Republic of the Philippines

FY 2016 Ex-Post Evaluation of Japanese Grant Aid Project

"The Project for the Bridge Construction for Expanded Agrarian Reform Communities Development, Phase II (Umiray Bridge)"

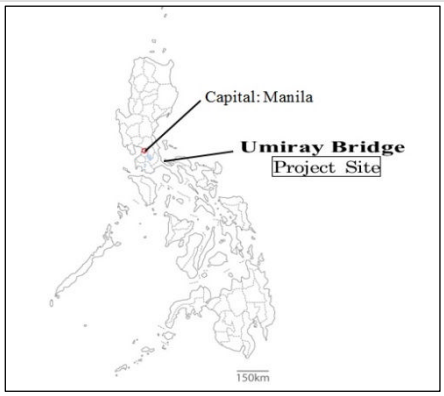
External Evaluator: Kenichi Inazawa, Octavia Japan Co., Ltd.

0. Summary

This project constructed a bridge over the Umiray River at the provincial boundary of Aurora Province and Quezon Province in Luzon Island. The construction aimed to realize safe and smooth traffic and improve efficiency in transportation of goods in the agrarian reform communities (hereafter referred to as "ARCs"); thereby contributing to the social and economic development in the region. With regard to relevance, the Government of the Philippines is aiming to improve agricultural productivity in the ARCs as espoused in its *Philippine Development Plan (2011-2016),* which also highlights the strategic development of transport infrastructures. Simultaneously, the Umiray Bridge, constructed under this project, plays an important role in facilitating smooth traffic access between Quezon and Aurora provinces in Region IV-A and Region III, respectively. Therefore, its relevance is high. Both the project cost and the project period fell within the original plan; thus, efficiency of the project is high. In terms of effectiveness and impact, the time required to cross the Umiray River has significantly reduced since the completion. Traffic has not been interrupted, even when the water level of the Umiray River rises due to typhoons and heavy rains. In addition, the beneficiary survey confirmed that this project is supporting improvements of agricultural productivity and contributing to the vitalization of the local economy. Thus, effectiveness and impact of this project are high. No major problems have been observed in the institutional, technical, financial aspects and current status of the operation and maintenance system. Therefore sustainability of the project effects is high.

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

1. Project Description



Project Location


Constructed Umiray Bridge and Access Road

1.1 Background

In the Philippines, lack of infrastructure development such as roads and bridges in the ARCs was a critical issue. In particular, since the eastern region of Luzon Island was prone to typhoons that are usually generated in the Pacific Ocean, sudden swelling of rivers due to heavy rainfall occurred frequently at Umiray River. For example, during the flood in 2004, 100 houses situated along the banks were washed away. The flood also killed 135 people, while 104 people were injured and 56 people went missing in Dingalan Municipality, Aurora Province. The Umiray River is flowing down along the boundary within both Barangay Umiray[1] in Dingalan Municipality, Aurora Province and Barangay Umiray in General Nakar Municipality, Quezon Province. Since there was no bridge at the site, using a small boat (hereafter referred to as "bangka") was the sole way to cross the river. Some areas in the neighboring communities used to be isolated when the Umiray River was over flooded. Thus, there was an urgent need to establish safe and smooth traffic flows in the ARCs, improving the accessibility and stabilizing safety in the areas. Based on this situation, the Government of the Philippines requested the Japanese Government a grant aid project for constructing the Umiray Bridge.

1.2 Project Outline

The objective of this project is to realize safe and smooth traffic and improve efficiency in transportation of goods in the ARCs, by constructing a bridge over the Umiray River at the provincial boundary of Aurora Province and Quezon Province in Luzon Island, thereby contributing to the social and economic development in the region.

[1] This barangay is located within both the Dingalan Municipality and General Nakar Municipality.

G/A Grant Limit / Actual Grant Amount	1,394 million yen / 793 million yen
Exchange of Notes Date /Grant Agreement Date	March 2012 / May 2012
Executing Agency	Department of Agrarian Reform
Project Completion	January 2014
Main Contractor	Shimizu Corporation
Main Consultant	CTI Engineering International Co., Ltd.
Basic Design	February to December 2008
Related Projects	【Grant Aid Project】 "The Project for the Bridge Construction for Expanded Agrarian Reform Communities Development" (2009) "The Project for Development of Agrarian Reform Communities in Marginal Areas" (2001) 【ODA Loan Project】 "Agrarian Reform Infrastructure Support Project (I)-(III)" (FY1995, 1999, 2007) 【Other Donors' Cooperation】 "Agrarian Reform Community Project" (Asian Development Bank, 1999) "Agrarian Reform Community Project (2nd phase)" (World Bank, 2008)

2. Outline of the Evaluation Study

2.1 External Evaluator

Kenichi Inazawa, Octavia Japan Co., Ltd.

2.2 Duration of Evaluation Study

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

Duration of the Study: August 2016 - November 2017

Duration of the Field Study: November 26 - December 8, 2016

March 22 - 29, 2017

3. Results of the Evaluation (Overall Rating: A[2])

3.1 Relevance (Rating: ③[3])

3.1.1 Consistency with the Development Plan of the Philippines

In 1993, the Philippine government formulated the *Agrarian Reform Community Development Strategy* as an approach to effectively achieve the objectives of agrarian reform and poverty reduction. In 2004, the government also formulated *the Medium-Term Philippine Development Plan (hereafter referred as to "MTPDP") for 2004-2010*. The MTPDP positioned as a major strategy, the creation of 10 million jobs and the increase in productivity and income resulting from developing 2 million hectares of agribusiness lands to eradicate poverty of the farmers comprised by majority of the poor population.

