

Country Name	Project for Improvement of Machinery and Equipment for Construction of Rural Agricultural Road (Phase 2)
Kingdom of Bhutan	

I. Project Outline

Background	In Bhutan, the majority of the people resided in the rural area and agriculture was a key industry. However, the whole country is located in the mountainous terrain and the agricultural land per farming household is quite small, and thus the agricultural income was limited. Another issue in the rural area was the outflow of the young generation to the urban area, which caused labor shortage and aging in the rural area. Under these circumstances, improving rural roads was very important for efficient agricultural work and shipping of agricultural products to the market, besides increasing productivity through mechanization, in order to increase food self-sufficiency and agricultural earning. Most of the machinery and equipment of the Department of Agriculture was old and insufficient and thus could not meet the needs of request of rural road construction.				
Objectives of the Project	To construct rural agricultural roads, by procuring necessary machinery and equipment for road construction.				
Outputs of the Project	<ol style="list-style-type: none"> 1. Project Site: Bhutan (whole of the country) 2. Japanese side: Provision of grant for procurement of a range of machinery and equipment for road construction: Hydraulic excavators, jack hammers, air compressors, etc. 3. Bhutanese side: Tax exemption, operation cost for the Central Management Unit (CMU), etc. 				
Ex-Ante Evaluation	2009	E/N Date	19 January 2010	Completion Date	3 March 2011
Project Cost	E/N Grant Limit: 597 million yen, Actual Grant Amount: 482 million yen				
Implementing Agency	Ministry of Agriculture and Forests (MoAF), Department of Agriculture (DOA)				
Contracted Agencies	Katahira and Engineers International Inc., Toyota Tsusho Corporation				

II. Result of the Evaluation

1 Relevance
<p>This project has been highly consistent with Bhutan's development policy at the time of both ex-ante and ex-post evaluation. Construction of rural roads and infrastructure is specified as one of the priority issues in the 10th Five-year Plan (FYP) (2008-2013) and 11th FYP (2013-2018). The project has also been highly consistent with development needs for construction of rural roads for efficiently transporting farm product to the market at the time of both ex-ante and ex-post evaluation. Also, this project was consistent with JICA's priority programs at the time of ex-ante evaluation, which supported agriculture and rural development in Bhutan. Road construction was considered as one of the programs for economic infrastructure development.</p> <p>Therefore, relevance of this project is high.</p>
2 Effectiveness/Impact
<p>All of the procured equipment has been utilized to the time of ex-post evaluation, and the project has achieved its objective of "construction of rural agricultural roads." As shown in the following table, a total of 1,555.4 km of rural agricultural roads were constructed during the period of the 10th FYP (2009-2013). Among this achievement, 940.5 km of rural roads were constructed with the equipment procured by the project against the planned length of 625 km, although the achievement was less than the targeted in 10 among the 20 Dzongkhags¹ due to the lack of the fund to pay for CMU machines. The country-level target set in the 10th FYP was achieved, although road construction with the existing equipment including those procured by the project (Phase 1) was not performed as planned². Besides, 2,229km of rural roads were constructed by contracting out to the private sector, which surpasses the target³.</p> <p>The project has also contributed to improvement of work efficiency; The average number of the sites where repair was monthly conducted with the procured mobile workshop van increased from 5 in 2008 to 12 in 2013. Therefore, wasting time caused by machinery failure was reduced.</p> <p>As for impacts, the following positive impacts have been observed as expected at the time of ex-ante evaluation. First, there has been drastic reduction of time for shipping of agricultural products. When there was no road to the main towns in Samtse Dzongkhag in 2009 (before the project), harvested oranges were transported on horse and the harvest, collection, transport and selling of oranges took 2-3 months in total. After the roads were constructed, the above-mentioned time has been reduced to one month. In another Dzongkhag of Zhemgang, it took six days to ship oranges to the town, but it takes just two days at the time of ex-post evaluation. Second, besides the reduction of shipping time, improved access to the main town increased the motivation for cultivating cash crops such as cardamom, ginger, oranges and betel nuts, which were not much cultivated before. The field survey revealed that the farm area and crop types have increased along the improved farm roads. For example, The production of gingers in Samtse Dzongkhag in 2011 was 2,359 ton and it increased to 2,555 ton in 2013. Third, improved roads have brought the rural residents an easier access to public services. The enrollment rate in the rural area at the primary level increased compared to before the project, and improved roads are one of the factors for this, according to</p>

¹ A Dzongkhag is an administrative and judicial district of Bhutan. Bhutan is composed of 20 Dzongkhags. Dzongkhags are divided into Gewogs.

² Road construction with the existing equipment was not performed as planned in 14 among the 20 Dzongkhags,

³ Road construction contracted to the private sector was not performed as planned in 4 among the 20 Dzongkhags,

CMU. In Dzongkhags of Bumthang, Paro and Punakha, commuting time to the primary school has been reduced from 1-2 hours to 30 minutes. Also, improved roads and better access to rural areas contributed to accelerating the construction of school facilities. With regard to the access to health services, time for reaching the Basic Health Unit or Hospital has been reduced drastically. In Samste Dzongkhag, time to the hospital was reduced from two days to three hours.

