region 4-1 To train extension officer on nutrition education by using material on SBCC prepared by Ministry of Health 4-2 To conduct nutrition education for the farmers as part of extension activities 4-3 To monitor the impact of nutation education	

(3) Farming village development project for revitalizing rural areas through the reversion of fallow land

Target Group: Farmer's group (Mainly youth group and new farmer's group)

Target Area: Three Dzongkhag will be selected.

Narrative Summary	Objective Verifiable indicators
Overall Goal To attract and retain young people in agriculture and related industries in rural areas, and to implement sustainable economic activities.	-
Project Purpose	
To increase employment opportunities for young people in rural areas and to revitalize the agricultural sector, a technical assistance package combining measures against fallow land and support to start farming will be developed.	1. Number of adoption of the technical assistance package.
Output	
1. Agriculture production by youth group and new farmer's group in the fallow land and unused land will be started. 2. Farm management by above farmer's groups will be continued and stabilized. 3. Farmers will be encouraged to use improved their income for improving nutrition.	1-1 Number of applications submitted and adopted number of the technical assistance package 1-2 Number of youth group and new farmer's group receiving the technical assistance package. 2-1 Continuity of management of farmer groups that received the package. 3-1 Performance of SBCC activities on nutrition
Activities	
1-1. To support new farming by youth groups, economically renewable farmland will be selected from fallow and unused land in the region, and appropriate agricultural land improvement (ALD) works and sustainable land management (SLM) technologies will be applied to maintain and improve the productivity of the farmland. 1-2. To promote agricultural production by the new groups on that farmland. 2-1. To promote agriculture attractive to youth people by introducing contract farming under school feed program in early-unstable production period and also applying ICT systems to reduce the workload of farmers through remote control, etc. 2-2. To conduct training on market-oriented agriculture to develop capacity of farmers to utilize market information, to negotiate and cooperate with venders in the markets, transporters, and aggregators, and to enter the market. 3-1. SBCC activities on nutrition will be conducted in collaboration with WFP to encourage farmers to use improved their income for improving nutrition.	

(4) Support Program for Strengthening the Implementation System of Sustainable Land Management (SLM)

Target Group: Participant farmers of ALD/SLM project, staffs of administrative agencies related to ALD/SLM project, Gewog Agricultural Extension Officer, NSSC staffs

Target Area: 1) Capacity building of relevant personnel and support for ICT utilization will be targeted nationwide, 2) Introduce and display of construction equipment for ALD and construction exhibition will be covered by selecting a few Gewogs in the target provinces.

Narrative Summary	Objective Verifiable indicators
Overall Goal To promote the reclamation and utilization of fallow land by improving the productivity and working environment of farmland.	-
Project Purpose	
To improve productivity and working environment of farmland by promoting the implementation of ALD projects centered on terrace construction and SLM projects.	1. Performance of ALD project (number of project and covered area) 2. Performance of SLM project (number of project and covered area)
Output	
1. A capacity of implementation agencies of ALD/SLM project will be strengthened and project implementation will be accelerated. 2. A capacity of monitoring and planning of SLM project will be strengthened. 3. A monitoring system for soil fertility will be established.	1-1 Number of applied and adopted ALD/SLM project. 1-2 Number of procured machinery for ALD project. 1-3 Performance of SLM campaign activities in Gewog. 2-1 Number of cases of use ICT in SLM project. 3-1 Number of installed soil fertility monitoring equipment.
Activities	
1-1. Strengthen the capacity of agricultural extension officers in agricultural land improvement (ALD) projects and sustainable land management (SLM) projects (technical guidance to farmers on ALD projects, assistance in project applications, and guidance on soil management through SLM after ALD projects are completed). 1-2. Strengthen campaign activities for SLM in each Gewog. 1-3. To introduce and display construction machinery suitable for ALD work on sloping land (Medium and small excavators, gravel removal machines). 2-1. Strengthen the mechanism by enhancing the capacity of the concerned parties for coordination and monitoring of SLM projects. 2-2. Strengthen the capacity of SLM project implementation planning and promote efficient implementation by supporting the use of ICT in SLM projects (use of the national soil database, introduction of measurement-based soil nutrient assessment, and application development). 3-1. Equipment support and capacity development of NSSC staff and extension officers for soil nutrient assessment and monitoring to improve soil fertility management	

(5) Strengthen Capacity to Collect and Use Agricultural Information

Target Group: ICTD, DOA (Agricultural officers in Central, Dzongkhags, and Gewogs), DAMC, Potential Farmers Group and Private Agri-business as AMIS users