At the time of ex-post evaluation, the government formulated the *Philippine Development Plan (2011-2016)* in 2011, which aimed at improving the agricultural productivity of the beneficiaries in the ARCs. The plan also highlighted the strategic development of transport infrastructures. In addition, the Department of Agrarian Reform (hereafter referred to as "DAR"), the executing agency of this project, formulated the agrarian reform *Policy Direction* in 2016 following the inauguration of a new government. This document talks about the improvement of farmers' living conditions in the ARCs through such measures as enhancing agricultural productivity, supporting farmers and increasing job opportunities.

Therefore, this project which has been supporting the development of infrastructure in the ARCs was, and continues to be consistent with the development policy of the Philippines at the time of the planning, as well as at the time of the ex-post evaluation.

3.1.2 Consistency with the Development Needs of the Philippines

At the time of ex-ante evaluation, due to lack of infrastructure development in the ARCs, there were a lot of areas in the Philippines without bridges. Thus, not only access to administrative services and medical institutions but transporting daily necessities was also limited. In particular, since the eastern region of Luzon Island was prone to typhoons that are usually generated in the Pacific Ocean, sudden swelling of rivers due to heavy rainfall occurred frequently at the Umiray River. The Umiray River is flowing down along the boundary between Barangay Umiray, Dingalan Municipality, Aurora Province and Barangay Umiray, General Nakar Municipality, Quezon Province. Since there was no bridge at the site, using bangka was

[2] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory and D: Unsatisfactory.
[3] ③: High, ② Fair, ① Low.

the sole way to cross the river. Under this circumstance, there was an urgent need to establish safe and smooth traffic flows in the ARCs, improving the accessibility and stabilizing safety in the areas.

At the time of ex-post evaluation, the Umiray Bridge, constructed under this project, plays an important role in facilitating smooth traffic access between Quezon and Aurora provinces in Region IV-A and Region III, respectively. This bridge is contributing to interactions among people, the vitalization of commercial transactions of agricultural and fishery products and the promotion of tourism in the surrounding areas[4], including the ARCs. Additionally, as Dingalan Municipality (located north of the Umiray Bridge) and General Nakar Municipality (located south) are prone to typhoons, tropical cyclones and heavy rains, the bridge is utilized by local residents when they need to evacuate. Thus, the bridge functions as a disaster risk response.

Therefore, the project is consistent with the developmental needs brought to light by the ex-ante and ex-post evaluations.

3.1.3 Consistency with Japan's ODA Policy

The Country Assistance Plan for the Philippines, which was developed by the Ministry of Foreign Affairs of Japan in 2000, identified the following priority areas and sector assistance policy: (1) "strengthening the economy and overcoming growth constraints toward sustained economic growth"; (2) "rectification of disparities (alleviating poverty and redressing regional disparities)"; (3) "environmental protection and anti-disaster measures"; and (4) "human resources development and institution building".

This project aimed to strengthen the economy and redress regional disparities of the Philippines by constructing a bridge and is in line with the above priority areas through country assistance plan and policy for economic cooperation operations. Therefore, it is consistent with the assistance policy of Japan.

In light of the above, this project has been highly relevant to the country's development plan and development needs, as well as Japan's ODA policy. Therefore its relevance is high.

[4] The roads near the Umiray Bridge are not covered with asphalt and are narrow. Because of this, the transport of goods and traffic access is time-consuming. (However, as will be discussed in the Impact section, traffic accessibility has greatly improved as compared to the time before construction of the bridge.)

3.2 Efficiency (Rating: ③)

3.2.1 Project Outputs

Table 1 shows the plan and actual outputs of this project.

Table 1: Outputs of the Project (Plan/Actual)

Plan (Before Project Commencement)		Actual (At the Time of Ex-Post Evaluation)
【Japanese Side】		
1	Construction of Umiray Bridge (bridge length: 358m, approach roads: 272m)	Implemented as planned
【Philippine Side】		
1	Acquisition of land for construction, relocation of houses	Implemented as planned
2	Customs clearance of equipment and materials	Not implemented
3	Maintenance of Inland transportation road	Implemented as planned
4	Securing of land required for the construction (site office, stock-piling yard, working yard)	Implemented as planned
5	Relocation of obstacles (electric and telephone poles, water pipes, agricultural canals etc.)	Implemented as planned

Source: Document provided by JICA, Answers to the questionnaires

The Japanese outputs were implemented as per the plan prepared. Also, the Philippine side's outputs were mostly implemented as per the plan. Meanwhile the only output not implemented by the Philippine side was "customs clearance of equipment and materials." While this output was intended for imported goods and equipment that would incur custom duties, in reality these items could be procured domestically, meaning that there was no need for custom duty.

Photo 1: Constructed Umiray Bridge

Photo 2: Access Road
（photo taken from General Nakar side）

3.2.2 Project Inputs

3.2.2.1 Project Cost

The initially planned project cost was approximately 1,550 million yen. In reality, the project cost was approximately 866 million yen; thus, the project cost was lower than planned (approximately 56% of the plan). Table 2 shows the difference between the initially planned and actual cost of the project.

