

Ex-Post Project Evaluation 2011:
Package III-7
(Laos, Sri Lanka, Bhutan, Ethiopia, Tanzania)

October 2012

JAPAN INTERNATIONAL COOPERATION AGENCY

**FOUNDATION FOR ADVANCED STUDIES
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Preface

Ex-post evaluation of ODA projects has been in place since 1975 and since then the coverage of evaluation has expanded. Japan's ODA charter revised in 2003 shows Japan's commitment to ODA evaluation, clearly stating under the section "Enhancement of Evaluation" that in order to measure, analyze and objectively evaluate the outcome of ODA, third-party evaluations conducted by experts will be enhanced.

This volume shows the results of the ex-post evaluation of ODA Loan projects that were mainly completed in fiscal year 2009, and Technical Cooperation projects and Grant Aid projects, most of which project cost exceeds 1 billion JPY, that were mainly completed in fiscal year 2008. The ex-post evaluation was entrusted to external evaluators to ensure objective analysis of the projects' effects and to draw lessons and recommendations to be utilized in similar projects.

The lessons and recommendations drawn from these evaluations will be shared with JICA's stakeholders in order to improve the quality of ODA projects.

Lastly, deep appreciation is given to those who have cooperated and supported the creation of this volume of evaluations.

October 2012
Masato Watanabe
Vice President
Japan International Cooperation Agency (JICA)

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Ex-Post Evaluation of Japanese ODA Grant Aid Project
“The Project for the Improvement of the Vientiane No.1 Road”

External Evaluator: Nobuko Fujita,
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0. Summary

This project was implemented to restore the safe and smooth flow of traffic on Road No.1, an arterial road for Vientiane, by undertaking road improvements and flood prevention. Improving Road No.1 was of utmost importance for the rapidly growing economy of Lao PDR because of the important role it plays as part of Lao PDR’s domestic and international road network. This project shortened travel time and decreased flooding, and thereby contributed to the increase in economic activities along the road and in the development of the tourism industry. One section of road targeted for construction included the high probability of encountering buried artifacts. During construction, the project paid maximum attention to the possibility of encountering underground artifacts and important historical cornerstones of Vientiane city (baseman stones) were discovered. Although the project cost was within the plan, the project period slightly exceeded the plan because construction work was suspended due to the unearthed cultural properties. Efficiency of the project; therefore, is fair. The implementing agency promptly repairs surface damage and road conditions are good thanks in part to roadside residents who help in cleaning and cutting grass in ditches alongside the road.

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

1. Project Description



Project Location



Vientiane No.1 Road

1.1 Background

The Capital of Lao PDR, Vientiane, formulated a road improvement plan for seven trunk roads in 1997. Starting in 1998, with funds from the Asian Development Bank, renovation of six of the seven trunk roads started, and a total of 45.1 km of road was completed. However, Vientiane road No.1, the longest of the seven roads at a length of approximately 28.9km (hereafter Road No.1), was left untouched.

Road No.1 runs through two of Lao PDR’s international entrances, Wattay International Airport and the Friendship Bridge, which is built over the Mekong River bordering Thailand and connects to the heart of the city (figure 1). At the time of the Basic Design Study (hereafter, B/D) in 2003, 12% of people entering Lao PDR came from Wattay International Airport while 60% came over the Friendship Bridge¹. In addition, Road No.1 links to national highway No. 13, and allows traffic from Vientiane to northern and southern Laos as well as northern Thailand. However, Road No.1 had been experiencing problems affecting the country’s social economic activities and daily lives of people in Vientiane such as flooding due to inadequate sewage systems and road surface deterioration.

This project was implemented to restore function to Road No.1 for the safe and smooth flow of traffic, by implementing road improvements and installing a drainage system.

1.2 Project Outline

The objective of this project is to restore function and capacity to Road No.1 between Sikhay Junction and Thanaleng Warehouse, by improving the deteriorated pavement and poor drainage system and thereby ensure the recovery of the smooth flow of goods and people to affected regions.

Grant Limit / Actual Grant Amount	Phase I & II total:4,645million yen /4,162 million yen
Exchange of Notes Date	Phase I :July 2005 Phase II: June 2006
Implementing Agency	Ministry of Public Works and Transport (MPWT)
Project Completion Date	December, 2007
Main Contractors	Phase I: Shimizu Corporation Phase II: Obayashi Corporation
Main Consultant	Katahira & Engineers International
Basic Design	“Basic Design Study Report on Project for Improvement of Vientiane No.1 Road in Lao People’s Democratic Republic” JICA, June 2005
Detailed Design	August - December, 2005
Related Projects (if any)	“The study of master plan on comprehensive urban transport in Vientiane in Lao PDR”(2007~ 2008) , “The Lao People's Democratic Republic, the project for urban development master plan study in Vientiane Capital”(2010.1~2011.3), “Project for Improvement of the Road Management Capability” (2011.9~2016.9)

¹ In 2010, although the percentage of the people entering the country from Wattay Airport (10%) and the Friendship Bridge (39%) decreased, the actual number of people doubled, from 72,224 (2003) to 158,713 (2010) in Wattay Airport, and from 357,038 (2003) to 719,347 (2010) at the Friendship Bridge.



Figure 1 Vientiane Road No.1 (based on B/D)

2. Outline of the Evaluation Study

2.1 External Evaluator

Nobuko Fujita, Foundation for Advanced Studies on International Development

2.2 Duration of Evaluation Study

Duration of the Study: November 2011 - September 2012

Duration of the Field Study: February 6th - February 18th, 2012; May 14th - May 18th, 2012

2.3 Constraints during the Evaluation Study (if any)

None.

