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Study on Training Provision Farmers and Extension Agents for the RNR Sector in Bhutan

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FINAL REPORT OF THE ASSIGNMENT: STUDY ON FARMERS' TRAINING PROGRAM FOR THE RNR SECTOR, BHUTAN

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ABBREVIATIONS

ACIAR	:	Australian Centre for International Agricultural Research
APA	:	Annual Performance Agreement
ARDC	:	Agriculture Research and Development Centre
BCSR:	:	Bhutan Civil Service Rules
CARLEP	:	Commercial Agriculture and Resilient Livelihoods Enhancement Program
CGIAR	:	Consultative Group on International Agricultural Research
CNR	:	College of Natural Resources
CSI:	:	Cottage and Small Industries
DAMC:	:	Department of Agricultural Marketing and Cooperatives
DCSI	:	Department of Cottage & Small Industries
DoA	:	Department of Agriculture
DoFPS	:	Department of Forests and Park Services
DOL	:	Department of Livestock
DSA	:	Daily Subsistence Allowance
EA	:	Extension Agent
EU	:	European Union
EU-TACS	:	European Union – Technical Assistance Complimentary Support
EU-TCP	:	European Union Technical Cooperation Project
FAO	:	Food and Agriculture Organization
FGD	:	Focus Group Discussion
FYP	:	Five-Year Plan
FSAPP	:	Food Security and Agriculture Productivity Project
GCF	:	Global Climate Fund
GDP	:	Gross Domestic Product
GEF	:	Global Environment Fund
GNH	:	Gross National Happiness
GHNC	:	Gross National Happiness Commission
HRD	:	Human Resource Development
ICT	:	Information and Communications Technology
ICTD	:	Information and Communications Technology Division
IFPRI	:	International Food Policy Research Institute
KII	:	Key Informant Interview
LFS	:	Labor Force Survey
MSME	:	Micro, Small and Medium Enterprise
MoAF	:	Ministry of Agrciulture and Forests
MoE	:	Ministry of Education
MoEA	:	Ministry of Economic Affairs
MoLHR	:	Ministry of Labour and Human Resources
NAPA	:	National Action Plan for Adaptation
NGO	:	Non-Government Organization
NSB	:	National Statistical Bureau
PHCB	:	Population and Housing Census of Bhutan
PMU	:	Project Management Unit
PPD	:	Policy and Planning Division

RCSC	:	Royal Civil Service Commission
RDTC	:	Rural Development Training Centre
REDCL	:	The Rural Enterprise Development Corporation Limited
RIM	:	Royal Institute of Management
RNR	:	Renewable Natural Resources
RGOB	:	Royal Government of Bhutan
RLDC	:	Regional Livestock Development Centre
RUB	:	Royal University of Bhutan
SAP	:	School Agriculture Program
SME	:	Small and Medium Enterprise
SPSS	:	Statistical Package for Social Science
TMR	:	Total Mix Ration
ToT	:	Training of Trainers
TV	:	Television
TVET	:	Technical and Vocational Education Training
UNDP	:	United Nations Development Program
UWICE	:	Ugyen Wangchuck Institute for Conservation and Environment Research

GLOSSARY

Dzongkhag	:	Province
Gewog	:	Block of villages or district

EXECUTIVE SUMMARY

This Study on Farmers Training Program for the RNR Sector in Bhutan was carried out to assess the impacts of various training events received by farmers and extension officials. The study adopted the processes of Post-Implementation Review (PIR) and Ex-Post Evaluation in determining the effects of formal training courses. A desk review was carried out of relevant literature, publications, policy briefs, legislative frameworks, and vital national documents. The primary data was collected from relevant stakeholders (extension agents and farmers) through a set of semi-structured questionnaires. Key Informant Interviews and focus group discussions were conducted to obtain feedback from the training providers. Wherever possible, face-to-face consultations and workshops were held with the training institutes.

The capacity-building of farmers and RNR extension staff is one of the primary responsibilities of the Ministry of Agriculture and Forests (MoAF) since this directly contributes to the Ministry's mission. MoAF provides capacity-building programs in training events, sensitization and exchange learning to the farmers, and extension officials based in the Gewogs and Dzongkhags.

The data collected from five training providers (RDTC in Zhemgang, UWICER in Bumthang, JSWNP in Trongsa, CNR in Lobesa/Punakha and ARDC in Bajo/Wangdue Phodrang), plus four surveyed Dzongkhags, indicate that numerous training events were provided to extension officials and farmers in the last eight years. The percentages of respondents stating they did not receive any form of training was 52% in agriculture, 67% in livestock, and 69% in the forestry sectors.

Survey respondents provided mixed responses regarding the usefulness and relevancy of the training programs, depending on the training received by the different sectors. However, most of the training beneficiaries reported robust impacts on their quality of work, farm productivity, and farm income. Similarly, the survey on extension training also indicated that the capacity-building of extension officials was useful. The outputs relating to their knowledge and skills, the increased understanding of farmers, the quality of farm work, increased farm productivity, improved self-sufficiency, nutrition security, efficiency, cost savings, and household income were primarily positive.

Although both farmers and extension staff found the training provided valuable and relevant, the study also identified various technical and institutional gaps. The issues range from not having the right qualifications to not giving training to the right target group at the right time. Furthermore, most training events were supported through donor-funded projects, so the coverage mainly was in specific project areas. The training events were ad-hoc and were more supply-driven than demand-driven.

Accordingly, an **Integrated Training Strategy and Action Plan** was developed for the Ministry as part of this study. It is recommended that MoAF should generate a list of training programs under different thematic areas over different time scales, i.e. short-term (1-2 years), medium-term (3-5 years), and long-term (6-10 years). Strategic action plans under six broad outcomes are also recommended.

The study concludes with recommendations for the human resource development of extension personnel, plus the capacity enhancement of farmers. These proposals draw on the literature review, survey findings and information concerning gaps and good practices.

Recommendations are made in: *training prioritization, integration, training needs, gender mainstreaming, a "lead farmer" approach, the timing of training events, training modes, training curriculums and modules, the Training of Trainers (ToT), the deployment of a critical mass of faculty/outsourcing of experts, monitoring and evaluation, remote training events, and formal training design and delivery. It is also recommended that the MoAF should conduct strategic planning sessions to assess its future requirements for training events, including the design and implementation of training events that are responsive to future needs.*

1. INTRODUCTION

1.1 Study Context and Rationale

Agriculture is the principal economic occupation of 62% (PHCB 2018) of the rural population. 51% of employed people are engaged in the agricultural sector, followed by 35% in the service sector and 14% in the industry sector (LFS 2019).

However, the contribution to GDP from the agriculture sector has steadily declined over the years, from 55% in 1985 to 36% in 2000, and was as low as 16.5% in 2017 (NSB 2018). Of the 16.5% recorded in 2016, the agriculture sector contributed 10%, followed by livestock and the forestry sector, at 4% and 2.7%, respectively. The farmers' training program is an essential strategy for empowering farmers and strengthening their livelihood security.

Building the capacity of farmers and the RNR extension staff is one of MoAF's most essential mandates and responsibilities, and directly contributes to achieving MoAF's mission and goals. MoAF provides capacity-building programs in training events, awareness, and networking to farmers and extension officials based in the various Dzongkhags and Gewogs.

Text Box 1: *Diversity of the training programs provided by different agencies under MoAF*

1. Regular formal training and ad-hoc courses at the Rural Development Training Centre (RDTC) at Zhemgang; Ugyen Wangchuck Institute for Conservation and Environment (UWICE) at Bumthang; and College of Natural Resources (CNR) at Punakha.
2. Courses provided by donor-assisted projects and NGOs.
3. Training events delivered by MoAF line departments and divisions.
4. Courses sponsored by Dzongkhags through their annual training plan budgets.
5. On-farm training by extension staff of the Departments of Agriculture, Livestock and Forests, based in all the Gewogs.
6. Private-sector training for contract farmers.
7. Students under the School Agriculture Program.
8. Technical and vocational education training (TVET) under the Ministry of Labour and Human Resources (MoLHR).
9. Awareness training through exposure visits and study tours through various providers, e.g., ICIMOD.

Currently, *MoAF lacks an integrated training strategy for farmers*. Different training programs are designed and delivered across many suppliers and platforms without a standard framework for planning, monitoring, evaluation, and reporting. This makes it difficult to assess the performance of the training events and their contribution to improving farm management, enhancing food self-sufficiency, increasing on-farm and off-farm incomes, diversifying farming systems, and enhancing the farm households' resilience to natural disasters.

Assessing and evaluating the impacts of the different training events is essential for maximizing the sustainable benefits from the training events. Understanding the effects and advantages of the various training events for farmers and extension staff will assist MoAF when the Ministry develops strategies for future training programs intended to enhance their effectiveness. This study aims to equip MoAF with appropriate strategies for the design and roll-out of training events so that they will maximize the benefits in terms of the overall development of farming systems, farming practices and farmer performance.

1.2 Study Objectives

The purpose of this study (EU-TACS/A2.1A) is to assess the impacts of the various training events supplied to the farmers and extension staff, in order to provide helpful information to MoAF regarding its strategy for future training events. This will include the design and implementation of training events by the training providers, which will take as their starting

point the needs identified in the RNR FYP programs and any significant capacity gaps and needs. Specifically, the objectives of the study were to:

1. *Study the impacts of the training events provided to farmers and extension staff on the development of Bhutan's farming systems, including their effects on-farm management, food self-sufficiency, on-farm and off-farm incomes, diversifying farming systems, and improving the resilience of the farms to natural disasters.*
2. *Evaluate the capacity of the training institutions involved in providing training eventsf.*
3. *Identify the future training needs of farmers and extension staff.*
4. *Prepare a national integrated RNR training strategy and action plan.*

1.3 Study Scope and Components

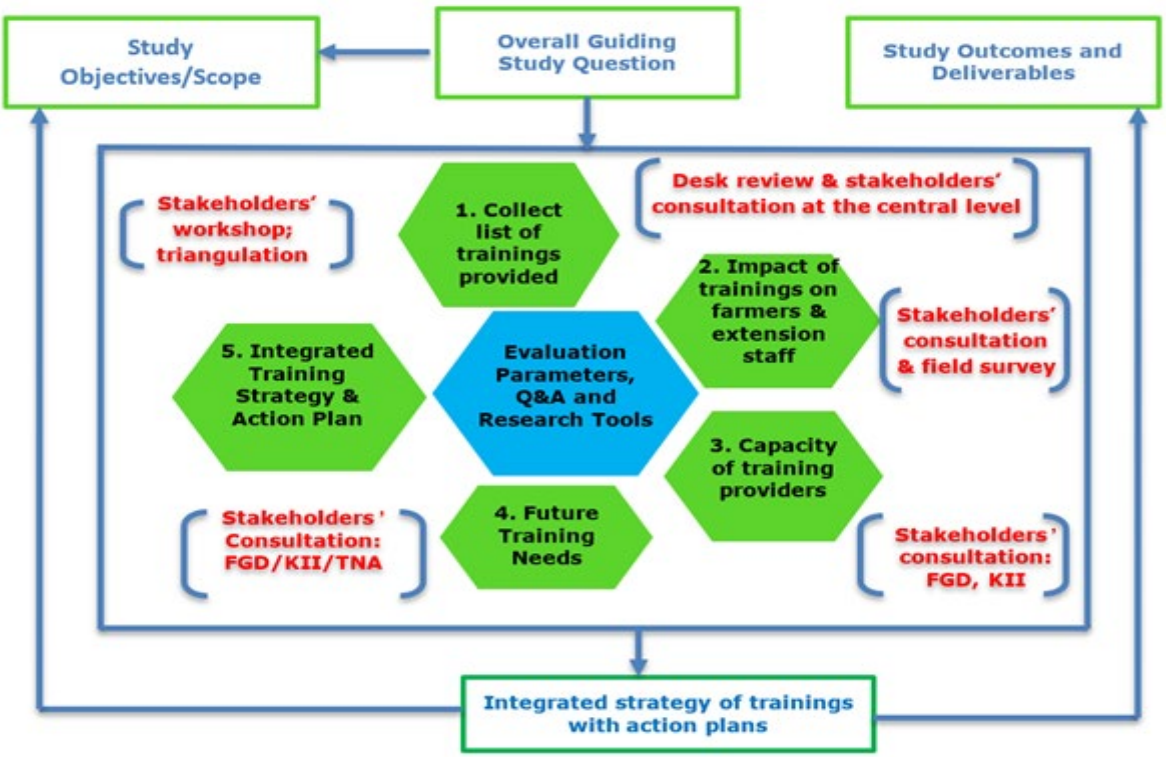
The study was conducted within the parameters of MoAF's objectives and goals for the RNR sector as envisaged in the current FYP programs while also taking account of the future directions developed by the departments under MoAF. RNR policy guidelines and legislative instruments were used as a framework for developing RNR sectors and activities as they relate to the capacity development of the farmers and extension staff.

Text Box 2: *Main components of the Study*

1. Assessment of the impacts of training events observed on farmers and the benefits.
2. Assessment of the impact of training events on extension staff in terms of their benefits.
3. Assessment of the capacity of training providers involved in training farmers and extension staff by identifying gaps, opportunities and best practices.
4. Identification of the training needs of farmers and the extension staff who are involved in training farmers through a needs assessment in the context of the current FYP.
5. Preparation and development of an Integrated Farmer Training Strategy and Action Plan, including innovative training modalities to be prioritized by MoAF.

The study applied the following analytical framework:

Figure 1: The Study's Analytical Framework



1.4 Study Approach and Methodology

The study adopted the methods of Post-Implementation Review (PIR) and Ex-Post Evaluation for assessing the impact of formal training courses. The following questions guided the study:

"What are the various RNR related capacity-building training events provided to the farmers and extension staff by the various relevant training institutes/agencies; how have the target groups benefited from the training events, and with what kinds of results; what is the extent of their overall contribution to the development of farming systems in Bhutan?"

The following sub-questions were used to support the findings relating to the study question, corresponding to the five components described under the study scope:

Text Box 2: *Sub-questions used to support the five components of the study*

*1) What **training was provided to farmers** in the 11th & 12th FYP of the RNR sector?*
*2) What training was **provided to extension staff** in the 11th & 12th FYP?*
*3) How did the different types of training provided to farmers and extension staff contribute to developing **productive and sustainable farming systems** and practices in Bhutan?*
*4) Based on the different impact areas mentioned under the study scope, how far **have these benefited farming communities** in Bhutan?*
*5) What are the **capacities of the various training providers** for designing and delivering high-quality training having the potential to improve the farming systems and practices?*
*6) What are the **capacity gaps and challenges** faced by farmers and extension agents?*
*7) How can **future training** be designed to provide maximum benefits to individuals and the RNR sector in general?*
*8) What are the **training needs of the farmers and extension staff**, and how do these correlate with potential training opportunities envisaged in the RNR FYP programs?*
*9) What kind of **integrated training strategy and action plan** can be designed to help MoAF implement a well-coordinated and centralized training program for farmers and EA?*
*10) What are the **main problems and issues** impeding high-quality training in Bhutan?*
*11) How can it be ensured that capacity-building is **inclusive, contextualized, sustainable, and promotes best practices**?*
*12) How can it be ensured that all the training provided has a **robust monitoring framework**, annual monitoring plans, and indicators for outputs, outcomes and impacts?*

The study commenced with the desk review of relevant literature and publications. The metadata for the training events provided in the 11th and 12th Five-Year Plans were facilitated by MoAF's departments and agencies, and coordinated by the EU-TACS Project Management Unit (PMU). The database of the training events was used to identify the sample population in each Central Office and Dzongkhag. A situation analysis of the capacity-building of farmers and extension staff was performed on the basis of the policy guidelines, legislative frameworks and statements in the FYP programs. The primary data for the study was based on stakeholder consultation in the field. A set of semi-structured questionnaires was used for farmers and extension agents.

Key Informant Interviews and FGDs were used to gain feedback from the training providers. Before the roll-out of the field survey, the questionnaires were tested by ten enumerators in Paro and Thimphu, and the survey questionnaires were further refined. Face-to-face consultations and workshops were held on the premises of the training providers, where possible.

1.5 Sampling

Using the metadata for the training events provided by the PMU, five training providers were chosen for the study: RDTC in Zhemgang, UWICER in Bumthang, JSWNP in Trongsa, CNR in Lobesa (Punakha), and ARDC in Bajo (Wangdue Phodrang). The EA survey was carried out to

consider all the EAs who could be reached. From the training events metadata, about 61,000 farmers who had been provided with some kind of training were identified.

Based on the geographical concentrations of these farmers and their regional distribution (east, west, central and south), the four Dzongkhags of Paro, Sarpang, Trashi Yangtse and Zhemgang were identified as the target study Dzongkhags for a total of 2,608 farmers, comprising 1,316 males and 1,292 females.

Table 1: Gender-segregated sample size by Dzongkhag

	Dzongkhag	Total sample size	Male sample size	Female sample size
1	Sarpang	652	329	323
2	Trashi Yangtse	1060	533	527
3	Zhemgang	451	223	228
4	Paro	446	231	214
	Total	**2609**	**1316**	**1292**

The gender segregation of the samples was based on the total number of males and females in the populations of the four Dzongkhags and the extraction of 10% of the total number of participants trained in the four Dzongkhags. This corresponds to the recommendation by the Senior Key Expert of the 10% rule-of-thumb extraction from the total concentration of farmers trained in each of the four Dzongkhags.

1.6 Survey Limitations

Rule-of-thumb sampling resulted in a high sample number: The 10% sample identification was set as a predetermined target for the reason that not all the responses collected might be of the same quality, and some might be rejected after data cleaning. The target set helped during survey enumeration, including after the respondents were contacted.

Unclear metadata: The metadata collection process was constrained because the different agencies that provided training events to the farmers had different formats for recording the farmers' training data. In many cases, only the numbers of participants were recorded (as metadata). Thus, repeat recordings of the same farmers may not have been avoided, with some double-counting increasing the total of training recipients. However, cross-comparisons were made to eliminate possible repeat recordings, in order to refine the population data.

Difficulty in tracing farmers: Because the survey period coincided with the peak of the farming season, it was difficult to trace the farmers. However, their contact details were obtained in collaboration with the local government, and individual farmers were contacted. Once contacted, the enumerators approached the farmers, and the survey was carried out. In some cases, telephone interviews were carried out with the farmers who had consented to them. However, most of the interviews were carried out in person.

Limitations due to the COVID-19 pandemic: Owing to the pandemic, several restrictions imposed at the community level hindered the survey process, since many types of permission had to be sought from different task forces. All protocols were observed during the survey process. The surveyors were tested for Covid-19 before visiting the field and were placed in quarantine after returning from high-risk zones like Sarpang Dzongkhag.

2. CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

This section reviews the literature on the training concepts, needs, and impacts of the training programs in relation to the farmers and extension agents. It covers the methods, approaches and best practices that can be used to develop critical actions for strengthening the farmers' and service providers' institutional and technical capacities.

2.1 Definition and Concepts

It is essential to understand the basic concepts of *capacity development, capacity-building, and training* before studying the impacts of farmer training.

According to the FAO (2012); UNDP (2009), *capacity development* is a process whereby individuals, organizations, and societies acquire and strengthen their core competencies to accomplish their own development.

On the other hand, *capacity-building* is a process that underpins the initial stage of creating capacities from the baseline. Capacity-building is often used in the context where there are few existing capacities, and is less comprehensive than *capacity development*.

Capacity development is a long-term process and addresses power relations, mindsets and behavioral changes. Therefore it underscores the importance of the motivations of individuals and institutions as primary drivers of change (CGIAR, 2020).

There is a slight difference between capacity development and training. A training process is merely one component of capacity development. Saleh et al. (2016); Milhem et al. (2014) defined training as a process of equipping an individual or a group with specific skills and knowledge in order to enable them to perform their job better. In simple terms, training is a learning process intended to bring about a permanent change in behavior arising from the training experience. More precisely, training is a specific kind of communication to enhance skills, modify behavior and increase competency that is targeted on a defined population, and focuses exclusively on what needs to be known (Collett & Gale, 2009). Although there are clear distinctions in the concepts, the terminologies are used interchangeably in this study.

