

Kingdom of Bhutan

FY 2016 Ex-Post Evaluation of Technical Cooperation Project

“Agricultural Research and Extension Support Project in Lhuentse and Mongar”

“Horticulture Research and Development Project”

External Evaluator: Keisuke Nishikawa, Japan Economic Research Institute Inc.

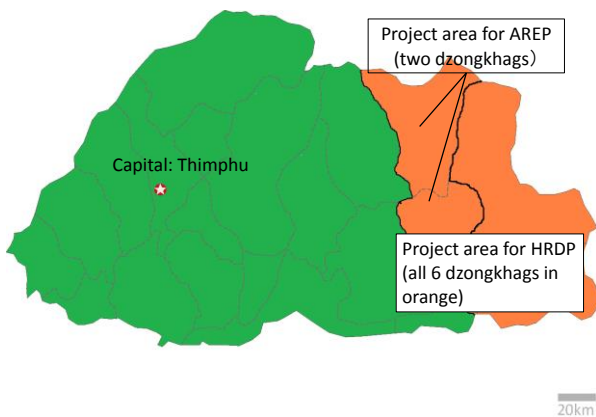
0. Summary

The Agricultural Research and Extension Support Project in Lhuentse and Mongar (hereinafter referred to as ‘AREP’) and the Horticulture Research and Development Project (hereinafter referred to as ‘HRDP’) were the collective projects by which horticulture as a source of revenue was promoted through improvements in the mechanism of agricultural research, dissemination, and marketing in the six dzongkhags (administrative and judicial districts)¹ in the eastern region of Bhutan where agricultural development was lagging and poverty rates were high. These projects supported agricultural promotion, poverty reduction, and correction of regional disparities, which had been consistently positioned as priority areas in Bhutan, and were in line with the development plans and development needs of the country. They were also consistent with Japan’s ODA policy at the time of planning which had a focus on supporting rural income improvement and rural life improvement through agricultural development; and, the relevance of this project is high. The Project Purpose was judged to have been largely achieved as it was observed that cultivation by many farmers was promoted, and marketing activities became more vibrant through implementing these projects. The achievement of the Overall Goal (target year of HRDP: 2020) is also expected as various activities have continued. Therefore, the effectiveness and the impact of these projects are high. The efficiency is fair as the project cost of AREP exceeded the plan though the project periods of both projects were within the plans. With regard to the sustainability of the effects generated by both projects, no major problems were observed in the policy background and the organizational, technical and financial aspects. Therefore, the sustainability of the projects’ effects is high.

In light of the above, this project is evaluated to be highly satisfactory.

¹ AREP targeted Lhuentse and Mongar Dzongkhags and HRDP was implemented in a total of six dzongkhags: Pemagatsel, Samdrup Jongkhar, Tashigang and Tashi Yangtse Dzongkhags in addition to these two dzongkhags.

1. Project Description



Project Location



Agricultural field of the farmer who participated in the training program of this project

1.1 Background

In Bhutan, 70% of the population lived in rural areas and most of them were making a living from agriculture, but a systematic cashing in on agricultural crops had rarely been practiced. In addition, no sufficient support mechanism for commercialization of horticultural crops was established, which was apparent in the eastern part of Bhutan. Under these circumstances, JICA dispatched an independent expert (2000-2004) to the Renewable Natural Resources Research Center – East of the Ministry of Agriculture (The name has changed twice, and it is the Agricultural Research and Development Center – Wengkhari at the time of ex-post evaluation.) and laid out the base of the research center. What followed was the AREP, implemented from 2004 to 2009, which had an objective to improve a mechanism of agricultural extension by interconnecting experimental research and the development of agricultural production technologies with extension activities in Mongar and Lhuentse Dzongkhags in the eastern region. In order to achieve this objective, improving the technologies used by farmers through efforts to develop agricultural technology options, strengthen extension structures, and to interconnect experimental researches and extension activities was set as the Outputs while increasing and adopting technical options to improve agricultural productivity in the eastern region after project completion were set as the Overall Goal.

However, at the completion of the AREP, while having the mind to commercialize their crops started to be seen, it did not reach the point where the commercialization of horticultural crops expanded to the entire eastern region. Therefore, the preceding efforts in the two eastern dzongkhags were expanded to four other dzongkhags as HRDP. In the HRDP, identifying agricultural technologies and crops that would lead to production and marketing, strengthening the implementing structure for horticulture training, establishing a structure for providing

seedlings, and formulating and vitalizing groups undertaking marketing activities were the Outputs, and as for the project as a whole, it became the Project Purpose that farmers were to implement adequate technologies to commercialize horticulture. Ultimately, the Overall Goal was set so that horticulture was to become popular as a source of income in the eastern region. It became a project with an aspect of increasing income through marketing, in contrast to the AREP.

1.2 Project Outline

Agricultural Research and Extension Support Project in Lhuentse and Mongar	Overall Goal		Potential technical options for increasing agricultural productivity are identified and adopted in the eastern region.
	Project Purpose		Technical delivery (agricultural extension) mechanism between research and extension is improved.
	Outputs	Output 1	Suitable technical options are developed for dissemination by the Renewable Natural Resources Research Center – East.
		Output 2	Extension system is strengthened in 2 dzongkhags ² for better technical service delivery.
		Output 3	Farmers' technical capacity is improved through pilot testing of farmer, research and extension linkage in 4 model gewogs.
	Total Cost (Japanese side)		476 million yen
	Period of Cooperation		June, 2004 - June, 2009
	Implementing Agency		Renewable Natural Resources Research Center East, Ministry of Agriculture
Supporting Agency / Organization in Japan		None	
Horticulture Research and Development Project	Overall Goal		Horticulture becomes more popular as a source of income in the target area (six eastern dzongkhags).
	Project Purpose		The trained and extended farmers practice appropriate technologies for commercialization of horticulture.
	Outputs	Output 1	Horticulture farming practices and crops in the target area are identified according to production and market potential.
		Output 2	Technical training system on horticulture is strengthened in Renewable Natural Resources Research and Development Center (RNRRDC), Wengkhar.
Output 3		The structure for providing seeds and seedlings is established in	

² Bhutan is comprised of 20 provinces (dzongkhags) and each dzongkhag consists of administrative units called 'gewog'. Lhuentse Dzongkhag and Mongar Dzongkhag, where the AREP was implemented, have eight gewogs and seventeen gewogs respectively.

		RNRDC, Wengkhar, nursery farmers, seed growers and National Seed Center (NSC) Tashi Yangtse farm.
	Output 4	Group for marketing is mobilized and/or formed in collaboration with the Regional Agriculture Marketing & Cooperatives Office (RAMCO).
	Total Cost (Japanese side)	359 million yen
	Period of Cooperation	March, 2010 – March, 2015
	Implementing Agency	Renewable Natural Resources Research and Development Center Wengkhar, Department of Agriculture, Ministry of Agriculture and Forests
	Supporting Agency / Organization in Japan	Agricultural Production Bureau, Ministry of Agriculture, Forestry and Fisheries
Related Projects	<p>[Technical Cooperation]</p> <ul style="list-style-type: none"> - Dispatch of Independent Expert (2000-2004) - Strengthening Farm Mechanization Project (2008-2011) - Strengthening Farm Mechanization Project Phase 2 (2014-2017) - Integrated Horticulture Promotion Project in the West Central Region (2016-2021 (scheduled)) <p>[Grant Aid]</p> <ul style="list-style-type: none"> - The Project for the Rehabilitation of Taklai Irrigation System in Sarpang District (2013) - The Project for Improvement of Machinery and Equipment for Construction of Rural Agricultural Road (2005) - The Project for Improvement of Machinery and Equipment for Construction of Rural Agricultural Road (Phase 2) (2010) - The Project for Improvement of Machinery and Equipment for Construction of Rural Agricultural Road (Phase 3) (2016) - Food Security Project for Underprivileged Farmers (2KR) (a total of 24 times from FY 1984 to FY2012) <p>[International Fund for Agricultural Development]</p> <ul style="list-style-type: none"> - Market Access and Growth Intensification Project (MAGIP) (2011-2015) - Comprehensive Market-Focused Agriculture and Rural Livelihood Enhancement Project (CARLEP) (2015-2022 (scheduled)) 	

1.3 Outline of the Terminal Evaluation

As the efforts in the AREP were followed by the HRDP, this section refers to the project in terms of achieving the Project Purpose and the Overall Goal, as well as the recommendations at the time of Terminal Evaluation of the HRDP.

1.3.1 Achievement Status of Project Purpose at the Terminal Evaluation

It was confirmed that technologies in fruit cultivation, vegetable seed production, and seedling production, which farmers had never tried before, had started to be applied through the training and extension approach introduced in this project. While several rounds of training and extension activities to foster new farmers had yet to be implemented till the end of the project, the Project Purpose was mostly achieved, judging from the past achievements in a comprehensive way.

1.3.2 Achievement Status of Overall Goal at the Terminal Evaluation

It was observed that the cash crops had diversified and the volume of vegetable intake at the household level had increased due to the effects of project implementation, indicating positive impacts toward the achievement of the Overall Goal. At the time of Terminal Evaluation, indicators of the Overall Goal were revised upward based on the previous achievements, and it was assumed that those indicators could be used for evaluation in the ex-post evaluation.

1.3.3 Recommendations from the Terminal Evaluation

As for the items to be implemented by project completion, promotion of training and extension approach, securing of a budget for post-project activities, and handing-over of farmland management from the experts were recommended. In addition, the following recommendations were made as items to be implemented after project completion.

Table 1: Recommendations toward Post-Project Period

Item	Recommendation
Implementation of follow-up activities after project completion	Wengkhar Center is expected to carry out follow-up activities as planned after project completion in cooperation with related organizations, such as Dzongkhag Agricultural Office and extension officers.
Strengthening of cooperation between farmers and markets	Joint shipping to schools by farmer groups has started with the support from the Regional Agriculture Marketing & Cooperatives Office (hereinafter referred to as RAMCO) ³ in the eastern region,

³ The eastern regional office of the Department of Agricultural Marketing Cooperatives under the Ministry of Agriculture and Forestry of Bhutan (one of the departments of the Ministry of Agriculture and Forestry, being in charge of marketing of agricultural crops)

	and it is hoped that the support from related organizations, including dzongkhag agricultural offices, will continue from now on. The Wengkhar Center, dzongkhag agricultural offices, and RAMCO need to collaborate to secure sales destinations, such as National Seed Center, so that the seed farmers fostered through this project can sell their seeds smoothly.
Research and extermination of pests, such as fruit flies	As the damages by fruit flies, etc. have been increasing, Wengkhar Center needs to continue to monitor fruit flies, etc. and raise awareness among farmers. The Ministry of Agriculture and Forests also needs to examine practical pest control methods in accordance with the country's organic agriculture policy ⁴ .
Extension to farmers operating under inferior production conditions	In this project, training has been provided by selecting the farmers with a high desire for increasing production and with relatively easier access to markets, through which the desired Outputs have been produced. Once the extension of horticulture has progressed in the future, extension activities for farmers operating under inferior production conditions need to be considered.

Source: Based on the HRDP Terminal Evaluation Report

2. Outline of the Evaluation Study

2.1 External Evaluator

Keisuke Nishikawa, Japan Economic Research Institute Inc.