Table 2: The Initially Planned Project Cost and Actual Cost

(Unit: million yen)

	Planned	Actual
Japanese side	1,394	793
Philippine side	Approx. 156	Approx. 73
(Whole)	Approx.1,550	Approx. 866

Source: JICA's document and answers to questionnaire

The main reason for this large change is the reduction of construction costs for the Japanese side. The construction company, contracted through competitive bidding, decided not to construct the temporary bridge (as was initially planned). They applied different construction methods, such as constructing a crane way in the Umiray River, fixing abutments and assembling a PG Girder before the erection work took place. As a result, construction costs were kept low. Applying such methods also led to the construction period being shortened. Project costs for the Philippine side were also within the initially planned budget (the budget for the initial plan was approx. 86.2 million PhP, whereas the actual cost was 32.7 million PhP). The main reason for this is the decrease of VAT[5] due to the reduction of construction cost for the Japanese side.

3.2.2.2 Project Period

This project was planned to last for 37 months, starting from May 2012 to May 2015. The actual project period for the Japanese side was 21 months from May 2012 to January 2014, which was shorter than planed[6] (77% of the plan). This is mainly because of the construction

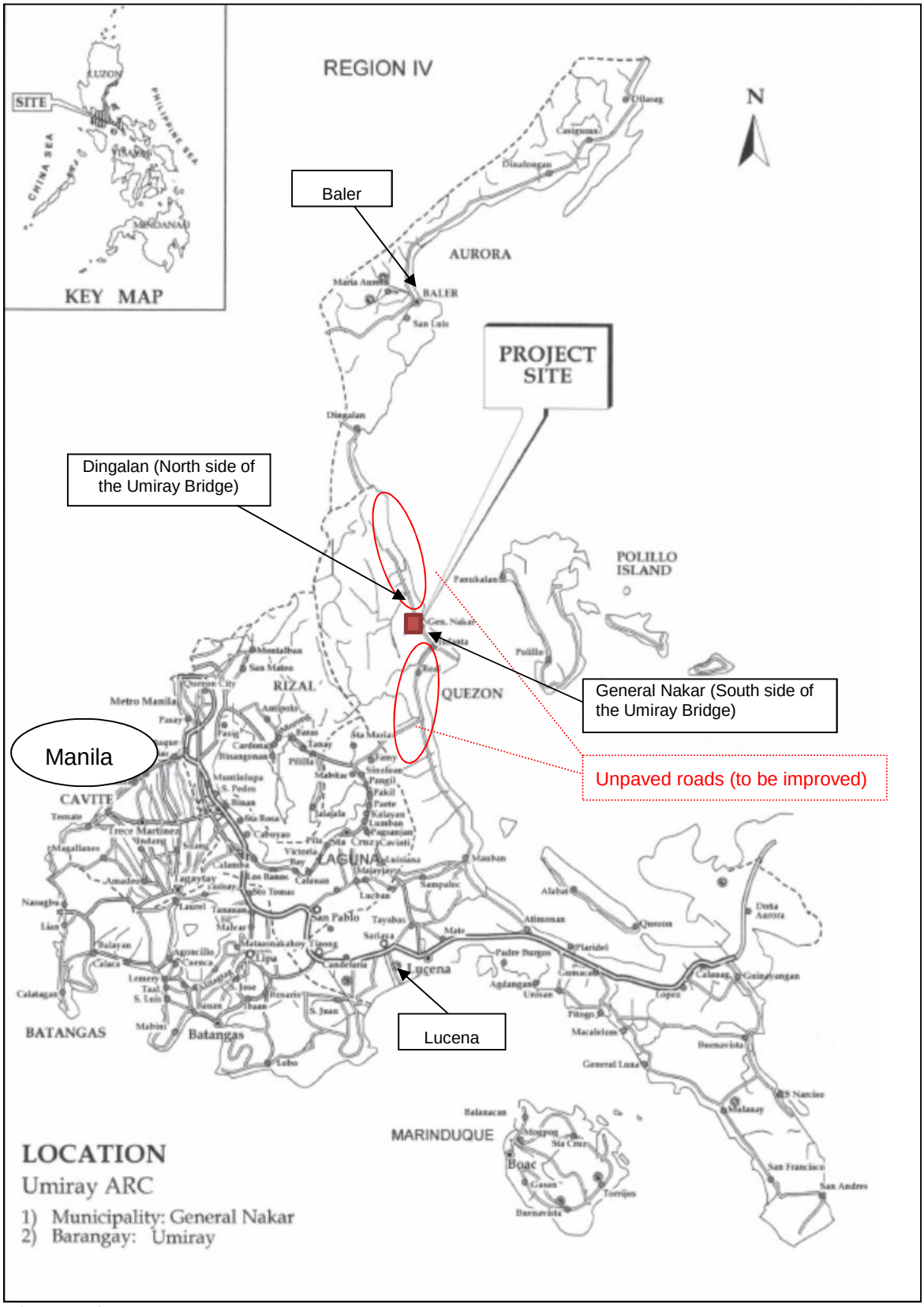
[5] It is 12% within the Philippines.

[6] It was confirmed through questionnaires and interviews with DAR headquarters and the Provincial Governments of Aurora and Quezon that the project period of the Philippine side spanned from January 2010 to October 2012. There

method applied by the contractor that shortened the project period, as explained above.

Influenced by the Japanese side's construction method, both the project costs and period were within the plan (project costs were 56% of the planned budget, whereas the project period was 57% of the planned period). The outputs were implemented within the plan, meaning that efficiency is high.

was no particular delay.