2.2 Training Approaches and Methods

The Department for Agriculture (DoA 2021) identified three key roles that are expected to be performed by Agriculture Officers. These are as a *technical expert*, as a *facilitator of production*, and as a *strategic planner,* as per the competency-based framework. This framework aims to develop knowledgeable, skillful and competent agriculture officers delivering efficient and effective services of the highest standard.

Agriculture extension methods are channels of communication between farmers and extension agents that are intended to motivate the farmers and help them find the means to solve their problems. Extension methods can be classified into three groups, namely *individual extension, group extension* and *mass media* (DoA, 2020; FAO, 2019a). According to Aremu et al. (2019), no single method is adequate, and a combination of methods will produce the best result in achieving the desired objectives, depending on the type of training being undertaken. The use of repeated or standardized training methods will make training ineffective, and therefore extension trainers need to use different approaches or varieties of method.

The Agriculture Extension Strategy (2020) published by the Department of Agriculture lists eight different approaches towards extension adopted by various organizations around the world: (1) general agriculture extension; (2) the commodity-specialized approach; (3) the training and visit approach; (4) the agriculture extension participatory approach; (5) the project approach; (6) the farming systems approach; (7) the cost-sharing approach; and (8) the educational institute approach.

It is difficult to single out a "one-size-fits-all" set of extension best practices worldwide. Agriculture extension in most countries is mainly based on a top-down technology transfer approach. Countries like China, India and Indonesia have used decentralized, bottom-up approaches, and their public extension systems are pursuing the market-driven approach. On the other hand, extension systems in developed economies have often been privatized in response to the increasing number of commercial farms (Aremu et al., 2019). The conventional extension approach used in Bhutan has focused chiefly on commodity production advisories and has been characterized by low outreach, resulting in meager impacts.

After drawing lessons from the global and national experiences of agricultural extension, five extension approaches have been adopted in Bhutan: the *participatory extension approach; commodity approach; lead farmer approach; training and visit approach;* and *cost-sharing approach* (DoA, 2020).

Recent developments have resulted in more comprehensive extension services that can be considered good practices. The emphasis is now on services that **span entire value chains, including processing, packaging, marketing, and production**. Swanson (2008) proposes that more attention be given to agricultural innovation systems since there is a growing recognition that marketing, not technology, is a primary driver of agriculture development. This suggests that **extension approaches must shift away from technology transfer towards human resource development or educational programs that will assist farmers in building their social capital and enable them to successfully produce and market different high-value products**.

2.3 Rationale for Improved Agricultural Extension

Agriculture extension services are those services delivered by extension officials to farming communities and other clients to improve their livelihood. Agriculture extension plays a vital role in enhancing farm productivity and incomes to reduce poverty and increase food security. Without them, the farmers would lack access to the support and services required for improving their agricultural practices (FAO, 2019). Extension services in Bhutan consist of advisory, technology transfer, facilitation, and administrative services (DoA, 2020).

The success of an organization is dependent on its ability to develop and use the skills of its employees. The importance of training and capacity-building is widely studied in the agricultural research literature, and within national policies. Saleh et al. (2016) explain training needs as the shortage of skills and abilities which could be reduced or eradicated through education and training events. According to Donovan et al. (2001), the focus must be on human resources development (HRD) to take advantage of each organization's intellectual assets.

In Bhutan, the national civil service policy emphasizes developing capacity and maintaining competencies to provide excellent-quality services, in line with the strategic objectives of each organization (RCSC, 2018). The Bhutan Civil Service Rules (BCSR) explicitly point out that areas of HRD programs must be identified in their strategic HRD plan based on both competency frameworks and needs assessments, which should be carried out periodically (RCSC, 2018). The RCSC (2018) advocates that agencies institute an M&E system that assesses training impacts and makes necessary interventions. Bhutan's civil service places a significant emphasis on training programs (both pre-service and during service) to enhance the workforce's capacity.

In 2021 the DoA developed a competency-based framework to map the skills and abilities required by agriculture officers for delivering the highest-standard services through robust professional competencies (DoA, 2021). This framework revealed that most EAs are young and motivated, and are working to develop the full potential of the farming communities they serve. Many possess a degree from the College of Natural Resources; others have a diploma. These agents are front-liners for implementing MoAF's program-and district-level plans (FAO, 2012).

The Department of Livestock has prepared its *Competency-based Framework for Livestock Production Officers* (DoL, 2019). Similarly to the DoA, the critical roles of technical expert, production specialist and strategic planner are emphasized. This document is helpful as a basis for designing professional development programs for extension agents at DoA, DoL and DoFPS.

2.4 Capacity Needs and Impact Assessment

Training programs are a necessary means for bridging the capacity and knowledge gaps resulting from the diversity of emerging skills needed to implement improved farming methods and enable farmers to make informed decisions. While agriculture has adapted in line with scientific progress, Raidimi et al. (2019) highlight the importance of updating curricula in the context of today's rapid rates of change.

Agricultural extension applies sophisticated techniques and demands a considerable range of skills. According to Aremu et al. (2019), agriculture extension agents need to keep abreast of new developments. In addition, training events address the changes in needs and shortages of skills in the immediate, medium and long term. Khan et al. (2011) emphasize that agriculture officers cannot perform their duties to their full potential without access to appropriate capacity-building programs. Training events are the fundamental component needed for the effective communication of information about technologies to the field. Accordingly, Raidimi et al. (2019) suggest customizing capacity-building initiatives that will enhance food and nutritional security.

Capacity development aims to improve the ability of organizations to deliver national development goals. UNDP (2010) underscores the importance of understanding the success of the capacity development process through the measurement of capacity and the capture of capacity change. In so doing, the process of enhancing the knowledge and skills of farmers and extension agents will be assessed.

A training identification phase should precede any effort to deliver a training program (Saleh et al., 2016). This is mainly because successful training outcomes are contingent on identifying the training needs. Donovan et al. (2001) highlight three necessary steps for training to succeed. The first is to identify the needs, singling out the areas requiring training. The second is to examine an agency and identify the issues that affect the application of new skills. The third is to ensure that sufficient resources are supplied for enabling an integrated training program to be carried out. Similarly, JICA (2014) advises three steps to be considered during the design and selection of themes for any training courses, namely: necessity; priority in the policies and mandate; and appropriateness.

Given the above, assessing the training needs and evaluating the outcomes are crucial for ensuring that the training of both training providers and recipients is effective; and that the resource spend is justified (Kalsariya et al., 2015). Aremu et al. (2019) recommend that training programs target problems and solutions.

Implementing a needs assessment ensures that the training targets the correct competencies, and the actual needs of specific types of employees (DoA, 2021). A needs assessment helps the transition from initial assumptions to an accurate understanding of a group, the educational levels of its members, and their networks. The need for continuous learning is evident, considering the pace of scientific progress and development in the agriculture sector.

Various studies have looked at the benefits of training to uncover the most direct link between capacity-building and impact. According to ACIAR (2009), the main benefits include a behavior change and improvements in confidence, competence, and income. Jørs et al. (2016) reported a safer handling of pesticides and reduced pesticide use following a training program. A study carried out by the International Food Policy Research Institute revealed that the annual rates of return on extension investments were 80%, based on 289 studies conducted worldwide (Alston et al., 2000). A study conducted by Noor & Dola (2011) in Malaysia found that 69% of the respondents acquired 70% more skills and knowledge because of their training courses.

The productivity gap in the farmers' fields has been reduced by training (Saleh et al., 2016). In Bhutan, an assessment conducted by RDTC (2014) reported that training events run by the institute are relevant, with 76% of training beneficiaries and 98% of the respondents expressing complete satisfaction. Considering these impacts, investing in building human capital will be beneficial in terms of enhancing food security and improving livelihoods in rural communities.

2.5 Capacity-Building and Training in the RNR Sector

The importance of agricultural extension was appreciated even in the first FYP in 1961. According to DoA (2020), extension services in the country were top-down from the 1st FYP to the 4th FYP. They were dominated by input supply (seeds/seedlings, fertilizers and tools), farmer training, demonstrations, and field days.

Starting with the 5th FYP, extension services were decentralized in line with the government's policy, and an RNR Center has been established in each of the 205 gewogs, most of which are staffed with extension officials. The extension system can be stratified into national, regional, Dzongkhag and Gewog levels.

Nearly all donor-funded projects recognize Capacity-building and training as essential for enhanced competency and learning. For example, the EU Technical Cooperation Project's support for the RNR sector built the capabilities of 1,149 officials with a budget of 4.6 mn Euros. The project supported 117 short-term training events at Maejo University in Thailand.

The review of MoAF's administrative data reveals that a range of capacity-building activities was provided, which were either RNR discipline-based or broader-based training events.

The RDTC's records indicate that the Centre has trained over 2,637 trainees, including farmers, over 13 years. In addition, government agencies such as the Agriculture Research and Development Centers (ARDC), College of Natural Resources (CNR), Ugyen Wangchuk Institute for Conservation and Environment Research (UWICER), Dzongkhag Agriculture Sector, and Dzongkhag Livestock Sector conduct numerous training programs annually.

Similarly, training events are provided by the School Agriculture Program and under the aegis of technical and vocational training (TVET) under the Ministry of Labour and Human Resources. Quantitative data and up-to-date reports are not available, although the Ministry has invested significantly in the human resources to deliver extension services. Despite the significant investment in capacity-building activities, no impact assessments have been carried out to verify the uptake of skills training and knowledge and any resultant changes in the trainees' behavior. Consequently, one of the major criticisms is that it is unclear how the new skills and information are being applied, despite the significant budgetary implication. The technical departments under the MoAF – mainly the **Department of Agriculture** and the **Department of Livestock** – are nodal agencies for extension services. They are responsible for planning, appointments, transfers, and capacity-building programs.

Text Box 3: Key Roles of extension agents under Dzongkhag Administration

Dzongkhags and Gewogs are responsible for providing critical services to farmers. According to the 12th FYP, the GNHC assigns the following technical-support roles to the extension agents, operating through administrative institutions, at both Dzongkhag and Gewog levels:

Role 1. Capacity-building of farmers & user groups.
Role 2. Market sheds and sales counters.
Role 3. Farm shops and cold-storage facilities.
Role 4. Rainwater harvesting structures.
Role 5. Soil and land management.
Role 6. Irrigation channels and delivery systems.
Role 7. Supply of seeds and seedlings.
Role 8. Arable, horticultural & livestock production.
Role 9. Organic farming & nature-based agriculture.
Role 10. Vegetable and fruit systems & production.
Role 11. Manure, fertilizer, pesticide, herbicide supplies.
Role 12. Farm mechanization: machinery supplies, technologies, tools.
Role 13. Livestock breeding support and supply of veterinary drugs, vaccines, and equipment.
Role 14. Veterinary hospital and ambulance.
Role 15. Development of fodder resources.
Role 16. Milk processing units.
Role 17. Agricultural product marketing, including value-added products & off-season vegetables.
Role 18. Human/wildlife conflict management via mains- and solar-powered electric fencing.

The DoA (2020) highlights that the agriculture extension agents lack sufficient knowledge and skills to disseminate agriculture technologies. The multi-tasking nature of the extension services affects their ability to focus on specific actions (FAO, 2012). So the DoA put in place

an Agriculture Extension Strategy (2019-2028) as a framework to strengthen its institutional capacity and provide a more effective and consistent delivery of agriculture extension services.

2.6 An Integrated Training Strategy and Action Plan

One of the desired outcomes of this study is the development of an integrated training strategy and action plan, including the training approaches MoAF should prioritize. Training becomes more effective, simpler to implement and easier to monitor and evaluate if guided by a comprehensive strategy. Various capacities are critical to fulfilling the mandates and achieving national goals. However, without a coherent process, training efforts would generally remain reactive, fragmented, and fail to provide a coordinated response to emerging problems.

The extension services are projected to increase as Bhutan's farming system transitions from subsistence-based to semi-commercial and commercial farming. The DoA has identified an in-country training program, an ex-country training program, and refresher courses as a capacity development approach for upgrading the knowledge and skills of the extension personnel to enable them to provide high-quality services (DoA, 2020).

3. RESULTS OF THE REVIEWS, DISCUSSIONS, AND SURVEYS

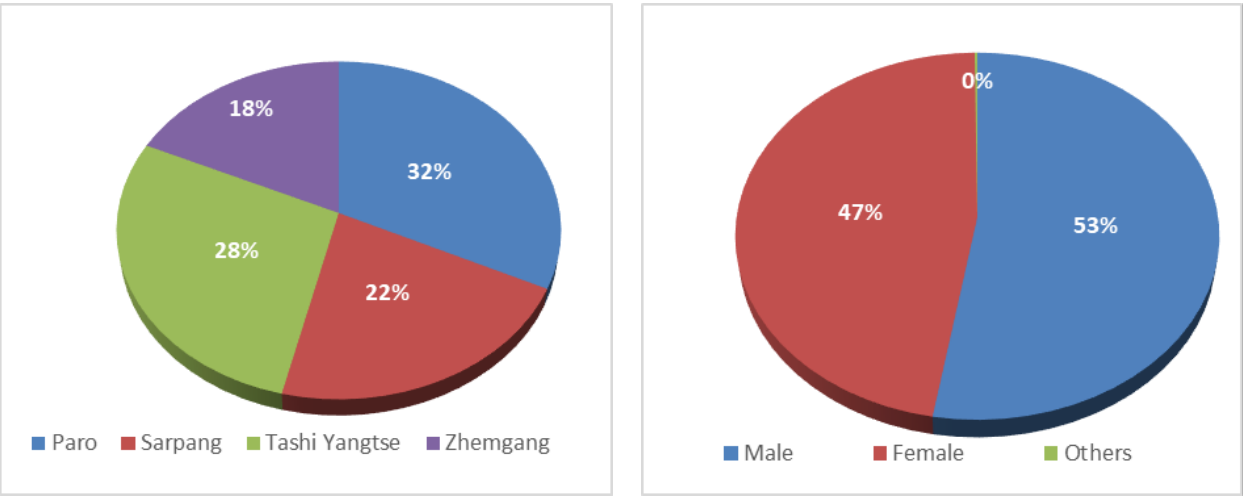
This chapter analyzes the main findings of the study, which comprise changes in the knowledge, attitudes and behavior of the farmers and extension officials through various capacity-building initiatives. It summarizes the impact of the farmers' training on farm income, food and nutritional security, and farm resilience.

3.1 FARMER SURVEY

A. Sample characteristics

The study was conducted in 32 Gewogs of four Dzongkhags, namely Paro, Sarpang, Tashi Yangtse and Zhemgang. About 1,515 farmers from the four Dzongkhags participated. The maximum representation was from Paro Dzongkhag with 32%, and the minimum was from Zhemgang Dzongkhag, with 18%. Slightly more than half of the respondents (53%) indicated that they were not the head of the family; heads of families thus represented 47% of the survey participants. 53% of the respondents were male, and 47% were female.

Figure 2: Composition of the respondents by Dzongkhag and by gender



The age groups of the farmers in the study are depicted in Figure 3. The modal age group was 36-40 years, 6.3% of the respondents were aged 20-25, and 12% were aged 56 and above.

Figure 3: Farmer respondents by age group

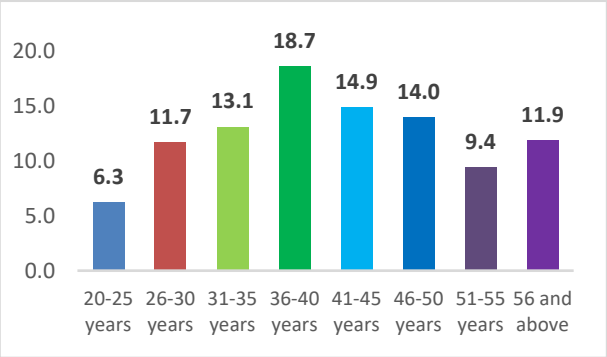
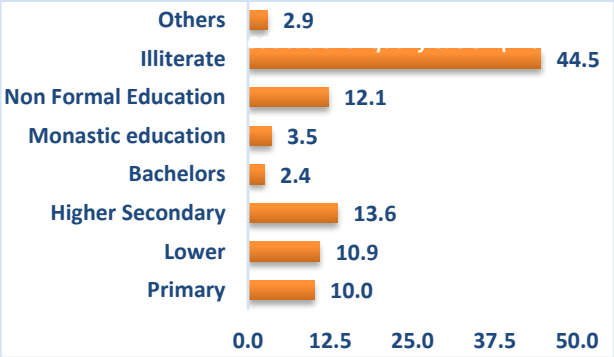


Figure 4: Farmer respondents by qualification



The population samples in this study contained a high proportion of illiterate individuals – 45%. 12% of the respondents have no formal education. Remarkably, the sample included 2.4% with a bachelor's degree, suggesting that some educated younger people are taking up farming, while 13.6% had received higher secondary education.

B. Income status

From the table below, most survey participants made a modest income from their farms. Many of the respondents (more than 59%) have an annual farm income below Nu. 50,000. The proportion of participants having an annual income between Nu. 50,000 to 100,000 is the second-largest category, at 21%. Around 80% of the respondents fall within the two lowest income brackets. A small percentage of the participants, corresponding to a figure of 1.1%, had an annual income greater than Nu 300,000.

When asked how many members in a family were earning a livelihood from off-farm sources, 41% of the respondents reported that none of their family members were getting any income. Over 27% reported at least one member earning an income for their household. The representation of additional family members contributing to the household income is much less. Only 0.9% of the total respondents had around five members in their family who were consistently earning an income from their farm.

Table 2: Income-earning HH members

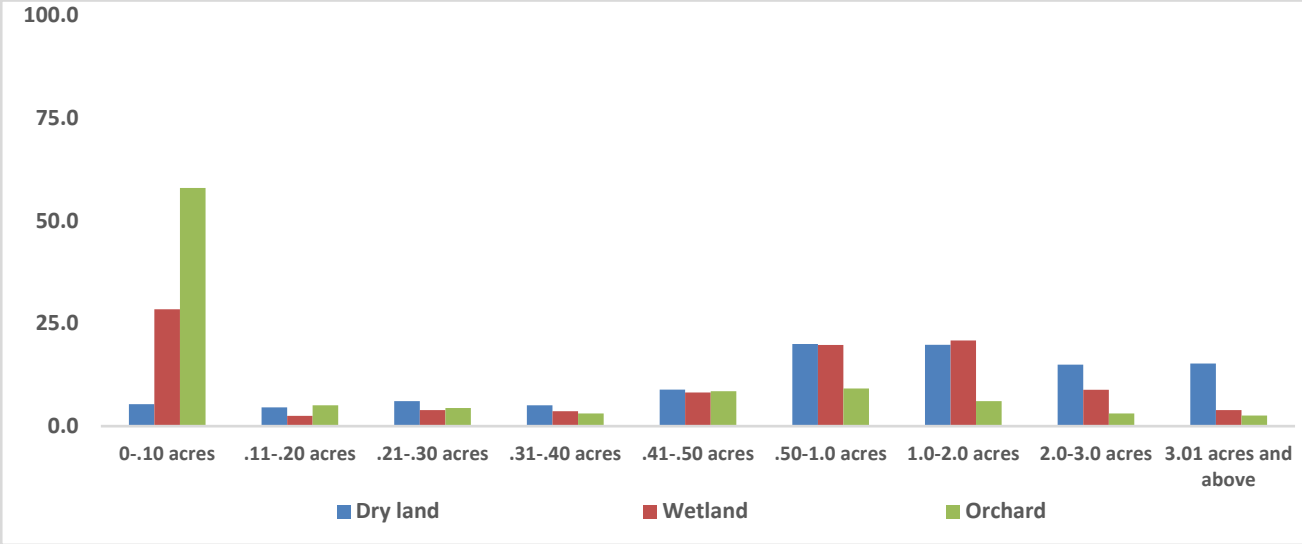
# of Family Members	Frequency	Valid %
0	618	40.8
1	420	27.7
2	318	21.0
3	92	6.1
4	46	3.0
5	14	.9
6 and above	7	.5
Total	**1515**	**100.0**

C. Asset ownership of land, livestock, and machinery

Almost all the respondents owned all three types of land asset (dry land, wetland, orchard), as illustrated in Figure 5 below. Due to their small land holdings, the farmers who took part in this assessment can also be categorized as smallholder farmers. About 20% of the participants owned dry land of between half an acre to 1 acre, versus over 15% of the respondents owning more than 3 acres of dry land.