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: September, 2016 – October, 2017

Duration of the Field Study: January 16 – February 7, 2017 and April 21 – May 4, 2017

3. Results of the Evaluation (Overall Rating: A⁵)

3.1 Relevance (Rating: ③⁶)

3.1.1 Consistency with the Development Plan of Bhutan

In Bhutan, 'Bhutan 2020' was formulated in 1999 as a development plan in which horticulture was stressed as a means of achieving an increase in farmers' incomes, a creation of export revenues, and an improvement of nutrition status of the rural population. A five-year plan was prepared based on this long-term development plan.

In 'The Ninth Five Year Plan' (2002-2007), the development plan at the time of planning of the AREP, key challenges in the agriculture sector were improvements in rural income,

⁴ At the time of ex-post evaluation, it was heard that while there was a policy direction to promote organic farming, there were not a few challenges to be solved for Bhutanese agricultural produce to be approved internationally as organic produce.

⁵ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁶ ③: High, ②: Fair, ①: Low

achievement of national food security, conservation and management of agricultural resources, and creation of employment opportunities. In the plan, agricultural modernization, including horticulture to achieve improvements in agricultural productivity and market access, and rural road development were planned to be carried out. In concrete terms, materials and equipment would be supplied and agricultural mechanization and the development of both the domestic and international market would be promoted in order to achieve the policy of renewable natural resources (hereinafter referred to as 'RNR', that is, agricultural, livestock and forestry resources). At the time of completion of the AREP, the Royal Government of Bhutan (hereinafter referred to as 'RGoB') positioned poverty reduction as an important agenda in the national plan. In 'The Tenth Five Year Plan' (2008-2013), reduction of the population of the poor to less than 15% (less than 20% in rural areas) by 2013 was set as the target. In one of five key areas, 'Synergizing Integrated Rural-Urban Development for Poverty Alleviation', improvements in agricultural productivity and commercialization of agriculture through the promotion of horticulture and cash crop support were prioritized.

The national development plan at the time of planning of the HRDP, a successor of the AREP, was the same as the one at the time of completion of the AREP, in which the above areas were emphasized.

At the time of completion of the HRDP, 'The Eleventh Five Year Plan' (2013-2018) promoted a strategy to commercialize the agricultural sector so that it would lead to an increase in farmers' incomes, an improvement of rural livelihoods, import reduction and export promotion, and creation of employment opportunities for youths.

Therefore, in all three five-year plans over the period spanning both projects, it was confirmed that agriculture was consistently positioned as an important sector in which an increase in income through an improvement in productivity, commercialization, employment creation, and so forth was emphasized as a direction. Also, the RNR policy, with its focus on agriculture, was treated as an important sector having an independent chapter in each of the five-year plans.

Based on the above, both projects were consistent with the development plans of Bhutan both at the time of planning and completion of each project.

3.1.2 Consistency with the Development Needs of Bhutan

3.1.2.1 Challenges of Agricultural Development

At the time of planning of the AREP, the following two challenges were mainly pointed out in terms of agricultural development and extension in Bhutan.

- Technical extension to farmers was not well implemented due to low technical skills of extension agents allocated at extension centers of each gewog under the administration

of dzongkhags, fragile extension structures, a lack of cooperation between research and extension services, and moreover, poor access due to a precipitous landscape.

- It was an issue that technologies to improve the productivity of agricultural produce, and new varieties and crops suitable to each location be developed, improved, and introduced, and the extension mechanism be subsequently strengthened.

While these challenges were somewhat improved after the implementation of the AREP, there remained the issue of systematic cashing in on crops rarely being practiced, as cultivated fields and varieties of crops were limited due to the precipitous landscape and infrastructure, such as markets and roads, was not developed at the time of AREP completion / HRDP planning.

After that, in 2010s, as the access to markets improved with rural roads becoming developed mainly by the Agriculture Engineering Division of the Department of Agriculture under the Ministry of Agriculture and Forests, some farmers gradually expanded their interest in the sales of cash crops. The HRDP was a project that supported sales and marketing in that context, and according to the Implementing Agency, various researches, the technology extension structure for farmers, and the marketing of crops improved to some extent through these projects. On the other hand, even at the time of HRDP completion, efforts were needed to disseminate the technologies and crops to more farmers in order to improve their productivity and increase farmers' incomes through distributing more agricultural produce. Additionally, there remained more challenges in the eastern region in terms of a further enhancement of irrigation for horticultural crops, development of all-weather farm roads for better market access, measures against damages to agricultural produce by wild birds and animals, pest control, and increasing the area of abandoned farmland due to a decrease in the agricultural labor force.

In sum, while the issues pointed out at the time of planning of the AREP and HRDP made a certain degree of improvement through project implementation, not all farmers were able to enjoy the benefits, and it was still necessary to implement the measures of both projects in the entire eastern region. Also, efforts to improve agricultural productivity and marketing, such as through the development of rural and agricultural infrastructure and through pest control and so forth, still remained as item of an important agenda.

3.1.2.2 Poverty Rate

According to the documents provided by JICA, agricultural development in the eastern region was lagging behind compared to that in the West in Bhutan; at the time of AREP planning, 97% of the poor in Bhutan were residing in rural areas, out of which nearly half lived in the eastern region (18.7% in the western region, 29.5% in the central region, and 48.8% in the eastern region), showing regional disparities.

After that, in 2014, Bhutan issued a multi-dimensional poverty rate calculated using a total of 13 indicators related to education, health and living standards (the data were for 2012), and the poverty rates of each dzongkhag in the eastern region were as follows.

Table 2: Poverty Rate of Each Dzongkhag in the Eastern Region (2012)

	Dzongkhag	Multi-dimensional Poverty Rate	Population Ratio
Eastern Region	Lhuentse	10.4%	2.5%
	Mongar	20.9%	6.6%
	Pemagatsel	11.6%	3.8%
	Samdrup Jongkhar	16.4%	5.2%
	Tashigang	16.5%	2.8%
	Tashi Yangtse	14.0%	7.5%
	Country of Bhutan	12.7%	100%

Source: 'Bhutan Multi-Dimensional Poverty Index 2012'

Though there were only the poverty rates from 2012, four of the six dzongkhags exceeded the national average (meaning that they were worse than the national average), indicating that poverty reduction is still a significant challenge in the eastern region.

3.1.2.3 Importance of the Agricultural Sector

In the labor market of Bhutan, the ratio of those in the agricultural and forestry sector (2015) was high at 58% (male: 27.5%, female: 30.5%) of the entire labor force (according to the 2016 Statistical Yearbook).

Agriculture makes up about 10% of the GDP, as shown in Table 3, but the rate has been gradually increasing. Coupled with the large size of the labor force, positioning of agriculture as the key industry is considered to have remained the same at the time of planning and completion of the HRDP.

Table 3: Proportion of Agriculture (Production of Agricultural Produce) in GDP and the Growth Rate of Agriculture from each Previous Year

	2011	2012	2013	2014	2015
Proportion of Agriculture in GDP	9.0%	8.9%	8.9%	10.1%	10.1%
Growth Rate from the Previous Year	2.9%	2.4%	3.4%	4.0%	5.7%

Source: 2016 Statistical Yearbook

From the analysis of the issues in agricultural development, poverty rate and the importance of the agricultural sector above, both projects, which supported agricultural research, extension, and marketing in the eastern region of Bhutan, were consistent with the development needs at the times of both planning and completion of each project.

3.1.3 Consistency with Japan's ODA Policy

At the time of AREP planning, one of the four priority areas of Japan's ODA to Bhutan was agricultural and rural development, in which 'agricultural infrastructure development (including the promotion of agricultural mechanization), agricultural technology development and extension' were to be promoted (Source: Country Data Book 2004 [Ministry of Foreign Affairs]). In addition, JICA's 'Country Assistance Plan for Bhutan in FY2004' had 'agricultural and rural development (agricultural technology improvement and agricultural infrastructure development)' as one of four priority areas for assistance which planned to support increases in rural income and improvements in rural livelihood through agricultural development. Concretely, the development and extension of production technologies for agricultural produce, including high value-added crops in the eastern region of the country, was emphasized as a priority agenda along with the development of agricultural production infrastructure to rectify regional disparities and reduce poverty.

At the time of HRDP planning, five years later, one of Japan's priority areas for assistance to Bhutan was also agricultural and rural development, areas in which Japan was to cooperate in agricultural modernization and promotion, and so forth (Source: Country Data Book 2009 [Ministry of Foreign Affairs]). JICA's Country Assistance Plan (formulated in 2009) also positioned agricultural and rural development as one of Japan's priority areas for assistance to Bhutan. In the agricultural technology development and extension program, assistance was to be provided for improving and disseminating agricultural technologies to increase agricultural income through improving productivity of cash crops.

Therefore, both projects can be said to have been consistent with Japan's ODA policy at the time of planning of each project.

At the times of planning and completion of both projects, agriculture was consistently regarded as an important sector, and income improvement through productivity improvement, commercialization and employment creation and so forth was set as the direction. Both projects were sufficiently in line with this direction. Also, agricultural promotion through technology extension, marketing promotion and so forth continued to be an essential area from the viewpoint of their importance to the industry as well as poverty reduction in the eastern region. Both projects were highly consistent with the development needs both at the time of planning and completion. Moreover, it was confirmed that both projects were in line with Japan's ODA policy to support agricultural and rural development in Bhutan.

In light of the above, these projects were highly relevant to Bhutan's development plans and development needs, as well as Japan's ODA policy. Therefore, their relevance is high.

3.2 Effectiveness and Impact⁷ (Rating: ③)

3.2.1 Effectiveness

3.2.1.1 Project Outputs

The AREP and HRDP as a whole were projects to disseminate horticulture business as a source of income through the improvements of mechanisms of agricultural research, extension and marketing in the eastern region of Bhutan, where agricultural development was lagging and the poverty rate was high. Both projects had three to four Outputs, and the achievement levels at the time of project completion were largely as shown in Table 4.

Table 4: Overall Achievement Level of the Output Indicators of each Project at the time of Project Completion

Project	Output, Indicator (at the time of planning)	Actual (at the time of project completion)
AREP	<p><u>Output 1: Suitable technical options are developed for dissemination.</u></p> <p><u>Indicator 1:</u> At least 2 varieties in rice, 3 varieties in vegetables, and 3 varieties in fruits are recommended by the end of the project.</p> <p><u>Indicator 2:</u> At least 5 different technical manuals on production management are produced by the end of the project.</p> <p><u>Indicator 3:</u> 10-15 different forms of extension materials are produced by the end of the project.</p>	<p>Output 1: Achieved</p> <p><u>Indicator 1:</u> During the project period, 2 varieties of rice, 8 varieties of vegetables (cauliflower, mustard leaf, carrot, etc.), and 5 varieties of fruits (persimmons, mandarin, etc.) were recommended and distributed to farmers.</p> <p><u>Indicator 2:</u> The 'Rice Cultivation Guidebook' for rice cultivation was prepared in 2008 and distributed to 206 gewogs all over the country. For horticultural crops, a total of 8 manuals, such as ones on citrus farming, vegetable cultivation, dissemination method and so forth were completed.</p> <p><u>Indicator 3:</u> 35 extension materials, including 16 leaflets and 2 calendars, were produced and being used in each dzongkhags by the time of project completion.</p>
	<p><u>Output 2: Extension system is strengthened in 2 Dzongkhags for better technical service delivery.</u></p> <p><u>Indicator 1:</u> Every Extension Agent of the project area receives training at least once a year.</p> <p><u>Indicator 2:</u> The self-assessment of planning management among Extension Agents improves during the project period.</p> <p><u>Indicator 3:</u> The Extension Agent's competency rating on planning management improves during the project period.</p>	<p>Output 2: Partially achieved</p> <p><u>Indicator 1:</u> A total of 24 extension agents (8 from Lhuentse and 16 from Mongar) participated in skill development training. As for the participation rate, the indicator to have all extension agents receive training once a year was not achieved.</p> <p><u>Indicator 2:</u> The 'Self-assessment Sheet' and the 'Self-assessment Data', recommended at the time of Mid-term Review (2007), could not be confirmed in the Terminal Evaluation. 11 out of 24 extension agents participated in training in Japan and took training on planning management method.</p> <p><u>Indicator 3:</u> The data related to competency rating, recommended at the time of Mid-term Review, could not be confirmed due to insufficient development of said data.</p>
	<p><u>Output 3: Farmers' technical capacity is</u></p>	<p>Output 3: Partially achieved</p>

⁷ Sub-rating for Effectiveness is to be put with consideration of Impact.