3. Results of the Evaluation (Overall Rating: A²)

3.1 Relevance (Rating: ③³)

3.1.1 Relevance with the Development Plan of Laos

In the “Sixth National Socio Economic Development Plan (2006~2010)”, the government of Lao PDR set forth objectives to develop infrastructure to more easily access foreign markets and allow people to move more easily that included constructing 2,300~2,400 km of road, and reaching an asphalt pavement ratio of 65.0~66.7%. Based on this plan, paving and improving roads, including the section of Road No.1 going to the Friendship Bridge, was set under way⁴.

As for the current “Seventh Socio Economic Development Plan (2011~2015)”, goals include efficient production by strengthening the transportation sector, and making transportation pivotal for

² A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

³ ③: High, ②: Fair, ①: Low

⁴ Lao PDR : Sixth National Socio Economic Development Plan (2006~2010) p129,168

modernization and industrialization by making it more accessible to all areas of the country and neighboring nations.

In the transportation sector, the “Traffic, Transport, Postal Services, and Construction Development Plan (1996-2020)” was implemented, stating that road traffic be enhanced to allow Laos’s socio economic standards to be level with its neighboring nations.

3.1.2 Relevance with the Development Needs of Laos

In the city of Vientiane, the development of socioeconomic activity and the rapid increase in the number of registered vehicles made it necessary to build a better road network. Road No.1 is a main road, both commercially and residentially, and a focal point of the city’s road network. However, the surface was deteriorating, and an insufficient draining system caused frequent flooding of the road, making it unsafe for passengers and vehicles.

Currently, although large-sized trucks avoid traffic by using the more recently built 450 Memorial Road, traffic on Road No.1 has been increasing exponentially, making it the capital’s most important road. Road No. 1, together with Lane Xang Avenue (home to Victory Gate), are also national symbols for visitors and tourists who inevitably use these roads once they are in Vientiane city.

3.1.3 Relevance with Japan’s ODA Policy

As for Japan’s ODA policy, one of the four important sectors identified in policy dialogue between Lao PDR and the study mission on economic cooperation in 1998 was infrastructure development. Bearing in mind the integrated development of ASEAN countries, Japan had been cooperating in transportation infrastructure projects (mainly trunk roads and bridges), and therefore this project corresponded with Japan’s ODA policy. In September 2006, a Country Assistance Plan for Lao PDR was formulated in which infrastructure development as well as the effective use of existing infrastructure was identified as one of six important sectors.

This project has been highly relevant with the country’s development plan, development needs, and with Japan’s ODA policy, therefore its relevance is high.

3.2 Effectiveness⁵ (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

The evaluation of previously set indicators, which were the reduction in travel time and the decrease in flooding on Road No.1, are as follows:

(1) Travel time reduction

- 1) The time it takes to drive from Sikhay junction to Chinay Moo junction, a distance of 12.3km,

⁵ Sub-rating for Effectiveness is to be put with consideration of Impact

during rush hour has somewhat decreased, as shown in the table below.

2) When the travel time from Sikhay to Thanaleng, a distance of 28.9km, is considered, what used to take 1 hour to complete can now be completed in one third of the time.

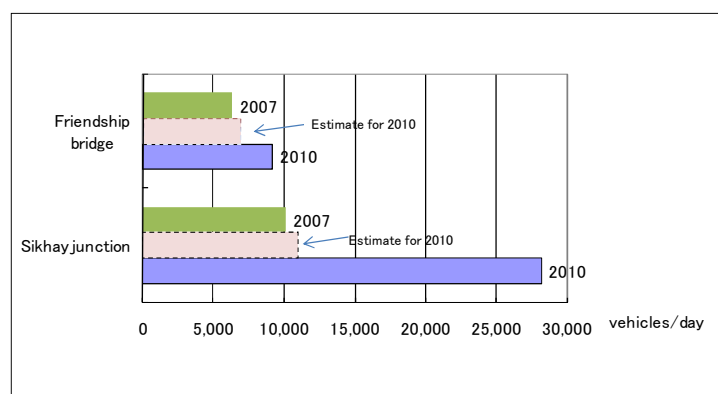
Table 1 Decrease in Driving Time (minutes)

Section	Time of Day	Baseline (2004)	Target (2007)	Actual (2011)
Sikhay to Chinay Moo (12.3km)	morning and evening rush hour	about 30	21	about 28
	non-rush hour	—	—	15~21
Sikhay to Thanaleng (28.9km)	non-rush hour	60	—	39~43

(Source : B/D for baseline and target of “Sikhay to Chinay Moo”, DPWT for baseline of Sikhay to Thanaleng, actual time were measured during the field study)

The section from Sikhay to Chinay Moo during rush hour did not reach its target times most likely because the road’s renovation increased traffic more than expected and there has also been a considerable increase in the number of illegally parked cars. The amount of traffic in 2010 was 1.4~2.8 times more than 2007. This represents an annual increase of 12~41 % (see figure 2), as compared to an estimated annual increase of only 2.9% in the B/D⁶. Furthermore, the number of vehicles in the city has also increased significantly. Due to the lack of parking spaces, illegal street parking has increased accordingly, worsening the congestion on Road No.1. In addition, compared to 2004, the total number of registered vehicles in Vientiane in 2010 increased 2.5 times (1.7 times over the period 2007~2010).