Wetland (*chhuzhing*) comprises an integral part of the Bhutanese farming system, but more than 28.4% of the respondents have less than 0.1 acres of wetland, which is relatively low. The majority of the participants have between 0.5 to 1 acre of wetland; those owning 1 acre make up 19.7%; and farmers owning 2 acres make up 21% of the sample. Only about 3.9% of the survey participants have more than 3.01 acres of wetland.

Figure 5: Land holdings of the farmer respondents



In terms of orchard ownership, more than half of the respondents (58%) have less than 0.1 acres of orchard. In the rest of the total area categorized, the proportion of people owning orchards is quite similar. 2.6% of the participants owned 3.01 acres and above.

The Bhutanese farming system is predominantly integrated, with crops, livestock and trees forming part of the farming system.

Cattle rearing for milk production is widespread, with many of the farmers producing farmyard manure (FYM) and adopting biogas production units for cooking, heating, and lighting. About 6.5% of the participants reported having more than 11 cattle, while 35% of the respondents have at least 1 to 3. However, 18% of the participants reported that they do not rear cattle.

A large portion of the respondents (79%) said that they do not rear poultry, although 8.4% of participants have more than 11 chickens. The number of people engaged in pork production is minimal, with more than 94% of the respondents reporting they do not rear any pigs.

The majority of farmers do not own any type of farm machinery. For instance, about 96% do not own a tractor, 79 do not own a power tiller, and 88% do not own a mini-tiller. Correspondingly, at least a single tractor, power tiller, and mini tiller are owned by respectively 4%, 20% and 12% of the total respondents.

In addition, 71% of the respondents do not own either a rice or flour mill. 28.6% of the respondents have at least a rice/flour mill in the household. About 31.4% of the participants have a power chain in their homes.

Figure 6: Respondents' livestock population: by type, numbers per HH, and % HH in each group

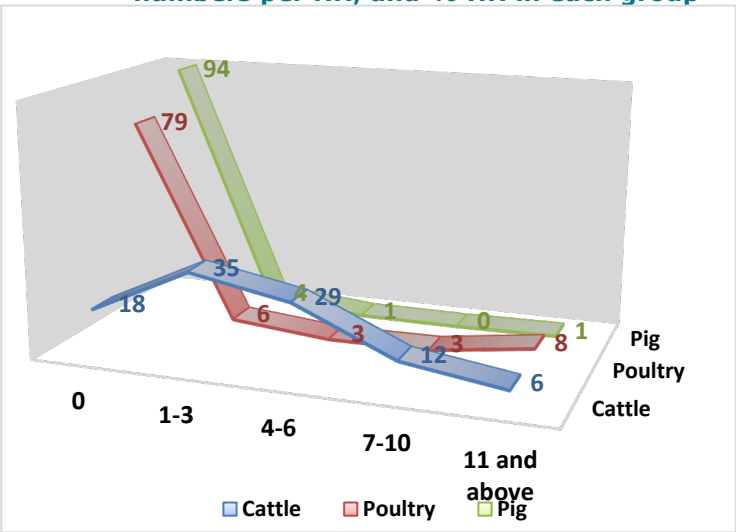
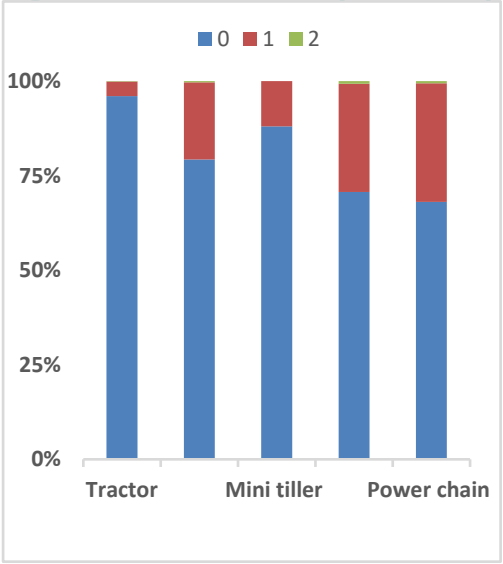


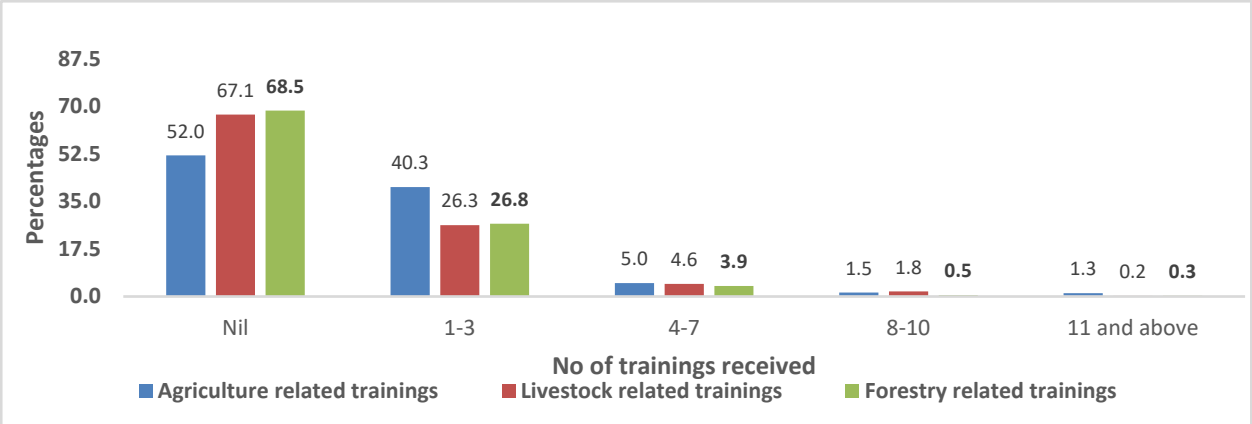
Figure 7: Farm machinery ownership



D. Type of training received by the farmers

The respondents were asked about the number of training events received by themselves or any household member in the last eight years, i.e., from 2013 to 2021. The proportion of participants not receiving farmer training is high. For example, 52%, 67%, and 69% reported not receiving any training in the agriculture, livestock, and forestry sectors. Similarly, farmers receiving 1-3 agriculture, livestock, and forestry training events in the past eight years were reported to comprise 40.3%, 26.3%, and 27% for the respective sectors. Some people said they had received 11 or more training events from 2013 to the present. However, this proportion is much smaller: only 1.3% fell into this category.

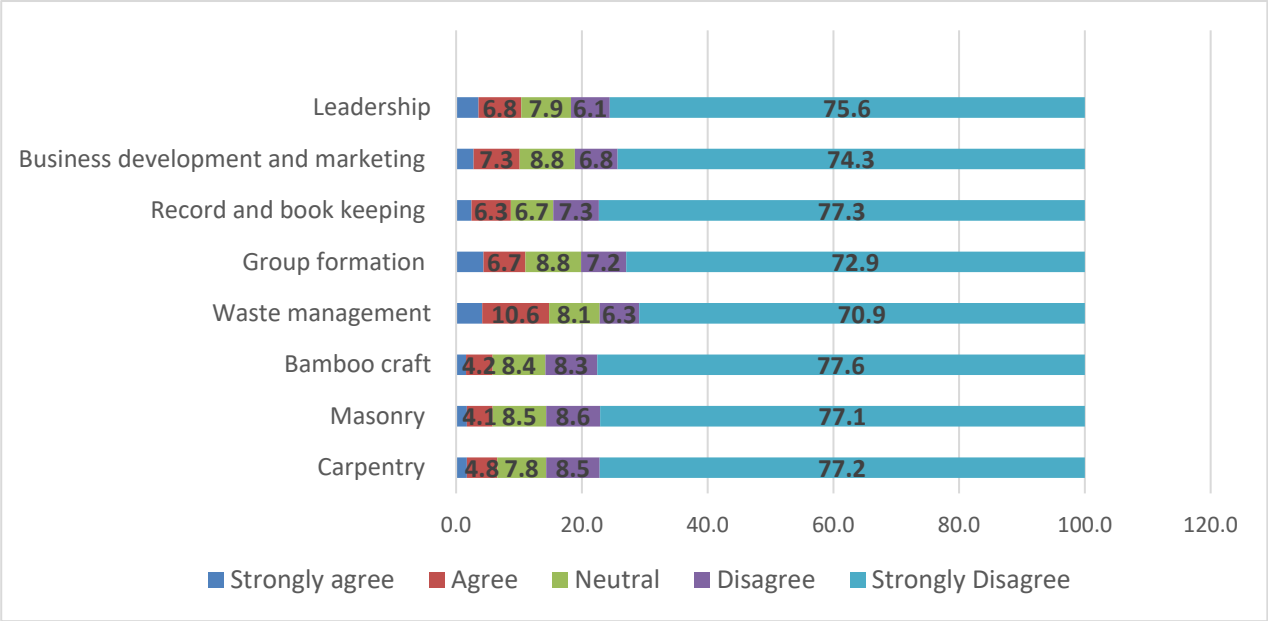
Figure 8: Sector-wise training received over the past eight years



Other general and cross-sectoral training events were also received by the farmers, as depicted in Figure 9. Most of the respondents strongly disagreed that these cross-sectoral training events had been provided.

For instance, 70-80% of the respondents disagreed that the training listed was provided over eight years. This indicates that TVET, leadership, and business management were less available to most farmers, focusing on agriculture production skills.

Figure 9: Non sectoral training events (inc. TVET) received over past eight years by % and type of training

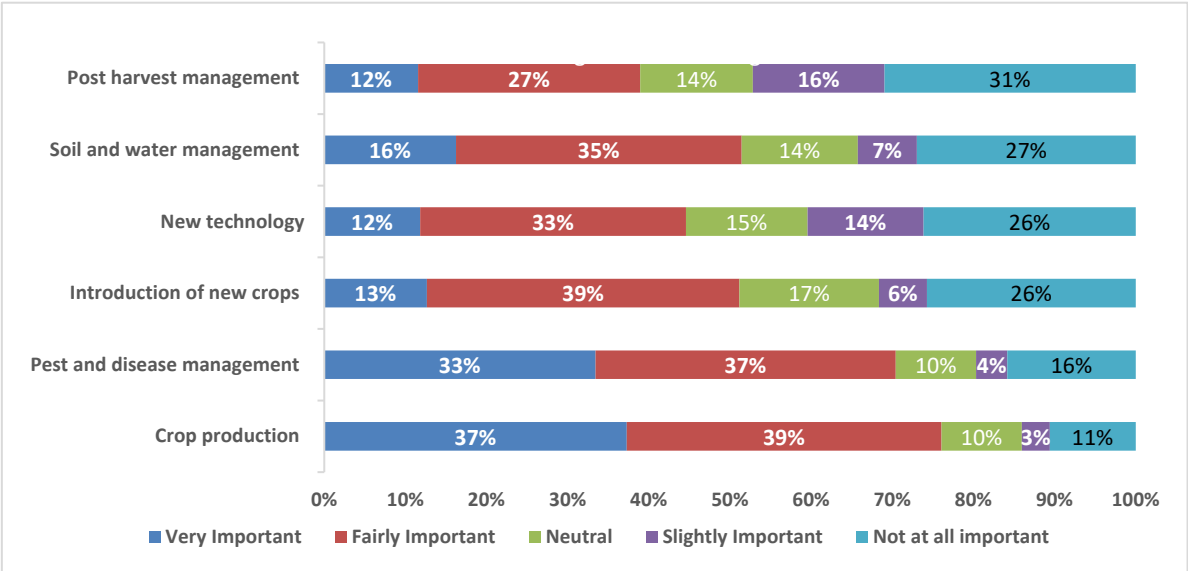


E. Usefulness and relevancy of the training

The participants were also asked about the usefulness and relevancy of the training areas over the eight years. Various training events in agriculture were provided, but the usefulness/practicality of the training programs elicited mixed reactions. About 37% of the respondents reported that crop production training was critical, and 39% viewed it as moderately necessary. On the other hand, 11% said that the training program was unimportant.

In the other training areas, such as post-harvest management, soil, and water management, new technologies, and the introduction of new crops, more than one-quarter of the respondents stated that the training programs were not useful at all.

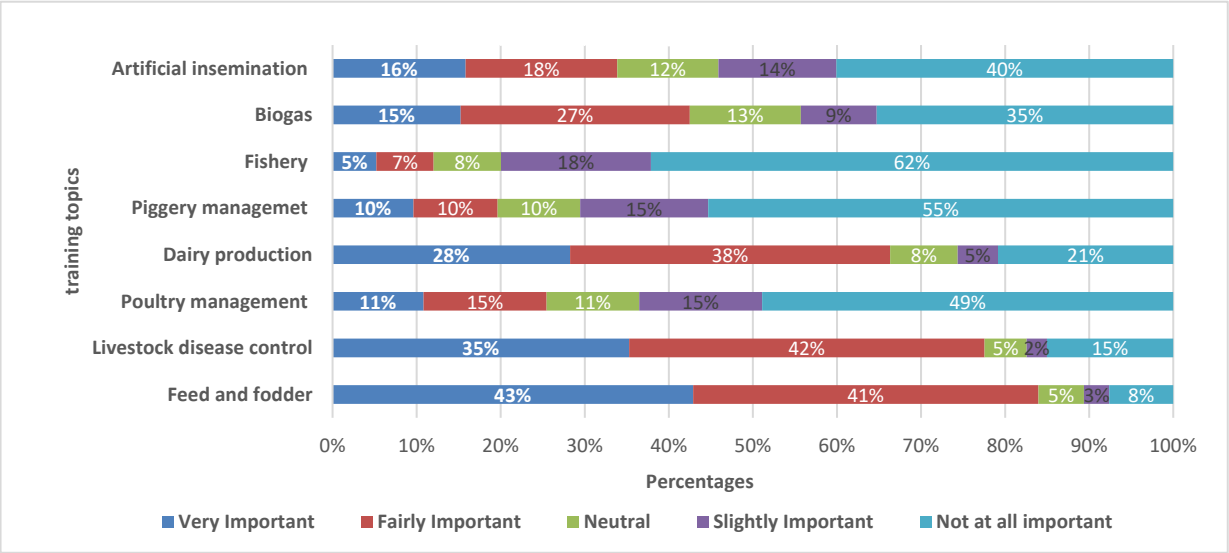
Figure 10: Usefulness of agriculture training events



Such differences in perception are even more pronounced in the livestock sector. Feed and fodder training was viewed as beneficial by 43%, and valuable by 42%. Only 8% of the respondents indicated that the training events were insignificant. Fishery, poultry, and pork

management training were not considered critical by most beneficiaries. As many as 62% of respondents reported that fishery training was not valuable.

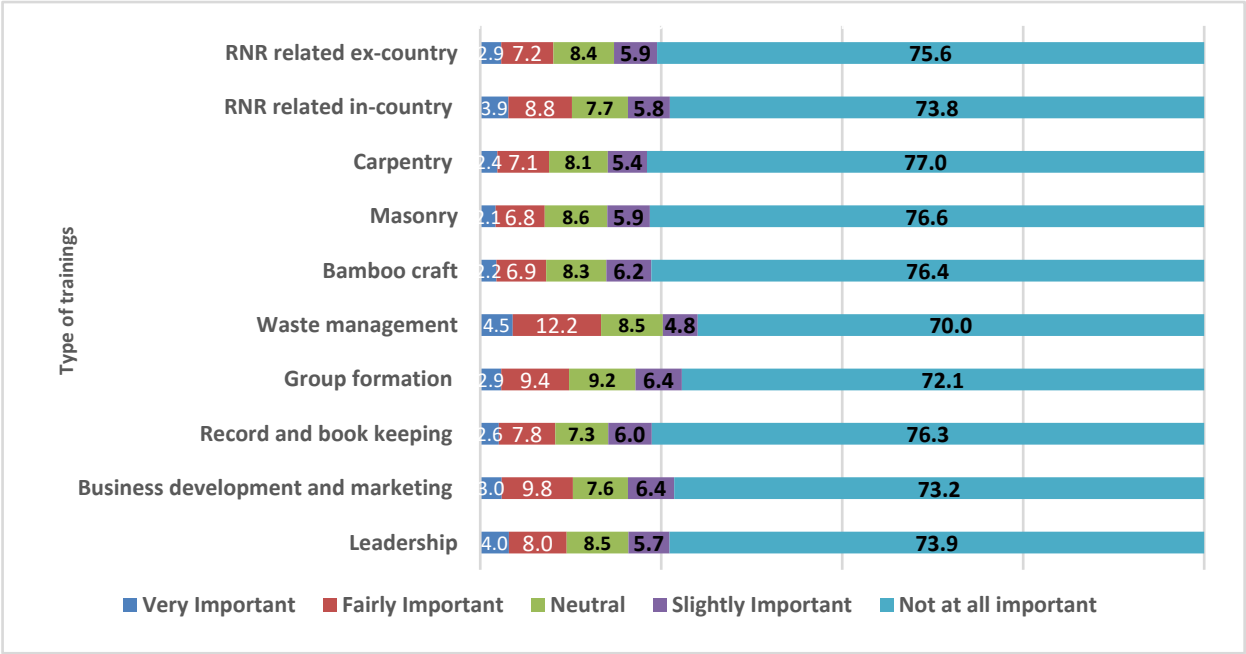
Figure 11: Usefulness of livestock training events



Besides the technical training events, capacity-building relating to various cross-cutting issues was also delivered. As with the sectoral finding, many of the participants felt the training programs were not at all relevant, with more than 70% of the participants indicating that the training programs were not suitable.

For instance, more than 77% felt that the carpentry training was not relevant, while 4% of the respondents reported that the leadership training events were of limited use. Similarly, less than 3% of the survey participants felt that the training provided was essential.

Figure 12: Type of general training event



Though several training events were provided, their desired benefits were not realized. This indicates that the training events were not needs-based but predominantly reflected the supply side. Targeting the right participants was noted as being important. The main findings suggest that the participatory needs assessments were not properly carried out. Many of the training

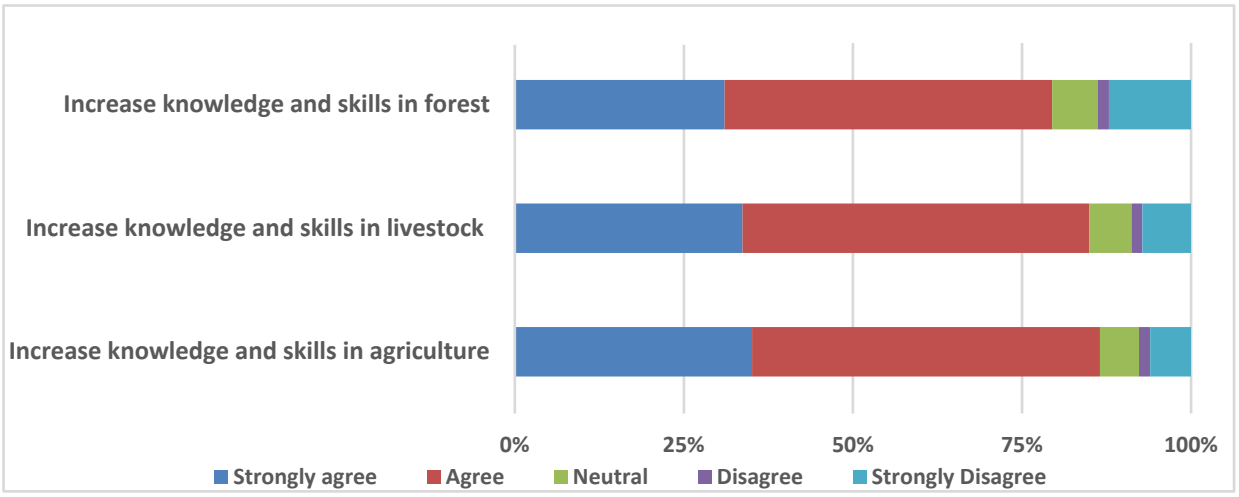
events appeared to have been decided on using a top-down approach without assessing their relevancy and the participants' immediate needs.