	<p><u>improved through pilot testing of farmer, research and extension linkage in 4 model gewogs.</u></p> <p><u>Indicator 1:</u> 40% of randomly selected 200 farming households from 4 model gewogs participate in training programs implemented in the project.</p> <p><u>Indicator 2:</u> 50% of randomly selected 200 farming households from 4 model gewogs are aware of recommended technologies.</p> <p><u>Indicator 3:</u> 45% of randomly selected 200 farming households from 4 model gewogs participate in project field activities excluding training (i.e. demonstration, field days, competition and so on).</p>	<p><u>Indicator 1:</u> The percentage of farmers in the four model gewogs that participated in the farmer training program of the project was 16%, 32%, 45% and 47%, showing that three out of four gewogs achieved 80% or higher of the indicator values.</p> <p><u>Indicator 2:</u> Out of the technologies proposed similar to those in the baseline survey (e.g., agrochemicals, seedling nurturing, pruning, and so forth), the percentage of farmers that recognize them as the ones recommended through the activities of extension agents were between 79% (pruning) and 98% (agrochemicals, grading).</p> <p><u>Indicator 3:</u> The on-site activities with high rates of participation of farmers from model gewogs were field demonstration (demonstration in the field where crops were actually cultivated) (44%), which was mostly in line with the target. However, the rates for the field day and the group support activities were both 29%, that of the competition was 16%, and that of the study tour was 6%, none of which reached their targets.</p>
HRDP	<p><u>Output 1: Horticulture farming practices and crops in the target area are identified according to production and market potential.</u></p> <p><u>Indicator 1:</u> Horticulture development guidelines / manuals are developed.</p>	<p>Output 1: Achieved</p> <p><u>Indicator 1:</u> 12 kinds of manuals and extension materials for gewog extension agents and farmers were developed.</p> <p>In addition, based on the experiences, etc. of the AREP, cultivation and analysis-evaluation of the varieties of the crops introduced from inside and outside the country were conducted, and the applicable crops and areas at the farmers' level were identified (e.g., three phyletic fruits and 38 phyletic vegetables were introduced).</p>
	<p><u>Output 2: Technical training system on horticulture is strengthened in Renewable Natural Resources Research and Development Center (RNRDC), Wengkhar.</u></p> <p><u>Indicator 1:</u> 90 % of trained farmers apply key training contents in the field (about 100 farmers trained per year).</p> <p><u>Indicator 2:</u> 90 % of trained extension officers apply key training contents (about 15-20 staff trained per year).</p> <p><u>Indicator 3:</u> Training organized by the project found to be relevant and effective by ≥ 80 % of the participants.</p>	<p>Output 2: Achieved</p> <p><u>Indicator 1:</u> In the Impact Survey* conducted by the project team, it was at 99% (158 out of 159 farmers), exceeding the target value.</p> <p><i>* Toward the completion of the HRDP, a survey was conducted in the six dzongkhags in the target area from May-June 2014, using a questionnaire form and interviews of 35 extension agents, 16 counterparts at Wengkhar Center, 43 researchers, etc. who received training at Wengkhar Center, and 424 trained farmers (parameter-508).</i></p> <p><u>Indicator 2:</u> It was at 96.8% in the Impact Survey (30 out of 31 valid responses), exceeding the target value.</p> <p><u>Indicator 3:</u> Regarding the evaluation of training programs, 99.4% of farmers and all (100%) of the extension agents and researchers evaluated the training as 'Very good' or 'Good' in the Impact Study, which exceeded the target value.</p>
	<p><u>Output 3: The structure for providing seeds</u></p>	<p>Output 3: Achieved</p>

<p><u>and seedlings is established in RNRDC, Wengkhar, nursery farmers, seed growers and National Seed Center (NSC) Yangtse farm.</u></p> <p><u>Indicator 1:</u> Seed and seedling production and distribution mechanism in RNRDC Wengkhar, nursery farmers and seed growers are developed (target production of about 4,500 fruit seedlings and 200 kg vegetable seeds per year).</p> <p><u>Indicator 2:</u> 100 % of trained farmers are provided with basic materials to apply skills acquired from the training program.</p> <p><u>Indicator 3:</u> Seed farm in National Seed Center Yangtse revived and begins seeds & seedling production.</p>	<p><u>Indicator 1:</u> An annual average of 7,877 fruit tree seedlings and 307.2kg of vegetable seeds (83.5kg by Wengkhar Center and 223.7kg by seed farmers) were produced, both of which exceeded the target value. Seedlings were distributed mainly to trained farmers by Wengkhar Center and to nearby extended farmers by seedling farmers.</p> <p><u>Indicator 2:</u> Original seeds, anti-bird nets, packing machines and labels, etc. were provided to all trained seed farmers. Seedlings, pruning shears and so on were provided to all trained seedling farmers.</p> <p><u>Indicator 3:</u> The project team supported the development of Tashi Yangtse Seed Center and the training of its staff, where 362kg of vegetable seeds and 10,000 seedlings of passion fruit trees were produced.</p>
<p><u>Output 4: Group for marketing is mobilized and/or formed in collaboration with the Regional Agriculture Marketing & Cooperatives Office (RAMCO), Mongar.</u></p> <p><u>Indicator 1:</u> 50% of groups in which trained farmers belong to start horticulture marketing activities.</p>	<p>Output 4: Achieved</p> <p><u>Indicator 1:</u> According to the Impact Survey, trained farmer groups had started activities for marketing and shipping of agricultural crops jointly. The rate of joint shipping reached 96%. As there were hardly any joint shipping activities prior to this project, the target can be said to have been achieved.</p>

Source: Terminal Evaluation Report of the HRDP, Information provided by the Implementing Agency and the judgment results of the Evaluator

The achievements of the Outputs of each project, sorted and summarized from the above table, were mainly as follows.

[AREP]

While Output 1 was achieved as an appropriate agricultural technology with an objective of extension was developed at RNRRC-East, Output 2 was only partially achieved as the indicator was at a level which required all extension agents to take training courses every year, meaning that an absence of only one extension agent would result in non-achievement of the indicator. However, according to the document provided by JICA, training courses for extension agents were implemented every year until project completion, and a total of 174 extension agents from the six dzongkhags in the eastern region participated. In addition, seeds and technical support on mushrooms and rice cultivation were provided to a total of 88 highly motivated extension agents in the two target dzongkhags. Therefore, the extension structure for better technical services was considered to have been strengthened to some extent. Regarding Output 3, only the information from three months before project completion was captured, which shows that some indicators were achieved while there were other indicators with achievement rates

that were not necessarily high. Output 3 as a whole was partially achieved.

[HRDP]

Output 1 can be said to have been achieved as the manuals and extension materials had been developed and utilized. Output 2 was also judged to have been achieved as each indicator had been achieved by the time of the Terminal Evaluation. Outputs 3 and 4 are also considered to have been achieved as all indicators had exceeded their targets at the time of Terminal Evaluation.

3.2.1.2 Achievement of Project Purpose

In both projects, the Project Purpose was expected to be achieved through the achievement of the Outputs. The indicators set to measure the expected level of achievement and the actual level of achievement at the time of project completion are shown in Table 5.

Table 5: Achievement Level of the Indicators for the Project Purpose

Project	Indicator	Actual
AREP Technical delivery mechanism between research and extension is improved.	<u>Indicator 1:</u> The number of farmers adopting the technologies or varieties developed and/or disseminated increases by 30% in 4 model gewogs and adjacent gewogs.	<u>Indicator 1: The achievement was limited.</u> The number of farmers adopting improved varieties of rice increased by 3% compared to 2004. Farmers who adopted improved varieties of vegetables increased by 18% for chilies, 1% for potatoes, 27% for radishes and decreased by 15% for cabbages. As a whole, farmers who adopted improved varieties increased by 7.8% on average. As for fruits, they increased by 25% for citrus, 92% for persimmons, 16% for pears, 25% for peaches and decreased by 17% for plums.
	<u>Indicator 2:</u> 80% of research-extension joint activities agreed at Working Group Meetings are effectively implemented.	<u>Indicator 2: Largely achieved</u> As the definition of ‘effectively’ was not clear, evaluation was done based on the number of activities. 81 activities were implemented among the 147 activities that had been approved at the working-group meeting (the average implementation rate over the four-year period was 55%). However, the implementation ratio which was 26% in FY2005 increased to 75% in 2006, 69% in 2007 and 77% in 2008. The factor for the implementation ratio not reaching 80% was the budget constraint.
	<u>Indicator 3:</u> Farmer, extension and research linkage strengthening as a model concept	<u>Indicator 3: Achieved</u> The implementation method of the ‘Research Outreach Program (ROP) ⁸ ,

⁸ A method in which research outcomes are disseminated by systematically conducting several training programs and hands-on training for farmers for a certain period of time in collaboration with the agricultural offices and extension

	is developed and well documented during the project period.	including the activities, such as on-farm demonstration, hands-on training, crop competitions and so forth, as well as the technologies introduced were developed and improved through the project. As a result, two kinds of documents, an extension manual utilized by extension agents in their ROP and an implementation guide expected to be used nationwide, were developed. It was confirmed that those manuals were being utilized by the extension agents of each gewog.
<u>HRDP</u> The trained and extended farmers practice appropriate technologies for commercialization of horticulture	<u>Indicator 1:</u> Horticulture is practiced in 5,000 acres of arable dry field in the target area.	<u>Indicator 1: Not achieved.</u> The size of horticultural land was 2,166 acres, not reaching the target of 5,000 acres. The figure of 5,000 acres was calculated under the following method: (1) An average unit of arable land (in this case. Dry fields) per farming household is to be 2.24 acres, of which 30% is assumed to be directed to agricultural use: 0.66 acres (2) (200 trained farmers per year + 1,278 extended farmers per year = 1,478 farmers per year) x 5 years = 7,390 in total (3) 0.66 acres/person x 7,390 farmers = 4,877 acres. Therefore, approximately 5,000 acres is set as the target.
	<u>Indicator 2:</u> 75 % of the trained farmers develop demonstration farms and conduct farmer to farmer extension.	<u>Indicator 2: Achieved</u> 100% of the farmers trained established demonstration farms, and 86% (144/167 farmers) shared and disseminated their knowledge to 6.4 farmers on average. Therefore, it can be regarded that the indicator was achieved. While 69% of the farmers trained were males, female farmers, accounting for more than half of the farming labor force, also benefited indirectly according to the Implementing Agency, as farming activities are normally carried out by all members of the family.
	<u>Indicator 3:</u> 50 % of trained and extended farmers start commercial horticulture.	<u>Indicator 3: Achieved</u> An average of 63.9% of farmers trained and extended farmers started commercial horticulture, which exceeded the target value.