Besides, unexpected positive impacts have been observed. Via improved roads, government officers have come to rural areas more often for monitoring of development activities and meeting with the people. And, infrastructure work including drawing electricity lines has been performed more safely, easily and timely.

There is one slight negative impact. Work of road construction in the mountainous steep area has caused a few small landslide cases which sometimes cause problems of run-off water but no substantial damages to the residents' area. No other negative impact has been observed, including those on the natural environment either of land acquisition and resettlement. On the other hand the land value in rural areas has increased which is considered a positive impact.

Therefore, effectiveness/impact of this project is high.

Quantitative Effects

Indicator		Year 2008 (before the project)	Year 2009-2013 (Target in 10 th FYP)	Year 2009-2013 (Actual in 10 th FYP)
Length of rural roads constructed by DOA (km)	with the equipment procured by the project	0	625	940.5
	with the existing equipment (including those procured at the phase 1)	n.a.	875	614.9
total		n.a.	1,500	1,555.4
(supplementary information) Length of rural roads constructed by contracting out to the private sector		n.a.	1,764	2,229

(Source) CMU.

3 Efficiency

The outputs of the project were produced as planned, and both the project cost and time were within the plan (ratio against the plan: 80% and 100%, respectively).

Therefore, efficiency of this project is high.

4 Sustainability

The operation and maintenance (O&M) of the procured equipment by the project have been carried out by CMU of DOA. The implementation structure is sustained in the way which was considered desirable at the time of ex-ante evaluation, with a sufficient number of technical staff being allocated. The responsibilities and roles are clearly demarcated among DOA, CMU and Dzongkhag offices. The number of the staff for the Engineering Section of DOA is sufficient. It increased from 16 in 2009 to 23 in 2013, among which one is assigned especially to deal with CMU-related issues. From 2009 to 2013, the total number of CMU staff for O&M increased; Staff at the two regional branches increased (20 to 51), while the central staff decreased (74 to 53). For O&M of the procured equipment, it was planned that 25 operators and 9 drivers be employed and actually 40 operators and 16 drivers have been employed, which is sufficient. However, at the Dzongkhag level, the number of the Engineering Section staff is not sufficient, which, however, does not influence road construction much as that section provides support only for surveying and planning for farm road construction. Farmers were expected to perform minor maintenance of rural roads to the technically and financially possible extent, and major problems such as land slide and road gradation are dealt with Gewogs or Dzongkhags.

Regarding the technical aspect, the training system has been established. Training has been given to the mechanics and operators who newly have joined CMU since 2009. Also, some CMU staff from the workshop section participated in the training in Japan in 2011 to learn trouble-shooting of machine/electrical wiring check-ups and function of hydraulics. Manuals for the procured equipment have been used at CMU. Thus, the technical level of CMU is sufficient, according to the Engineering Division of Trashigang Dzongkhag. The Engineering Section of Dzongkhag offices is responsible for surveying, planning and estimating road construction, and it has kept sufficient techniques.

With regard to the financial aspect, the implementing agency has no problem in covering maintenance costs. CMU has almost doubled its budget and expenditure until the time of ex-post expenditure (Budget: 39 million Nu in FY2007-08 to 72 million Nu in FY2013-14; Expenditure: 39 million Nu in FY2007-08 to 62 million Nu in FY2013-14). While the total expenditure for FY2013-14 decreased from the previous year, more expenditure for the maintenance was assured. Before the project, the necessary cost for construction of 1,500 km in the 10th FYP was estimated 150 million Nu. Referring to the expenditure of the last five years, it can be assumed that CMU has had sufficient expenditure. Each Dzongkhag assures the fund for road construction, depending on its prioritization every year.

So as to the current status of O&M of the equipment, there is no problem. Daily check-up by the operators and minor repair by the mechanics are performed on the construction site. For major repair, mobile workshop vans come to the site. The more rural roads have been constructed, the more extensively the equipment has been utilized. To deal with this, CMU has increased the maintenance frequency. On-site maintenance is usually monitored by CMU regional branches, and on the monthly basis the CMU head quarter monitors the branches regarding equipment management (monitoring and planning for repair/replacement), inventory control of spare parts and compilation of progress reports. CMU's work is supervised by DOA annually. Spare parts are stocked by CMU, and there is no difficulty in purchasing and restocking them. As a result, all of the procured equipment has been utilized without any problem to the time of ex-post evaluation.

No problem has been observed in the structural, technical, financial aspects and the current status of operation and maintenance. Therefore, sustainability of this project effect is high.

5 Summary of the Evaluation

This project has largely achieved its objective of “construction of rural roads,” as more rural roads were constructed than the targeted in the 10th FYP and the procured equipment has been fully utilized to the time of ex-post evaluation. Besides, several positive impacts have been observed, such as increased agricultural products, increased efficiency of agricultural works, easier access to public services, etc., while one minor negative impact of landslide has been reported. Therefore, effectiveness/impact of this project is high.

As for sustainability, the implementing agency has no problem for institutional, technical and financial sustainability and in the current status of O&M.

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

III. Recommendations & Lessons Learned

Recommendations to implementing agency:

- None.

Lessons Learned to JICA:

- None.



Farm road under construction



Farm road construction site