F. Output on knowledge and skills

While the thematic areas in which the training events provided were not that relevant, the programs made a lot of difference to the knowledge and skills gained for different sectors (Figure 13). 35% of the respondents strongly agreed that their agricultural knowledge and skills had increased. 51% agreed that there had been an increase in knowledge and skills, while 6% were neutral. On the other hand, about 6% strongly disagreed that the training events had contributed to any significant gain in knowledge and skills.

The other sectors also perceived a difference in their knowledge and skills arising from the training programs. As with agriculture, 34% of the respondents strongly agree that there was an increase in knowledge and skills regarding the livestock sector. A similar proportion of participants agree regarding their increase in knowledge and skills. About 9% of the respondents disagree (2% disagree and 7% strongly disagree) that the training had led to an increase in knowledge and skills. The number of people in the forestry sector reporting an increase in knowledge and skills is also similar. The proportion of respondents strongly agreeing or agreeing regarding their increase in knowledge and skills is 31% and 48%, respectively. At 12%, the number of people who strongly disagree about the impact of training in terms of forestry knowledge and skills is higher than for agriculture and livestock.

Figure 13: Impact of training in the knowledge and skills for different sectors



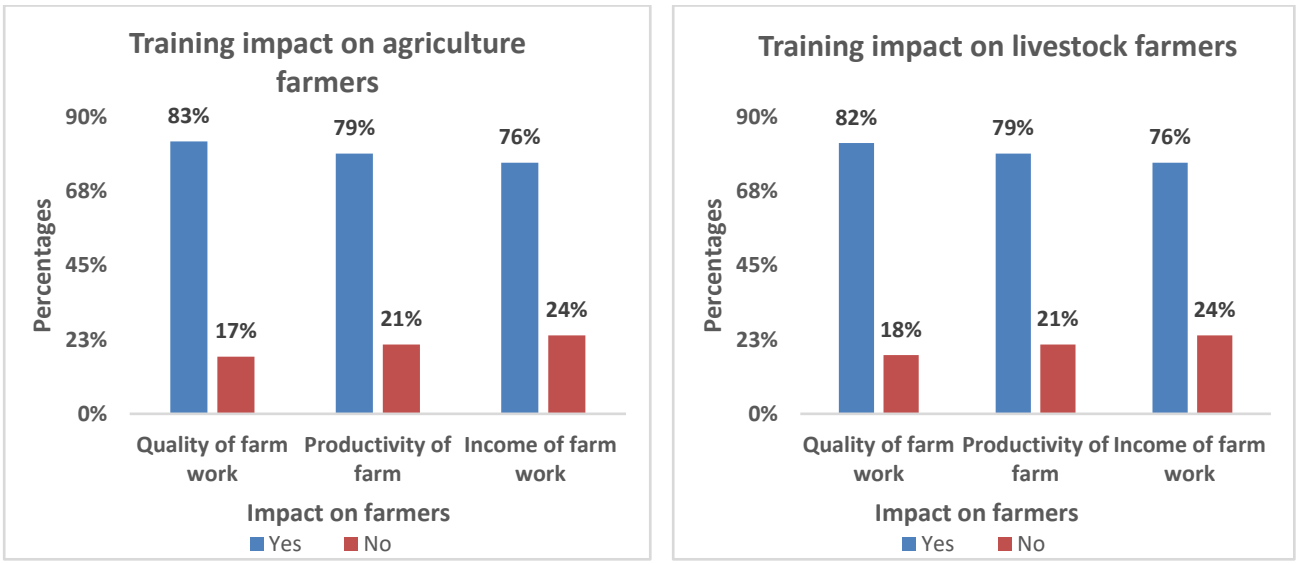
G. Overall impact on the farming system

To assess the impact of training on the farming system, the respondents were asked about the overall effect of the training on the quality of their farm work, the productivity of their farm, and their farm's income.

The response of the participants was positive in terms of the training impact. According to them, the agricultural training events have provided sound effects in terms of the quality of farm work (83%), productivity (79%) and income (76%).

On the other hand, 17% of the respondents reported there was no impact on the quality of their work, 21% said that the training did not make any difference in terms of the productivity of the farm, and 24% responded that it made no difference to their farm income either. The participants had a similar response regarding the impact of the livestock training events, as Figure 14 illustrates.

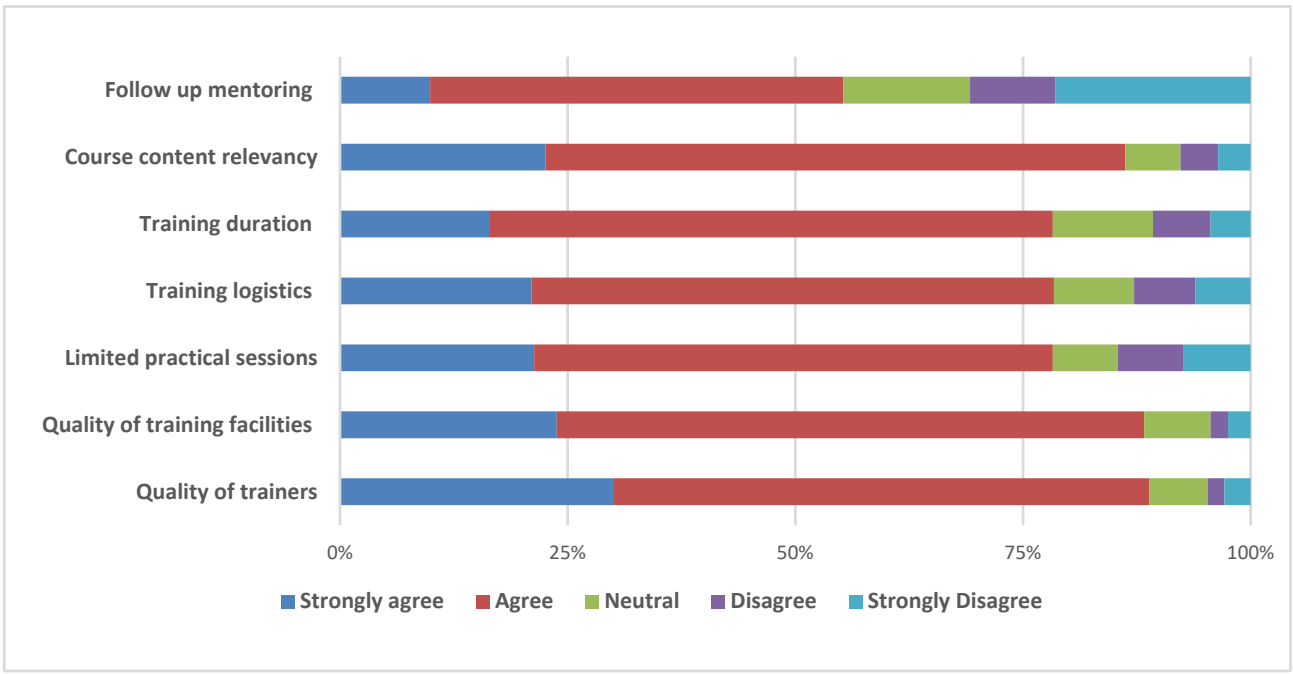
Figure 14: Training impacts in terms of sector



H. Feedback on the training program

Feedback on the training program provided over the past eight years was obtained, and the assessment was conducted across seven key parameters (Figure 15). The responses varied depending on the parameters being assessed. To cite one example, 80% of the respondents strongly agreed or agreed that the quality of trainers was high. One weak area was the follow-up mentoring, where only 55% strongly agreed/agreed that follow-up was carried out. In general, the feedback for most of the parameters was positive.

Figure 15: Feedback on the usefulness of all formal training courses



The farmers' opinions on improving the training programs in the future were collected from the survey participants via an open-ended question. The most strongly held view was that farmer training should be provided with only a small number attending and conducted over more days. The farmers feel that post-training on-farm monitoring and follow-up should be held regularly. The timing of the training is also crucial, with the respondents' opinion being that providing the training during the off-season when most people aren't fully occupied with farm work will be more effective. Instead of theory sessions, more practical and hands-on sessions

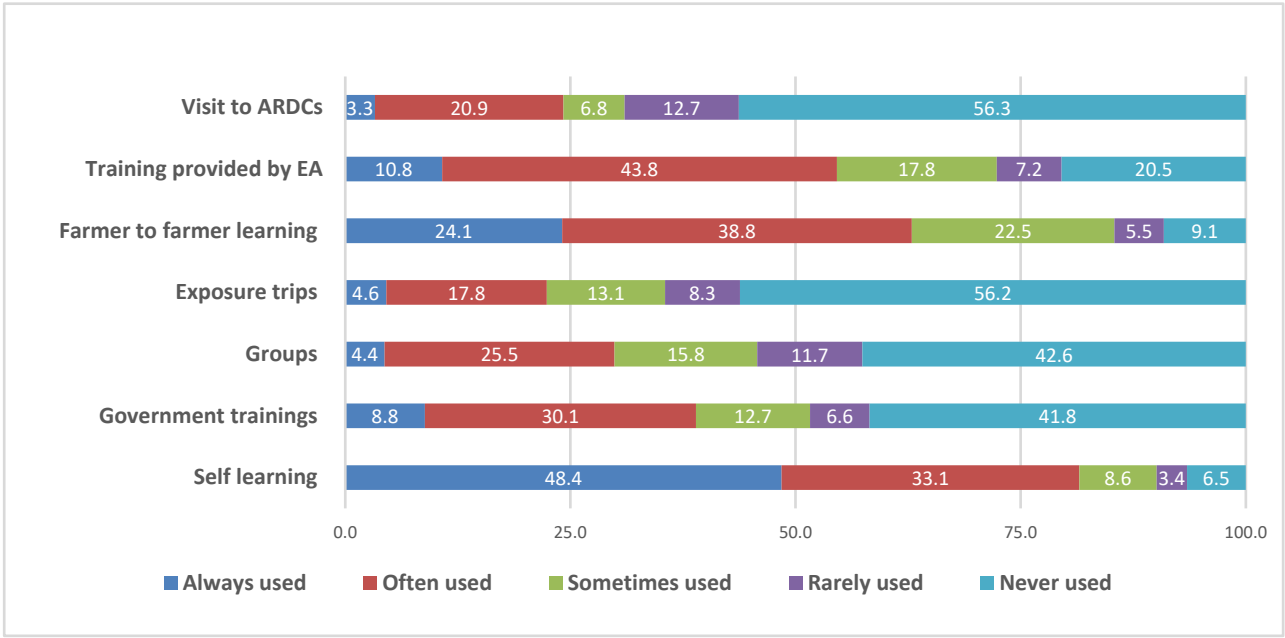
were requested. The provision of a DSA and other logistical considerations came up frequently during the interview.

I. Mode of training events and sources of information

The farmers were asked about the sources of knowledge and skills that they had gained over the previous eight years to improve their farm management (Figure 16). It appears that self-guided learning, i.e., on-farm learning from parents and relatives since childhood, was the most common source of information. About 48.4% of the respondents reported that self-guided learning was always used. Interestingly, ARDCs, which are typically considered the hub of new technology information, were never used as a source of information by 56.3%. Only 3% of respondents used visits to ARDCs to obtain information. Information through exposure trips, group membership, and government training events were also reported to have never been used. Farmer-to-farmer learning was more significant than conventional training sources. 24% of the respondents said they had always used farmer-to-farmer learning to enhance their knowledge and skills.

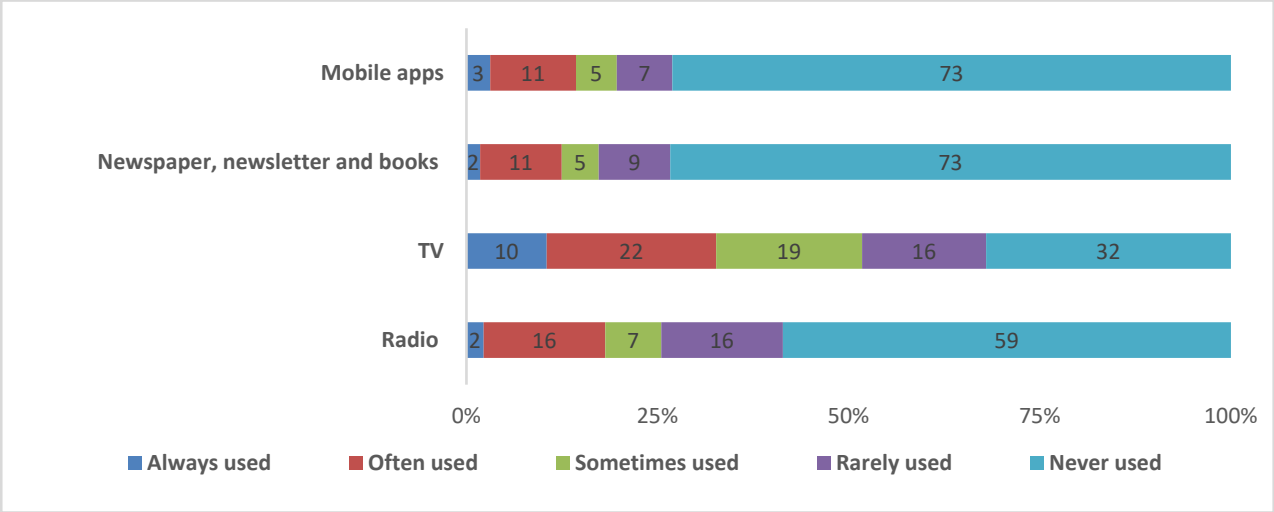
Information regarding the media as a source of information was collected. Mobile phone apps, newspapers, newsletters, and books were not seen as credible sources, which may correlate with the prevalence of illiteracy among farmers revealed by the study.

Figure 16: Farmers' sources of information for training events (by level of use per source)



More than 73% of the survey participants reported that they had never used mobile apps, newspapers, newsletters or books as sources of information for enhancing their knowledge and skills. Surprisingly, the mainstream media such as TV and radio are also not popularly relied on as information sources. Nonetheless, TV was always or often used to obtain information by about one-third of all the respondents.

Figure 17: Farmers' information from mass media & social media outlets (% use per source)



J. Needs assessment

This assessment maps the training areas by identifying critical gaps and areas that should be prioritized to improve the farming system. Most of the participants involved in agriculture expressed a need for the continued provision of training regarding crop production, pest and disease management, the introduction of new crops, new technologies, soil and water management, and orchard management.

In the livestock sector, training needs were expressed regarding feed and fodder development, control of livestock diseases, dairy production, biogas production technology, artificial insemination, and new livestock technologies.

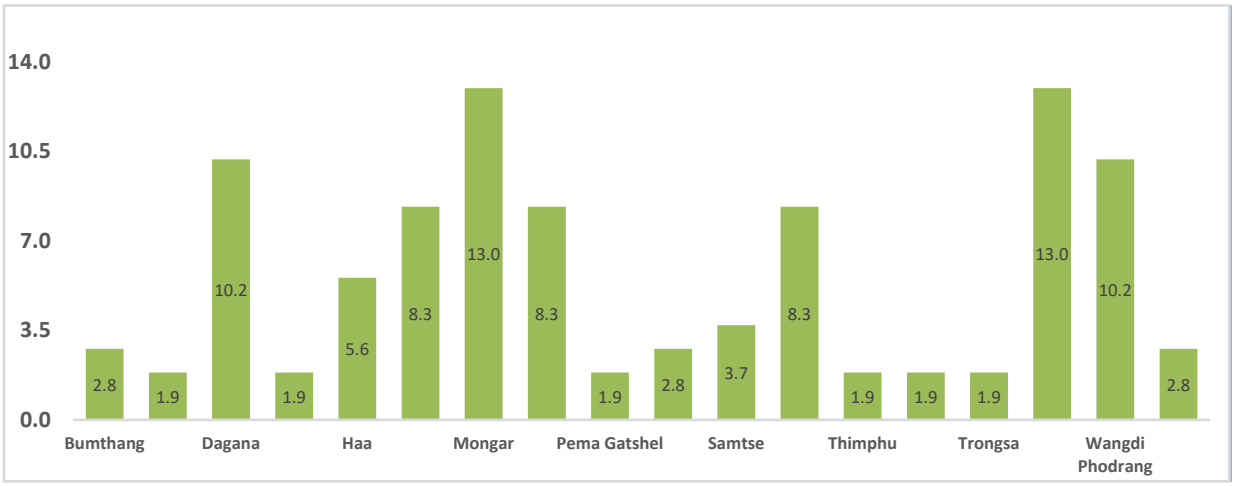
In addition, appropriate training in the local village or Gewog was recommended, as traveling long distances was disliked by most farmers or was difficult. It was reported that the focus of the training events should be more practical, with an emphasis on hands-on experience, and that the training duration should be neither too short or too long. To make the training programs effective, literate farmers should be targeted who would then act as ToT agents for farmer-to-farmer delivery of knowledge. The farmers expressed the need for more marketing-oriented training programs and more frequent monitoring and follow-ups following the delivery of a training program by EA and trainers/researchers in order to enhance its effectiveness.

3.2 EXTENSION AGENT SURVEY

A. Socio-demographic profile

The online survey assesses the impact of training on extension services, and covers most of the extension officials working in the 18 districts. About 108 extension staff working in various Gewogs and communities responded to the survey. Tsirang and Mongar Dzongkhag's extension agents had the maximum representation, corresponding to 13%, followed by Wangdue Phodrang and Dagana at 10.2%. Chhukha, Gasa, Pema Gatshel, Thimphu, Tashigang and Trongsa had the lowest representation, at just 1.9% each. The representation of the respondents from all the districts is depicted in the chart below.

Figure 18: Extension respondents by Dzongkhag



The survey respondents spanned a good spread of ages. Around 17% of the RNR EA staff were aged between 20-25. Most respondents fell into the two age groups of 26 to 30 years (21%) and 36 to 40 years (21%). The oldest of them were in the 51-55 age group, which comprised 6.5% of the respondents.

Figure 19: Percentage of EA respondents by age range

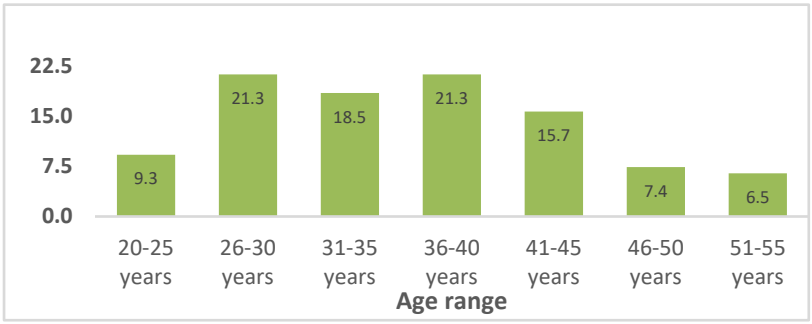
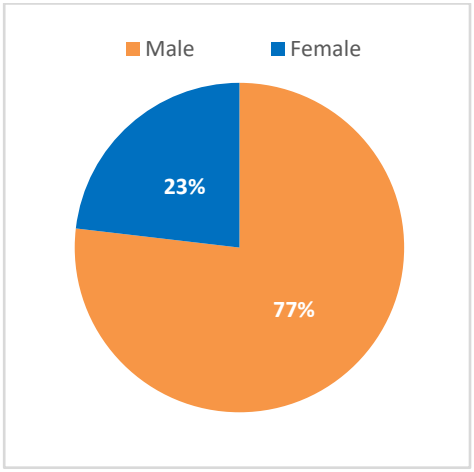
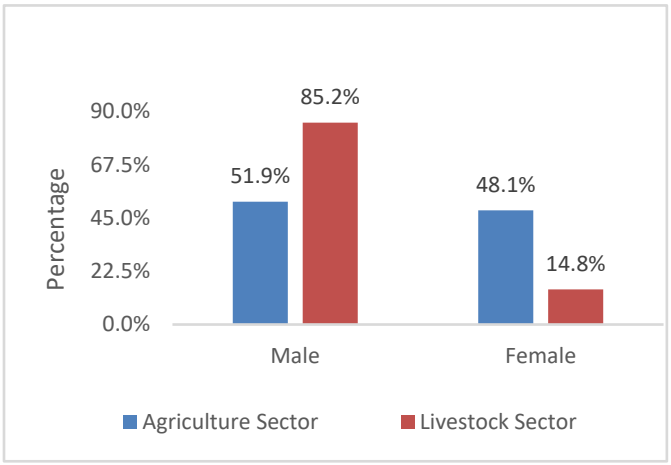


Figure 20: Respondents by gender and sectoral representation





The RNR extension officials were also analyzed regarding the diversity of their work experience. 4.6% of respondents were recently recruited into Extension service, while 14.8% of the survey participants had more than 20 years of in-service experience. About 73.6% of the respondents had a diploma degree, while 23.6 had the minimum qualification, i.e. a bachelor's degree. Only 23% of the participants were female, indicating a male-dominated workforce. The female representation was comparatively greater in the agriculture sector (48%) versus 14.8% in the livestock sector. About 82% of the extension officials are married, while most of the rest are single (15%), and 2.8% stated 'other.'