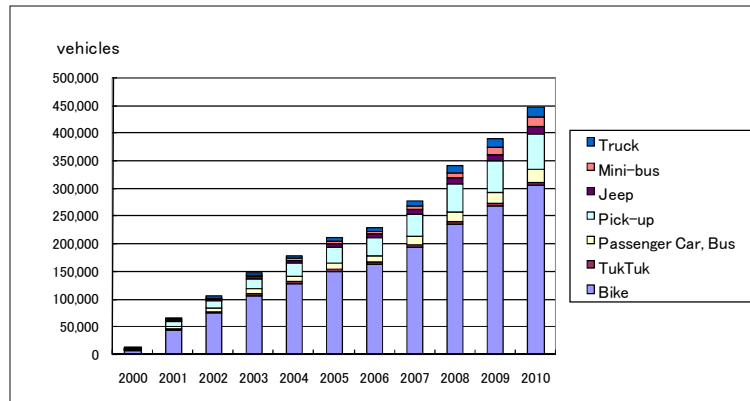
While driving on the Road No.1 during field studies, there was nothing wrong with the road and there was no traffic caused by vehicles needing to avoid holes. As rough sections of the road no longer slow down traffic, the objective to shorten the time of travel has been achieved.



(Source : The Project for Urban Development Master Plan Study in Vientiane Capital Final Report:App.1-76)

Figure 2 Increase of Traffic on Road No.1 Compared to the Estimate

⁶ It was estimated that between 2003 and 2017, there would be a 48.2% increase (B/D).



(Source : Ministry of Public Works and Transport)

Figure 3 Number of Vehicle Registration (Vientiane city)

(2) Flooding

Flooding used to occur primarily in low areas, but due to the installation of efficient draining systems, flooding has decreased significantly⁷. According to the Ministry of Public Works and Transport (hereafter MPWT), flooding occurred every time it rained hard; in 2004 it flooded 73 times. However, in the past 4 years, Road No.1 has experienced only one flood per year if any, and the length of time traffic is stopped due to flooding has decreased from 3 hours to 1~2 hours (table 2).

In 2008 and 2010, the Mekong River flooded causing parts of the city to be submerged. By piling up sandbags; however, Road No.1 managed to remain above water. In 2011, Laos experienced unusual rainfall. Although the Mekong River did not flood, Road No.1 was briefly submerged under water as deep as 20cm in some places, but the water withdrew within a few hours.⁸

In the road side residents' survey⁹ of all residents on Road No.1 that were affected by flooding, over 93% responded that they had seen improvement.¹⁰ Over 87% of respondents stated that it takes less time for the road to clear. Prior to the project, the respondents pointed out that without a proper draining system there were parts of the road that took 6 to 7 days to drain.

⁷ Flooding here is defined by rainfall that covers the road and inhibits driving.

⁸ To prevent the Mekong from flooding, a bank road was also constructed along the river by Korea (the Economic Development Cooperation Fund, "the Mekong river Integrated Management Project," 2009-2013, 30.855 million US\$).

⁹ The road side residents' survey was conducted between Sikhay Junction to Thanaleng Warehouse in 31 different locations with 36 residents that have lived or worked on or near Road No.1 for over 10 years using face to face interview with a questionnaire (30 valid samples). The breakdown of interviewees was: 20 commercial set ups, 5 non-commercial facilities (schools, hospitals), 20 residences (including those with store attached), 2 temples. Questions included satisfaction toward the project, changes before and after the project (business, convenience, sanitation, scenery, flooding situation, and safety issue), opinions regarding cultural preservation, maintenance of the road, and visibility of the project, etc.

¹⁰ Even in areas where respondents answered that flooding "increased," only one incident during a storm in 2011 was mentioned.

Therefore, the project has achieved its goal of decreasing flood occurrence and draining time.

Table 2 Frequency of Flooding and Clearing Time

Indicators (unit)	Baseline (2004)	Target (2007)	Actual			
			2008	2009	2010	2011
Flooding frequency (per year)	73	decrease	1	0	0	1
Average time taken for road to clear from flooding (hours)	3	decrease	1	0	0	2

(Source : B/D for baseline and target. MPWT for actual)

3.2.2 Qualitative Effects

(1) Increase in Access

With the improvements to the pavement, sidewalks, and drainage systems, Road No.1 has become more convenient. In the roadside residents' survey, 97% responded that traveling on foot and by vehicle has become faster, and more convenient. Additionally, the improvements to the sidewalks and drainage systems have made walking and shopping more pleasant for tourists in the central area which has many temples.¹¹

(2) Increase in Safety

In regards to safety issues, there were both positive effects and negative effects. Positive effects include surface improvements, installation of sidewalks, bus stops, parking lots, pedestrian crossings, traffic lights, and road signs whereas negative effects include the increase in speeding enabled by smoother pavement.

There is no data for traffic accidents that occur only on Road No.1¹², but according to the road side residents' survey, 50% said that the number of accidents has decreased since the project, while 43% said that the number of accidents has increased. 55% also said that they feel the road is safer thanks to the median, disappearance of potholes, and pavement improvement, while 38% said that the road has become more dangerous due to the increase in traffic as well as the increase in speeding¹³. Reasons for the increase in speeding can be attributed to the project's road improvements, but the reasons for the increase in traffic has to do with driving manners which are outside of the project¹⁴.