Source: DAR

Figure 1: Project Related Map

3.3 Effectiveness[7] (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

In order to achieve the project objective regarding the Umiray Bridge "to realize safe and smooth traffic and improve efficiency in transportation of goods in the ARCs", the following operation and effect indicators were set at the time of ex-ante evaluation. Actual values for each indicator were also obtained through this evaluation study and the results of these analyses were as follows:

3.3.1.1 Operation Indicator of the Project: Average time to cross the river

Table 3 shows the operation indicator of the project: average time to cross the river (baseline, target and actual).

Table 3: Operation Indicator of the Project:
Average Time to Cross the Umiray River (baseline, target and actual)

Baseline 2011 (planned year)	Target	Actual*			
	3 years after the project completion (as of year 2018)	2013	2014 (Completion Year)	2015 (1 year after completion)	2016** (2 years after completion)
300 sec.	52 sec.	300 sec.	30-35 sec.	30-35 sec.	30-35 sec.
			55 sec.	55 sec.	55 sec.

Source: Document provided by JICA (baseline, target); answers to the questionnaire and actual measurements during the field survey (actual)
Note 1*: Regarding the actuals for 2014-2016, the figures in the upper row show the average time taken to cross the river during non-peak time, while the figures in the lower row show the average time taken to cross the bridge during peak time.
Note 2**: Before the project, achievement of the quantitative effect (target) was set at 2018, 3 years after the completion. However, this project was completed in 2014, and the latest year, 2016 is compared against the target year for analyzing the project effect.

This project was completed in January 2014. Concerning the operation indicator, the figure for 2013 and the year before (i.e., 300 seconds) refers to the time required to cross the Umiray River by bangka. After the project completion, the river can be crossed within 30-35 seconds during non-peak time, and even during peak time one can do so within 55 seconds. As a result of the significant time reduction, the flow of people and the distribution of goods have improved[8].

[7] The sub-rating for Effectiveness is to be considered together with Impact.
[8] Before the commencement of the project, there was a long waiting time to board the boat. While crossing the river by the boat took only 300 seconds, people often had to wait one or two hours until they could get on the boat.

3.3.1.2 Effect Indicators of the Project:

3.3.1.2.1 Annual Number of Days of Access Disruption

As shown in Table 4, there has been no single day during which access was disrupted since the completion, as per the initial plan. Traffic accessibility was secured even when the water level of the Umiray River increased due to typhoons and heavy rains.

Table 4: Effect Indicators of the Project: Annual Number of Days of Access Disruption (baseline, target and actual)

Baseline Planned year (as of year 2011)	Target	Actual			
	3 years after the project completion (as of year 2018)	2013	2014 (Completion Year)	2015 (1 year after completion)	2016* (2 years after completion)
6 days	0 day	n/a	0 day	0 day	0 day

Source: Document provided by JICA (baseline, target); answers to the questionnaire (actual)
Note*: Before commencement of the project, achievement of the quantitative effect (target) was set at 2018, 3 years after the completion. However, this project was completed in 2014, and the most current year, 2016 is the target year for achieving the project effect.

3.3.1.2.2 (Reference Figures) Passenger Car Unit (PCU)

Concerning the Passenger Car Unit (hereafter referred to as "PCU") shown in Table 5, the baselines and targets were set as a projection for before and after the completion of the Umiray Bridge. However, the projection was based on examples from the Bazal Bridge (another grant project funded by JICA, located near the city and market), which was implemented almost at the same time. It was not an accurate figure for traffic demand at the Umiray Bridge[9]. With respect to traffic volume, it was observed during the field survey that the actual demand is assumed to be around 300 PCU at Umiray Bridge. With the unpaved roads of the surrounding areas, 1,500 or more PCU would not be realistic for the traffic demand and comparisons of the target and actual. Considering the above, the PCU figures will be used as reference. On the other hand, traffic volume has been increasing gradually since the completion of the bridge (i.e., 200 PCU in 2015 and 300 PCU in 2016). As will be discussed below under 3.4 Impact, this is because there is an increasing number of two- and three-wheel motorbikes and also because public bus service began to operate.

[9] The baselines and targets set at before implementation of this project (both were estimated figures) were calculated by applying the trip ratio of the Bazal Bridge (indicating the daily flow of people who constitute the main traffic as a percentage) to the case of Umiray Bridge.

Table 5: Effect Indicators of the Project: (Reference Figures) Passenger Car Unit (PCU) (baseline, target and actual)

Baseline (as of year 2008's estimation)	Target	Actual			
	3 years after the project completion (as of year 2020's **estimation**)	2013	2014 (Completion Year)	2015 (1 year after completion)	2016* (2 years after completion)
1,541 PCU	2,001 PCU	n/a	93 PCU	200 PCU	300 PCU

Source: Document provided by JICA (baseline, target); answers to the questionnaire (actual)
Note*: Before the project, achievement of the quantitative effect (target) was set at 2018, 3 years after the completion. However, this project was completed in 2014, and the latest year, 2016 is compared against the target year for analyzing the project effect.

3.3.2 Qualitative Effects (Other effects: Ensuring safe traffic at the time of flood calamities)

According to local residents living around the Umiray Bridge, the Provincial Governments of Aurora and Quezon and DAR, they can evacuate safely in the event of typhoons, heavy rains and tropical cyclones by crossing the bridge, and the issue of neighboring communities becoming isolated by the event was also solved. In light of the above, it is thought that the implementation of this project has secured safe traffic access and also plays a role in the evacuation of residents[10].