B. Type and mode of training events received by extension agents

The training programs were provided to fulfill the Ministry's mission and supplied to all the sectors under the MoAF. However, this analysis covers only the agriculture and livestock sectors.

About 75% of the training program was provided for livestock development. The share for agriculture was around 25%, indicating an integrated farming system with greater training being provided regarding livestock systems.

Forestry extension staff were recently switched from the Dzongkhag administration to the control of the Forestry Division, so for institutional reasons data on forestry training were not collected during this study. In addition, the on-farm agroforestry and social forestry extension program is not yet well established in Bhutan and has been the subject of a separate study under the EU-TACS Project. Agroforestry capacity needs were identified during this study.

A majority of the 108 extension personnel interviewed across 18 Dzongkhags stated that they had been exposed to several different types of the training program over the previous eight years. The findings from the survey indicate that the training events they had attended were main elements of their in-service training program that were intended to improve their performance in terms of their current job responsibilities through professional development.

"Learning by doing" or "on-the-job" were considered the best methods for learning new techniques. About 72% of the EAs reported that they had been involved in these types of training events, and are consequently enthusiastic, self-directed learners who rely on their own field experience for acquiring new ideas.

On the other hand, it was interesting to note that a small cohort of 1% reported not being interested in self-directed learning. Since most EAs are keen to learn by themselves, this could be a valuable baseline for developing a long-term human resources development strategy and plan for Extension Agent capacity-building.

Extension officials have taken up training opportunities both within Bhutan and outside it. About 0.9% of the respondents reported attending exposure visits and face-to-face in-country training programs very frequently (more than 16 events).

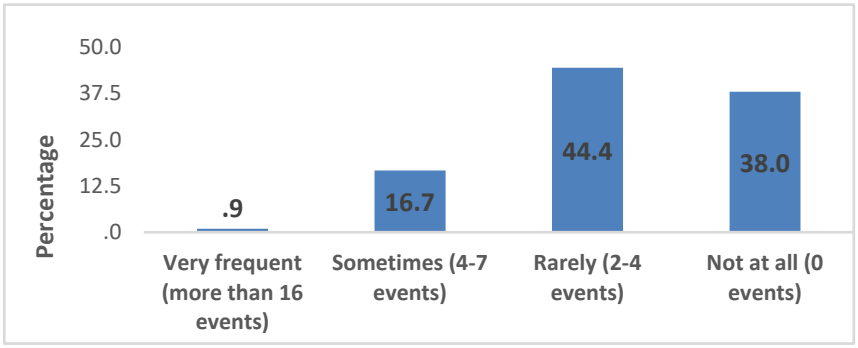
Notably, 44.4% of the employees indicated that they had rarely (2-4 events) attended exposure visits within Bhutan, and 38% of the survey participants stated that they had never had the opportunity to participate in in-country exposure visits, clearly indicating that they had limited opportunities to learn from and share with others in different locations.

One of the distinct findings from the survey was the limited participation of female EAs, including the frequency of the training events they attended. Female training participation is lower than for their male counterparts regardless of the type of training – whether it was conducted within the country, comprised exposure trips to other countries, or took the form of the recently available virtual training events.

For instance, no females fell in the category of "commonplace exposure trips carried out in the country which is represented by more than 16 times over the past eight years". Similarly, only 22% of females have attended 4-7 exposure trips, meaning that the composition of Exposure Groups is often biased towards men. Ex-country training opportunities are often considered a privilege by respondents. 46.3% of the respondents indicated not attending any study tours outside the country (0 events).

48% of the employees had rarely participated in ex-country study tours (2-4 events). About 0.9% of the participants took part in such study tours frequently (more than 16 events). Some EAs had also participated in several training programs held outside Bhutan. The representation of EAs in such training programs was also low.

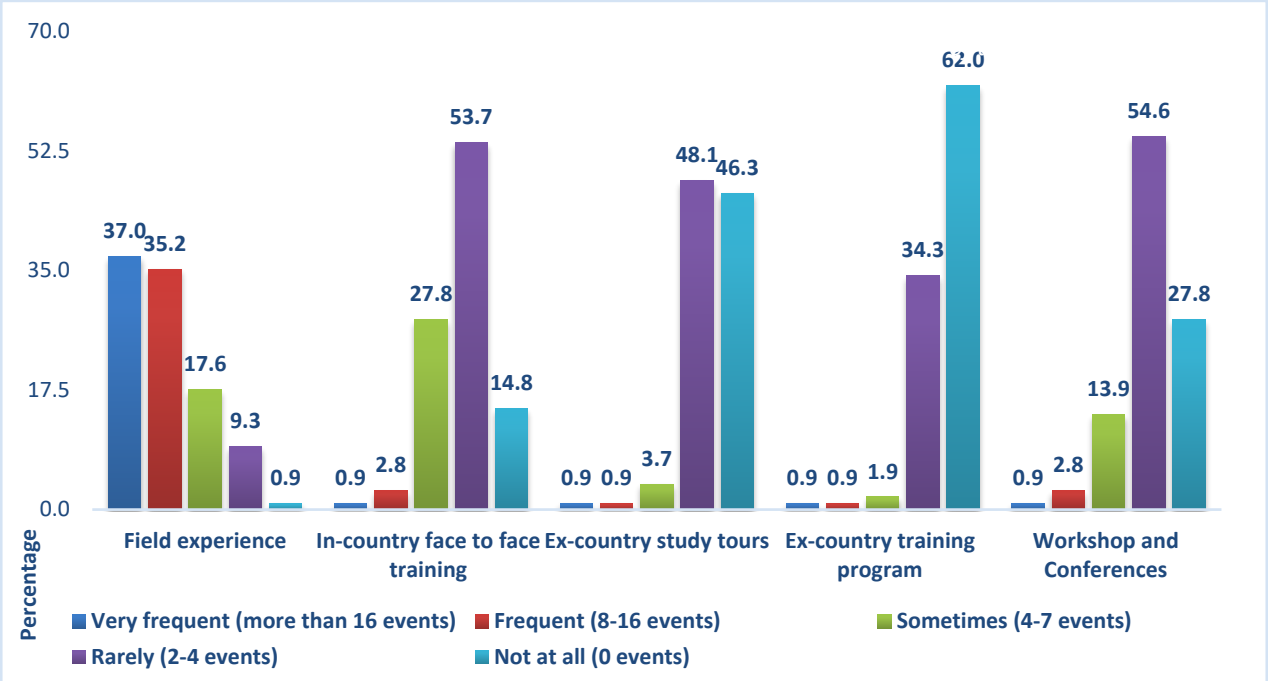
Figure 21: Frequency of EA exposure visits over eight years



The overwhelming majority (62% of the respondents) reported not having undergone ex-country training programs, whereas 34.3% of survey participants indicated that they had taken part in a few training programs (2-4 events). However, a small group of extension personnel constituting 0.9% of the participants had frequently accessed training programs, exceeding 16 events. Similarly, a large majority (82% of EAs) reported that they rarely attended and/or were not attending any at all.

The Covid-19 pandemic and related lockdown and social-distancing safety protocols have affected everyone in Bhutan, including how people interact and learn. Extension services are no different in this regard; the pandemic has also changed the dynamics of the EAs' learning.

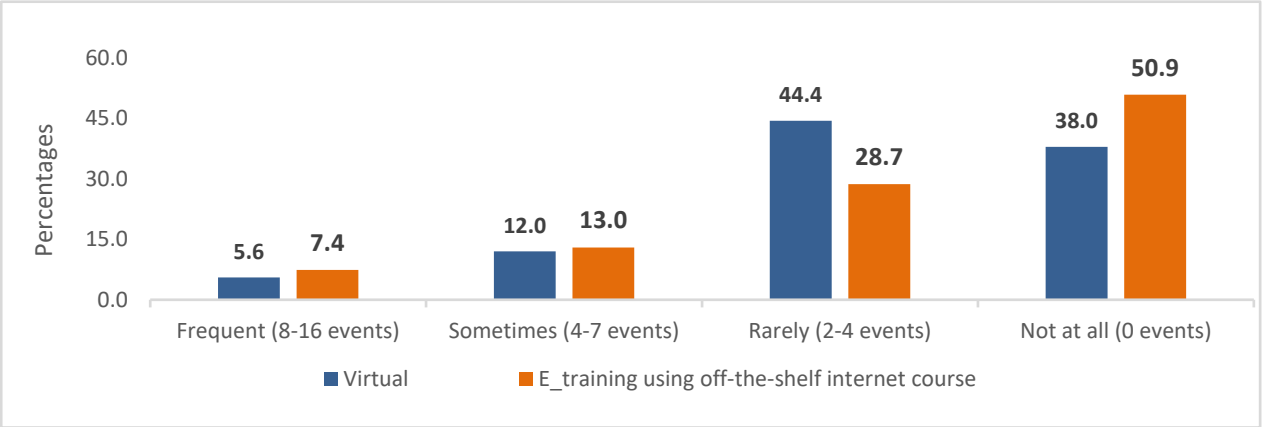
Figure 22: Frequency of training method for EAs over eight years by training type



EAs have also started to use virtual platforms (e.g. Zoom, WebEx, Microsoft Teams, Google Meet) to access learning and skills development programs in recent months. About 5.6% of the respondents were frequently engaging in virtual training events (8-16 events), while 12% were engaging only sometimes (4-7 events). However, the overall engagement in remote training events is relatively low, with the survey revealing that 38% of the EAs have not participated in any virtual training events. This tye of training course is expected to become more common, both in response to the lockdowns caused by the pandemic and as a way of engaging wih remote and physically inaccessible communities in mountain environments. Similarly, off-the-shelf or online E-learning is the least-accessed training mode. Only 7.4% of the survey participants had accessed e-training programs frequently over the past eight years (8-16 events) and 13% only sometimes (4-7 events). More than 50% of the EAs have not

participated in any E-learning programs. Given that many such types of E-learning are available on the internet, including many that are gratis, this is a lost opportunity.

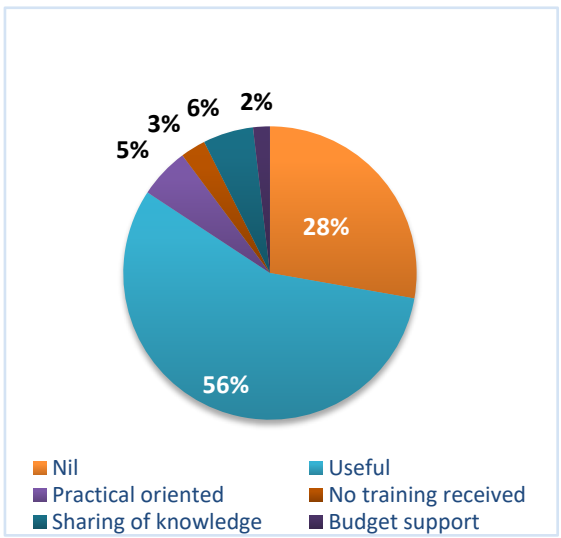
Figure 23: Frequency of EAs accessing virtual training events and E-training courses

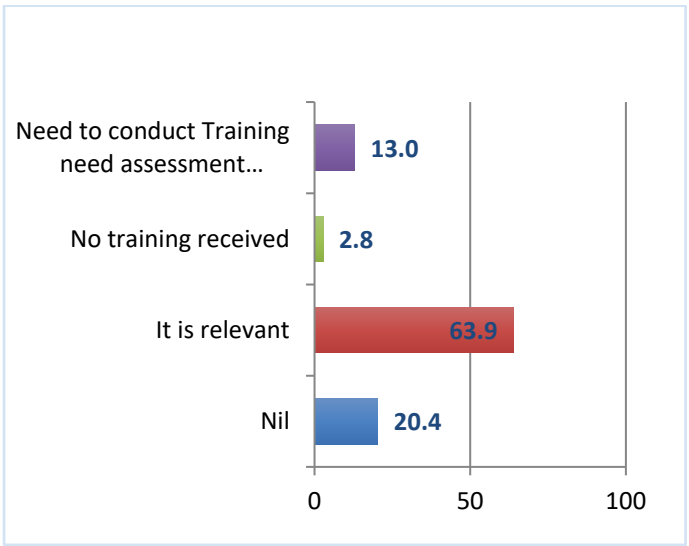


C. Usefulness and relevance of EA training

The respondents were asked about the usefulness and relevancy of their EA training program. More than half of the extension officials (56%) indicated that the training provided was functional. 2% of the participants also felt the need for further funding support for their training. 3% of extension officials indicated that they were not part of any training program. In addition, 64% of the extension agents said that training events were relevant. Remarkably, 13% of the participants mentioned the need to conduct training needs assessments before the training program.

Figure 24: Usefulness of the training provided to EAs over the past 8 years





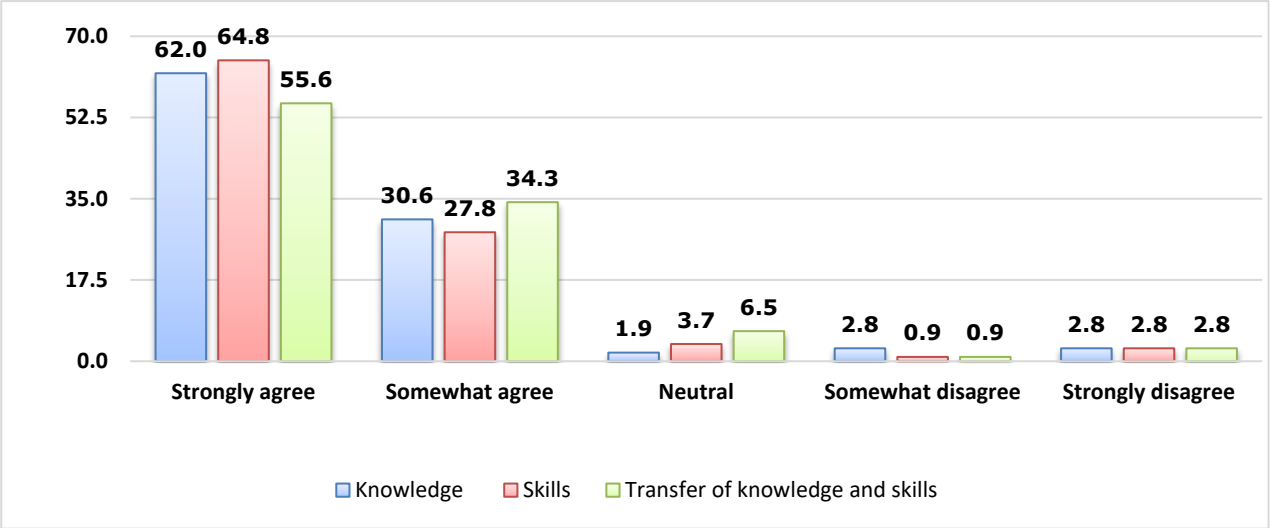
Although over 63% of the training events provided to EAs were relevant, 13% of the respondents stated that a needs assessment ought to be conducted prior to any training events. 2.8% had not received any form of training, while over 20% did not respond.

D. Transfer of technical know-how, knowledge and skills

The training impact is best represented by the increase in the participants' skills. The survey revealed that the respondents rated the learning transfer as practical. About 62% of the training beneficiaries strongly agreed regarding the knowledge transfer, and 31% partly

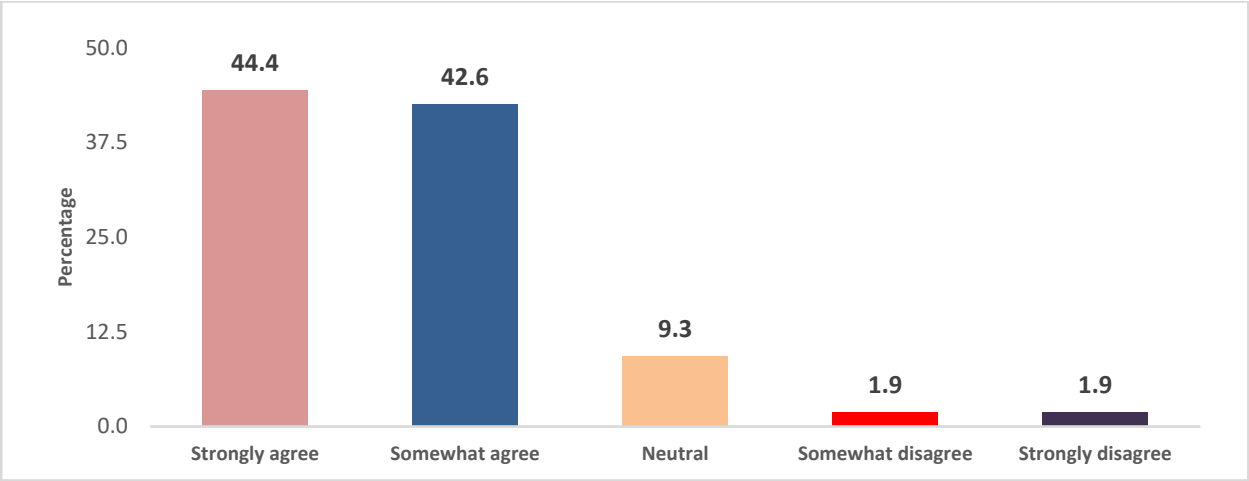
agreed. It was reported by 56% of the respondents that the transfer of knowledge and skills had followed a training program, as reflected in Figure 26. However, 2.8% of individuals disagreed that a transfer of knowledge and skills had resulted from capacity-building programs.

Figure 25: Increased knowledge and skills gained by EA after training, and whether these have been transferred to farmers through the EAs' ToT role (by % of respondents)



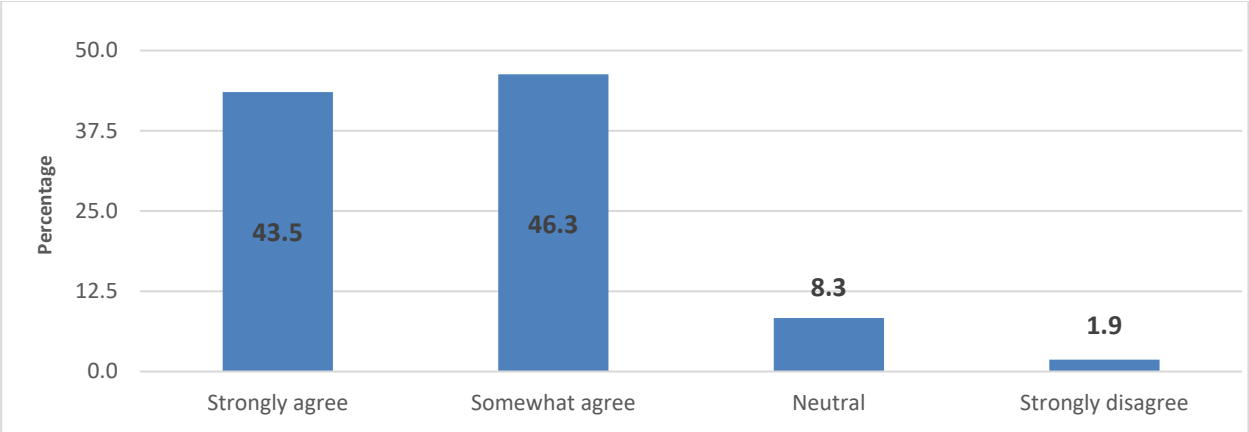
Concerning whether their training events had effectively reinforced their skills and transferred their knowledge to farmers, 87% of the respondents agreed that the know-how of the farmers increases when the extension officials are well trained. By contrast, 3.8% of the extension officials believe that there is no increase in knowledge to farmers from the training events provided to EAs.