Source: Information provided by JICA and the Implementing Agency

The achievements of the Project Purpose of each project, sorted and summarized from the table above, were as follows.

agents of each dzongkhag

[AREP]

As the Terminal Evaluation was conducted at a time when this project was mostly completed, the achievement levels of indicators at the time of project completion were judged by using the information mainly from the Terminal Evaluation.

Regarding Indicator 1, while the adoption rates of improved varieties of fruits were high, the introduction rates of improved varieties of rice and vegetables were stagnant, showing low growth. Therefore, the achievement was limited.

While the meaning of 'effectively' in Indicator 2 was not clear, the target value was nearly achieved, as the rate of implementation was 77% at the time of completion (the 2008 data was used as the project was completed in June 2009).

Indicator 3 can be said to have been achieved as the method of the Research Outreach Program (ROP), in which research outcomes were disseminated by conducting training programs and hands-on training for farmers in collaboration with the agricultural offices and extension agents of each dzongkhag, was firmly established and the outcome was documented.

Based on the above, the Project Purpose, which aimed to disseminate agricultural practices through collaboration of research and extension activities, can be judged to have been achieved.

This project had a goal aiming to improve the skills of the people concerned through improvements in agricultural technologies, the development of an extension structure, and collaboration between farmers, research, and extension so that agricultural extension would be promoted as a result. Regarding the achievement level of the Outputs, the data on self-assessment and the competency rating related to Output 2 were not sufficiently developed, and the achievement level of participation rates in on-site activities, pertinent to Output 3, was not sufficient, either. While the target values of other indicators as a whole were largely achieved, the overall achievement of the Outputs can be judged to have been partially achieved. With regard to Project Purpose, while Indicator 1 was only partially achieved, Indicators 2 and 3, which were particularly essential factors for this project as it aimed to implement research and extension activities and to establish a model concept, indicated more than a certain level of achievement. Therefore, the Project Purpose as a whole can be judged to have largely been achieved.

[HRDP]

As the Implementing Agency had not captured information from the time of the Terminal Evaluation, implemented four months before project completion till the end of the project, the achievement level of indicators at the time of project completion was judged by using information from the Terminal Evaluation conducted by the JICA survey team in addition to the project completion report prepared by the project experts.

As shown in Table 5, while Indicators 2 and 3 had exceeded their target values at the time of Terminal Evaluation, Indicator 1 was at less than half of its target. The farmers targeted for acreage calculation included the farmers trained and supported in this project and the farmers instructed by agricultural extension agents trained in this project. However, the data on farm land size for horticulture purposes of the extended farmers instructed by trained farmers and extension agents were not necessarily captured in a sufficient manner, and the dry fields developed or converted for horticultural use were not as large as expected. It was heard from the experts and the Implementing Agency that the target value set had been ambitious. In fact, the assumption of having 30% of the cultivated land used for horticulture purposes was not grounded solidly, resulting in the target value being significantly higher than its real number.

Therefore, from the viewpoint of the achievement of Project Purpose, it was largely achieved as it was confirmed that the efforts to develop demonstration farms by trained farmers and to disseminate to neighboring farmers were seen and many farmers had started commercial activities, but the sizes of fields for horticultural use were significantly lower than the target. It is considered that the Project Purpose as a whole was partially achieved.

In the HRDP, based on the experiences and outcomes fostered in the AREP, it was aimed to clarify the methods of developing horticulture and marketing of crops, to improve the implementation structure of cultivation technology training and the distribution mechanism of seedlings, and to strengthen marketing activities in collaboration with other groups, and all the Outputs were achieved. The Project Purpose was achieved except for the cultivated areas having fallen below the target values.

As a result of a series of activities over the periods of the AREP and the HRDP, appropriate cultivation technologies suitable to climatic conditions of each location were developed and introduced. Cultivation by many farmers was promoted through systematic training and extension activities, and marketing activities started to be implemented during these projects. As a consequence, more varieties of vegetables and fruits started to be cultivated compared to the initial stage of the project's commencement, and they have reached the stage of sales and marketing. Therefore, within the Project Purpose, while the

indicator on the areas for horticultural use set in HRDP was not achieved, other indicators for the AREP and HRDP were largely achieved, and it is considered that the non-achievement of the area size for horticultural use in the HRDP is partial in terms of the overall achievement level of both projects. Therefore, the Project Purpose of both projects as a whole was largely achieved.

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

The Overall Goal expected in the AREP was that technical options for improving agricultural productivity would increase and be adopted in the eastern region after project completion, and such goal expected in the HRDP was that the horticulture would become a general source of income for farmers. The achievement levels of the indicators set for the Overall Goal in both projects were captured in the ex-post evaluation study, whose summary is shown in Table 6.

Table 6: Achievement Level of Overall Goal

Project	Indicator	Actual
AREP Potential technical options for increasing agricultural productivity are identified and adopted in the eastern region.	<u>Indicator 1:</u> Lessons learnt from the model concept are used to improve RNR (agricultural) research and extension strategy at the national level.	<u>Indicator 1: Achieved</u> Lessons learned for Wengkhari Center and the Department of Agriculture extracted from the ‘Research Outreach Program (ROP)’ were that it was effective that the traditional method of ‘training + distribution of seeds and seedlings’ be shifted to the identification of crops based on research, implementation of systematic training, hands-on training, etc., and on the development of skills of researchers, extension agents, and farmers through those activities. After the completion of this project, the activities evolved continuously in the HRDP in all six dzongkhags in the eastern region, and according to the Department of Agriculture of the Ministry of Agriculture and Forests and according to Wengkhari Center, they became the model for research and extension activities in other RNR Research Centers in the country (changed to Research and Development Center later).
	<u>Indicator 2:</u> The yield of horticultural crops in the eastern region increases by 15%.	<u>Indicator 2: Achieved</u> The agricultural statistics of the six dzongkhags in the eastern region (Table 7) captured at the time of ex-post evaluation show that the production volume of major horticulture crops increased in the range of 39% - 358% from 2009 to 2015, substantially higher than the target value of 15%.
	<u>Indicator 3:</u> The yield of rice in the eastern region increases by 10%.	<u>Indicator 3: Achieved</u> After the completion of this project in 2009, paddy production decreased in two of the eastern dzongkhags, but increased by 13% from 2009 to

		2015 in the six eastern dzongkhags as a whole.
HRDP Horticulture becomes more popular as a source of income in the target area.	Indicator 1: The trained and extended farmers in the project target areas increase their annual income from sale of horticulture produce from Nu. 8,400 to Nu. 20,000 by 2020.	Indicator: To be achieved As the annual income of farmers (2016) has not been captured, the concrete amount of income was unknown. However, the Implementing Agency understands that the income has been increasing further as activities in farmers' production and sales have become more active through the implementation of the 'Post-HRDP Project' ⁹ . In the beneficiary survey, 70% of the trained farmers had an increase in their income, with an average increase of 59%.
	Indicator 2: 800 farmers are trained by RDC Wengkhari by 2020.	Indicator 2: Expected to be achieved During the first year of the 'Post-HRDP Project' led by the Implementing Agency, 102 farmers engaged in a systematic training program at Wengkhari Center, making a total of 767 such farmers as of May, 2016.

Source: Information provided by JICA and the Implementing Agency (Judgment by the Evaluator is added as appropriate.)

[AREP]

In the Research Outreach Program (ROP), an extension of various technologies leading to productivity improvement, such as spraying of agrochemicals, pruning, grading, seedling nurturing and so forth, was planned and implemented, and since the project was completed, it was being applied and expanding as a model of research, development and extension activities mainly in dzongkhags in the eastern region besides Lhuentse and Mongar dzongkhags which were the target locations of the project. It showed that the extension activities were expanding geographically.

With regard to the change in the volume of horticultural crops and rice, in the eastern region, changes in the production volume of agricultural crops representative of the target locations of both projects were calculated using the agricultural statistics issued by the Ministry of Agriculture and Forests. The results are shown in Table 7.

⁹ After the completion of the HRDP, the same activities are to be continued until 2020 with solely the budget of the Implementing Agency. It is called the 'Post-HRDP Project'.

Table 7: Changes in Production Volume of Major Agricultural Crops in the Eastern Region

	2004→2009	2009→2015	2004→2015
Paddy (two dzongkhags targeted)	170%	88%	150%
Paddy (six dzongkhags in the eastern region)	144%	113%	163%
Mandarin	134%	139%	186%
Pear	216%	432%	935%
Broccoli	214%	458%	979%
Cauliflower	205%	365%	749%
Green leaves	136%	152%	207%

Source: Agricultural Statistics, each year (Department of Agriculture, Ministry of Agriculture and Forests)

Note: The data for 'paddy (two dzongkhags targeted)' are for Lhuentse and Mongar dzongkhags.

Over the period of 2004 (when the AREP commenced) to 2009 (when the AREP was completed), the production volume of rice in the two target dzongkhags rose to 170%. However, as rice cultivation was not included in the HRDP and a focus was placed on the cultivation support of horticultural crops, the volume of rice from 2009 to 2015 decreased by 12%, which was still a 50% increase compared to 2004. In the six eastern dzongkhags as a whole, the production volume of rice kept rising after the completion of the AREP, with a 13% increase from 2009 to 2015. While it was difficult to examine whether the outcomes of production support in the two dzongkhags in the AREP directly spread to the entire eastern region, the production volume maintained a positive trend.

As for horticultural crops, the production volume of representative vegetables and fruits of the six eastern dzongkhags were captured. Citrus volume increased by 34% from commencement till completion of the AREP, and increased further after that. As a consequence, the production volume in 2015 was 186% of that in 2004, showing a significant increase. Other major horticultural crops, whose cultivation was supported through the AREP and HRDP, recorded considerable increases in the region as a whole, as shown in Table 7. Moreover, it is estimated that more fruits can be harvested as the time will come when the fruit trees (such as persimmons) planted during the HRDP will start bearing fruits. Therefore, the Overall Goal can be judged to have been achieved.

[HRDP]

The indicators of HRDP's Overall Goal were the following until before Terminal Evaluation.

- Indicator 1: The trained and extended farmers in the project increase their incomes by 80% by 2020 (baseline of Nu8,400).
- Indicator 2: 500 farmers are trained by RNRRDC, Wengkhari and the trained farmers extend their skills to others.

However, the annual income of farmers in the target area of this project was 15,790 ngultrum at the time of Terminal Evaluation, revealing that it had already been exceeding the target value of Nu 15,120¹⁰. Because of this, at the time of Terminal Evaluation, the indicator was revised upward for the ex-post evaluation to be Nu 20,000 by 2020. As for Indicator 2, a total of 508 farmers had already received training, with 80% of them sharing and extending their knowledge to an average of 6.4 farmers at the time of the Terminal Evaluation, also revealing that this indicator had been achieved. This indicator was revised upwards to foster 800 farmers by 2020.

In the ex-post evaluation, a beneficiary survey¹¹ was conducted on some of the farmers trained through the HRDP and the status of increased income was captured. As shown in Figure 1 and 2, 69% of the farmers replied that their production volume had increased after the training, and 70% of the farmers replied that their income had increased. The rate of increased income from the time they were receiving training to the point of ex-post evaluation was 59% on average. It is expected that the income of farmers will continue to rise in consideration of the following factors.