¹¹ According to the Tourism Department, road side stores and guest house hearing

¹² As for the total number of accidents in Vientiane city in 2011, accidents have decreased by 15%, injuries decreased by 21%, and deaths increased by 18% compared to 2007(MPWT hearing).

¹³ In the roadside residents' survey, a few people pointed out accidents caused by making a sudden big turn at the cuts in the median which was made for residents' conveniences, and by bikes' hitting concrete blocks (curbstones) which were placed to divide pedestrians and vehicles safely. However, most of the accidents are caused by multiple factors such as drinking, violation of traffic rules, speeding, unlicensed driving, etc., and the number of accidents that are clearly caused by the road's design is unknown. As for bikes' bumping into curbstones, most of them are minor accidents and reporting to the police is not required (Vientiane city traffic police, Sisatunuk district traffic police hearing).

¹⁴ In Vientiane city, 70% of motor vehicle accidents include under aged drivers, unlicensed drivers, and drivers under the influence (Lao PDR Statistical Yearbook 2010).

3.3 Impact

3.3.1 Intended Impacts

(1) Socioeconomic Impact

Since the renovation of Road No.1, new houses, shops, and factories have been built, boosting the economy of small businesses along the road. According to the road side residents' survey, 77% of shops and bus tour companies reported an increase in sales.¹⁵ In addition to commercial facilities, temples and hospitals have also become more accessible to the people.¹⁶

Between 2007 and 2010, the annual GDP growth was 7~8%, and GDP per capita increased from \$714 US to \$1,088 US.

Column 1 : Sisatunuk District Hospital

(A nurse explains,)

“Previously, Road No.1 in front of the hospital used to flood for over 3 hours, making it very difficult for me to commute by motorcycle and the patients to come to the hospital. However, the new drainage system clears the road quickly and it has been very helpful. I also feel that the road has gotten safer now that people don't have to drive on submerged pavement.”



Sisatunuk District Hospital

(2) Boost in Tourism Industry

This project has improved access from Wattay Airport and Thailand via the Friendship Bridge to the heart of Vientiane, thereby making a positive impact on the tourism industry.¹⁷ Tourist buses that come from Thailand via the Friendship Bridge used to take a detour due to the deteriorated surface conditions of Road No.1. Now they can get to the city faster thanks to the improvement of Road No.1. Moreover, the enhancement of the sidewalk has made it easier for tourists to shop along the Road. The addition of street lights has made it possible to hold events such as the Laos New Year's parade.¹⁸ With the help of the Government of Laos which has been promoting the tourism industry as one of main industries of the country: Vientiane city has seen a 36.5% rise in the number of tourists from 2006 to 2010, new restaurants and guest houses have increased alongside the road, and businesses related to tourism, such as bus companies, are flourishing¹⁹.

¹⁵ “Decreased” 11%, “No change” 8%, and “Do not know” 4%. The respondent who said their business decreased suggested parking problem as its cause. Due to parked cars in front of the stores, other cars cannot stop by at their stores. This problem is observed in one way street where only one side of the street is designated for parking.

¹⁶ Road side residents survey

¹⁷ In 2010, entry from the Friendship Bridge has increased by 24% and 49% from Wattay Airport compared to 2006 (Statistical Report on Tourism in Laos 2010).

¹⁸ Tourism Department hearing

¹⁹ Road side residents survey

(3) Improvement of Roadside Cleanliness

According to the road-side residents' survey, over 74% replied that the roadside has gotten cleaner.²⁰ During the dry season, there is less dust; during the rainy season there is less flooding and fewer puddles remain.

3.3.2 Other Impacts

(1) Impacts on the natural environment

There was no negative impact on the environment. All 485 roadside trees remain where they were, and sidewalks were made with bricks for aesthetic considerations in the central area sections in which many temples and important architecture are located. According to the roadside residents' survey, 90% responded that "the landscape has become more beautiful" due to new street lights, medians, greenery on road shoulders, etc.²¹

(2) Land Acquisition and Resettlement

In places where houses needed setbacks to improve the road, sidewalks were adjusted accordingly to avoid resettlements. To explain changes to roadside residents, a Japanese consultant and officials of Environment Section of MPWT went around to each house, approximately 2000 of them. Also, notice of the construction in English and Lao was included in a newspaper flyer. Right before actual work in each area started, meeting to explain to local residents were held lot by lot. There were almost no complaints by the residents, and some residents even brought the workers water and ice. Disturbances to the residents such as construction dust and inconveniences were held to a minimum, and there were no significant problems that were reported.²²

(3) Other Indirect Impact

The fact that some ancient artifacts were found in the past within the planned project site was revealed during the B/D and the B/D was suspended until a preliminary survey on cultural property was conducted.²³ This survey found the high probability of buried cultural property, therefore utmost attention was paid in digging before building underground structures such as the drainage pipes in the 6 km²⁴ section of road within the ancient castle wall²⁵. As a result, over 140,000 new artifacts, such as

²⁰ "No change": 19%, "Do not know": 6%, and "Worsened": 0%

²¹ "10% replied "unchanged."

²² Roadside residents' survey

²³ The preliminary study of this project started in January 2003, and B/D started in May. However, probability of buried cultural property revealed to be high by July, survey on cultural property was requested to Lao PDR government, B/D was suspended in consequence. Later, Lao PDR government requested Japan a pilot survey on cultural property, and Support Study for the Buried Cultural Properties was conducted in February 2004. By this study, further support on survey on cultural property was decided. B/D resumed in July, along with test trench conducted by the second Support Study for the Buried Cultural Properties. As a result, it was decided to treat buried property in 1.0m layer between 1.0~2.0 m from surface first, then only after that, digging and construction of underground structure was going to be implemented.

