2006 Ex-Post Monitoring for Completed ODA Loan Projects

External Evaluator: Masakatsu Kato (IC Net, Ltd.)

Project: Bangladesh “Jamuna Multipurpose Bridge Project” (BD-P36)

Loan Outline
Loan Amount/Disbursed Amount: 21,562 million yen / 21,290 million yen
Loan Agreement: June 1994
Loan Completion: August 2000
Ex-Post Evaluation: March 2001
Executing Agency: Jamuna Multipurpose Bridge Authority (J MBA), Bangladesh

Project Objective:
By constructing a multipurpose bridge on the Jamuna River, which flows from north to south almost through the center of Bangladesh, the project aims to handle traffic demand and to correct disparities between the eastern and western regions, thereby contributing to economic development of Bangladesh.

Consultant: Ben C. Gerwick Inc. (USA), and others
Contractor: Local companies, and others

<table>
<thead>
<tr>
<th>Item</th>
<th>At time of ex-post evaluation</th>
<th>At time of ex-post monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness &amp; Impact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Effectiveness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Traffic volume</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volume of traffic crossing the river on Jamuna Bridge</td>
<td></td>
<td>Since the traffic volume has continued to grow after the ex-post evaluation, greatly exceeding planned figures, the effectiveness has been high. The project is also considered that it has been contributing for the increased agricultural productivity in the west bank region.</td>
</tr>
<tr>
<td>Overall traffic volume exceeds planned figures by 29.7% (1999).</td>
<td></td>
<td>(1) Traffic volume Volume of traffic crossing the river on Jamuna Bridge (table below) Volume of traffic crossing the river on Jamuna Bridge (table below)¹ Overall traffic volume exceeds planned figures by 80% (Actual figures exceeded forecast figures by 84% in 2005, and are expected to exceed them by 88% in 2006).</td>
</tr>
</tbody>
</table>

¹ The source is created based on questionnaire responses (responses of J MBA), and data received during the present field survey.
Table 1: Comparison of Average Daily Traffic Volume: Forecast at Time of Appraisal vs. Actual

<table>
<thead>
<tr>
<th>Index (Project completion year)</th>
<th>1998*1</th>
<th>1999</th>
<th>2000*2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trucks (per day)</td>
<td>1,093</td>
<td>1,253</td>
<td>1,365</td>
</tr>
<tr>
<td>Actual</td>
<td>645</td>
<td>891</td>
<td>1,361</td>
</tr>
<tr>
<td>Achievement rate</td>
<td>59.0%</td>
<td>71.1%</td>
<td>99.7%</td>
</tr>
<tr>
<td>Buses (per day)</td>
<td>340</td>
<td>383</td>
<td>414</td>
</tr>
<tr>
<td>Actual</td>
<td>660</td>
<td>825</td>
<td>1,192</td>
</tr>
<tr>
<td>Achievement rate</td>
<td>194.1%</td>
<td>215.4%</td>
<td>287.9%</td>
</tr>
<tr>
<td>Passenger cars, motorcycles (per day)</td>
<td>196</td>
<td>227</td>
<td>247</td>
</tr>
<tr>
<td>Actual</td>
<td>773</td>
<td>702</td>
<td>893</td>
</tr>
<tr>
<td>Achievement rate</td>
<td>394.3%</td>
<td>309.3%</td>
<td>361.5%</td>
</tr>
<tr>
<td>Total (vehicles per day)</td>
<td>1,630</td>
<td>2,418</td>
<td>3,445</td>
</tr>
<tr>
<td>Forecast</td>
<td>2,079</td>
<td>2,025</td>
<td></td>
</tr>
<tr>
<td>Actual</td>
<td>1,865</td>
<td>1,27.5%</td>
<td>170.1%</td>
</tr>
<tr>
<td>Achievement rate</td>
<td>129.7%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: JMBA data
*1 Figures for the volume of general traffic from June to December
*2 Figures from January to June
*3 Actual figures are the total of these vehicle categories for tolls: light truck, medium truck, heavy truck.
*4 Actual figures are the total of these vehicle categories for tolls: small bus, large bus.
*5 Achievement rate = (Actual traffic volume) / (Traffic volume expectation at appraisal)

(2) Time to cross river
Ferry (one way): Approximately 2.5 hours
Waiting time to board ferry: 8 to 48 hours
Jamuna Bridge (one way): 12 to 18 minutes

(2) Time to cross river
- Ferry (one way): (Aricha to Nagarbari, several dozen kilometers downstream) Approximately 55 to 80 minutes (Waiting: time 10 to 20 minutes, Crossing time: 45 to 60 minutes)
- Jamuna Bridge (one way):
(3) Crossing toll
Comparison in Jamuna Bridge tolls with ferry fares