Figure 26: Increase in the farmers' knowledge after the EAs had attended training events



Similarly, the EAs indicated that the quality of the farm work was positively correlated to the extension training events (see Figure 27). About 90% of the EAs feel that the quality of farm work had improved because of the training events delivered to the EAs, and the subsequent mentoring on-the-job of farmers, by extensión agents. However, 1.9% of the respondents do not believe that the quality of the farm work was enhanced by the training programs they had received.

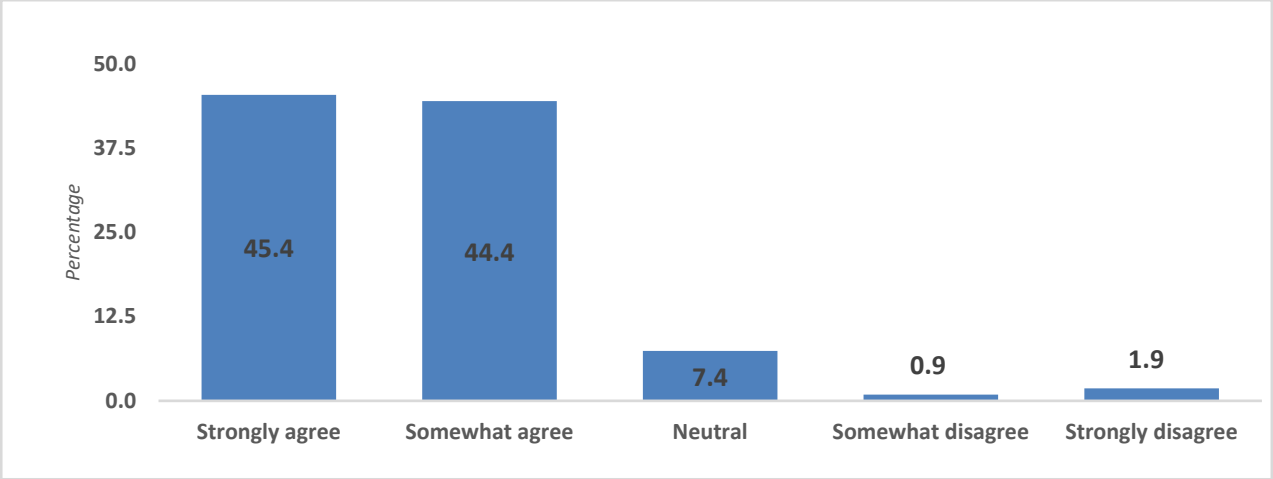
Figure 27: Perception that the farmers' quality of farm work has increased because of a knowledge transfer to farmers after their EAs had attended training events



E. Farm productivity, food self-sufficiency, and nutrition security

About 45% of the extension officials strongly agreed that the training events delivered to them had improved farmer productivity, food self-sufficiency and nutrition security. Almost as many participants somewhat agreed that an improvement of farm productivity had resulted from their interventions, as opposed to a very small proportion who disagreed.

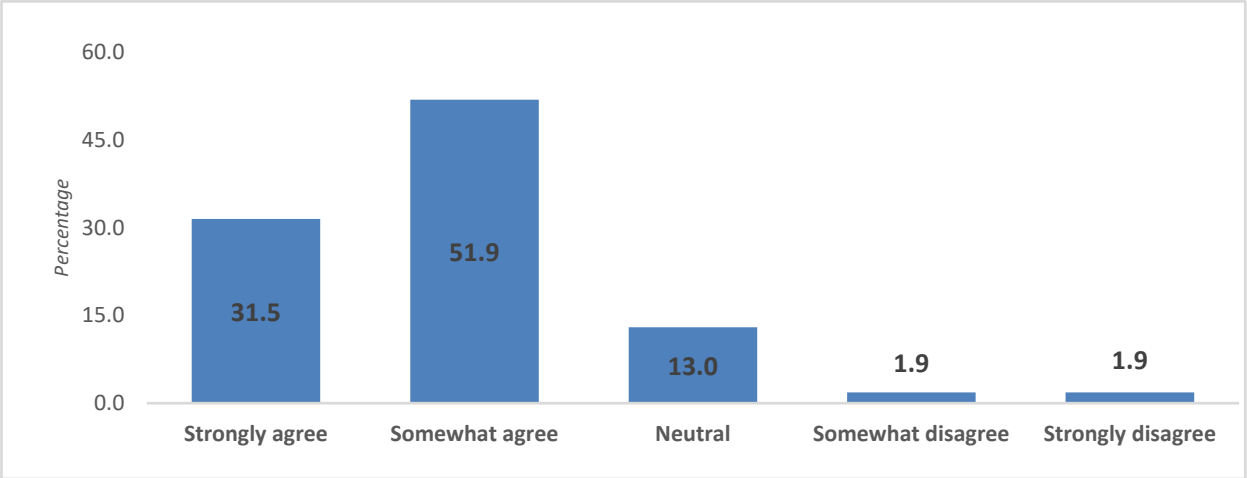
Figure 28: Improvement in the farm productivity of farmers after EAs had passed on to them the knowledge they had gained during their own training



F. Increased efficiency and cost savings

When the EAs were asked their opinions on whether the training events they had provided contributed to improving on-farm efficiency and cost savings for the farmers, 32% of them strongly agreed that the farmers' efficiency rates and cost savings had increased as a result of various capacity-building initiatives. The proportion of respondents somewhat agreeing with the statement was 51.9%.

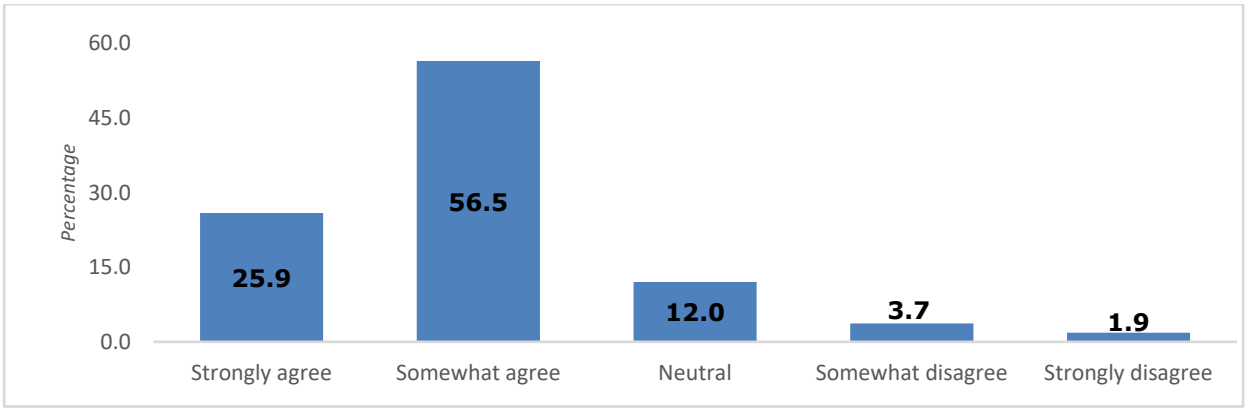
Figure 29: Perception that farmers' cost-saving efficiencies have increased as a result of a knowledge transfer to farmers after their EAs had participated in training events



G. Increased time saving through mechanization and innovation

The training beneficiaries were asked about the farmers' access to farm mechanization or their adoption of new technologies following the training programs they had received during the previous eight years. The ratings are measured on a 5-point Likert scale, as shown in Figure 31. In total, about 82% of participants agreed that there was an increase in farm mechanization or an adoption of new technologies following a training program. About 12% took a neutral view, and 5.6% of the participants strongly disagreed that the training programs had contributed to adopting innovations and farm mechanization technologies.

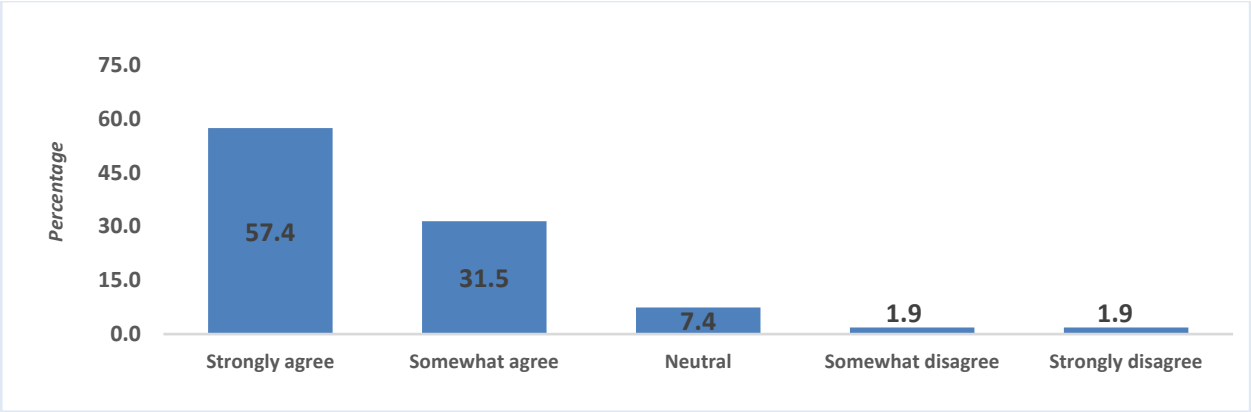
Figure 29: Perception that farmers' labor efficiency has increased due to farm mechanization and other innovations being transferred to farmers after EAs had received training



H. Increased farm household income

The EA respondents were asked if their capacity-building programs had increased the farmers' income after they had imparted the knowledge they had gained to the farmers. Many of the participants agreed that farm incomes had risen following a training program, with 57% strongly agreeing, as opposed to 2% disagreeing.

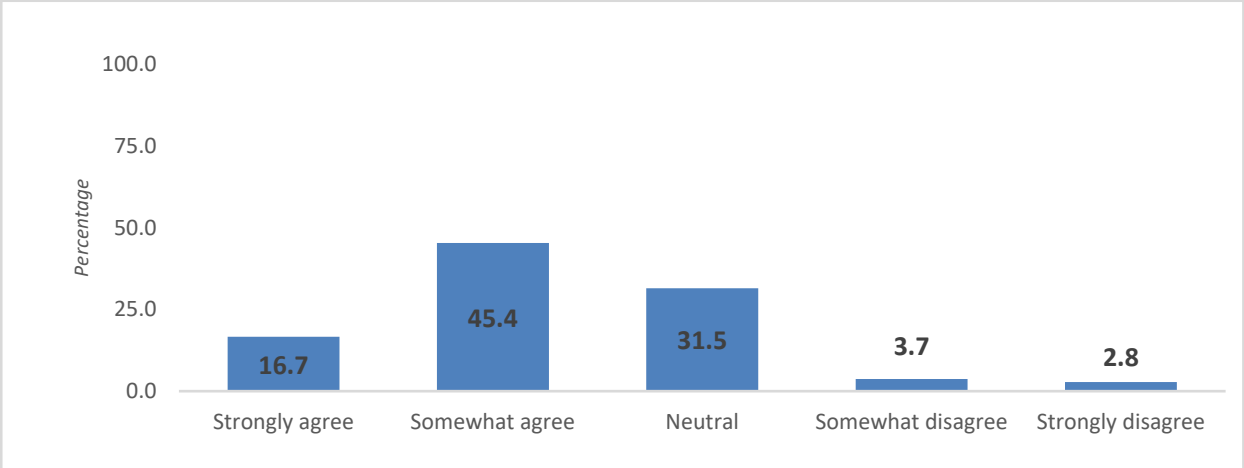
Figure 30: Perception that the income of farmers has increased as a result of the knowledge imparted to farmers after the EAs had received training



I. Increased resilience to natural hazards and disasters

Regarding resilience against natural hazards and disasters due to the training events provided, only 17% of the respondents strongly agreed with the proposition. 45.4% of this figure corresponds to about 81 extension agents partly agreeing that the training program had also enhanced the resilience of farming communities to natural hazards. 3% of respondents took a different view, disagreeing strongly about any resilience enhancement due to training events.

Figure 31: Perceived impact of EA training on farmers' resilience against natural disasters after knowledge transfer to farmers by EAs

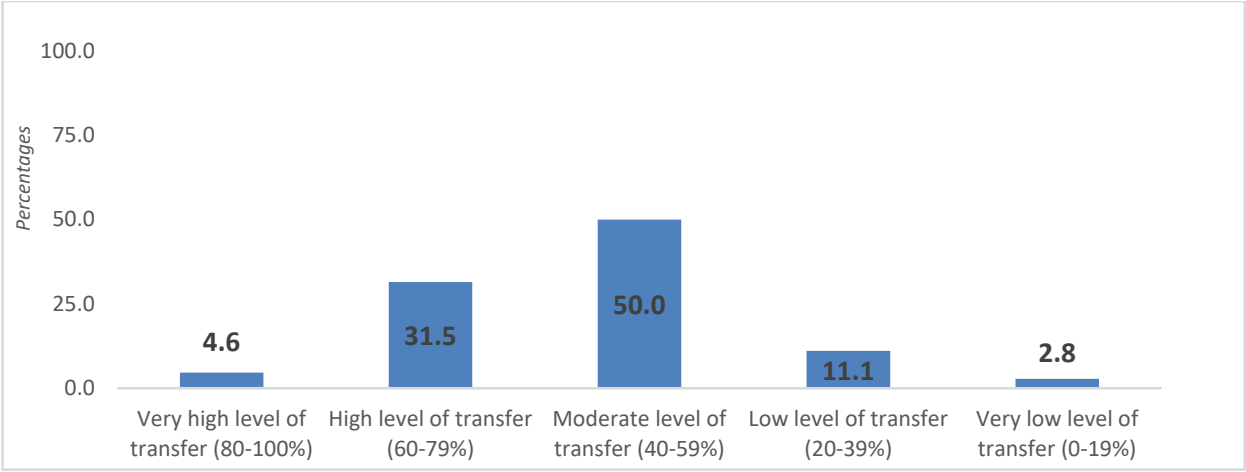


J. Increased networking and mutual knowledge transfer among farmers

The survey shows an increase in networking, peer-to-peer learning and the transfer of knowledge among farmers following an EA training program.

Overall, 50% of the participants felt that there is a moderate level of knowledge transfer (40-59%), while 4.6% reported a very high level of knowledge transfer (80-100%). About 3% of the participants felt the degree of knowledge transfer was minimal (0-19%).

Figure 32: Perceived impact of EA training on farmers' resilience against natural disasters following knowledge transfer to farmers by EAs



3.3 CAPACITY GAPS AND ASSESSMENT OF TRAINING INSTITUTIONS

The capacity gap is critical in examining the effectiveness of the training events and capacity development programs across the RNR sector.

Using the quantitative and qualitative findings, including the FGDs and KIIs conducted during the data collection, this section synthesizes the capacity needs assessments and learning expectations of farmers, extension personnel, and service providers.

The capacity gap and needs assessments suggest specific training needs and issues relating to their efficiency and outcomes, such as strengthening the ability to provide timely technology, services, and training to beneficiaries.

This will be a valuable tool for facilitating a relationship between the farmers' organizations, service providers, and research institutions in adopting research outcomes and improved farming technology. The findings are used as a basis for proposing a strategy and action plans to enable MoAF to develop effective training packages.

A. Capacity Gap analysis: challenges and barriers

Human resource development is intricately associated with in-service training programs. The assessment looked at the training programs offered by various institutions and agencies.

In-service training of officials in the public sector is perceived to increase an economy's efficiency, productivity, and international competitiveness. As a result, several institutes under the Royal University of Bhutan and MoAF focus on learning and development. The institutes listed in Table 2 are considered critical centers of education and research to convert information into actionable knowledge.

These public agencies are keen to facilitate the processes by which knowledge is created, shared and used within the organization and rural communities.

Table 3: Institutes and agencies providing farmer training in Bhutan

	INSTITUTION TYPE	MANDATE / ROLES
1.	College of Natural Resources (CNR), RUB, Lobesa	The CNR is the leading educational institution in the agriculture sector. It serves as a resource center for high-quality professional and advisory services in agriculture, natural resources management, and rural development.
2.	Ugyen Wangchuck Institute for Conservation and Environment Research (UWICER), Bumthang	UWICER is a government-based research and training institute. The institute is housed under the Department of Parks Services in the MoAF. The institute trains current and future generations of conservation workers, environmental leaders, practitioners and academics. It offers short courses and tailor-made training events. The institute also provides training on apiculture, mushroom cultivation technologies, poultry and kitchen gardening under the School Agriculture Program.
3.	Rural Development Training Center (RDTC), Zhemgang.	The RDTC was established in 2004 to provide training events to farming communities, including school leavers and youths, to support and promote the commercialization of farming practices, with a focus on income generation and rural entrepreneurship. It has recently become more involved in TVET-type education.
4.	Agriculture Research and Development Centers	The ARDCs were established to conduct basic, applied, adaptive and policy research for sustainable agriculture development. The four centers strategically located across the country serve as knowledge hubs for technology generation and capacity-building.
5.	Regional Livestock Development Centers	The RLDCs were established to coordinate livestock development and are mainly mandated to provide technical backstopping to Dzongkhags and develop the capacity of the field staff.
6.	Dzongkhag Agriculture and Livestock Sector	One of the roles and responsibilities of the Dzongkhag is to build the HR and technical capacity of extension personnel and farmers. The Dzongkhag administrations provide many specialized training events.
7.	Central Technical Departments	The Department of Agriculture and Department of Livestock have the mandate to guide and support agricultural development and improve farmers' livelihoods in line with the national vision and objectives. The departments also represent the extension system at the national level and function as a link with other departments and agencies within and outside the country. These departments spearhead guidelines and new extension concepts.
8.	Project-based	Most of the capacity-building programs for farmers and extension officials are supported by projects housed under various government agencies. Numerous capacity-building programs are funded through projects such as FSAPP, CARLEP, GEF NAPA III, GCF, EU-TACS etc.
9.	Private-sector training institutes	Over the last decade, several private training institutes have been established in Bhutan. For instance, in 2008 Rigsum Information Technology and Management Training Institute was established, focusing on training rural youth, including agriculture training.
10.	International and Bhutanese NGOs and local CSOs	NGOs and CSOs are sometimes contracted to carry out training on behalf of the government, especially in innovative and new thematic areas, e.g. SNV, WWF etc.

B. Ex-country training program

The ex-country training program also provides a platform for stakeholders to take part in some exposure trips and enhance their knowledge, skills and approaches. This opportunity has been taken advantage of by both extension officials and farmers. One central institute involved in this type of training and arranging study tours is ICIMOD, based in Kathmandu, Nepal.

C. Areas of training specialization and jurisdictions of coverage

Most extension officials are diploma holders and have participated in numerous capacity development events. Some have upgraded their qualifications and completed their two-year degree course in agriculture and livestock from CNR. They have participated in several training events in the agriculture and livestock sectors. More than 75% of the training events from 2013 onwards were in the livestock sector, and the rest were attended by agriculture personnel.

At times, the areas of specialization and the jurisdiction of training coverage were contentious. The multiple FGD participants revealed that the actors in the field had expressed their training needs, but the training opportunities have often been given to officials from the secretariat and headquarters. The regional centers also have their share of capacity development programs.

A survey conducted by RIM revealed that out of the total training beneficiaries, 28% comprised Secretariat and Headquarters staff, 48% were from the regional/zonal centers, and the remaining 24% were from the Dzongkhags and Gewogs. The representation is not balanced, as more than 82% of the employees are posted at the regional centers and Dzongkhags. On the other hand, the EAs in the Dzongkhags and Gewogs with donor-funded projects are comfortable with with capacity-building programs.

The training provided in agriculture was mostly in sustainable land management, post-harvest management and value addition, pest and disease management, farm mechanization, organic agriculture and general crop production. In the livestock sector, FGDs revealed that animal health, livestock production, TMR formulation, artificial insemination, disease control, product diversification, biogas, and dairy value chain development were everyday training events. Most of these training events were supported through donor-funded projects, and thus the coverage was mainly in project areas.