3.4 Impacts

3.4.1 Intended Impacts

3.4.1.1 Contribution to the social and economic development in the ARCs

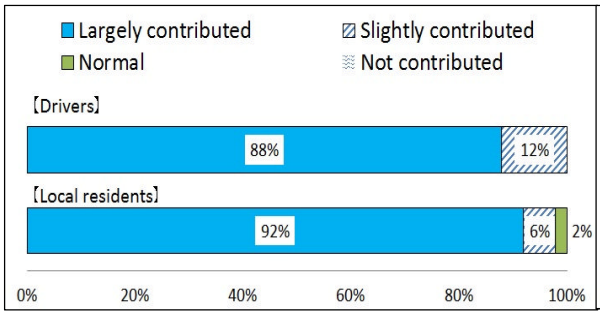
It was expected that this project would increase transaction of agricultural products, vitalization of cooperatives' activities, increase of farmers' income, and increase in medical, educational and employment opportunity access. As part of this ex-post evaluation, a beneficiary survey was conducted, targeting drivers and residents who use the constructed Umiray Bridge. The survey took a total of 102, of which 50 were drivers and 52 were surrounding residents[11]. The questions and responses are summarized below.

[10] Information could not be obtained regarding numbers of the injured and deaths due to typhoons and other disasters after the completion of the project, since there are no recorded data.

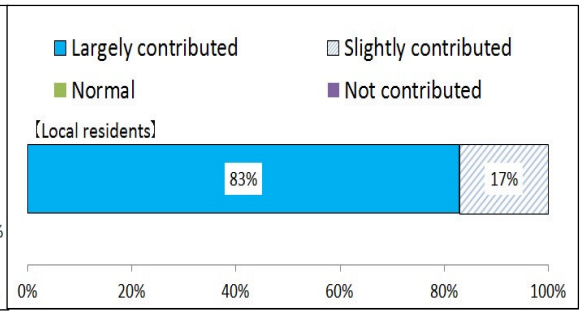
[11] The properties of the samples are: 1) those who have been crossing the Umiray River for the past 5 years or more (i.e., those who can tell the difference between before and after the project); 2) the targeted barangay was Barangay Umiray (Barangay Umiray on the Dingalan side and the General Nakar side); 3) sex ratio: 72% male and 28% female; 4) average age: 40 for drivers and 42 for local residents; 5) occupation (of drivers): 40% were engaged in three-wheel motorbikes (i.e., taxis), 50% in three-wheel taxis and agriculture, 6% in three-wheel taxis and as security guards, 2% were public bus drivers and 2% were ambulance drivers; 6) occupation (of residents): 31% were barangay staff, 25% were housewives, 23% worked in agriculture, 8% were shop owners and worked in the retail business and 13% had other occupations. The lists of drivers and residents were obtained from Barangay Umiray, the Umiray Agrarian Reform Beneficiaries Multi-Purpose Cooperative (UMARBEMPCO) and others. Samples for this beneficiary survey were drawn by selecting every third person, starting from the top of the list. The survey used

Concerning Question 1 regarding improvement of local farmers' incomes, both of the most drivers and residents answered "greatly improved". According to the interviews with the respondents, following comments were received: "Because of the completion of the Umiray Bridge, I began producing rice and corn. As transporting the goods to the markets became easier, the work became more profitable. Thanks to the fact that our income actually increased, we renovated our house (made the outside walls concrete) and purchased a motorbike." In the light of such a comment, it can be judged that the completion of the bridge is contributing to increasing incomes of local farmers in some cases. Quantitative data concerning exact agricultural income could not be obtained, since there is no record at Dingalan Municipality. Therefore, it is not clear to what extent the income has increased. Questions 2 to 4 concerned the relationship between the completion of the Umiray Bridge and improved access to public facilities, more job opportunities and increased educational opportunities. Only residents were asked about these questions; the answers were mostly positive, confirming that the project had contributed. According to the interviews with respondents, following comments were received: "Because the Umiray Bridge was completed, I purchased a two-wheel motorbike. Additionally, I move around more often because the public bus service began to operate. We became able to access not only markets, but also schools and work places that we had previously been unable to choose (because of the distance) even if we wanted to." Based on such a comment, it can be judged that this project is contributing to improved access to public facilities and also to increased job and educational opportunities in some cases. Question 5 was a question concerning the relationship between this project and local economies. It was confirmed that both drivers and residents felt that the completion of the Umiray Bridge was contributing to the vitalization of local economies. Respondents commented when interviewed, "The numbers of tourists and resort facilities have been increasing year by year. There are more vehicles passing, and it is becoming livelier." Thus, it can be judged that this project has played some role in vitalizing local economies.

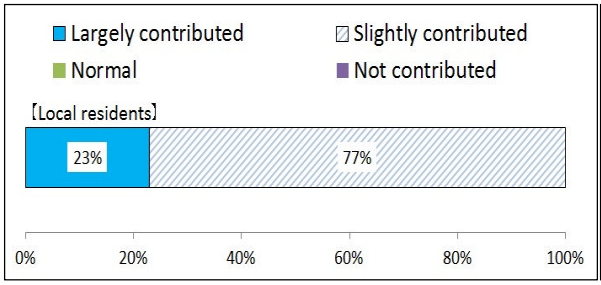
face-to-face interviews using questionnaires. Regarding biases and notes for interpreting the result, it can be said that the results are not statistically significant because the sample size of this beneficiary survey was small.