- (1) The farmers trained through the HRDP started feeling a benefit of training in terms of income several years after commencement of the project.
- (2) The number of farmers trained during the one-year and three-month period from 2014 to 2015 in the final stage of the project was as many as 184 (it was 665 for the entire project period spanning 2010 and 2015), and extension activities were being implemented after that period.
- (3) Particularly, more than several years are required for fruit trees to bear fruit and farmers' incomes to increase.
- (4) As stated later, 763 acres of land became newly used for horticulture purposes in FY2015/16 in the entire eastern region.

The income of farmers trained and extended in this project increased 88% between 2010 and 2015 (from Nu 8,400 to Nu 15,790) and furthermore, in the beneficiary survey conducted from January – February 2017, the rate of increased income among the farmers that experienced a rise in income was 59%. Therefore, it is estimated as realistic and achievable that their incomes will rise 27%, from Nu 15,790 to Nu 20,000 between 2015

¹⁰ Nu. 8,400 (baseline value) x 180% (1.8) = Nu. 15,120. Ngultrum (Nu) is a Bhutanese currency unit and is equivalent of Indian Rupee. Nu 1= 1.72 yen (as of the end of May, 2017)

¹¹ In the six dzongkhags covered in the HRDP, 25 trained farmers from each dzongkhag (a total of 150 farmers [25 farmers/dzongkhag x 6 dzongkhags. As the male-female ratio was 69:31, the interview survey was conducted with 100 males and 50 females]). 25 farmers were randomly selected in each dzongkhag from the list of trained farmers. However, when those to be respondent lived very far away, the interviews were limited to an area accessible within 26 days by beneficiary survey assistants. The main questions were changes in production volumes, changes in cultivated varieties, whether joint shipment was done, status of farmer-to-farmer extension, changes in connectivity with markets, whether their market had expanded, changes in income, challenges for production expansion, impacts on the natural environment, and so forth.

and the target year of 2020.

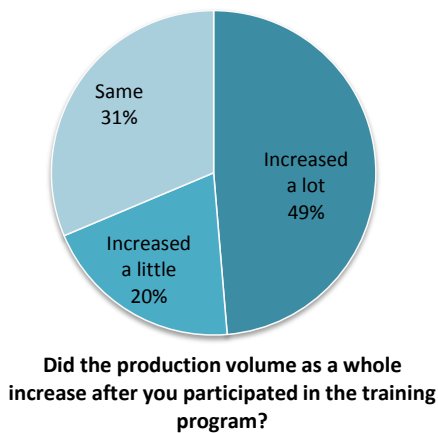


Figure 1: Increase in Crop Production Volume

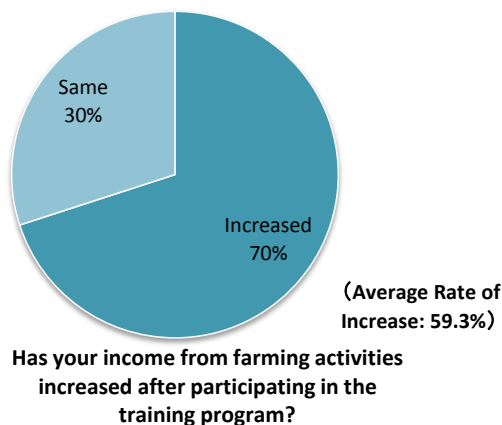


Figure 2: Increase in Farming Income after Training

In the beneficiary survey, the following topics for questions were given and the result shown in the figures below were obtained: Diversification of varieties of horticultural crops after training; Improvement of access through farm road development; Sales of agricultural crops in the market; Cooperation with agricultural extension agents; Extension of knowledge and skills among farmers; Collaboration in marketing activities; and Whether the shipment of vegetables and fruits had increased.

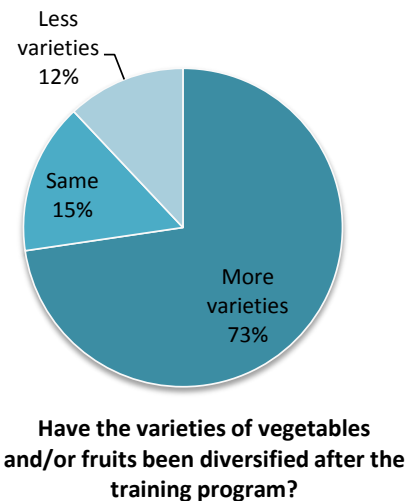


Figure 3: Diversification of Horticultural Varieties

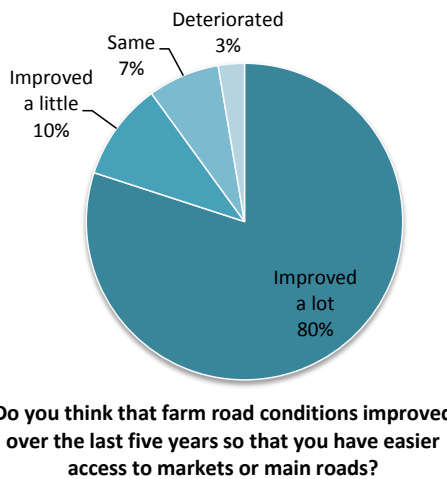


Figure 4: Improvement of Access through Farm Road Development

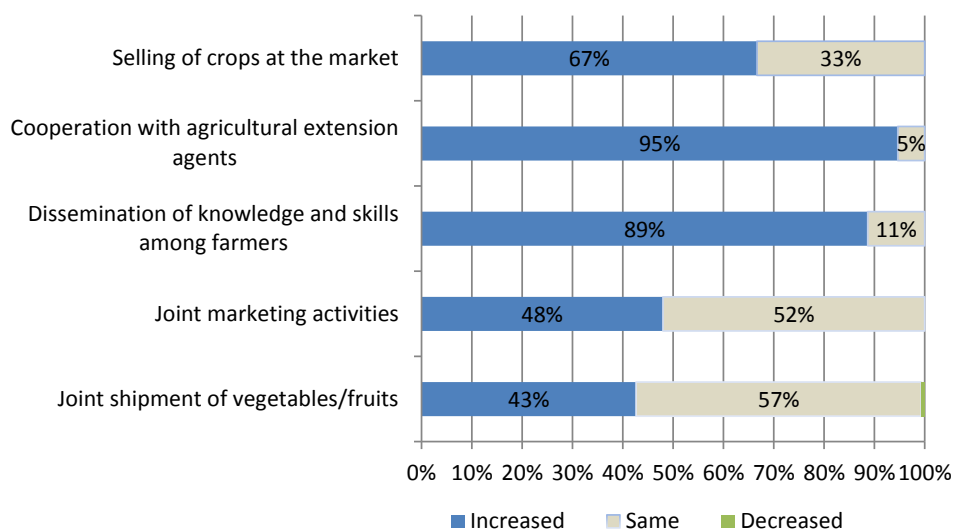


Figure 5: Increase/Decrease in Activities by HRDP

From these results, it was confirmed that many farmers were noticing the effects of the diversification of varieties of horticulture crops and the improvements in access to markets and main roads after project implementation. Also, it was observed that cooperative relationships between agricultural extension agents and farmers had been strengthened and that there were many farmers with increases in sales of crops in the markets. These changes can be said to have been positive impacts through the efforts made in the AREP and HRDP.

Among these changes, the access improvement through farm road development was due to rapid development of farm roads based on the Tenth Five Year Plan (2008-2013), as shown in Table 8. While much of the farm road development was not part of the HRDP¹², this external factor is considered to have contributed to the improvement in access for bringing crops to the markets.

¹² As described in '1.2 Project Outline' related projects, farm road development was implemented under grant aid projects: 'The Project for Improvement of Machinery and Equipment for Construction of Rural Agricultural Road' (2005); 'The Project for Improvement of Machinery and Equipment for Construction of Rural Agricultural Road (Phase 2)' (2010); and 'The Project for Improvement of Machinery and Equipment for Construction of Rural Agricultural Road (Phase 3)' (2016). Road construction equipment procured through these projects have been utilized for farm road development in Bhutan.

Table 8: Length of Farm Road Developed in each Dzongkhags of the Eastern Region

(Unit: km)

Dzongkhag	Before 2008	2008-2013	2013-2014	2014-2015
Lhuentse	4.6	354.8	16.3	22.7
Mongar	2.3	467.3	70.0	42.0
Pemagatsel	No data	256.8	97.4	27.2
Samdrup Jongkhar	No data	193.7	15.7	21.3
Tashigang	No data	647.24	13.0	21.6
Tashi Yangtse	13.0	159.2	10.2	3.9

Source: Data provided by the Implementing Agency

According to the agricultural offices, extension agents and farmers in the six eastern dzongkhags visited during the site survey of ex-post evaluation, what was often heard as positive impacts were that (1) varieties and production volume of vegetables and fruits cultivated through this project increased; (2) agricultural crops could be easily transported, as the farm road was developed through the projects of RGoB; (3) sales of vegetables to nearby schools as major customers enabled stable income and further contributed to the enhancement of the children's nutrition statuses, and so forth.

With regard to the objective of having a cumulative number of 800 trainees set as Indicator 2, the Implementing Agency implemented the 'Post-HRDP Project' after the completion of the HRDP, as stated above, in which activities such as the exhibition of new varieties, distribution of seeds and seedlings, orchard development, diversification and concentration of cultivation, etc. have continued for farmer groups and villages. The number of trainees undergoing systematic training had reached 767 by May 2016, and the objective of 800 farmers is likely to be achieved in 2017 through steadily implementing the project. Furthermore, during the first year of the 'Post-HRDP Project', training programs on vegetable production management and transplanting technologies were implemented for 532 farmers during the field day, farm demonstration and so forth, in addition to the above mentioned systematic training programs.

Based on the above, the AREP has achieved its Overall Goal, and the Overall Goal of the HRDP was largely achieved at the time of ex-post evaluation and is highly likely to be fully achieved by 2020. It is considered that both projects produced a substantially positive impact for the research and extension activities of horticulture in the eastern region. Further evolution of the project effects has been generated through the implementation of the RGoB-funded project after the HRDP and through the utilization of the Outputs in the project of a different donor, showing permeation into the entire region.

3.2.2.2 Status of Project Effects after Project Completion

In the ex-post evaluation, the statuses of the Project Purpose and each Output, whose achievements at the time of project completion were checked in ‘3.2.1 Effectiveness’, were captured and analyzed at the time of ex-post evaluation. The key results are shown in Table 9¹³.

