Internal Ex-Post Evaluation for Grant Aid Project

conducted by Papua New Guinea Office: May 2016

Country Name	The Project for the Urgent Rehabilitation of Markham Bridge
The Independent State of Papua New Guinea	

I. Project Outline

Background	Markham Bridge, which is the longest bridge in Papua New Guinea, is located on the Wau road connecting the major cities in Morobe Province such as Lae City, the second largest city in the country. The Wau Road is not only a major industrial road which transports major local products but also the sole lifeline for around 200,000 inhabitants in the roadside areas. Therefore, once blockage on the Wau Road occurs, those areas would be isolated and constrain socio-economic activities. In fact, in March 2004, a flood damaged the Markham Bridge and made the bridge temporarily impassable. Although the government of Papua New Guinea conducted temporary works to make the bridge passible in May 2004, it was necessary to rehabilitate the bridge in order to ensure safe traffic over the bridge.				
Objectives of the Project	To strengthen stability of structures and improve bearing capacity of bridge piers of the Markham Bridge against floods by rehabilitation works for the bridge, thereby ensuring safe and stable traffics at the point where the Wau Road crosses over the Markham River and contributing to keeping the function of the bridge for the next 20 years.				
Outputs of the Project	1. Project Site: Lae City, Morobe Province 2. Japanese side: Construction of revetment work, repair of bridge abutment, reconstruction of 4 bridge piers, superstructure work, and approach road (50m) 3. Papua New Guinea's side: Securing necessary land for the site and construction of police post				
Ex-Ante Evaluation	2006	E/N Date	18 May, 2007 3 February,2009[1]	Completion Date	3 October, 2010
Project Cost	E/N Grant Limit: (E/N in 2007) 620 million yen, (E/N in 2009) 996 million yen, Actual Grant Amount: 984 million yen (in total amount under the E/N in 2007 and the E/N in 2009)				
Implementing Agency	Department of Works (DOW)				
Contracted Agencies	Chodai Co., Ltd, Daiho Corporation				

II. Result of the Evaluation

<Special Perspectives to be Considered in the Ex-post Evaluation>

[Verification of the Quantitative Indicators and the expected impact]

Since the quantitative indicators set by the ex-ante evaluation and the Basic Design Study (BD), such as bearing capacities and expected life time of structure are very technical, the data need to be checked by DOW as a part of monitoring and maintenance activities. However, as DOW does not have such data, the attainment of the project objectives to increase safety and strength of the bridge was e verified by alternative data from various aspects including the current status of the bridge, the maintenance activities, the traffic conditions and so on through the site visit and interviews with DOW and users.

1 Relevance

Consistency with Papua New Guinea's development policy at the time of ex-ante evaluation and ex-post evaluation

This project has been highly consistent with Papua New Guinea's development policy to prioritize bridge works and the Wau Road in road network set in policy documents such as the National Transport Development Plan (2006-2010) and the Medium Term Transport Plan (2014-2018). Since the government of Papua New Guinea plans to upgrade the Wau Road to the class 1 of highway standard from the class 2, all the bridge assets along the Road will be given highest priority in maintenance.

Consistency with Papua New Guinea's development needs at the time of ex-ante evaluation and ex-post evaluation

The project has met Papua New Guinea's development needs for maintenance of the Wau Road including the Markham Bridge connected to the major cities of Morobe Province, in order to ensure safe and stable traffic in the road side areas.

Consistency with Japan's ODA policy at the time of ex-ante evaluation

The project was consistent with Japan's ODA policy for Papua New Guinea prioritizing support for infrastructure development including bridge at the time of ex-ante evaluation.

Evaluation result

In light of the above, relevance of this project is high.

2 Effectiveness/Impact

Effectiveness

The project has achieved its objective, "to strengthen stability of structures and improve bearing capacity of bridge piers of the Markham Bridge against floods". Despite lack of data for the bearing capacity safety ratio and the bearing capacity of the bridge piers which require very technical calculation, it was observed that the bridge is in good condition Although a number of floods occurred at the time between the project completion and ex-post evaluation, they did not cause any damage owing to the enhanced durability of bridge piers against the floods. As a result, there was no occasion that the Markham Bridge had been impassible.

Impact

[1] While E/N was signed on May 18, 2007, the project was canceled, as the bidding was unsuccessful. Then the implementation review study was conducted from July to September, 2008 and project cost was revised and E/N was signed again on February 3, in 2009.

After the rehabilitation works on the bridge by the project, the expected lifetime of the bridge can reach the target value of 20 years since the project completion in 2011. Namely, it means that the bridge will be well functioning for the next 16 years as planned. Also, the project contributed to improving safety and stability of traffics and pedestrians crossing the bridge. No damage was observed or reported on tires of the passing vehicles after the repair of bridge foundation. In addition, the approach road allows smooth flow of traffic over the bridge without any further delay. The waiting time at the edge of the bridge has reduced on average to 36 seconds at the time of ex-post evaluation from 43 seconds at the time of Basic Design in 2006 [2]of. In terms of the safety of pedestrians crossing the bridge, the stable condition of the walk way and handrails guarantee safe crossing by the pedestrians. According to an interview with a Land Owner Group, no accident was reported after the project completion up to the time of ex-post evaluation. No negative impact of the project was observed at the time of ex-post evaluation.

Markham Bridge

Evaluation Result

In the light of the above, effectiveness/impact of the project is high.