²⁴ The area to be treated with consideration to cultural properties was decided based on a Decree of the President of the Lao People's Democratic Republic on the Preservation of Cultural, Historical and Natural

ceramic ware and tile, were discovered. The artifacts were divided and categorized, then sent to the National Museum storage in 3000 boxes. Some artifacts are displayed at the Museum. Among the artifacts found were sema stones from Lane Xang dynasty, Vientiane's cornerstone (Column 2).

According to the road side residents' survey, people appreciated consideration given to the cultural properties during the construction, as well as the excavation of artifacts. The project helped raise awareness for cultural properties. Also, 67% of the respondents acknowledged that the project was a Japan grant aid project, and that roads constructed with Japanese aid are known for their sturdiness.

This project has largely achieved its objectives, therefore its effectiveness is high.

Column 2:Excavation of sema stone, Vientiane city's cornerstone

In January 2007, sema stones were unearthed at a project construction site of the near Simuang temple, about 6.5km from Sikhay junction. Composed of 193 leaf and egg-shaped stones (all together 177cm in length, 99cm in width, and 55cm in height) and once covered by gold leaf and/or painted with red pigment, these stones are said to have been made for religious purposes and used in rituals. They were most likely offered by different regions in the Lane Xang Kingdom when King Setthathilath relocated the capital from Luangprabang to Vientiane (1560), and they are considered valuable for archaeological and religious reasons. The top of the stones were destroyed by road and ditch construction in the first half of 20th century.

The Ministry of Cultural Information (then) decided to build the Vientiane City Pillar Shrine at the excavation site on the grounds that since the stones could remind people of Vientiane's history of repetitious invasions, the shrine would facilitate history education and raise people's awareness of ancient culture. In order to build the shrine, roughly 200 meters of Road No.1 was moved 5 meters to the north (the Lao government covered all expenses related to the construction of the shrine and moving the road). The Shrine is under construction and expected to be completed in the fall of 2012. Until then, the unearthed stones will be displayed at the National Museum.

According to the Ministry of Education, Cultural Information and Tourism, in cases of major construction works inside the castle wall of Lane Xang dynasty, surveying buried cultural properties is mandated by Presidential decree (surveys are, however, rarely implemented). Since the Lao government has not procured budget for archeological surveys, construction projects are the only opportunity for excavation. This project is highly regarded by Lao people for simultaneously achieving the construction of a modern infrastructure and the preservation of ancient cultural properties. This project led the way for the implementation of archaeological survey in large scale project by Lao government and World Bank in the same area. After the

Heritage by Ministry of Education and Culture.

²⁵ Construction was done in a way that first 1m surface dirt was dogged and taken away by machines, then workers scooped dirt by hands by 25cm deep, wash and dry artifacts found, store in boxes with explanation, numbers and remarks, send it to the storage, then installed drainage pipes. Two experts on cultural properties were involved in this process all thorough this period.

shrine is officially opened, the Department of Tourism Development is planning to launch a campaign to stimulate the tourism industry.

According to the roadside residents' survey, 83% of respondents were aware of the excavation, and 33% had gone to see the stones at the construction site or the Simuang temple where the stones had been stored temporarily. Over half of the respondents stated that "it was good to unearth sacred artifacts" and "the artifacts are worth preserving," while only 2 out of 36 people were dissatisfied with moving the road due to the construction of the new shrine.



One of the sema stones.
Inscription of zodiac position
is calculated to be 1540.



Stones on display in the
National Museum



The new shrine being built on Road
No. 1

Photo (left): Preliminary Report on the Buried Cultural Properties Salvage Works for the Project for Improvement of Vientiane Road No.1

3.4 Efficiency (Rating: ②)

3.4.1 Project Output

Project output was produced as planned (see Table 3). Changes from the plan were minor such as the locations of street lights. As for the excavation and preservation of buried cultural properties, works such as sorting, transporting, and storing of unearthed properties were done simultaneously with the construction work over a 6.5km section. Lao side obligations were fulfilled without delay except for the installation of traffic lights which was implemented with funds provided under cooperation from France.

Table 3 Project Output

Japan side	
Road section : Sikhay junction~Thanaleng warehouse	
Road length : 28.92km	
Pavement	All asphalt concrete
Drainage system	15.5km
Relocation of water pipes	6.5km
Road facilities	sidewalk : Mount up type for 10.4km (Sikhay junction~Thatkhao junction) , Flat type for 11.3km (Thatkhao junction~BeerLao) , Road shoulder type for 7.2km (BeerLao~Thanaleng warehouse) Lighting : 15.5km Traffic lights : base only Median : 9.3km
Unearthing buried cultural properties	6.5km
Lao side	
Preparation for construction	Providing the land necessary for temporary offices, construction works, storage yards and others.
	Conducting building survey alongside the Project site.
	Installing switchboards for street lighting and traffic lights.
Relocation of hindrances	Relocating all structures like electric poles, advertising boards, drainage pipes from factories, underground cables and manholes, etc., that lie in the way.

Sewage pipes	Providing sewage pipes from residences to the public sewage inlet boxes.
Road facilities	Installing traffic lights at intersections improved by the project



Sikhay junction, starting point of Road No.1. Design of lighting is popular among residents.