Even though the Bhutanese farming system is transitioning from a subsistence-based economy to semi-commercial and commercial farming, the training modules provided so far have usually covered topics that center mainly on crop and livestock production, with only a narrow focus on product development, processing and marketing. Key knowledge-change themes relating to farmer issues were often not addressed, e.g. climate adaptation, building resilience against disasters, waste management, the commercialization of farming, and business planning.

D. Capacity of training providers to train farmers and extension staff

The quality of the extension services received by the farmers relies on the education and ongoing training events delivered by the personnel of the Ministry of the Agriculture and Forests. The norm is that each Gewog is equipped with an agriculture and livestock extension agent. It was reported that it is difficult for a single EA to provide services in all households in a Gewog, which is aggravated by remoteness, scattered settlements and rugged terrain.

Most extension personnel hold a diploma in agriculture and animal husbandry, and their knowledge is generally essential. For instance, close to 74% of the 108 extension officials who took part in this study are diploma holders, and the remainder have a degree. The majority of extension personnel participating in the survey and FGDs reported their ability to disseminate agriculture technologies to rural communities being limited by the weakness of their knowledge and skills, which is exacerbated by the absence of training and refresher courses to address it.

Efforts are being made at the ministerial and individual levels to upgrade the qualifications of extension staff. Most of the diploma holders have now upgraded their qualifications. But it remains a challenge because of the mismatch between the numerous employees of the Ministry and the low number of higher education institutions. The availability of resources for training the desired number of people is a further constraint. The training institutions listed either altogether lack or have only limited in-house expertise for responding to the changes required for sustainable agriculture. Most of the training modules provided were theory-based, and had only a narrow focus on the vocational aspects (i.e. hands-on training).

Participant photograph after completion of a training module for extension agents

A significant review of RDTC was carried out to assess its training program vis-à-vis the requirement of its clients, and to examine the capacity of its HR staff, with the aim of reviving RDTC as a model training institute. The review highlighted a weak link in its management and the inability of its inexperienced human resources department to provide high-quality training events, particularly in farm business management. The institute also has a weak linkage with the Dzongkhags' agricultural extension officials and planners. Farmer training in the country is characterized by unique challenges on both the supply and demand sides. Most farmers are illiterate and have limited knowledge of the benefits of training opportunities. The family members who work in the fields often have no time to participate. The household is usually represented by another member who takes advantage of the training events purely for financial reasons. Female household members are often constrained by childcare responsibilities, which prevent them from participating in the training programs.

Several training events are provided to enhance the capacity of the EAs and make a difference in the livelihoods of the rural communities. However, one of the challenges is the sustainability of the training programs. For example, there is limited post-training support, a lack of post-behavioral-change assessment from the organizers' side, and even poor follow-ups and lack of monitoring. Training programs should be reviewed regularly, and constant follow-ups should be conducted to assess their relevance and progress. Monitoring is also essential in order to maintain and sustain the quality of the agriculture being practiced.

One common problem concerns the financing of capacity development programs. This includes an insufficient allocation in the national budget for such programs, and a lack of capacity in the national and local governments to facilitate the training programs. A few private institutes offer a myriad of training programs. However, their training programs are restricted to other sectors, which means that the lack of private-sector engagement in agricultural training events is a distinct limitation.

Integrated needs assessments are urgently needed. We recommend that (1) potential trainees should be identified and their needs characterized; (2) government agencies/other providers must ensure that they have the capabilities, resources, and skilled teaching staff that is needed; and (3) by which embedding the change strategies for new sectoral policies. The needs assessment aims to:

1. Identify capacity gaps and areas for capacity-building interventions based on the beneficiaries' requirements, including strengthening of the institutional policy response and the frameworks needed to enhance skills and knowledge; and

2. Evaluate priorities where resources are scarce, including recommendations and actions implied by the respondents' capacity needs and those required for addressing capacity-building policies and strategic activities.

Additionally, the study reveals a resounding acknowledgment of the necessity of training, but the respondents also pointed out a variety of constraints and other technical difficulties.

2.4 CAPACITY-BUILDING NEEDS OF FARMERS & EXTENSION STAFF

A. Capacity-Building Needs of Farmers and Extension Personnel

Training issues, gaps, and barriers	**Capacity-building results and activities** (Program and training courses)	**Target group** Extension (E) Farmers (F)	**Priority**		
			Short 1-2 yrs.	Medium (3-5 yrs.	Long – 6/10 yrs.
Limited knowledge generation, best practice dissemination, and field applications	***R.1 Engagement of research centers, institutes % academia for knowledge management & learning:*** A1.1. Advocacy and awareness creation for new and relevant RNR (agriculture, livestock, forestry) training technologies and practices			X	
	A1.2 Demonstrate and train EAs in innovative on-farm adult learning techniques	E&F		X	
	A1.3 Design and organize programs of farmers' field days and farmers' schools	E&F	X		
	A1.4 Extension communication techniques training for EAs and farmers' groups	E			X
Limited access to training events on new production and farm management technologies	***R.2 New agricultural production systems:*** A2.1 Mushroom production technologies	E&F	X		
	A2.2 Seed production technology and plant propagation	E		X	
	A2.3 Diversification of fruit trees, intensified (intercropping/alley cropping) orchard management	E		X	
	A2.4 Organic agriculture and organic certification process	E&F			X
	A2.5 Pest and disease control	E	X		
	A2.6 Electric fencing to combat human-wildlife conflict (solar and on-grid)	E&F		X	
Post-harvest processing and storage	***R3 Product development, value addition, and post-harvest technologies*** A3.1 Food processing, packaging & branding	F		X	
	A3.2 Agriculture and livestock product diversification and value addition	F		X	
Climate-change adaptation in agriculture and livestock	***R4 Climate-resilient and smart agriculture:*** A4.1 Protected cultivation technologies (hydroponics, aeroponics, polytunnels, greenhouses)	E	X		
	A4.2 Agriculture land development (sustainable land management, bio-engineering technologies, fallow land conversion, entrepreneurial agroforestry)	E	X		
	A4.3 Smart irrigation systems and water management (channel, pipe, drip, sprinkler, water harvesting, pumping systems)	E&F		X	
	A4.4 Crop protection, integrated pest and nutrient management (IPNM)	E	X		

Training issues, gaps, and barriers	Capacity-building results and activities (Program and training courses)	Target group Extension (E) Farmers (F)	Priority		
			Short 1-2 yrs.	Medium (3-5 yrs.	Long – 6/10 yrs.
	A4.5 Biogas and farm manure production and use	E&F	X		
	A4.6 Climate-smart livestock system practices (animal housing, breeds feed, and fodder)	E&E		X	
Research skills	***R5 Research skills for extension personnel:*** A5.1 Training on data analysis using iPad, software packages (STATA/SPSS), and academic writing	E	X		
	A5.2 Soil survey/soil mapping for agriculture and horticulture use	E		X	
	A5.3 Mapping using Google Earth, GIS, remote sensing, using drones for monitoring crops	E			X
	A5.4 HWC management	E			X
Orchard management	***Orchard management***: Pruning and training	E&F		X	
	Orchard layout and management	E		X	
Digitization	***Digital agriculture and livestock:*** Digital agriculture and automation of farms	E	X		
	Application of digital technology in livestock farming	E		X	
Agribusiness	***Agribusiness & entrepreneurship development:*** Livestock megafarms and management	E&F			X
	Agribusiness, marketing, and entrepreneurship development and practice	F	X		
	Entrepreneurial agroforestry, agribusiness management	F	X		
Livestock production and management practices	***Smart livestock farming techniques:*** Nutrition	F	X		
	Beekeeping	E		X	
	Dairy, poultry, piggery development, and goat farming	E&F	X		
	Animal health management	E&F		X	
Aquaculture	***Aquaculture farming:*** Aquaculture – fish breeding and hatchery development	E		X	
	Trout farming and product processing	E&F			X
Veterinary and clinical services	***Animal clinical services:*** Animal surgery	E		X	
	Clinical treatment	E		X	
	Animal treatment and Welfare	E		X	
	Veterinary medicine	E		X	
	Artificial insemination	E&F	X		
Feed production & management techniques	***Integrated feed production and storage:*** Total mix ration formulation	E&F	X		
	Winter fodder production and storage	F	X		
Need-based training methodology,	***Experiential and practical-based learning:*** Set up of demo plots/farmer research plots	E		X	

Training issues, gaps, and barriers	Capacity-building results and activities (Program and training courses)	Target group Extension (E) Farmers (F)	Priority		
			Short 1-2 yrs.	Medium (3-5 yrs.	Long – 6/10 yrs.
approach, and design	Exchange and farmer field learning	E&F		X	
	ToT on training & mentoring skills for transfer	E			X

4. TRAINING & CAPACITY-BUILDING STRATEGY & ACTION PLAN

Multiple FGDs and interviews have reaffirmed that one of the strategies for transforming the Bhutanese farming system involves capitalizing on employing modernized and innovative farming techniques. The strategy and action plans are synthesized from the concerns and recommendations raised by farmers and service providers, including those based on value judgments.

An **integrated strategy for the agriculture and livestock sector** was designed to highlight and translate the capacity gaps and differing priorities of farmers and service providers. The primary objectives of the capacity-building strategy are:

1. **Identifying the actions and approaches for addressing the capacity-building needs.**
2. **Establishing implementation strategies to build capacities.**

Although a separate assessment would be required to assess the impact of the COVID-19 pandemic on food systems in Bhutan, the pandemic has globally raised essential questions about how we produce, process, distribute, trade and consume our food. Therefore, three broad priorities have been identified to support the training need assessments beyond the COVID-19 recovery efforts which are aimed at transitioning from a reactive approach to proactive and responsive action.

4.1 Strategic Priority Activity Outcomes

Priority	Priority Outcomes
1.	**<u>Strengthen institutional and technical capacities</u>** • Outcome 1.1: Collaboration and coordination at all levels for institutional innovation and integrated planning • Outcome 1.2: Capacity development at extension and farmer levels for effective service delivery
2.	**<u>Advance knowledge management, learning, and lesson sharing</u>** • Outcome 2.1: Communication and education to raise awareness of agricultural technologies • Outcome 2.2: Skills- and vocational-based learning outcome
3	**<u>All stakeholders working in Farmer and extension agent training must become fully conversant in applying digitization and ICT, fully-understanding climate change responses, and how to disseminate innovative agricultural practices.</u>** **<u>This will ensure an enhanced anticipatory, adaptive, and future-proofed agriculture sector</u>** • Outcome 3.1: Improved tools, capacities and infrastructures • Outcome 3.2: Improved tools, capabilities, and institutional responsiveness to change

4.2 Strategic Action Framework

Actions	Frequency	Lead responsi-bility	Collaborating partners	Priority (I, M, L)
OUTCOME 1.1: COLLABORATION AND COORDINATION AT ALL LEVELS FOR INTEGRATED PLANNING AND PROGRAMMING IN THE RNR TRAINING AND EDUCATION SECTORS				
Foster learning to enhance **knowledge partnerships** with local research and training institutes for knowledge, best practices, and experience sharing to address technical gaps.	Regular	HRD, MoAF	Training institutes	I
Review and **upgrade RNR human resources and capacity development strategy** focusing on extension and farmer needs.				
Revisit and **upgrade training curricula** and modules to integrate a vocational training program that blends knowledge, practical and skills-based learning.	Periodically	DoA & DoL	Training institutes	M
Institute, an RNR thematic capacity development and mentorship program, involving agriculture and livestock specialists from government, CSO, and NGO sectors.	Annually	HRD	Research centers, DoA, DoL	M
Develop and streamline agriculture and livestock sector **RNR training guidelines and manuals,** integrating the needs of EAs and farmers.	Review periodically	HRD, DoA & DoL	Training institutes, research centers	I
OUTCOME 1.2: CAPACITY DEVELOPMENT AT EXTENSION AND FARMER LEVELS FOR EFFECTIVE SERVICE DELIVERY				
Identify a **pool of capacity development personnel for ToT in specialized areas** from technical departments, research centers, and CSO/NGOs to train EAs.	Annual review	HRD	DoA, DoL, research centers	I
Develop **training materials and knowledge products** to be used by EAs for farmer training	Annually	DoA, DoA	HRD, RUB, CNR, EAs	M
Periodically **monitor and evaluate the effectiveness of training events**	Annually	HRD, Technical departments	EAs, Research Centers, Academia	M
Mainstream lead farmer approach into extension system and devise a proper incentive mechanism	Review every 5 yrs	DoA, DoL	Farmers, EAs, projects & Program Management Units	I
Target and **train youths and farmers in value-added agriculture and livestock enterprise development** (product development, processing, and branding).	Annually	DoA, DoL, DAMC	Farmers, agribusinesses, youth, CSI, SMEs	M
Train youths and communities in livestock production, processing, and animal health	Annually	DAMC, DoL, DoA	EAs, farmers, youth	M
Recognize **open and distance-learning programs in agriculture extension** through E-RNR approaches.	Annually	HRD	DoA, DoL, RCSC, RUB	
OUTCOME 2.1: COMMUNICATION AND EDUCATION TO RAISE AWARENESS REGARDING AGRICULTURAL TECHNOLOGIES				
Invest in **promoting practical training/participatory learning methods.**	Regularly	CNR, RDTC	DoA, DoL, EAs, and Farmers	M
Networking of platforms and development of communication loops to connect professionals and share knowledge	Regularly	DoA, DoL	EAs, lead farmers, farmers' groups, and cooperatives	I
Development of an **integrated digital extension delivery system** to document best practices, lessons and case studies for replication and scaling up.	Regularly	ICTD, DoA, DoL, EA	Private agribusinesses, youth, farmers, projects	I
T**argeted training on advocacy and influencing agricultural policies with CSOs and NGOs**	Annually	ICTD	HRD, DoA, DoL, EAs, farmers, youth	I

Actions	Frequency	Lead responsi-bility	Collaborating partners	Priority (I, M, L)
Innovative RNR knowledge delivery and sharing mechanisms such as farm demonstrations by lead farmers, farmer day schools, on-farm research trials, peer-to-peer visits among EAs and farmers, school agriculture, and permaculture	Annually	EAs	Farmers, DoA, DoL, projects, Dzongkhags	M
OUTCOME 2.2: DATA AND INFORMATION MANAGEMENT SYSTEM				
Establish **open education online resources** and mechanisms for information, knowledge, and best practice sharing for extension service	Update regularly	HRD, ICTD	DoA, DoL, RUB, EAs Farmers, research centers	L
Invest in **training data analysis and management**	Regularly	DoA, DoL, EA	ICTD, HRD	L
Invest in **training survey techniques, research skills, and methodologies**	Annually	DoA, DoL	EAs, research centers	L
Institute a robust **M&E system for training/capacity-building plans** and methods, plus resources for data collection, analysis, documentation of administrative data, and reporting	Annually	HRD	EAs, DoA, DoL, farmers	L
OUTCOME 3.1: IMPROVING TOOLS, CAPACITIES, AND INFRASTRUCTURES				
Institute a **'learning by doing' program** on specialized training activities for EAs and farmers.	Annually	HRD, DoA, DoL	EAs, farmers, Dzongkhags	M
Improve institutional readiness for **online teaching and learning program**	Regularly	ICTD, MoAF	EA, DoA, DoL,	I
IMPROVE THE INFRASTRUCTURE FACILITIES OF THE TRAINING CENTERS	Regularly	MoAF	DoA, DoL, ICTD, GNHC	I
OUTCOME 3.2: IMPROVED TOOLS, CAPACITIES, AND INSTITUTIONAL RESPONSIVENESS TO CHANGE				
R**espond to the training needs not only of production, but of the entire value chain – climate-informed planning, early warning system, agribusiness, good agricultural practices**	Regularly	MoAF	DoA, DoL, GNHC	I
Unlike standalone and periodic traditional training events, workshops, and seminars, innovative adult learning initiatives such as self-paced learning and platforms are incorporated into a long-term HR strategy to enable behavior change and build learning capital among the farming fraternity. This will aid continuous learning, knowledge sharing, and replication of best practices	Regularly	HRD	DoA, DoL, ICTD, RUB	I

5. KEY CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

C 1. Training programs are necessary for bridging the capacity and knowledge gaps regarding the new and emerging technologies needed for implementing improved methods and making informed decisions. It is essential to train the EAs, since the quality of extension services received by the farmers is dependent on the education and training of the MoAF employees. Any capacity development program for EAs is crucial for keeping them abreast of developments.

C 2. The results of a new training program reflect how well the training needs have been identified. Capacity development programs should therefore be planned and implemented strategically.

C 3. A training identification process should be conducted before any training program. It is critical to identify the required training areas while concurrently identifying the issues and challenges that will affect the delivery of new skills.

New Technologies Relating to Adaptation to Climate Change and Environmental Management – practical learning for construction, operation, and maintenance

1. Energy-efficient farmhouses.
2. Irrigation systems, including channel-fed; pipe-fed; sprinkler; and drip systems.
3. Polytunnels for horticulture crops.
4. Greenhouses for horticulture crops.
5. Electric fencing, both solar- and mains-powered.
6. Battery-powered farm machinery.
7. Shelter for farm animals that is both heat- and cold-resistant.
8. Biogas digestion units, both on- and off-farm.
9. Cooking, heating, and lighting powered biogas from farmyard manure.
10. Organic composting units (on-farm/off-farm).
11. Cold storage units (on-farm/off-farm).
12. Pest-hardened crop storage units (on-off-farm).
13. Recycling units for processing farm waste (e.g., rice mill waste, cereal straw, paper, plastics, etc.)

C 4. It is also vital to ensure that sufficient resources are allocated to carry out and integrate the training program. Once the training is conducted, it is critical to evaluate the training outcomes to ensure that the training was practical, and the resources spent were justified.

C 5. MoAF prioritizes pre-service and in-service training to enhance their workforce's knowledge, skills, and abilities (KSA), since the EAs have limited knowledge and skills for disseminating agriculture technologies.

Nevertheless, providing both human and financial resources for training the desired number of EAs has been difficult, and will need substantial increases in financial and human resources.

C 6. The country's training institutions either lack, or have only limited in-house expertise with which to respond to the changes required for sustainable agriculture, rural development in general, and the transitions toward the commercialization of Bhutan's agriculture.

C 7. A significant problem is the absence in Bhutan of an **Integrated Farmer and Extension Agent Learning Program** (IFEAP) and a harmonized **Monitoring, Evaluation, Research, and Learning** (MERLU) system. These instruments are urgently required to provide a substantial volume of high-quality training directed at lead farmers, farmer groups, and extension agents.

5.2 Recommendations

The following recommendations are suggested for the human resource development of the extension personnel and farmers, drawing from the literature review, survey findings, identification of gaps, and good practices.

Recommendation 1. Developing a Training Partnership Program: Led by MoAF, an IFEAP-MERLU system would:

(1) Establish and build up a **partnership of complementary institutions**;
(2) Enable **effective collaboration** between participant institutions;
(3) Support the **sharing of training best practices**, to improve the effectiveness of farmer capacity-building; and
(4) Avoid the **duplication** of training.

A vital element in an integrated training program would be for MoAF to develop a **partnership** with all significant institutions in Bhutan that provide farmer training. MoAF would determine how to develop further **bilateral and multilateral collaboration**, involving all stakeholders, to improve the volume and quality of farming capacity-building across all the farming Districts of Bhutan. MoAF would lead institutional stakeholders to discuss the critical problems hindering farmer capacity-building from identifying **immediate solutions** to address these concerns.

The proposed **farmers' learning program** would deliver a sustained set of courses for the learning participants within each targeted geographical region that are sequential and build upon each other. This would prevent the common problem whereby training events are only delivered as one-offs, with no follow-up for applying a consistent **skills development curriculum** that targets the farmers' needs.

Finally, the system would **organize and allocate funding to finance farmer-to-farmer events and networks**. These would aim to generate a significant volume of skills training based on the **training-of-trainers model**. This initiative would seek to expand the scale of skills training available for farmers substantially, thereby significantly increasing the capabilities of targeted Lead Farmers.

After receiving training that meets their needs, the LFs would support the development of skills among their friends and neighbors living in their local communities. Learning for EAs would be based upon a **national capacity-building system aimed directly at the needs of extension agents.**

This overall system design would tackle the emerging policies and themes that MoAF seeks to implement, covering topics on various scales, such as spring-shed management, crop field production, commercial value chains, the resilience of farmer livelihoods, and increasing community food security.