Quantitative Effects

Indicator	Year 2006 (before the project) Actual value	Year 2010 (target year) Target value	Year 2010 (target year) Actual value	Year 2015 (ex-post evaluation) Actual value
Indicator 1: The bearing capacity safety ratio of the temporary bridge pier foundation piles.	2	3	-	-
Indicator 2: The bearing capacity of the bridge piers against floods.	There was a risk of damage on the bridge piers by 10 year flood (EL=11.18m)	The bearing capacity against 100 year flood (EL=11.58m)	-	-

<Sources> Basic Design Study Report

3 Efficiency

Although there was no major change in the planned outputs, the project cost and the project period considerably exceeded the plan (ratio against the plan: 159%, 205%, respectively) because of the dramatic depreciation of exchange rate of yen as well as the sharp increase in the commodity prices at the time of bidding and the increase in the cost for moving blocks of bank protection works. The considerable change in the bidding conditions required a retender process resulting in the overrun of project period starting from the contract for the consultant to the completion of construction. Therefore, efficiency of this project is low.

4 Sustainability

Institutional Aspect

DOW has been responsible for construction and maintenance of road networks, including bridges, in the country and there has been no change in their organizational structure. It is expected that the current restructuring of DOW will improve the Road Asset Management System (RAMS) and the Bridge Management System (BMS) which are tools or software adopted by DOW for cost estimation of all the bridge and road assets in terms of maintenance activities. For maintenance of the Markham Bridge, the DOW Morobe Provincial Office is responsible and deploys 24 technical staff in the Engineering Division. The number of technical staff in the provincial office is sufficient to conduct maintenance works for the bridge. Also, a private contractor is available to be engaged for maintenance activities when necessary.

Technical Aspect

The technical staffs of DOW, including the provincial office of Morobe, have basic skills and knowledge for maintenance works of bridges, such as general civil engineering covering minor maintenance, hydraulics, basic design survey, quality control, environmental planning and project management. In general, they are scheduled to participate in workshops and training courses for maintenance of infrastructure at the DOW Madang Training Center in order to refresh their skills and knowledge for proper maintenance works. All trainings at DOW Madang Training Center are associated with infrastructure activities, including road and bridge construction and maintenance to be implemented by DOW.

Financial Aspect

For the maintenance of the Markham Bridge, the provincial office needs to submit a request to the head office of DOW and the fund is released to the provincial office upon the needs and cost identified. The annual budget of DOW for maintenance of roads and bridges increased from 0.76 million PGK (Kina) in 2012 to 1.63 million PGK in 2014 and 1.49 million PGK in 2015. Despite of no specific allocation for the maintenance of the Markham Bridge, it can be considered that the maintenance budget of DOW is sufficiently allocated annually for the proper maintenance activities for bridges, including the Markham Bridge, to sustain their expected lifetime as planned. In addition, the DOW Morobe office has requested to Morobe Mining, the constant users of the Wau Road and the Markham Bridge, to take care of road maintenance activities for sustaining good conditions of the road and the bridge, and the negotiation between them has been

Bride Piers of Markham Bridge

[2] The survey method of traffic volume was different from the BD study and the survey at the time of ex-post evaluation. While the traffic volume survey for the BD study measured for 12 hours from 6:00 am to 6:00 pm, the traffic volume survey at the time of ex-post evaluation measured for 2 hours from 10:00am to 12:00 am.

underway to determine budget allocation from the Morobe Mining's side.

Current Status of O&M

As mentioned above, the Markham Bridge has been in good condition after the rehabilitation works by the project. The maintenance plan for the bridge has been in place but no necessity to implement it so far because of its good condition. In addition, as the DOW Morobe Office has been conducting awareness raising activity for the public including the surrounding communities not to litter and not to make the bridge dirty, neither rubbish nor dirt was observed at the time of ex-post evaluation. Although DOW does not have stock pile of the materials and has not procured any necessary materials and spare parts, DOW has sufficient budget and maintenance system in place so that the materials and spare parts shall be procured when need arise for maintenance.

Evaluation Result

In the light of above, sustainability of the project effect is high as there is no problem in any aspects.

5 Summary of the Evaluation

The project has achieved its objectives, "to strength stability of structure and to improve bearing capacity of bridge piers of the Markham Bridge". As for efficiency, the project cost and the project period considerably exceeded the plan because the E/N amount in 2007 was much lower than the re-examined cost estimate and it required the retender process for the construction works. Sustainability of the project effect is highly secured because of good condition of the rehabilitated Markham Bridge by the sufficient number of technical staff with basic technical skills and knowledge and the sufficient budget to be allocated.

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

III. Recommendations & Lessons Learned

Recommendations to implementing agency:

[For DOW]

Since the bridge has been in good condition, it is recommended that DOW Morobe Office conduct routine checks on monthly basis to make sure that the bridge is well maintained at all times for safety of pedestrians and transportation of good and services. In terms of procurement of spare parts, it is recommended that DOW make an asset management plan for the bridge maintenance based on which DOW requests for necessary budget to stockpile of necessary materials such as concrete blocks and cement and make them readily available so that whenever in need for maintenance; they can use the parts without delay even though the timely procurement of necessary materials is guaranteed.

Lessons learned for JICA:

For implementing the rehabilitation work of the Markham Bridge, the retender process was necessary because all bidders withdrew from the tendering under the original E/N in 2007. The reason was that the cost estimates by the bidders were much higher than the E/N amount thus making it difficult to complete the construction work within the E/N period. The higher cost was a consequence of fluctuation of foreign exchange rates and commodity prices, and the increase in the cost for moving blocks of bank protection works. Some of the factors were unpredictable. However, it is essential to avoid predictable risks by more precise cost estimation at the time of formulation of basic design for construction project.