Table 9: Achievement of Output and Project Purpose of the HRDP (at the time of Ex-Post Evaluation)

Output	Achievement of Indicator
Horticulture farming practices and crops in the target area are identified according to production and market potential.	Indicator 1 : It was confirmed in the interview survey at the time of the field study that extension agents and trained farmers continued to use the manuals and texts and have been utilizing them in extending to nearby farmers. In addition, three kinds of extension manuals (avocado nursery production and management, staggered vegetable cropping calendar, processing and product development of fruits, vegetables, and maize) were in the pipeline in 2017 for publication by the Implementing Agency.
Technical training system on horticulture is strengthened in Renewable Natural Resources Research and Development Center (RNRRDC), Wengkhhar.	Indicator 1: Farmers trained in the HRDP continued to practice what they learned (cultivation of vegetables and fruits), and 26 lead farmers were selected and training was being provided by Wengkhhar Center. Indicator 2 and 3: No assessment has been conducted after project completion, but training for extension agents had been implemented every year. It was confirmed in the site survey of the ex-post evaluation (in all six dzongkhags) that the extension agents in each location were visiting their farmers several times a year.
The structure for providing seeds and seedlings is established in RNRRDC, Wengkhhar, nursery farmers, seed growers and National Seed Center (NSC) Yangtse farm.	Indicator 1: A total of 19,828 fruit seedlings and 300kg of vegetable seeds were produced in FY2015/16. Indicator 2: The trained farmers were provided with original seeds, bird nets, seedlings and so on, and were carrying out the activities of the Post-HRDP Project (confirmed through visiting three farmers). Indicator 3: The seed farm is planned to expand as a center which will play the role of a research hub on citrus and pest control
Group for marketing is mobilized and/or formed in collaboration with the Regional Agriculture Marketing & Cooperatives Office (RAMCO), Mongar.	Indicator 1: The percentage of groups undertaking marketing activities after project completion has not been surveyed. However, a project called the ‘Comprehensive Market-Focused Agriculture and Rural Livelihood Enhancement Project’ (hereinafter referred to as ‘CARLEP’) (2015 – 2022 [scheduled]), supported by the International Fund for Agricultural Development (hereinafter referred to as ‘IFAD’), has been implemented, through which efforts were to be made on marketing improvement in cooperation with RAMCO. Also, in the beneficiary survey, 48% of the farmers replied that opportunities to collaborate in marketing activities with neighboring farmers increased (Figure 5).
Project Purpose	Achievement of Indicator
The trained and extended farmers practice appropriate technologies for commercialization of horticulture.	Indicator 1: 75 acres of land for horticultural use increased in FY2015/16, as part of Wengkhhar Center project. Also, 763 acres of land newly came into use for horticultural purposes in the entire eastern region during the same period. (While no concrete land size is indicated, further expansion is expected as the ‘Post-HRDP Project’ is going to be continued until at least 2020.) Indicator 2 and 3: The figures were not known as no surveys had been conducted after project completion. According to the Implementing Agency, trained farmers were actively extending to nearby farmers mainly through the ‘Post-HRDP Project’. In addition, according to the interviews with agricultural offices of each dzongkhag, the number of farmer organizations had been increasing in recent years despite a lack of data, some of which had started processing their agricultural produce.

Source: Information provided by the Implementing Agency and the results of the Beneficiary Survey

¹³ As the status of the AREP at its completion is included in the HRDP, the statuses of HRDP’s Project Purpose and Outputs were captured and analyzed here.

After the completion of the HRDP, the contents and method of training introduced in the HRDP has evolved through the efforts of the Implementing Agency itself as the 'Post-HRDP Project' has been implemented with the RGoB budget. While there are some indicators without data, efforts have been continued so that the vegetables and fruits researched and cultivated at Wengkhhar Center are extended to farmers through instruction and training, then marketed through CARLEP. Further development was observed as the efforts to increase the incomes of farmers through the extension of horticulture promoted in the AREP and the HRDP.

3.2.2.3 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

At the time of HRDP planning, an effect of preventing soil runoff on steep slopes was expected through fruit cultivation.

It was checked in the ex-post evaluation, which showed that according to the Implementing Agency, there was a case in which soil runoff was prevented even during times of heavy rain at locations with steep slopes where landslides had frequently occurred under similar weather conditions after planting fruit trees through this project; though, no formal survey had been conducted.



Photo 1: A slope where soil runoff has been prevented by planting fruit trees (on the right-hand side of the photo, in Mongar Dzongkhag)

Also, according to the Implementing Agency, there were no negative impacts on the natural environment caused by the implementation of either project, and it was confirmed in the beneficiary survey that there were no negative impacts. Therefore, it can be judged that there were no problems.

(2) Resettlement and Land Acquisition

According to the Implementing Agency, neither resettlement nor land acquisition occurred due to this project. Due to the nature of the project and based on confirmation by the Implementing Agency, no resettlement and land acquisition cases are considered to have occurred.

(3) Other Indirect Effects

In the HRDP, it was set at the time of planning that the skill development of women in the eastern region would be promoted upon project implementation.

In fact, the number of farmers who received training at Wengkhar Center from the commencement of the HRDP until May 2016 was 767, of which 237 (31%) were women. In addition, 164 (31%) of 534 farmers that benefited from direct cultivation support to villages were women, and the Implementing Agency instructed female farmer groups on the processing technologies for agricultural produce. As already stated, the proportion of the population operating in the agricultural and forestry industries in Bhutan is 58.0% and the male and female rates (in 2015) was 47.4% males and 52.6% females. Thus, as there are more women, the percentage of female participants in training is comparatively low. However, according to the Implementing Agency, as it is difficult for women to leave their homes for several days to attend training programs at Wengkhar Center, the proportion of men as trainees tends to become higher. Even if men participate in a training course, the benefits can be felt for the entire family. Therefore, women are not disadvantaged in particular and the effects spread to all farmers. In the farms actually visited in the ex-post evaluation, no situation was observed in which women were not enjoying the merit of the project just because of being women. Nevertheless, it cannot be said that activities focusing on the 'development of women's skills' were actively implemented through the HRDP.

As a result of a series of activities occurring from time of the AREP to that of the HRDP, appropriate cultivation technologies suitable for climatic conditions of each location were developed and introduced, and cultivation by many farmers was promoted through systematic training and extension activities. Moreover, marketing of agricultural crops was also implemented through the project, leading to a broad achievement of the project effects. As a result, more varieties of vegetables and fruits were cultivated compared to the time when the project initially started, and a stage has been reached in which the produce has been sold and distributed. Therefore, the Project Purpose of each of the projects as a whole can be said to have been largely achieved. Regarding the Impacts, it is highly likely that all the Overall Goals will be achieved by the target year of 2020, and the indicators of HRDP's Outputs and Project Purpose had been largely achieved at the time of ex-post evaluation or are highly likely to be achieved by 2020. Therefore, it can be considered that both projects have generated significant positive impacts on the research and extension of horticulture in the eastern region.

Based on the above, the effectiveness and impact of both projects are high, given that the Project Purpose and the Overall Goal of each being achieved or likely to be achieved.

3.3 Efficiency (Rating:②)

3.3.1 Inputs

The planned and actual inputs of this project are shown in Table 10.

Table 10: Planned and Actual Input of Each Project

Project	Inputs	Plan	Actual (at the time of completion)
AREP	(1) Experts	3 Long-term Approx. 3 Short-term / year	3 Long-term 4 Short-term
	(2) Trainees received	4 – 5 officers / year (training in Japan, third-country training)	A total of 39 officers (training in Japan) A total of 6 officers (third-country training)
	(3) Equipment	Mini-bus, Agricultural equipment, Surveying equipment)	A total of 277 items, such as 3 vehicles, agricultural equipment, research equipment, etc.
	(4) Local Cost Borne	Unknown	Approximately 45 million yen (construction of the training hall and farm roads, development of a track for tractors, development of 2 gewog offices, etc.)
	Japanese Side: Total Project Cost	A total of 350 million yen	A total of 476 million yen
	Inputs from Bhutan	<ul style="list-style-type: none"> - 23 counterparts (17 from RNRRC-East, 3 each from Lhuentse and Mongar Dzongkhags) - Provision of experts' office and facilities necessary for project activities - Basic project costs, such as utilities charges and domestic communication 	<ul style="list-style-type: none"> - A total of 51 counterparts (32 from RNRRC-East, a total of 19 Dzongdags (Governors), Agricultural officers and Extension agents) - Facilities and equipment (Provision of the office for experts, land, and facilities) - Local cost: 31.46 million ngultrum (approximately 630 thousand US dollars). (Mostly allocated for personnel and transport expenses.)
HRDP	Inputs	Plan	Actual (at the time of completion)
	(1) Experts	3 Long-term 3 Short-term	3 Long-term A total of 10 Short-term

	(2) Trainees received	On horticulture development, agricultural extension model, formation of local specialty, etc.	A total of 53 officers (14 for training in Japan, 39 for third-country training)
	(3) Equipment	Transportation vehicles, etc.	Vehicles, Excavators, Tractors, Agricultural materials, Electric fences, etc.
	(4) Local Cost Borne	Unknown	35 million yen (payment to seasonal workers, training costs, extension materials, equipment, etc.)
	Japanese Side: Total Project Cost	A total of 450 million yen	A total of 359 million yen
	Inputs from Bhutan	<ul style="list-style-type: none"> - Assignment of counterparts: Project Director, Project Manager, Counterparts, Administrative Assistant, Secretary for Japanese Experts, Driver, etc.) - Provision of land, the building, and other materials and equipment needed - Project operation cost (for employment of 10 workers, etc.) - Training costs, such as those for seeds, seedlings and per diems 	<ul style="list-style-type: none"> - Assignment of counterparts: 37 in total - Facilities and equipment (provision of the project office and research farm at Wengkhar Center) - Local cost: 64.4 million ngultrums (project operation cost mainly the salaries and transportation costs of counterparts, including seeds, seedlings and per diem)

Source: Information provided by JICA

3.3.1.1 Elements of Inputs

[AREP]

The number of experts, their expertise, and the items of equipment provided seemed to have been adequate in light of the project contents and implementation conditions. The number of counterparts was the total headcount of the officers involved in the project and a major factor for the substantial increase from the planned number



Photo 2: Training hall at Wengkhar Center developed in AREP

was the transfer of officers to and from other organizations and due to some of their overseas studies during the project period. According to the Implementing Agency, the number of researchers and dzongkhag agricultural officers was sufficient. As there were no troubles in subsequent activities, it is assumed that there were no problems.

After the commencement of this project, farm roads and extension offices were additionally developed as it was considered necessary to develop such farm roads connecting to markets for transporting the agricultural crops whose production volume increased through research and extension activities and to have such an office where farmers could be based and undertake effective expansion of extension activities in the two gewogs in Lhuentse Dzongkhag, selected as model gewogs, given that there were no such extension offices there. These were the major changes from the plan which greatly affected an increase in project costs, as will be stated later. According to the Implementing Agency, market access for farmers improved due to farm road development, and the extension offices functioned effectively as a place to steadily provide training to farmers and to display the crops produced.

[HRDP]

In the HRDP, short-term experts were dispatched as needed. According to the long-term experts at that time, the amount of inputs by short-term experts actually became less than the initial expectation. The counterparts were researchers from research centers, mainly from Wengkhar Center, in addition to the secretary of the Ministry of Agriculture. The number of counterparts was the total headcount of the officers involved in this project and the major factor for the increase was, similarly to the AREP, the transfer of officers during the project period.

It was confirmed that the local cost included the project operation cost and the training

cost, including seeds, seedlings, and per diems.

3.3.1.2 Project Cost

A major factor for the increase in the project cost (Japanese side) for the AREP was, as stated above, the additional needs to construct both the facilities required for training and extension and the part of the farm roads within the project scope of the AREP after the project started. Eventually, the actual cost was 476 million yen, 136% of the planned amount.

On the other hand, the actual project cost for the HRDP (Japanese side) was 359 million yen, 80% of the plan, mainly due to the decrease in the amount of input from short-term experts.

Therefore, while the project cost was within the plan of the HRDP, it exceeded the plan in the AREP.

The project cost of the AREP and HRDP together was 836 million yen, which exceeded the sums of the planned costs of both projects (800 million yen) by 5%.

3.3.1.3 Project Period

The planned and actual periods of both projects are shown in Table 11.

Table 11: Planned and Actual Project Period of Both Projects

	Plan	Actual
AREP	June, 2004 – June, 2009 (61 months)	June, 2004 – June, 2009 (61 months)
HRDP	February, 2010 – February, 2015 (61 months)	March, 2010 – March, 2015 (61 months)

Source: Information provided by JICA

The project period was 61 months respectively for both projects, judged to have been the same as the planned period.