Target Area: Whole Country

Narrative Summary	Objective Verifiable indicators
Overall Goal Increase in the number of users for ICT systems such as AMIS	-
Project Purpose	
To improve the capacity of Gewog extension officers to collect information, and to increase the number of users of the system.	1. All the related officers (central, dzongkhags and gewogs) can understand and use the ICT system for monitoring or execution of extension activities. 2. Number of markets where the commodity price information is constantly collected increased by XX%. 3. Rate of ICT use in RNR sector is improved
Output	
1. ICT system which integrates the database of farmers and extension workers information is functioned and maintained. 2. Work efficiency of extension officers can be measured by the system and improved. 3. The number of ICT system users in private sector are increased	1-1 Capacity development for ICTD is made to design and develop ICT system 1-2 ICT system which integrates the database of farmers and extension workers for their daily task is developed by ICTD 1-3 Database of farmers and extension officers is prepared. 2-1 Training to use ICT system is made for all the related officers (central, dzongkhags and gewogs) 3-1 The number of AMIS users increase by XX%
Activities	
1-1. Strengthening the capacity of the ICT Division to design and supervise the development of ICT systems to improve the work efficiency of Gewog extension officers (capacity development for the development of farmer and extension worker databases, mapping tools, activity reporting systems, and crop/harvest reporting systems) 2-1. Training of personnel to conduct surveys on basic database (assuming youth groups such as unemployed Graduates) 2-2. Training in the use of the above system for all the related officers (central, dzongkhags and gewogs) 3-1. Training for Farmers Group, Cooperative and Aggregator to improve IT and financial literacy to utilize market information	

(6) Support for strengthening the “School Feeding Program”

Target Group: Students, their parents, and teachers at the pilot schools, District Agriculture Offices, District Education Offices, Gewog Agriculture Extension Officers, Members of the Farmer Groups that sell their produce to the pilot schools

Target Area: Selected 6 Dzongkhag （2 Dzongkhag from Western, Central and Eastern region each）

Narrative Summary	Objective Verifiable indicators
Overall Goal	
More school children have nutritious school meals with food stuff produced by local farmers through the year.	1. The number of school children who have nutritious school meals with required frequency through the year has increased by XX%. 2. The volume of the locally produced food stuff bought by the schools has increased by XX%.
Project Purpose	
The current School Feeding Program is revised in order to ensure the quality and the quantity of school meals with food stuff produced by local farmers through the year.	1. The National Plan to improve the School (and Hospital) Feeding Program agreed by the stakeholders to implement.
Output	
1. A unified monitoring system for the current School Feeding Program is established and implemented. 2. Trial models to be tested in the pilot Dzongkhag are identified based on results of the monitoring. 3. Trials to improve the School Feeding Program is undertaken in the pilot Dzongkhag. 4. A National Plan to improve the School Feeding Program is developed based on results of the trials.	1. The indicators agreed by the stakeholders to be applied to assess the current School Feeding Program. 2. The identified good practices and challenges of the current School Feeding Program. 3. The trial models to be undertaken in the pilot Dzongkhags. 4. The identified models to be applied in order to improve the School Feeding Program.
Activities	
1-1 The indicators to be applied in the monitoring of the current School (and Hospital) Feeding Program are jointly established among the stakeholders to identify Good Practices in ensuring the quality and quantity of school meals. 1-2 The implementation arrangements for the monitoring are established with necessary financial arrangements. 1-3 The implementation plan of the monitoring of the school feeding program is prepared and agreed by the stakeholders. 1-4 The monitoring is implemented in accordance with the plan. 2-1 Results of the monitoring is consolidated and analyzed. 2-2 Good practices and challenges to be addressed of the current School Feeding Program are identified. 2-3 Measures to be taken to replicate the Good Practices in other schools are identified. 2-4 Measures to be taken in order to address the challenges are identified. 3-1 Trial models to be applied in schools of the pilot Dzongkhag are identified based on the identified measures to replicate Good Practices and to address the challenges. 3-2 A plan of the trials with necessary financial arrangements and monitoring system is prepared. 3-3 The plan of trials is agreed by the stakeholders. 3-4 The agreed plan of trials is implemented. 3-5 Results of the trials are monitored and analyzed. 4-1 Based on results of the trials, models to be applied in the School Feeding Program are identified. 4-2 A national plan to improve the School Feeding Program with necessary financial arrangements is prepared. 4-3 The National Plan to improve the school feeding program is agreed by the stakeholders. 4-4 Relevant manuals and regulations are prepared to implement the National Plan.	