Morning rush-hour



Buffalo skin shops opened after the project by bus bays

3.4.2 Project Input

The project cost remained under budget.

Table 4 Project Cost

	Planned	Actual
Japan side	4,645 million yen	4,162 million yen (89.6%)
Laos side	84 million yen	N.A.

3.4.2.2 Project Period

The project was estimated to take almost 28 months, but took 29 months and 5 days, and exceeded the schedule slightly (104% of the plan). The reason for the delay was that the construction works were suspended at the sema stone excavation site. The delay was minimized by working on other sections in the meantime.

Although the project cost was within the plan, the project period was slightly exceeded, therefore efficiency of the project is fair.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

Operation and maintenance (from daily cleaning to undertaking necessary major repairs) are carried out by the Department of Public Works and Transport (DPWT), the Vientiane branch of the MPWT, and the Vientiane Urban Development and Administration Authority (VUDAA). The VUDAA is in charge of the section from Sikhay Junction to Nong Khai Junction, while the DPWT covers the section from Nong Khai Junction to Thanaleng warehouse. When necessary, both entities work jointly using DPWT budget for example, when large-scale repairs take place before international conference.

The DPWT consists of 97 employees, 27 of which are in the Department of Roads (2011). VUDAA consists of 70 employees, 27 of which are in the Department of Urban Management and 18 of which are in

the Unit of Traffic Management and Security. When repair projects are taken up by private companies; the company with the best technology and newest equipment are chosen by competitive bidding. Street and traffic light bulbs are changed by Electricité du Laos (EDL).²⁶ Manpower at implementing agencies seems to be sufficient, and no particular problem is observed in the structural aspects of operation and maintenance.

3.5.2 Technical Aspects of Operation and Maintenance

Maintenance of pavement has been carried out with no difficulties. A section near a beverage factory has been repaired many times since its road surface is fragile due to unstable soil with ground water.²⁷ During the first field study which happened to be right after a major repair, there was no problem. However, in the second field study conducted 3 months later, 6 or 7 holes were observed in the pavement. In response, the DPWT is planning to raise the road 1 meter over a distance of 300 meters, to prevent puddles after heavy rain which can cause surface damage, and has set aside a budget of 300 million kip for it. It is expected that this major repair will finally improve the condition.²⁸

The maintenance manual being used was made by officials in Laos. There have been no technical difficulties reported.



Section that was repaired several times

3.5.3 Financial Aspects of Operation and Maintenance

The budget for operation and maintenance is financed by the Ministry of Finance and the Road Maintenance Fund (RMF) through MPWT. Maintenance of all 7,200km of national roads is financed by RMF, including regular maintenance, emergency repairs, weeding, and labour costs.

The RMF comes from gasoline, diesel, and engine oil import taxes (currently 420 kip per litre) as well as overload fines. The RMF has been increasing every year; compared to 2006/07, the 2010/2011 RMF revenue was 300 billion kip (\$36.78 million US), almost 2.7 times more (table 4). This amount is distributed over 17 prefectures, with the capital city of Vientiane having priority.²⁹ In 2009, the budget for Road No.1, including daily, periodical, and emergency maintenance, was 410 million kip (\$54,000 US), equal to the planned amount: 410 million (\$54,065 US). With energy prices hovering at a rather high level, it is expected that revenue will remain stable for some time in the future.

The MPWT and VUDAA both estimate costs necessary for repair, request an appropriate budget as

²⁶ DPWT, VUDAA hearing

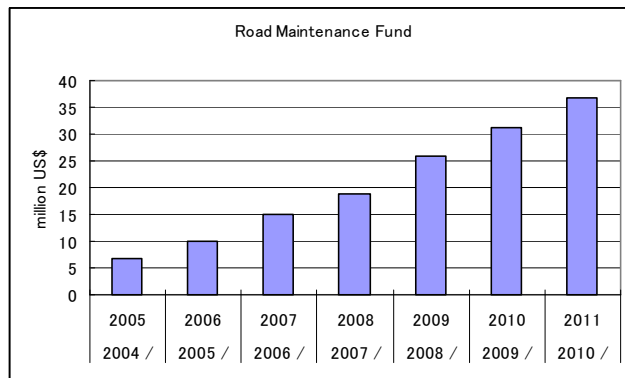
²⁷ DPWT, MPWT, VUDAA, Expert of "Project for Improvement of the Road Management Capability" hearings.

²⁸ 100 kip=1 Japanese yen

²⁹ MPWT hearing

part of an annual plan, and put repair works out for tender (lot by lot) once the budget is disbursed.

To pay for cleaning and maintenance of street and traffic lights, 2000 kip per household per month is paid out of the electricity fee from EDL to VUDAA. For 2011, this amounted to a total of 161 million kip per month. A further 50 million kip per month is taken from water bills in the same manner. From February 2012, EDL took charge of replacing street and traffic lights and used 1000 kip per household per month out of available funds as mentioned above.³⁰



(Source: MPWT)

Figure 4 Revenue of Road Maintenance Fund

3.5.4 Current Status of Operation and Maintenance

The current status of operation and maintenance seems to be satisfactory, with no major traffic problems. Potholes in the pavement have been fixed swiftly, cleaning is done regularly, and greenery is kept in good condition. Depending on rainfall, there are certain sections of the road where the drainage system does not work as planned. This can be attributed to clogging by garbage and mud. Residents clean the road and cut grass in ditches every Saturday (according to the road side residents' survey, 97% of residents participate in the cleaning). On the other hand, it was pointed out by the residents that the drains get clogged easily with dirt and sand from construction sites.