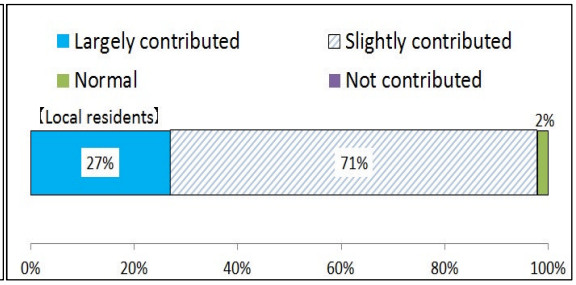
Question 1: How do you think that completion of the Umiray Bridge contributed to improve agricultural income of local farmers? (n= 50 of drivers, 52 of local residents)



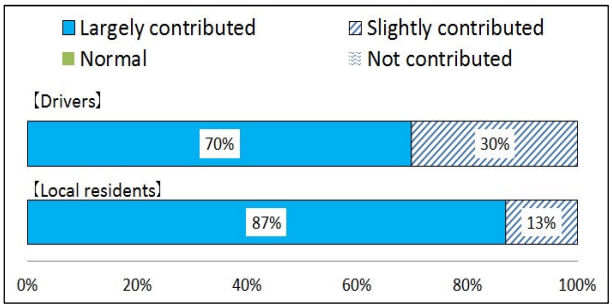
Question 2: How you think that completion of the Umiray Bridge contributed to improve your access to public facilities? (e.g., church, school, hospital, market) (n= 52 of local residents)



Question 3: How do you think that completion of the Umiray Bridge contributed to increase job opportunities? (n= 52 of local residents)



Question 4: How do you think that completion of the Umiray Bridge contributed to increase education opportunities? (n= 52 of local residents)



Question 5: How do you think that completion of the Umiray Bridge contributed to improve local economy? (n= 50 of drivers, 52 of local residents)

(Reference) Changes in Volume of Agricultural Products

Table 6 shows changes in volume of agricultural products in the Dingalan Municipality, located to the north of the Umiray Bridge. As discussed at this impact section, it is assumed that completion of the Umiray Bridge has been contributing to transporting production inputs such

as seeds, seedlings and fertilizer and making it easier to purchase and less costly, and this is leading to increasing the volume of agricultural products.

(Reference) Table 6: Changes in Volume of Agricultural Products in the Dingalan Municipality

(Unit: ton)

2012	2013	2014	2015
2,398	2,440	2,467	2,510

Source: Dingalan Municipality

3.4.1.2 Contribution to Economic Development

As shown in Table 7, tax revenues of the Dingalan Municipality increased due to the vitalization of its economy and rise in land prices[12], which has increased their budget through collection of taxes. The Dingalan Municipality commented: "As a result of the improvement in traffic access after the completion of the bridge, the transportation of goods and the flow of people increased, and we have become able to publicize our municipality as an attractive tourist destination. We have more tax revenues due to the vitalization of the economy and less delinquent tax, and we have become able to put more focus on providing governmental services. We have also been able to increase our staff by 15%." Therefore, it can be judged that the completion of the Umiray Bridge has been playing a role in vitalizing the economies of the surrounding areas.

Table 7: Budget of the Dingalan Municipality[13]

(Unit: PhP)

2012	2015
64,799,000	93,866,083

Source: Dingalan Municipality

3.4.2 Other Positive and Negative Impacts

3.4.2.1 Impacts on Natural Environment

The questionnaires and interviews with DAR, the Provincial Government of Aurora and Quezon, the Dingalan Municipality, the General Nakar Municipality and Barangay Umiray confirmed that there was no negative environmental impact during the project implementation. According to DAR, for example, the contractor set exclusive space for construction wastes, thereby avoiding negative influence on river and sea water quality.

[12] According to Dingaran Municipality, it has been influenced by the economic revitalization.

[13] Data 2013 and 2014 was not available since it was not provided by Dingalan Municipality. Only data regarding 2012 and 2015 was available.

It was also confirmed that the situation remains the same at ex-post evaluation. No particular negative impact was observed on air pollution, water quality, noise, vibration and ecological systems in the areas surrounding the constructed bridge.

Barangay Umiray, which is located closest to the Umiray Bridge, is mainly responsible for the environmental monitoring of this project. In some cases, the officials of Barangay Umiray report to supervising bodies, the Dingalan Municipality and the General Nakar Municipality, or even to higher bodies, such as the environmental departments of the provincial government of Aurora and Quezon. However, there has been no particular environmental issue since the completion of the project and no measures have thus been taken as a result of the monitoring.

3.4.2.2 Land Acquisition and Resettlement

Under this project, 4 families in the Dingalan Municipality and 10 families in the General Nakar Municipality were subject to resettlement. All of these families were informal settlers residing along the road connecting to the Umiray Bridge. 40,000 to 100,000 PhP was paid to each family, not as compensation but as a relocation fund, based on DAR's internal regulation. The actual square meters of land acquired was approximately 5,700m^2 as planned. The relocation was carried out by the time of the commencement of construction works. The relocation site is located not far from the Barangay Umiray and the Umiray Bridge, and the relocated people are still living there. The payment was made from DAR's budget and the procedures were smooth. Apart from the relocation fund, DAR provided job support the service industry, such as catering workers and three-wheel motorbike drivers.

In addition, before implementation of this project, there were in total 14 bangkas operating in the Umiray River. It was expected that the boat owner and operator would be affected after the construction of the bridge. In reality, although they were affected by the completion of the Umiray Bridge, they understood the benefits of the project and accepted it. The interviews with DAR, the Dingalan Municipality, the General Nakar Municipality and the bangka operators confirmed that the boat operators had sufficiently understood that the completion of the Umiray Bridge would benefit many of the surrounding residents. At the time of ex-post evaluation, it was confirmed that the boat operators continue to work by connecting upstream and downstream movements of peoples and goods, and their income is secured.