Table 2: Comparison in ferry fare with toll to cross Jamuna Bridge

<table>
<thead>
<tr>
<th></th>
<th>Truck</th>
<th>Bus</th>
<th>Passenger cars, Motorcycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jamuna Bridge crossing toll</td>
<td>750 1000 1,250</td>
<td>550 800 30 400</td>
<td>705.5 1,346.7 29 290.9</td>
</tr>
<tr>
<td>Ferry fare</td>
<td>705.5 1,346.7 29 290.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Truck: Small (below 5 tons), Medium (5 tons – 8 tons), Large (over 8 tons)
Bus: Small (29 or less seats), Large (30 or more seats)

(4) It is confirmed that river management (dike work) is appropriately maintained.

(5) Other
There are plans to add a railroad, electricity transmission lines, a gas pipeline, and telephone cables.

(3) Comparison in Jamuna Bridge tolls with ferry fares
Jamuna Bridge tolls have not changed since the time of ex-post evaluation.
Ferry fares (Aricha to Nagarbari)
Truck: 1090 takas
Bus: 1155 takas + 14 takas/passenger
Passenger cars, motorcycle: 115 takas + 14 takas/passenger
Jeep or pickup: 305 takas + 15 takas/passenger

Average 7 minutes
(Waiting time: 0.5 minutes, crossing time: 6.5 minutes)

(4) Maintenance and safety work for river control (dike work) is outsourced by the executing agency to an operation and maintenance company. Dike work is operated normally and appropriately, with river patrols, waterway measurement surveys, engineering surveys, safety management, etc.

(5) Other
Since the bridge is built for multipurposes, in addition to the road, the following were installed and began its operation after the ex-post evaluation (However, the railroad, electricity transmission lines, gas pipeline, and telephone cables were not financed by the ODA loan).
(2) Electricity transmission lines – Installation of 230kV transmission capacity completed, but actual electricity transmission has not started yet.
(6) EIRR  
At the time of the ex-post evaluation, the economic internal rate of return (EIRR) was calculated to be 14.7%. This is comparable to the 14.9% planned at time of appraisal.

Impact  
(1) Bridge related  
1) Gross Regional Domestic Product on east and west banks of the river: not available.


(6) EIRR  
17.2%

2) Annual comparison of production from existing industries (agriculture, jute, silk) in the region west of the river: not available.

2) Agricultural production of the west bank (Rajshahi Division) grew faster after the bridge was opened (2001-02), relative to growth before it opened (1997-98). There was especially rapid growth for potatoes (65%), wheat (42%), rice (38%), fruits (32%), and vegetables (30%). At the same time, producer prices rose rapidly overall, especially for fruits and vegetables (66%), and fish/milk/eggs (40%) (comparing 1998 with 2002). It is thought that producer prices rose due to improvements on the road in the east bank, improved access for agricultural produce from the west bank region to major markets such as Dhaka and Chittagong, which contributed to strong economic activity.

(1) Bridge related  
1) GDP growth rate of the west bank (1998-2001) (Rajshahi Division): 5.5%  
The east bank: not available  
According to a survey performed in 2002* by a Bangladesh consultant company, “During the years after Jamuna Bridge was opened from 1998 to 2001, the GDP growth rate of Rajshahi Division was 5.5% which was 0.5% higher than the national average. In particular, agricultural production increased remarkably, growing 17.6% annually during 2001-02, which was nearly twice the 9.5% national average. There was high activity in transport of agricultural inputs via the Jamuna Bridge from the east to the west, and of agricultural production from west to east. The regional economy was active, centering on agriculture, and average wages in the region rose to 45% during the five years after Jamuna Bridge was opened.” Thus, it can be said that the project is supporting increased agricultural production.  
(*Research results from the “Economic Impact of Jamuna Bridge on Rajshahi Division” by Bangladesh Consultants Ltd. (BCL) in 2002, and from an impact survey for Jamuna Bridge done in the same period by Louis Berger Group, Inc.)
3) Utilization rate of electricity transmission lines laid along the bridge: Operation planned in future.

4) Utilization rate of gas pipelines laid along the bridge: Operation planned in future.

(2) Related to resident relocation

Achievement level of resident relocation plan

Table 1: RRAP Achievement Rate

<table>
<thead>
<tr>
<th>Category</th>
<th>Item</th>
<th>Achievement rate (from progress report)</th>
</tr>
</thead>
</table>
| Unconditional compensation | • CCL payments  
• Extra 50% added to CCL payment  
• Lump sum cash compensation  
• Cash compensation related to housing construction  
• Cash compensation related to housing relocation | • 74% or greater  
• 100% of CCL recipients  
• 100%  
• 92%  
• 100% |
| Conditional compensation | • MARV payment  
• Stamp tax payment refund  
• Substitute site acquisition after monetary | • 48% (The basis for this planned value is uncertain)  
• 48% (The basis for this planned value is uncertain)  
• 93% (The basis for this planned value is uncertain) |

3) Electricity transmission lines – Installation is complete, but actual transmission of electricity has not started yet (It appears that a related institution will soon begin improvement work. In addition, relocated resident beneficiaries near the bridge said in interviews: “We are happy because there are fewer power outages.” However, according to executing agency sources, electricity supply to that area nearby is unrelated to the Jamuna Bridge electricity transmission lines).