Although there is little effect on the function of the road, replacing burnt streetlights bulbs and repairing streetlight poles damaged by traffic accidents seem to be taking too much time. During the second field study, approximately 10.8%³¹ of streetlights from Sikhay Junction to Chinay Moo Junction were not lit. According to VUDAA, EDL is supposed to have the bulbs changed by the fall of 2012 in time for the Asia- Europe Meeting.

Although outside the scope of this project, illegally parked cars (sometimes on multiple lanes) slow down traffic and therefore efforts to increase parking space will be necessary to maintain efficient

³⁰ Installation of street lights by this project was Sikhay Junction to Chinay Moo Junction. Street lights between Chinay Moo Junction and Thanaleng Warehouse were installed by cooperation from Thailand.

³¹ May 15th, 2012, 88 out of 721 streetlights were not lit between Sikhay Junction and Chinay Moo Junction.

traffic flow.

No major problems have been observed in the operation and maintenance system, therefore sustainability of the project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented to restore the safe and smooth flow of traffic on Road No.1, an arterial road for Vientiane, by undertaking road improvements and flood prevention. Improving Road No.1 was of utmost importance for the rapidly growing economy of Lao PDR because of the important role it plays as part of Lao PDR's domestic and international road network. This project shortened travel time and decreased flooding, and thereby contributed to the increase in economic activities along the road and in the development of the tourism industry. One section of road targeted for construction included the high probability of encountering buried artifacts. During construction, the project paid maximum attention to the possibility of encountering underground artifacts and important historical cornerstones of Vientiane city (sema stones) were discovered. Although the project cost was within the plan, the project period slightly exceeded the plan because construction work was suspended due to the unearthed cultural properties. Efficiency of the project; therefore, is fair. The implementing agency promptly repairs surface damage and road conditions are good thanks in part to roadside residents who help in cleaning and cutting grass in ditches alongside the road.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

- (1) In order to maintain the efficiency of drainage systems, it is important to remove dirt from the ditches and sewage every year before the rainy season.
- (2) To keep drains from getting clogged during the construction of buildings and houses or the installation of telecommunication cables, etc., it is essential for construction companies to understand the importance of avoiding excess dirt reaching the drainage system.
- (3) To improve the functional efficacy of the road, illegal street parking needs to be dealt with even though it was not within the scope of this project. Parked cars clog up the road which severely reduces the functional efficacy of the road. Control of illegal parking should be strengthened and ways to supply additional parking spaces should be considered.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

Since the probability of buried cultural properties had become clear during the B/D study, this project was implemented simultaneously with an archaeological study. Although it slowed down the construction of the road, it resulted in raising people's awareness toward cultural properties, and unearthing important artifact such as the ancient Vientiane city cornerstones. This, along with the quality of the completed road, increased the reliability of Japanese cooperation. When undertaking construction projects in areas with historical value such as Vientiane city, sufficient consideration must be given to cultural properties when full-scale archaeological surveys are unaffordable.

0. Summary

The project was intended to improve the quality of healthcare services offered by ten target District Hospitals (DHs) by installing necessary facilities and equipment. This objective is in line with the development policy of the Lao Government, the development needs of the country, as well as Japan's assistance policy for Laos at the time of planning. Thus, the relevance of the project can be evaluated as high. The number of patients for major healthcare services has increased — in many cases to a great extent — in most of the target DHs, and the level of hospital user satisfaction with services offered by target DHs was found to be very high. In view of these findings, it can be concluded that the project has produced sufficient effects. Although some wastewater and solid waste has been disposed of differently from the methods stipulated in the project plan in some DHs, which raises some concern about environmental implications, the disposal methods practiced by some DHs are in most cases not violating the MoH's environmental standards or their advice. Taking this fact into consideration, the effectiveness and the impact of the project can be evaluated as high. The project was also efficiently implemented with inputs executed and outputs produced almost as planned. However, there are some challenges in respect to maintenance of provided equipment and therefore the sustainability of the project effect is considered fair.

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

1. Project Description



Project Locations



Champasak DH



Khoua DH

1.1 Background

The Lao People's Democratic Republic (Laos) had exhibited steady economic growth since the transition to a market economy in 1986. The country's Gross National Income (GNI) per capita, however, was USD379 (2004) and still lower than that of neighbouring countries. Growth has been limited to specific areas and economic disparities have been widening between urban areas and rural areas, where 80% of the population resides.

Health indicators show a low level of health status in Laos. In particular, the infant mortality rate, the under-five child mortality rate and the maternal mortality rate in Laos were among the highest in the Asian region. The major causes of death were preventable and curable diseases and diarrhea. The improvement of basic health care services including primary health care is imperative, especially in remote areas where the quality of health care is particularly poor.

The rural medical care system in Laos consists of five regional hospitals, thirteen provincial hospitals and 134 district hospitals (DHs), as well as many health centers. Although regional and provincial hospitals had been renovated or rebuilt with support from development partners, the majority of DH facilities remained old and did not have sufficient basic medical equipment and the local residents was unable to access basic health care services.

In response to this situation, the Ministry of Health (MoH) planned to strengthen the referral system in rural areas by improving DHs located in key traffic areas and turning them into Inter-District Hospitals (IDHs) and upgrading a few neighbouring DHs to Regional District Hospitals (RDHs). For that purpose, the Government of Laos requested Japan's assistance.