Recommendation 2. Training Prioritization: In the ensuing Five-Year Plans, the government should continue prioritizing capacity development programs, comprising varied adult learning modalities suitable for farmers and extension agents, to increase the visibility of the extension services and ensure sustainable food security system. The government could incorporate a built-in mechanism for the capacity development of extension personnel and farmers and include it in the Annual Performance Agreement (APA) targets. This would go a long way towards reaffirming government support and ensuring a robust extension system. However, the capacity assessment and needs would require rigorous and interactive participation across stakeholders to encourage ownership and learning while underscoring sustainability. One way to achieve this outcome is to design and implement a capacity assessment tool to identify needs and address the capacity gap issue for farmers and extension agents at DoA, DoL and DoFPS.

Training integration for better management: There is no formal central training unit (for EA and farmer training) within the Ministry to coordinate the training of extension agents and farmers. Regarding the need for a central training institute, the RDTC is planning to build a technology park. It has vast potential for undergoing a significant overhaul whereby several training programs could be offered, including integrated cross-sectoral training programs.

It is recommended that the various agencies under the technical departments, such as AREDs, RLDCs, RDTC, the Human Resource Division under Directorate Services at MoAF, Dzongkhags/Gewogs, plus the private sector, should coordinate the training program to improve its management and avoid unnecessary duplication.

Recognizing the weak institutional linkages between RDTC and the Dzongkhags, it is **recommended that training events are designed in close coordination with Dzongkhags staff.**

It is also **recommended to institute coordination and communication mechanisms between training providers in Bhutan, to design relevant and inclusive training programs.**

Additionally, training events offered for longer durations and structured programs must be provided by the training institutes, such as CNR and UWICER, acknowledging their long-established technical capacity and institutional environment. By contrast, EAs should conduct field-oriented farmer training and demonstrations.

There is a need to develop **training guidelines and standard training modules for each training topic to be used by the EAs in the field,** so that the training content is maintained uniformly throughout the country and the quality of the training is not compromised.

The possibility of establishing a ***training coordination and monitoring unit*** **under the Directorate of Services at MoAF** should be considered, in order to integrate the widespread and multi-agency training activities, enhance planning, and report at the Ministry level. This will avoid duplication, improve the planning of adult learning techniques, identify best practices, and strengthen needs assessments throughout the Ministry. This unit would prepare annual integrated RNR training plans and reports.

Recommendation 3. Emerging Training Needs: The existing multi-tasking nature of extension work impedes the ability of EAs to focus on core issues. The role of agriculture extension has increased due to the backdrop of climate change impacts. The agriculture sector is confronted by climate-induced hazards like floods, landslides, erosion and windstorms, plus the growing incidence of damaging insects, pests and diseases affecting crops and livestock. This compounds the crop and livestock production risks and threatens household food security.

The farming community relies on extension officers for technical advice. The extension agents' role in providing information for climate change adaptation and disaster risk reduction is becoming an imperative mandate. This will assist Bhutan's farmers in climate-informed agriculture planning and making decisions about the management of their farming systems.

Climate-smart and resilient agriculture practices must be an integral part of any training module developed in the future. Most farmer respondents want their training to focus on the problems they have identified over decades working the land.

Their core competencies concentrate on crop production, pest and disease control, water management etc. Agricultural thematic areas that originate from policy changes coming from outside are often not perceived as relevant, e.g. leadership, gender or carpentry.

Training events in new thematic areas must focus on carefully selected target groups, awareness training techniques, and exposure visits. For example, although 62% of the respondents reported that training events on fishery were unnecessary, it would be essential to ensure that training events on topics like this are not left out, given their significant potential.

Therefore, it should be provided in accordance with the needs of interested farmers and the existence of suitable locations. Training in new areas such as **hydroponics, aquaponics and farm fisheries should focus on awareness-raising and exposure visits to working enterprises as essential training methods.**

Other thematic areas that are emerging and need addressing include areas deriving from changes in policy at the national level, e.g. transforming from subsistence-based to commercial forms of agriculture, entrepreneurial agroforestry, farm and chiwog waste management (re-use, repair, recycle approaches), converting fallow land and idle land back to agriculture, soil fertility management approaches, and farm mechanization using clean energy technologies.

The central departments and non-departmental agencies need to identify and prioritize these new thematic areas and feed them into awareness-training events such as videos on local cable TV or at Gewog communication hubs.

Text Box 6: MoAF's Emerging Policies and the Implications for Needs Assessments

We must shift the emphasis of the types of knowledge delivered by farmer training:

First of all, the topics addressed by participant institutions must **fully meet the needs of farmers for skills that improve their crops, agroforestry and livestock management**. Building on this basis, training components should be implemented that increase the EAs' and farmers' understanding of emerging policies from central and local governments, to include:

Theme 1. **Integrated value chains**. This skills area would deal with the main crops and commodities that Bhutanese farmers produce, and would provide training in how farmers can adapt to the available inputs and services and meet each value chain's evolving demands for farm products. The value chain emphasis must demonstrate to farmers *how to better position themselves within Bhutan's main commodity markets*. Farmers can achieve this if they participate in production aimed at specific market windows (e.g. via new agro-processing facilities), maximizing their prospects of earning a robust income.

Theme 2. Emerging **market opportunities** for farmers to supply emerging agro-processing businesses with commercial-scale volumes of agricultural products from farms, using out-grower organization models that provide the farmers with **reasonable purchase prices for their crop production**, as well as the implementation of cost-effective solutions to **improve soil fertility**.

Theme 3. **Climate change adaptation and climate-smart technologies** including hydroponics; rainwater harvesting; polytunnels and greenhouses; solar/mains electric fencing; solar cookers and biogas systems; mushroom production; innovative irrigation systems (including sprinkler and drip systems); vermiculture and other waste composting methods; and cold-storage technologies.

Theme 4. MoAF's renewed focus on **agricultural extensification** seeks to bring **fallow land** back into agricultural production, primarily by establishing **entrepreneurial agroforestry systems**; community-level irrigation (especially using hydro-ram water-pumps); managed forest regeneration; improved utilization of farm machinery; and the active management of soil fertility.

Theme 5. Increased scale of ICT-based **decentralized information and communication technologies** that the agencies involved in Bhutan's agricultural extension system use to reach right down to the grassroots level, and which can deliver relevant messages to farmers. These messages and other ICT outreach should be managed so that ICT-based messaging is consistent with the face-to-face communication between farmers and EAs. This will include community-based message delivery systems that address the **resilience of farmers' livelihoods** and rural communities in the face of natural hazards and the increased risk of disasters due to the changing climate.

Recommendation 4. **Technical and Vocational Education and Training:** TVET is education and training that provides knowledge and skills for employment. An essential purpose is to prepare youth for work. In Bhutan, where there is a nexus of youth outmigration from rural areas, high youth unemployment, shortages of skilled agricultural labor in rural areas, and a lack of youth taking up commercial agriculture as a profession, there is a need for skills training in attractive RNR-related employment opportunities, e.g., start-up SMEs for unemployed youth in hiring out farm machinery to agricultural producers' groups and women's groups. It is recommended that the MoAF carry out a study on the potential for TVET in the agriculture, livestock, forestry, and marketing sectors in Bhutan, with an analysis of the employment opportunities and current TVET providers. This will require taking the findings in the MLHR's Human Resources Masterplan for the Economic Sectors (2018-2023) into consideration and providing an additional platform for the Strategic Vision 2040 in the RNR Sector.

A key recommendation is to **establish a TVET support program for government and private training institutes**. This would target job seekers, unemployed rural youth, farm

laborers, and members of farming households seeking off-farm income sources. TVET would go beyond the traditional masonry, carpentry and handicraft-making activities, and enter new thematic areas. These would now include building hydroponic units, installing climate-smart water management irrigation systems, installing electric fencing, and community or farm-level irrigated polytunnels and greenhouses.

Recommendation 5. Gender Equality: There is a need to emphasize women's participation in training and include them in all training programs. Gender mainstreaming is critical to bridging the strategic gaps and conditions in the agriculture sector. This will motivate more women to play an active role in agriculture at various levels.

This strategy becomes even more important because women's part in farming is increasingly indispensable due to the feminization of rural households in recent years. This results from the outmigration of men and rural youth to seek work and education in urban areas.

Districts, where there are a large number of female-headed households (i.e. with more than 50% of heads of household being women), include Bumthang, Trongse, Punakha, and Wangdue. The MoAF should develop training programs that cater to both men's and women's interests and ensure that the learning environments consider the unique needs of women.

Recommendation 6. "Lead farmer model" and approach: Each Gewog center is assigned one extension worker from each agriculture and livestock sector. Forestry was recently centralized into the Forest Divisions and placed outside the Dzongkhag/Gewog supervision sphere. Covering each household by a lone extension agent (for each sub-sector) working in the Gewog is a challenge due to the geographical spread, the large number of Chiwogs to be covered, physical remoteness, and the physical accessibility of the scattered farming households.

More innovative knowledge delivery mechanisms such as "lead farmer models," involving on-farm demonstrations of best practices and farmer-managed research, plus peer-to-peer exchange visits, will help with advocating better agriculture technologies.

It is **strongly recommended that MoAF build a training and mentoring program for Lead Farmers, spearheaded by Extension Agents and rural researchers** engaged at field level. The development of farmer-to-farmer extension systems will rely on Lead Farmers graduating to become community-level RNR trainers. Lead Farmers will provide further multiplier training to neighbors within farming communities, using training-of-trainer (ToT) principles and practices.

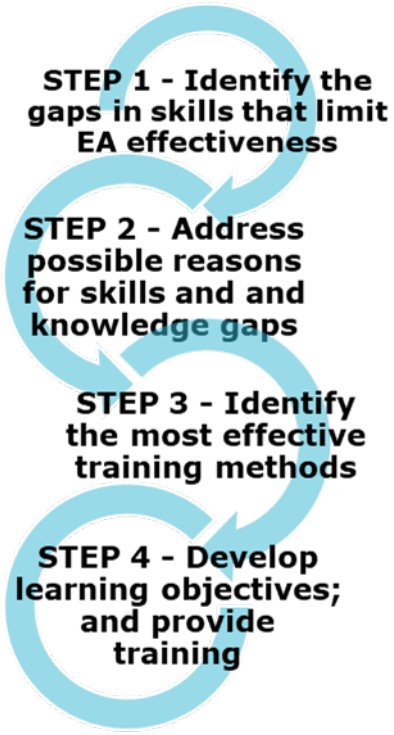
Recommendation 7. Training methods for farmers: Most RNR-linked training events offered to farmers in Bhutan are theory-based, with limited practical sessions and very little hands-on skill enhancement. Therefore, training imparted to farmers has to be focused more on functional needs and demands through participatory and hands-on learning methods rather than theory-based lessons.

Since farmers are unwilling to travel long distances for formal training courses and the timing of training events is constrained by the agricultural calendar, emphasis should be placed on in-situ training events such as: EA training, farmer-to-farmer training events, farmer field day classes, farmer school hub training, farmer-managed research and demonstrations (designed by ARDC), on-farm research trials by ARDC staff, secondary school agriculture and permaculture clubs, virtual chiwog/farmer group training organized through Gewog extension centers and/or local cable TV networks where available, and the use of simple E-RNR communication technologies (with support from ICTD).

Exposure visits can be arranged with the full participation of farmers in the design and planning. In addition to farmers benefiting from the technologies adopted by neighboring lead farmers, the timing of the formal training and careful selection of participants is essential.

More emphasis has to be placed on the quality and relevance to the farmers of the training events and their timing so that they fit into the agricultural calendar.

<u>Recommendation 8.</u> Training methods for extension agents: Traditionally, extension agents have received formal training courses or taken part in exposure visits to ARDC, and sometimes in overseas study tours to Nepal or India. It is expected that these modalities will continue in the future; however, virtual training courses should be added, which would enable more EAs to attend, reduce travel costs, and allow courses to be designed, managed, and delivered from anywhere in Bhutan or elsewhere.



EU-TACS (2020) organized a core competency virtual training course in "Value Chain Analysis for Agribusiness Development" using the Maastricht School of Management (based in the Netherlands) as the training provider, targeting MoAF officers from the four key departments.

Extension Agents require capacity building to improve service delivery in the topics listed in the previous section. A **training needs assessment (**TNA) is necessary for all Dzongkhags and Gewogs. This TNA should follow the steps recommended by the Royal Civil Service Commission, as shown to the right.

<u>Recommendation 9.</u> Training of Trainers (ToT) approach: The training should be provided to the farmers and designed in a way that translates learning into practice, primarily through training of farmers to become village trainers, and of EAs as trainers on behalf of ARDCs and other researchers, i.e. a ToT approach. The ToT approach should be prioritized to build the internal capacity of the workforce to generate a critical number of high-quality trainers from among the EAs in each Dzongkhag; within the private sector (including contract farming); and among the farmers.

<u>Recommendation 10.</u> Training curriculum and modules: Farming in Bhutan is gradually transitioning from subsistence-based to semi-commercial and commercial farming. The training modules provided by relevant stakeholders cover topics mostly relating to crop production. Furthermore, some thematic areas in which training was provided to the farmers were reported as not being applicable during the study. The training curriculum and modules need to be responsive to value chain-oriented approaches, including an emphasis on product development through processing; value addition and branding; and market-oriented commercialization.

In addition, MoAF needs to engage with regional and local institutions/agencies to take advantage of training packages and publications that give guidance on Best Practices when delivering training products.

These include **climate-smart villages, entrepreneurial agroforestry, commercial farming,** and **landscape management approaches**, as well as other new policy areas as they emerge, e.g. **circular economies and waste management** from RNR and on-farm derived waste biomass.

Training designs should be better developed with a good balance of theory, practice and field visits. They should be conducted for a period that matches each type of subject matter to achieve a more effective outcome for the trainees. This will involve more funds for the training process, ranging from design, the identification of good trainers, venue preparation, practical demonstrations, innovative training, adult learning techniques, follow-up M&E, etc.

A key recommendation is for **MoAF and other stakeholders to intensively promote improved traditional and innovative knowledge delivery and knowledge sharing systems,** including on-farm demonstrations; farmer day-schools; farmer-managed on-farm research trials; out-scaled school agriculture, agroforestry, and permaculture programs; train-and-visit (T&V) extension approaches; and learning-by-making methods.

- Carrying out a study to evaluate and upgrade training curricula at key training institutes to change the focus from the current production orientation towards a **commodity value-chain orientation that includes farm mechanization, the promotion of climate-smart technology, and measures to increase resilience against natural disasters.**

- Development of an **up-to-date series of RNR extension guidelines, Packages of Practices, and manuals that focus on the needs of extension agents and farmers** in all RNR sub-sectors such as agriculture, livestock, entrepreneurial agroforestry systems, and community forestry.

- Encouragement and finance of teams of professional trainers to **develop off-the-shelf, cartoon-strip-based RNR training materials** and knowledge dissemination products for extension agents and lead farmers to use with farmers' groups and women's groups.

Recommendation 11. Deployment of a critical mass of high-quality trainers: Only a handful of people employed in the Government training institutes are further limited by their capacity to impart knowledge and skills in the required disciplines.

Hence, deploying a critical number of faculty members and investing in their KSA needs to be a priority. Also, enhancing the supply of teachers and mentors can be achieved by using private training institutions, NGOs, and CSOs both within Bhutan and the SARRC region.

Addressing the topics mentioned and implementing the projects listed above will need the recruitment of additional key staff in a wide range of disciplines at both central and local levels. A training plan for human resources gap analysis and training needs assessment will be required. The Soil Fertility Management Task Force will also need capacity strengthening.

MoAF should prepare an **Integrated Human Resources Training Plan** directed at trainers and RNR extension agents, and also farmers, herders, and farm foresters. The plan would examine the needs of the target groups; develop relevant training content; determine the most practical knowledge delivery methods, focusing on E-learning and self-learning, to out-scale the reach of direct face-to-face training.

It is recommended to establish an **association for professional RNR trainers in Bhutan** to address the shortage of high-quality trainers in Bhutan. The association would provide a service offering membership and certification of RNR trainers, implement a search facility for trainers, accept requests for training events, support a mentorship facility for farmers and extension workers, and operate an interactive website. This could be established via a local NGO.

Recommendation 12. Private Sector, NGO, and CSO involvement in training: Capitalizing on private-sector partnership and knowledge transfer potential: the design of the survey has not examined the private-sector participation in the provision of training services.

It is recommended that "private partnership" and "south-south cooperation for knowledge transfer" approaches, such as farmers' field models involving government agencies/institutions and the private sector, including agri-entrepreneurs, should be explored and facilitated with an enabling policy and regulatory environment.

EU-TACS Project has used international and Bhutanese private training institutes and Bhutanese NGOs for training events during 2020-21, and the relevance of this type of training for EAs needs to be explored. ICIMOD in Nepal has hosted farmers and extension staff on

study tours in a range of subjects, including climate-smart agriculture and natural disaster resilience during the 11th and 12th FYP periods.

Recommendation 13. Virtual/remote training events: COVID 19 has impacted lives in numerous ways. It has changed the way people interact and learn. Virtual training has become a convenient platform for learning new things.

To support the capacity development of extension officials using remote training events, instructions for ICT processes should be available both in hard copy offline and online via a tablet or laptop. Hence investments need to be made to improve internet connectivity and ensure affordable connectivity.

It is recommended that **Innovative and Participatory Adult Learning Methods** (IPALM) will focus on relevant knowledge content and improved field-based knowledge delivery systems, E-learning technologies, and participatory techniques. Methods to be considered include the following:

- **The use of mobile phone technology** to transfer knowledge to EA and farmers should be further developed, and the establishment of community RNR communication hubs at Gewog Centers to aid knowledge transfer should be prioritized and supported by using educated rural youth (especially those currently unemployed). The "e-RNR crop advisory app" for mobile phones, promoted by the ICTD, is an important method for adult learning in rural areas, and should be expanded through more awareness creation events.

- Development of **Open Online Training Courses** (free-at-source, E-Learning platforms) for Extension Agents to use with young farmers to build their skills in key thematic areas of RNR.
- Creation of **Technological Networking Platforms** to connect RNR professionals for sharing knowledge regarding both on-farm research and agricultural extension, using platforms such as WebEx, Zoom, Microsoft Teams, and other purpose-built platforms.

- Develop an **Integrated Digital Extension Delivery System** throughout Bhutan to disseminate best practices, lessons learned, and case studies to EAs, Lead Farmers, farmers' groups, and cooperatives using Gewog and Chiwog communication hubs. These would out-scale the use of *E-RNR technologies,* such as mobile phone-based crop advisory management applications, ag-extension TV program series, and ICTD aimed at farmers (see E-RNR Master Plan 2016 for complementary concepts).

Recommendation 14. Monitoring and Evaluation: Monitoring and evaluating the farmer and extension agent training program is currently a weakness in MoAF's five-year plans. Stringent mechanisms should be put in place for post-training monitoring and evaluation.

This can be done for both the farmer and EA training events. Conducting regular field surveys to assess and monitor the training needs of farmers is essential for relevance and sustainability. There are no integrated annual reports on farmer and EA training due to the disaggregated nature of the sources of training delivery. Feedback on modes of delivery preferred by farmers is equally important.

MoAF, with other participant institutions, should establish a **Monitoring, Evaluation, Research and Learning Unit** (MERLU) under MoAF's Secretariat to develop and monitor training programs and plans across all sectors, as part of the proposed Integrated Farmer and Extension Agent Learning Program. This Unit will prepare twice-yearly integrated training reports for the Ministry and identify RNR best practices and lessons learned.

Impact-oriented monitoring and evaluation (Outcomes and Impacts) of training are required, and not just the regular monitoring of training inputs (funding and training days delivered) and outputs (number of participants trained).

The MERLU Unit will also prepare **targeted Training Concept Notes** for all emerging RNR policies based on identified needs. These concept notes would specify the relevant agencies involved and the funding required. They would facilitate the evaluation of training programs across all departments at MoAF and provide targeted support to all the agencies involved in the Integrated Farmer and Extension Agent Learning Program.

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