4) Gas pipeline – Supply volume is 425 mmmscfd (installed transport capacity (utilization rate) is 85%).

(2) Related to resident relocation

Compensation payments from resident relocation plans (Revised Resettlement Action Plan, Erosion and Flood Affected Persons) were almost finished in 1999/2000. From that time, work was done on infrastructure in the relocation destination, and training provided to relocated residents. The entire plan finished at the end of 2003. Residents are satisfied with the infrastructure improvements of the relocation destination, but some are experiencing unemployment and worse living standards.

* The following is information collected from interviews with 302 households living in the relocation areas in the east and west banks, to understand the current situation of relocated residents (there is no actual data on improvement or deterioration).

i) Regarding the situation of housing in the relocation destination, 52% said it was “improved after relocation.” 17% said it was “worsened.”

ii) A great majority of relocated residents welcomed improved social infrastructure and public facilities, such as water supply, sanitation facilities, access to electricity, roads, schools, and mosque facilities.

iii) Regarding access to agricultural land, 90% of households said that ownership and access to agricultural land had worsened, and agricultural producers fell from 60% before relocation to 24% after (day labor agricultural workers increased from 7% to 11%). However, it also seemed that the farmers found alternative sources of income.

iv) Regarding the problem of employment and income sources (livelihood), the most serious problem widely raised was the lack of employment opportunities and income sources to replace agriculture. These are general
compensation (excluding relocation to prepared relocation site)
- Relocation to prepared relocation site
- Training for human resource development
- Occupational training

uncertain

- 85% (The basis for this planned value is uncertain)
- 50% (This planned value was calculated based on the survey)
- 48% (This planned value was calculated based on the survey)

Table 2: EFAP Achievement Rate

<table>
<thead>
<tr>
<th>Period</th>
<th>The expected number of applications</th>
<th>The number of applications actually received and handled</th>
<th>Payment achievement rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996, 97</td>
<td>10,499</td>
<td>9,337</td>
<td>100%</td>
</tr>
<tr>
<td>1998, 99</td>
<td>4,536</td>
<td>2,790</td>
<td>63.5%</td>
</tr>
</tbody>
</table>

(3) Environmental impact
The status of natural life, fish, insects, and animals was surveyed before and after project implementation, and serious effects on existing plants and animals were not recognized.

(v) Food security and cash income worsened for 43% of households after relocation (28% are gradually improving).

Environmental impact
Since various environmental programs took effect, no serious impacts on the environment have arisen.

Sustainability

(1) Technical capacity
Three engineers from JMBA (Jamuna Multipurpose Bridge Authority) are stationed in the office of JOMAC (Jamuna Operations and Maintenance Contract) on the east bank of the Jamuna Bridge.

The size of the executing agency is not changed since the time of ex-post evaluation. There were also no particular problems since operation management was contracted to a private company. The financial status also continues to be profitable. However, The function on decision-making has weakened due to reorganization in the Ministry of Communications.

(1) Technical capacity
JMBA consists of 22 engineers. Eight people received technical training from 1998-2003. It plans to train 15 people over five years from 2004. Moreover, three JMBA engineers are stationed on the east bank at Jamuna Bridge.
(2) Structural organization
JMBA consists of approximately 100 staff. Many staff are from institutions related to the Ministry of Communications, and are transferred to or employed by JMBA, primarily engineers and experienced staff. For five years after bridge completion, JMBA contracted operation and maintenance to JOMAC (a multinational company formed from three companies in South Africa, England, and Bangladesh. It has a total of 352 employees). The contract period with JOMAC is scheduled to end in 2002.

(3) Financial status
JOMAC has an annual operation and maintenance contract of about US$24 million. Toll revenues in 1999 were 597 million taka. The government decided to give priority to expenditures for the operation and maintenance budget for this bridge. There are no particular problems with budget measures.

(2) Structural organization
JMBA consists of 157 staff. Many staff are primarily engineers and experienced managers from institutions related to the Ministry of Communications, and are transferred to or employed by JMBA. During the project, JMBA was as an independent organization at the ministerial level (its head was a Secretary). However, after the project was implemented, it was lowered to the level of a department in the Ministry of Communications, which weakened JMBA's ability for decision-making, operation and maintenance. Since 2003, operation and maintenance has been contracted to Marga Net One Ltd. (300 employees).