Photo 3: Road Surface of the Umiray Bridge

Photo 4: Bangka on the Umiray River

3.4.2 Other Unintended Positive Impacts

Changes in the numbers of hotels, resort facilities and tourists in the Dingalan Municipality before and after the completion of the project are shown in Table 8.

Table 8: Data Related to Tourism in the Dingalan Municipality

	2012 (Before project)	2015 (1 year after completion)
Number of Hotels	0	2
Number of Resort Facilities	18	29
Number of Tourists	10,000	27,955

Source: Dingalan Municipality

Due to the construction of the Umiray Bridge, the accessibility has been improved. As a result, tourism is developing in the surrounding areas. The areas surrounding the bridge are characterized by beautiful scenery looking out to the Pacific Ocean, attracting domestic and international visitors coming for marine sports such as surfing. Particularly after the completion of the bridge, the number of hotels and resort facilities has increased and the number of visitors from Manila is increasing. As discussed above, the budget of the Dingalan Municipality has increased, partly because their tax revenue has increased due to the vitalization of the tourism industry.

Therefore, it can be judged that this project has been contributing on tourism development in the surrounding regions.

＜Summary of Effectiveness and Impacts＞

After the completion of this project, the time required to cross the Umiray River has

significantly reduced. Traffic has not been interrupted, even when the water level of the Umiray River rises due to typhoons and heavy rains. In addition, the beneficiary survey confirmed that this project is supporting improvements of agricultural productivity and contributing to the vitalization of the local economy. Furthermore, the budget of the Dingalan Municipality, tourism-related data and interviews with the local barangay shows that the construction of the Umiray Bridge is contributing to the economic vitalization, in the surrounding areas. In light of the above, the effectiveness and impact of the project are high.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspects of Operation and Maintenance

The executing agency of this project is DAR. Immediately before the completion of the project, DAR had a discussion with the Provincial Governments of Aurora and Quezon and the municipalities under its jurisdiction (the Dingalan Municipality and General Nakar Municipalities, respectively) about the operation and maintenance of the Umiray Bridge after its completion. Under the leadership of DAR, an operation and maintenance plan, the *10-Year Sustainability Plan for the Umiray Bridge Project*, was formulated. As a result, it was decided that Barangay Umiray, closest to the Umiray Bridge, would hold principal responsibility for operation and maintenance, the Provincial Engineering Office (hereafter referred to as “PEO”) of the Provincial Governments of Aurora and Quezon would be responsible for major repairs. On the other hand, DAR is to supervise the operation and maintenance of the Umiray Bridge. Interviews confirmed that coordination and communication among the relevant institutions was smooth.

Based on the above plan, Barangay Umiray is responsible for the whole and day-to-day operation and maintenance. The barangay staffs are to carry out routine works such as cleaning, de-weeding and the painting of the balustrade parapet. Meanwhile, the PEOs of the Provincial Governments of Aurora and Quezon conduct major periodic maintenance twice a year, which includes inspection of the bridge girder and bolts and repairs using heavy machinery.

Regarding the number of staff, although Barangay Umiray is not assigning a specific number of staff for the operation and maintenance of the Umiray Bridge, it is observed that about 5 to 10 people are usually engaged in the task. On the other hand, the PEO of the Provincial Governments of Aurora and Quezon are supposed to assign 11 and 50 staff respectively. However, the number of required staff depends on the nature of the operation and maintenance work. In any case, in light of the structure scale of the Umiray Bridge and the

requested operation and maintenance, it is judged that the number of the staff is enough.

Furthermore, Dingalan and General Nakar Municipalities, the Provincial Government of Quezon and Aurora, as well as the Department of Public Works and Highways (hereafter referred to as “DPWH”) are considering of upgrading the surrounding roads, including the Umiray Bridge, from provincial to national roads. The Umiray Bridge is one of the main infrastructures connecting the 2 provinces. If the roads are upgraded to a national road, the Umiray Bridge will also be consequently converted into a national bridge. As a result, it can be thought that DPWH will assist the periodical maintenance activities with sufficient amount of the budgets.

Therefore, it can be judged that there is no problem with the institutional aspect of this project at the time of ex-post evaluation.

3.5.2 Technical Aspects of Operation and Maintenance

No particular high-level technologies are needed to operate and maintain the Umiray Bridge. Barangay Umiray simply cleans, de-weeds and paints the balustrade parapet. The required tasks therefore are not of a particularly high level.

The PEO of the Provincial Government of Aurora is responsible for the training of technical staff. Some of this technical trainings relate to the supervision of construction sites and bridge technologies, while some are technical training offered by DPWH. The situation is the same for the PEO of the Provincial Government of Quezon. Periodic training is conducted and the offices are staffed with experienced personnel. Staff interviews during the field survey also confirmed that they had sufficiently understood the importance of operation and maintenance. In addition, it was also confirmed that on-the-job training (OJT) is given to newly recruited staff.

Technical maintenance manuals are available at both of the PEOs. Interviews confirmed that these manuals were referred to as needed.

Therefore, no major problems have been particularly observed concerning the technical aspect of the operation and maintenance concerning this project.