Based on the above, while the project period was within the plan, only the project cost of the AREP exceeded the plan. Therefore, the efficiency is fair.

3.4 Sustainability (Rating:③)

3.4.1 Related Policy and Institutional Aspects for the Sustainability of Project Effects

In both projects, it was aimed to link research and extension activities to improve agricultural productivity and to let the farmers who benefit take advantage of adequate technologies toward commercialization of horticulture in the eastern region of Bhutan. It can be said that the activities toward this objective achieved significant results as a whole. The

policy and institution to sustain the effects were as follows at the time of ex-post evaluation.

- Agriculture is regarded important in ‘Bhutan 2020’ and the ‘Eleventh Five Year Plan (2013-2018), the policies in effect at the time of ex-post evaluation, in the same way as at the time of project completion.
- In a speech made by the King on the National Day in December 2016, the importance of commercial agriculture and agricultural finance as a support for it was emphasized, showing a continued importance in policy aspects.
- RNR-related policies at the time of ex-post evaluation were the ‘RNR Marketing Policy¹⁴’ (2016) and the ‘E-RNR Master Plan’ (formulated in 2016, with 2023 as the target year), in which a systematic promotion of distribution and sales of agricultural crops and a promotion of the introduction of IT into the RNR sector were listed as the directions.

In this way, it was confirmed that there has not been a change in policy directions even at the time of ex-post evaluation, and agriculture has been positioned as an essential industry.

It was seen at the Wengkhar Center that the ‘Post-HRDP Project’ was being implemented – not only in terms of policy aspects but also as a concrete movement – to produce seedlings in the farm of Wengkhar Center and to continue farmer training and extension even after project completion. According to Wengkhar Center and Department of Agriculture of the Ministry of Agriculture and Forests, this project is expected to be budgeted through 2020, which can be highly valued as an effort to institutionalize the research and extension method introduced in the AREP and HRDP.

3.4.2 Organizational Aspects for the Sustainability of Project Effects

The Implementing Agency in charge of sustaining the effects of both projects is the Agricultural Research and Development Center – Wengkhar, positioned as part of the Agriculture Research and Extension Division of the Department of Agriculture under the Ministry of Agriculture and Forests, which remained unchanged during the times of the AREP and HRDP. Wengkhar Center is an organization with divisions of administration and research & development, having 66 staff members under its program director. The Research and Development Division has five sections such as the horticulture division, agriculture system division, and so forth. While personnel transfer of staff members has been done on a regular basis, the program director and several deputy chief researchers have remained in Wengkhar Center during and after the project period.

Wengkhar Center is an organization to undertake research and development of agricultural cultivation and often collaborates with agricultural offices and extension agents of each dzongkhag in the eastern region in charge of agricultural promotion, mainly in extension activities to farmers. For example, it was seen that activities were carried out in collaboration

¹⁴ It had not been finalized and was still in a draft form at the time of ex-post evaluation.

with RAMCO for distribution and sales. In addition, it was confirmed at the time of field survey that the structure to provide seeds and seedlings necessary for extension had been established.

In the HRDP, demonstration farmers to be in charge of further extension in each village area were appointed among the trained farmers. These farmers were receiving the visits because of their success as farmers in the region when Wengkhar Center deployed extension programs during the ‘Post-HRDP Project’ and were distributing seedlings and so on to nearby farmers. Additionally, IFAD has been implementing CARLEP to support distribution, etc. of agricultural crops, the program for which the extension method introduced through the AREP and HRDP has been adopted and implemented.

Therefore, the position and organizational structure of Wengkhar Center has not changed much, and the structure to implement technical training has been established with the experiences and number of staff; and the ‘Post-HRDP Project’ and CARLEP have been implemented steadily. Also, the method of appointing demonstration farmers to extend their knowledge to nearby farmers in each location has been received as an effective one by the Implementing Agency, agricultural offices of each dzongkhag, extension agents, and trained farmers, leading to sustainable efforts as seen through its adoption in CARLEP.

Based on the above, there are no problems in terms of the structure to sustain the effects of the AREP and HRDP by Wengkhar Center.

3.4.3 Technical Aspects for the Sustainability of Project Effects

Skills of the staff members increased substantially through the AREP and HRDP, and a similar program was being deployed independently through the ‘Post-HRDP Project’ and CARLEP at the time of ex-post evaluation. According to Wengkhar Center, it builds up the experiences of new staff members by having them participate in the training programs for extension agents and farmers and through on-the-job-training, and there were no technical issues found in the skills of the staff of Wengkhar Center. It was observed that the Center was pursuing further technical improvements through the implementation of their own projects after the completion of the HRDP and the provision of training to extension agents of each gewog on a regular basis.

The manuals developed in the HRDP were being utilized in training programs at Wengkhar Center, being distributed to



Photo 3: Training conducted in the ‘Post-HRDP Project’

dzongkhags in and out of the eastern region by the Implementing Agency, and being used by extension agents in the agricultural technology transfer and farmer training.

The major equipment procured through both projects was effectively being utilized. Procurement of spare parts was also undertaken by the officer in charge and there was no problem with it.

Therefore, no concerns were observed in terms of the technologies needed to sustain the effects generated in both projects.

3.4.4 Financial Aspects for the Sustainability of Project Effects

In order to sustain the effects generated in both projects, it is necessary to secure the budget to deepen the link between research and extension of cultivation and to promote commercialization. Situations of the budget of Wengkhar Center since FY2010/11 are shown in Table 12.

Table 12: Budget of Wengkhar Center

(Unit: million ngultrums)

Financial Year	Ordinary budget	Special budget for 'Post-HRDP Project'	Total
2016/17	56.78	11.79	68.56
2015/16	47.21	8.53	55.74
		Budget for HRDP	
2014/15	24.22	16.03	40.26
2013/14	36.75	12.37	49.12
2012/13	23.91	11.78	35.69
2011/12	22.64	12.66	35.30
2010/11	21.20	11.56	32.77

Source: Information provided by the Implementing Agency

As stated above, the 'Post-HRDP Project' has been implemented for a scheduled period of five years, from the time of HRDP completion to FY2020/21, in order to expand the effects of the HRDP, and Nu 8.53 million of the special project budget was allocated in the first financial year (FY2015/16) and Nu 11.79 million in the following year. According to Wengkhar Center, there have been no obstacles in their activities. Also, IFAD-funded CARLEP will be providing support to expand and support various activities of Wengkhar Center at the scale of 31.5 million dollars during a period from 2015 to 2022, through which promotion of market-oriented agricultural production, establishment of value chains, improvements in marketing, and so on will be implemented.

Regarding the financing method in case a deficit balance within the financial year is

expected, the Center commented that a budget from other donors or the government, with similar project objectives, will be utilized, or an advance payment of budget or an advance for construction work to be received will be allocated.

Based on the above, it was confirmed that Wengkhari Center has the budget available to conduct certain activities in the 'Post-HRDP Project' and that CARLEP was being implemented. As the activity expenses have been budgeted to further expand the activities of the AREP and HRDP, it can be said that financial sustainability has been ensured.

The significance of agriculture continued to be indicated up to the time of ex-post evaluation, and a project succeeding the HRDP has been planned and implemented, all of which shows that the sustainability in terms of policy and institutional aspects is high. No problems were found in organizational aspects, and the skills of the staff members improved through the AREP and HRDP, which have reached a level that will allow staff to expand by themselves. In financial aspects, no particular issue was observed as the budget has been secured every year.

In light of the above, no major problems have been observed in the policy background and the organizational, technical, financial aspects. Therefore, sustainability of the project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The AREP and the HRDP were the collective projects by which horticulture as a source of revenue was promoted through improvements in the mechanism of agricultural research, dissemination, and marketing in the six dzongkhags in the eastern region of Bhutan where agricultural development was lagging and poverty rates were high. These projects supported agricultural promotion, poverty reduction, and correction of regional disparities, which had been consistently positioned as priority areas in Bhutan, and were in line with the development plans and development needs of the country. They were also consistent with Japan's ODA policy at the time of planning which had a focus on supporting rural income improvement and rural life improvement through agricultural development; and, the relevance of this project is high. The Project Purpose was judged to have been largely achieved as it was observed that cultivation by many farmers was promoted, and marketing activities became more vibrant through implementing these projects. The achievement of the Overall Goal (target year of HRDP: 2020) is also expected as various activities have continued. Therefore, the effectiveness and the impact of these projects are high. The efficiency is fair as the project cost of AREP exceeded the plan though the project periods of both projects were within the plans. With regard to the sustainability of the effects generated by both projects, no major problems were observed in the policy background and the organizational, technical and financial aspects. Therefore, the

sustainability of the projects' effects is high.

In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

The continuation through the 'Post-HRDP Project' of the research and extension mechanisms established through the AREP and HRDP has led to further advancement of agricultural promotion and an income improvement of farmers in the eastern region. It is important for Wengkhari Center to further promote an increase of agricultural production and its diversification, processing of agricultural crops and the development of sales channels inside and outside the country through utilizing the effects of both projects in cooperation with dzongkhag agricultural offices, extension agents of each gewog, RAMCO, and so forth, and to continue its efforts in connecting to agricultural promotion and to employment creation in the eastern region.

4.2.2 Recommendations to JICA

The research and extension mechanism established through the AREP and HRDP should not be an outcome restricted only to the eastern region but can be considered for expansion to other regions. In fact, in the technical cooperation project, 'Integrated Horticulture Promotion Project in the West Central Region', commenced in 2016 based on this idea, identification and development of suitable crops at suitable locations and a practical outreach program, etc. have been implemented by utilizing the experiences from the AREP and HRDP. In said project, it is desirable, through considering a different structure and background of the Implementing Agency, to implement the project in a way that farmers, that is, the final beneficiary, will be able to feel the effects of the diversification of varieties, improvements in the quality of agricultural produce, and the increase in production and income through project implementation, in the same way as that in the AREP and HRDP.

4.3 Lessons Learned

Importance of establishing a structure within an organization to promote activities

The promotion and support for horticulture in the eastern region of Bhutan was provided for 14 years through the dispatch of an individual expert, the AREP, and the HRDP. As a project in the agriculture sector dealing with nature, many processes and much time were required to promote 'research → cultivation (production) → extension (expansion) → distribution (commercialization)' regionally. However, it was possible to steadily proceed with various activities as the people concerned recognized the merits at each stage. In addition, the counterparts, who played central roles, were engaged in both projects at Wengkhari Center for

many years and were to lead the 'Post-HRDP Project' and CARLEP after completion. Both projects made a contribution in establishing a model of research and extension activities at Wengkhar Center.

In this way, activities and the structure for promotion were positioned as beneficial within the organization, which became the foundation of Wengkhar Center as the experts had instructed and cooperated steadily and as the outcome could be felt by the people concerned. As a result of having the people concerned sharing the common view, the effects of concepts and methodologies were accumulated within the organization. When JICA plans a similar project inside or outside Bhutan, or when the RGoB expands a similar project in the country, it is desired to formulate such plans by sufficiently considering (1) steady implementation through recognizing the merit of each activity and (2) the existence of key counterparts who understand all processes therein. (It is desirable they be assigned to the position as long as possible, or that their successors be promptly secured even at the time of personnel transfer and be handed the tasks smoothly). With this process, concepts and methodologies will be accumulated within the organization, leading to the continuity of activities and the achievement of the overall goal.