(3) Financial status
JMBA has been managed profitably for the past five years (FY2000/01 – 2005/06) with a good cash flow. JMBA has also paid subsidies on behalf of the government since FY2004/05 (4.4 million taka in FY 2005/06).

Table JMBA Revenues and Expenses (Thousand Taka)

<table>
<thead>
<tr>
<th>Fiscal year</th>
<th>Revenues</th>
<th>Expenses</th>
<th>Operation and maintenance costs (%) *</th>
<th>ODA loan payments (%) **</th>
<th>Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000/2001</td>
<td>1,080,757</td>
<td>571,574</td>
<td>44</td>
<td>41</td>
<td>509,189</td>
</tr>
<tr>
<td>2001/2002</td>
<td>1,072,909</td>
<td>599,481</td>
<td>47</td>
<td>39</td>
<td>473,428</td>
</tr>
<tr>
<td>2002/2003</td>
<td>1,365,334</td>
<td>670,099</td>
<td>36</td>
<td>35</td>
<td>695,235</td>
</tr>
<tr>
<td>2003/2004</td>
<td>1,580,718</td>
<td>870,324</td>
<td>25</td>
<td>49</td>
<td>710,394</td>
</tr>
<tr>
<td>2004/2005</td>
<td>1,834,365</td>
<td>1,426,444</td>
<td>8.5</td>
<td>72</td>
<td>407,921</td>
</tr>
<tr>
<td>2005/2006</td>
<td>1,903,794</td>
<td>1,519,087</td>
<td>-</td>
<td>-</td>
<td>384,707</td>
</tr>
</tbody>
</table>

* Operation and maintenance costs divided by Expenses
** ODA loan repayments divided by Expenses
*** Expectation

Table JMBA Toll Revenues, Operation and Maintenance Expenses (Million Taka)

<table>
<thead>
<tr>
<th>Fiscal year</th>
<th>Toll revenues</th>
<th>Operation and maintenance expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000/2001</td>
<td>811.49</td>
<td>253.8</td>
</tr>
</tbody>
</table>
Operation and maintenance (Current status of output, and its operation and maintenance)

JOMAC is in charge of collecting tolls, supervising traffic, security of the surroundings, and regular maintenance of the bridge, approach road, and river dikes. If major problems arise with the facility, JMBA will directly carry out maintenance. Also, the structure includes JMBA engineers stationed at the bridge who inspect the maintenance situation, etc.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td>919.99</td>
<td>1,070.23</td>
<td>1,293.00</td>
<td>1,504.34</td>
<td>1,560.79</td>
</tr>
<tr>
<td>Expenses</td>
<td>280.9</td>
<td>240.6</td>
<td>221.1</td>
<td>120.7</td>
<td>121.0</td>
</tr>
</tbody>
</table>

- Operation and maintenance

The operation and maintenance system is basically similar to that at the time of ex-post evaluation, but since 2004 JMBA has been directly in charge of maintenance work on the approach road. Some cracks were found on the bridge’s deck surface at the start of 2006, which is currently investigated. Also required are the restarting operation of the freight vehicle weigh bridges (for trucks), and installation and operation of a railcar weigh bridge.

Lessons Learned, Recommendations, Information Resources and Monitoring Methods

(1) Follow up on lessons learned and recommendations made in the ex-post evaluation report or in later evaluations

(2) Proposals for securing sustainability, and instructions given at time of ex-post monitoring

No lessons learned or recommendations were mentioned.

In large-scale infrastructure projects, it is important to consider positive and negative social and environmental impacts such as resident relocation issues from the planning stage. It is also necessary to ensure that the executing agency has sufficient technical and organizational capabilities for implementation, operation, and maintenance.

(1) Lessons at time of ex-post monitoring

In large-scale infrastructure projects for roads or bridges, such as Jamuna Bridge (especially when associated with converting use of a huge land area), it is necessary to systematically survey and draft plans regarding the major issues of impacts on society and the natural environment during project design, then take sufficient measures, as it was done in this project. When resident relocation occurs, it is necessary to secure future means of livelihood for residents in relocation plans. For sound execution, it is also important to clarify the participatory approach based administrative and organizational framework.

(2) Recommendations for securing sustainability

- To ensure JMBA has sufficient operation and maintenance abilities, it is important to strengthen its administrative position and decision-making authority in the Ministry of Communications, and develop specialist
| | staff able to plan and manage work from a longer-term viewpoint (minimizing employment transfers). |
| | For the financial sustainability of JMBA, it is vital to ensure sufficient future revenues, and necessary to strengthen financial planning ability over the medium term, including setting tolls. |