3.5.3 Financial Aspects of Operation and Maintenance

As discussed in 3.5.1, Barangay Umiray is mainly responsible for maintaining the Umiray Bridge. The bridge is located in this barangay, and its northern side, Dingalan, spends 25,000 PhP/year while its southern side, General Nakar, spends 50,000 PhP/year on maintenance

costs[14]. Since the actual maintenance tasks are cleaning, de-weeding and the painting of the balustrade parapet, there is therefore no need for a large budget. Budgets for barangays are directly disbursed by the central government on a yearly basis[15], and the maintenance costs for Barangay Umiray are disbursed every year based on the *10-Year Sustainability Plan for the Umiray Bridge Project*.

The maintenance costs of the PEOs of the Provincial Governments of Aurora and Quezon, responsible for major maintenance works carried out every 3-5 years at necessary base, are shown in Table 9[16]. When interviewed about the maintenance costs, the PEOs of the Provincial Governments of Aurora and Quezon commented: "While we cannot say that the allocated operation and maintenance budgets are high, the minimum amounts needed have been allocated."

Table 9: Maintenance Costs of Aurora and Quezon Province

(Unit: 1,000PhP)

	2014	2015	2016
Aurora Province	4,485*	5,333*	5,000*
Quezon Province	13,000**	13,000**	13,000**

Source: PEOs of the Provincial Government of Aurora and Quezon
Note*: The 2014/2015 figures are actuals and the 2016 figures are allocated budgets.
Note** : All figures are allocated budgets.

In light of the above, no particular problems are observed regarding the financial aspect of the operation and maintenance of this project.

3.5.4 Current Status of Operation and Maintenance

It has been confirmed through site visits during the field survey that the Umiray Bridge is fully functional as an appropriate civil structure at the time of the ex-post evaluation, thanks to proper maintenance works. Traffic interruptions due to defects or insufficient maintenance and damage to a road surface were not observed. Therefore, it can be judged that there is no major problem with the maintenance status of the Umiray Bridge.

Spare parts for the Umiray Bridge are procured as appropriate when replacement or repairs are needed (i.e., spare parts are not usually stocked, but are procured as needed.) Some spare parts can be procured locally without much time, while importing parts can take time from

[14] Mainly purchase of painting/cleaning equipment, etc.
[15] The cost item for this is "Barangay's Internal Revenue Allotment or IRA".
[16] However, the figures in the table are not limited to the Umiray Bridge and constitute the maintenance costs for the entire province.

application to the completion of the procurement. However, there has been no major problem after project completion.

No major problems have been observed in the institutional, technical, financial aspects and current status of the operation and maintenance system. Therefore sustainability of the project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project constructed a bridge over the Umiray River at the provincial boundary of Aurora Province and Quezon Province in Luzon Island. The construction aimed to realize safe and smooth traffic and improve efficiency in transportation of goods in the ARCs; thereby contributing to the social and economic development in the region. With regard to relevance, the Government of the Philippines is aiming to improve agricultural productivity in the ARCs as espoused in its *Philippine Development Plan (2011-2016)*, which also highlights the strategic development of transport infrastructures. Simultaneously, the Umiray Bridge, constructed under this project, plays an important role in facilitating smooth traffic access between Quezon and Aurora provinces in Region IV-A and Region III, respectively. Therefore, its relevance is high. Both the project cost and the project period fell within the original plan; thus, efficiency of the project is high. In terms of Effectiveness and Impact, the time required to cross the Umiray River has significantly reduced since the completion. Traffic has not been interrupted, even when the water level of the Umiray River rises due to typhoons and heavy rains. In addition, the beneficiary survey confirmed that this project is supporting improvements of agricultural productivity and contributing to the vitalization of the local economy. Thus, effectiveness and impact of this project are high. No major problems have been observed in the institutional, technical, financial aspects and current status of the operation and maintenance system. Therefore sustainability of the project 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 Executing Agency

As a result of the completion of the Umiray Bridge, the flow of people and the distribution of goods have improved in the surrounding areas of the municipalities of Dingalan and General

Nakar. On the other hand, the transportation of goods and traffic access from production sites to markets still take time, as the roads connected to the bridge are not paved. In order to further vitalize the flow of goods and people, it would be preferable for the DPWH and other relevant institutions to proceed with the idea of widening and paving these surrounding roads.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

Importance of the early institutionalization of the post-completion operation and maintenance plan for the project outputs

Immediately before the completion of the project, DAR discussed the post-completion operation and maintenance of the Umiray Bridge with the related organizations. The *10-Year Sustainability Plan for the Umiray Bridge Project* was formulated. It was decided that Barangay Umiray would be principally responsible for daily operation and maintenance, and that in the case of major repairs being needed, the PEOs of the Provincial Governments of Aurora and Quezon would take charge. As a result, the decision has made clear demarcation of responsibilities among the organizations, and the condition of operation and maintenance has been kept in good condition. Therefore, it can be said that the early identification and institutionalization of which organization should carry out operation and maintenance, in what way and with what budget, is an important element for immediate and sustained project effects.

Usefulness of collection of impact quantitative data (baseline value)

In this ex-post evaluation, the change (after 2012) in volume of agricultural products and amount of tax revenue after commencement of the project was collected as quantitative data of impact, and it was subject to review in evaluation judgment (data before the commencement was not available). Originally, in terms of these quantitative data, it is desirable that baseline values be collected before the commencement, compared and verified with the same data transition from the beginning of the project until the project completion, and evaluation judgment would be made. However, the baseline values were not collected at the preliminary survey stage (before 2011). JICA and the executing agency should collect such data as much as possible during the formation of similar grant aid projects and utilize them for monitoring and ex-post evaluation after the project completion.