End

Changes in Relationship and Mental Health of Farmers in the Rural Community in the Eastern Region of Bhutan through the Implementation of the AREP and the HRDP

The two projects evaluated in this study were implemented in the eastern region of Bhutan for 10 years in total, and that total becomes as many as 14 years when the dispatch of an independent expert prior to these projects is added. In this project, because the method of transferring cultivation technologies learned in training programs from trained farmers to other farmers was being adopted, it was anticipated that through a series of these projects in the six dzongkhags in the eastern region of Bhutan, there could be some impacts besides those of increased volume and income from agricultural production among farmers. Therefore, an analysis, especially of changes in community relationship and the mental health of farmers, was conducted.

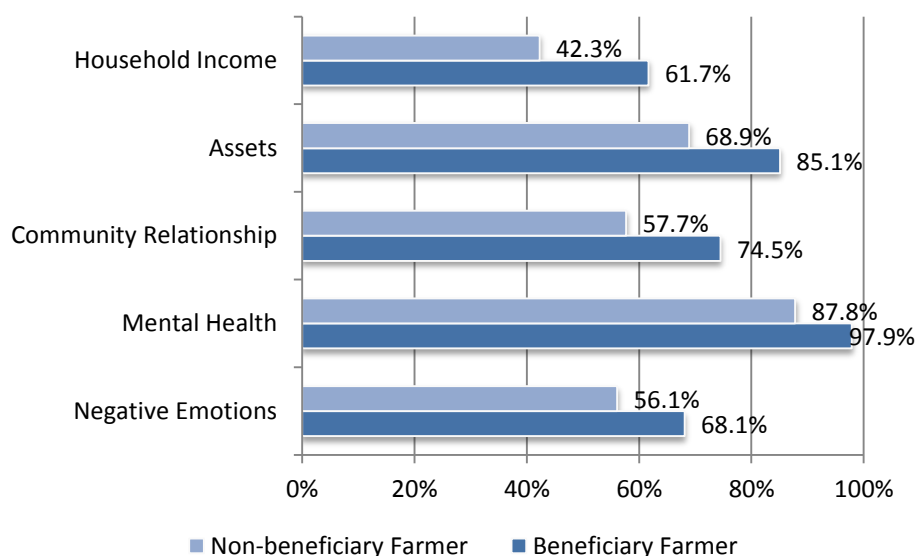
With regard to the social impact of this project on the rural society in the eastern region of Bhutan, an impact survey¹⁵, which JICA conducted with the Centre for Bhutan Studies in 2016, has summarized the results of interviews¹⁶ with beneficiaries of the HRDP (47 households) and non-beneficiaries (196 households).

The major differences between beneficiary farmers and non-beneficiary farmers among the 33 indicators of GNH¹⁷ were mainly found in 'household income', 'assets', 'community relationship', 'mental health' and negative emotions, and it was revealed that the beneficiary farmers had higher sufficiency as shown in Figure 1.

¹⁵ 'Fruits of Happiness: Impacts of Horticulture on Gross National Happiness in Mongar, Bhutan'

¹⁶ However, the target area of the survey was limited to Mongar Dzongkhag.

¹⁷ Gross National Happiness. A concept advocated by the 4th King of Bhutan in the 1970s which placed importance on the spiritual richness of each national while making consideration for the traditional society and culture, the environment, as well as economic and materialistic richness. There are nine domains with which to measure GNH: psychological wellbeing; health; education; time use; cultural diversity and resilience; good governance; community vitality; ecological diversity and resilience; and living standards, and 33 indicators are set under these domains.



Source: Created from “Fruits of Happiness: Impacts of Horticulture on Gross National Happiness in Mongar, Bhutan”

Figure 1: Levels of Sufficiency among the Beneficiary Farmers of and Non-Beneficiary Farmers¹⁸ of the HRDP

Particularly, the levels of sufficiency in the community relationship (the beneficiary farmers’ trust in neighbors and sense of belonging to the community) were 74.5% among the beneficiary farmers and 57.7% among the non-beneficiary farmers, revealing that beneficiary farmers had an approximately 17 points higher level of sufficiency. In the HRDP, extension activities were incorporated—through which beneficiary farmers were to provide instructions on cultivation technologies and seedlings and furthermore—to lead the establishment of a farmers’ organization and an expansion of joint marketing activities, both of which were considered to have been the factors for the higher sufficiency ratio among the beneficiary farmers. Also, questions on the degrees of improvement among the GNH’s nine categories were asked to beneficiary farmers and it was indicated that a high percentage of beneficiary farmers (95%) felt that their mental condition had improved as well.

However, regarding these two indicators, no concrete cases or information about the higher values for the beneficiary farmers were sufficiently presented in the report. Therefore, this ex-post evaluation conducted interviews¹⁹ with farmers in a total of four model gewogs in Mongar Dzongkhag and Lhuentse Dzongkhag where both the AREP and the HRDP were implemented. In the interviews, the following topics were checked:

¹⁸ The significance level of 5 indicators shown in Figure 1 is all at 5%.

¹⁹ Farmers from 4 model gewogs in the AREP who were active in expanding agricultural production and in extension activities among farmers and who were also recommended by agricultural extension agents as the ones who could attend the meetings at the time of the evaluator’s visit. Five farmers each from respective gewogs participated in the meetings.

- (1) What kinds of factors contributed to the improvement of community relationships and mental health conditions?
- (2) How did the farmers feel about agricultural activities before, during, and after the series of projects?

Among these questions, (1) was to reveal the factors that contributed to the improvement in the social aspects and (2) was to confirm in further detail how such feelings changed over time as both projects, the AREP and HRDP, were implemented.

As for (1), the major reason for the improvement in community relationship was the increase in the number of opportunities for collaborative farming activities among farmers through extension activities and in the number of cases of joint agricultural activities and shipping as the agricultural production activities became more vibrant. During and after the project, the relationship among farmers became closer through a number of collaborative agricultural activities, which led to their higher level of sufficiency, coupled with the generated effects. Also, through the increase and stabilization of opportunities for cash income, it was observed that farmers became more mentally stable compared to their stability in the pre-project period. With the onset of the economic aspect, that is, increased cash income, other positive aspects were clearly observed, such as a reduction of anxieties over economic aspects and education opportunities for children in the future, and an acquisition of confidence in agricultural activities and so forth.

As for (2), the mechanism for how farmers were motivated to work with heightened activity was grasped by using the “Self-Determination Theory”, a theory founded in the social psychology field. In the Self-Determination Theory, it is said that fulfilling three types of basic needs—Autonomy, Competence, and Relatedness²⁰—facilitate spontaneous motivation. As observed through the group interviews with farmers (as shown in the table on the last page), they were passive as they could not be certain of their futures at the beginning of the AREP given that there were no options other than those in agriculture, but they became gradually more confident from their agricultural activities provided through the target projects and their active behavior (Autonomy) could be observed. The outcome became evident in the form of increased agricultural production in terms of varieties and volume (Competence) and it was confirmed that farmers had built up cooperative relationships with each other in farming activities and other events in the rural area (Relatedness).

Through this analysis, it was confirmed that the targeted projects had produced positive impacts regarding improvements in community relationship and mental health, which were the indicators of GNH. According to the survey conducted by the Centre for Bhutan Studies, it became clear that relatedness and mental stability of the beneficiary farmers were at a level

²⁰ JICA, 2016, “Genba no Koe kara Himotoku Kokusai Kyoryoku no Shinrigaku (Psychology of International Cooperation Clarified from the Voices of the Field)”

higher than that of non-beneficiary farmers. A beneficiary survey in the ex-post evaluation also showed that knowledge and skills were disseminated among farmers. Furthermore, it was confirmed that farmer organizations were established and joint shipping and marketing activities by the farmer organizations became more vigorous, all of which indicates that “Autonomy” and “Competence” among farmers had been established, thus leading to enhanced “Relatedness”. In this project, activities related to each of these three elements have been undertaken and it can be said that the relatedness and sufficiency of beneficiary farmers were raised in stages. In addition, the result obtained in the survey above was supported by the detailed interview survey with farmers in that their deeper confidence in agriculture as an industry was not limited to economic benefits.

Therefore, it can be said that relatedness among farmers became stronger and their psychological wellbeing improved through the AREP and the HRDP. Especially, many positive opinions about the future of agriculture were obtained, which shows that the activities and approaches of the targeted projects were accepted in a way which the rural society of the eastern region of Bhutan could feel the economic and social benefits. This approach is considered to be applicable to other areas in Bhutan with slight adjustments according to the characteristics of each region.

(Reference) Change in Farmers' Motivation based on the Self-Determination Theory

	Before AREP (- 2004)	At the time of the completion of AREP and the commencement of HRDP (Around 2010)	After HRDP (At the time of ex-post evaluation (2017))
Autonomy ²¹	<ul style="list-style-type: none"> • Agriculture was difficult and considered an unrewarding activity. There were various limitations, such as no materials or cultivation technologies as well as poor market access, etc. • It was not a job for our children to take up due to social and economic reasons. 	<ul style="list-style-type: none"> • With training and mechanization, I started feeling more empowered in agricultural activities (thanks to RNRDC, Wengkhhar). • Agriculture started to become an industry with economic gains as well as a way of subsistence. 	<ul style="list-style-type: none"> • With adequate infrastructure, training and support, agriculture can be a profitable industry and it is important for the country's development. • It can reduce the number of issues present, such as rising unemployment and food security challenges. • I want to expand my farmland for cultivation as there is surely a market to sell my crops.
Competence ²²	<ul style="list-style-type: none"> • There were few varieties for cultivation and no destinations to sell agricultural crops. There was also a problem of food shortage. • It was difficult to feel the achievement of my agriculture activity. 	<ul style="list-style-type: none"> • Varieties for self-consumption increased and the menus of meals improved. • Vegetables and fruits became available for sale in the market. • Cultivation skills improved and I became able to share my knowledge with neighboring farmers. 	<ul style="list-style-type: none"> • By implementing or applying cultivation methods and by using farming machines, whose operation skills were learned through the training programs, the production volume has increased. • Farmers became able to sell enough vegetables and fruits and save money so that they could invest in light agriculture machinery. • With the continuous support from Wengkhhar Center, the production volume has increased further.
Relatedness ²³	<ul style="list-style-type: none"> • Extension agents only distributed seeds, etc. • No joint activities were taken as each farmer was facing his/her own difficulties. 	<ul style="list-style-type: none"> • Farmers could consult someone in the community about cultivation and so forth. • Researchers of RNRDC, Wengkhhar visited the farmland and gave on-site advice to farmers. • Farmers formulated a joint sales group and supported each other's farm work. 	<ul style="list-style-type: none"> • The extension model became popular and has been used for various agricultural extension activities. • Farmers can contribute more and the community events or religious events in the village have become more vibrant. • Trained farmers share the results with other farmers.

Note: Opinions frequently heard in focus group interviews with farmers were extracted and described.

Source: results from focus group interviews

²¹ A sense of self-selection for his/her action to behave proactively. The interviews with farmers were on questions such as "I feel that farming is fun"; "I want to be better at farming"; and "I found value in agriculture".

²² A sense of desire to achieve something. The interviews with farmers were on questions such as "I became able to produce more farming products"; "I could see the achievement of my activities"; and "I feel that my knowledge and skills have improved".

²³ A sense of desire to connect to others and build a mutual trust. The interviews with farmers were on questions such as "I became trusted by neighboring farmers"; "Neighboring farmers and I became more friendly"; and "I became of service to the community".