1.2 Project Outline

The objective of this project was to improve the quality of healthcare services offered by 10 target DHs by constructing facilities and providing medical equipment.

Grant Limit/Actual Grant Amount	Phase 1: 150 million yen/122 million yen Phase 2: 413 million yen/397 million yen Phase 3: 658 million yen/652 million yen
Exchange of Notes Date	Phase 1: February 2006 Phase 2: August 2006 Phase 3: June 2007
Implementing Agency	Department of Healthcare, Ministry of Health
Project Completion Date	December 2008
Main Contractors	Construction: Kanto Construction Co., Ltd. (Phase 2), Kanto Construction Co., Ltd. and Sanpo International (Phase 3) Procurement of equipment: Green Hospital Supply Co., Ltd. (Phase 1 and 3), Ogawa Seiki Co., Ltd. (Phase 2)
Main Consultants	Kume Sekkei Co., Ltd. and Binko International Ltd.

Basic Design	Basic Design Study on the Project for Improvement of District Hospitals in the Lao People's Democratic Republic, February 2005–January 2006
Detailed Design	Phase 1: March 2006–May 2006 Phase 2: October 2006–November 2006 Phase 3: June 2007–October 2007
Related Projects (if any)	[Technical Cooperation] Project for Strengthening Health Services for Children (2002–2007), Project for Strengthening Medical Logistics (2005–2008), Project for Human Resources Development of Nursing/Midwifery (2005–2010), Project for Upgrading Diploma Nurses (2008–2012), Project for Strengthening Integrated Maternal, Neonatal and Child Health Services (2010-2015)

2. Outline of the Evaluation Study

2.1 External Evaluator

Rie Fusamae, Foundation for Advanced Studies on International Development

2.2 Duration of Evaluation Study

Duration of the Study: November 2011– October 2012

Duration of the Field Study: April 18, 2012– May 7, 2012, and June 25, 2012–June 29, 2012

2.3 Constraints during the Evaluation Study

The field study was conducted on five hospitals out of 10 target hospitals due to time constraints, though most data were collected from all 10 hospitals. Therefore, analyses by hospital were carried out only to a limited extent.

3. Results of the Evaluation (Overall Rating: A¹)

3.1 Relevance (Rating: ③²)

3.1.1 Relevance to the Development Plan of Laos

The project intended to improve the quality of health care services by developing infrastructure and upgrading medical equipment of some DHs that are expected to be turned into IDHs. Such an objective and the approach of the project were in line with the policy of the Lao Government at the time of the project planning. In 2010, the Government of Laos introduced the Health Strategy up to the Year 2020, which aims for full health care coverage and fair health care services. The strategy adopts six health development policies, including the facilitation of community-based health promotion and disease prevention, and the improvement and expansion of hospitals at all levels and in remote areas. The Lao Government also prepared a health master plan in 2002 based on the strategy, with assistance from JICA. The master plan identifies the enhancement of DHs as one of the highest priority programs,

¹ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

² ③: High, ②: Fair, ①: Low

and the government planned to develop, above all, those DHs located in important traffic areas into IDHs.

The project objective remains relevant at the time of ex-post evaluation. The Health Strategy continues to show basic policy orientation of the Lao Government. Under the 7th Five-Year Health Sector Development Plan (2011–2015) formulated based on the Strategy, the government aspires to improve the quality of health care services as well as service delivery capacity through the development of human resources and infrastructure.

3.1.2 Relevance to the Development Needs of Laos

The major causes of deaths in Laos at the time of the project planning were preventable and treatable infectious diseases. In rural areas (where 80% of the population live), residents did not have access to basic health care services due to the deterioration of facilities and shortages of basic medical equipment in DHs.

Although a number of health indicators show improvements in health status in Laos at the time of ex-post evaluation, preventable and curable infectious diseases and diarrhea are still leading causes of death.³ The infant mortality rate, for instance, has been greatly reduced but most infant deaths are still caused by preventable and treatable diseases or conditions such as neonatal conditions, pneumonia, diarrhoea and measles. On the other hand, the maternal mortality rate remains high despite considerable improvements in mother and child health (MCH) services, and the majority of maternal deaths occur in rural and remote areas⁴.

It therefore can be said that the project, which aims to improve rural health care services through the enhancement of DHs, fitted and still fits the needs of Laos.

Target hospitals were selected from among prospective IDHs located in key traffic areas in order to benefit a greater number of people. Priority was given to the northern and the central regions, which are particularly poor. Since there were only six hospitals in those regions suited for the project, four hospitals in the south located at important traffic points were later added. Although three of them are relatively close to provincial hospitals, they cover broad geographical areas and therefore they can be considered appropriate selections in terms of the number of beneficiaries.

3.1.3 Relevance to Japan's ODA Policy

The project was consistent with Japan's assistance policy towards Laos at the project planning stage. Basic Human Needs (BHN) was one of Japan's priority areas for assistance to Laos. In regards to the health sector in particular, the Japanese Government specifically planned to provide key hospitals with

³ World Health Organization Country Cooperation Strategy 2012–2015.

⁴ Ibid.

physical support, such as construction and renovation of facilities and equipment supply.

As seen above, this project has been highly relevant to the country’s development plan and development needs, as well as to Japan’s ODA policy. Therefore, its relevance is high.

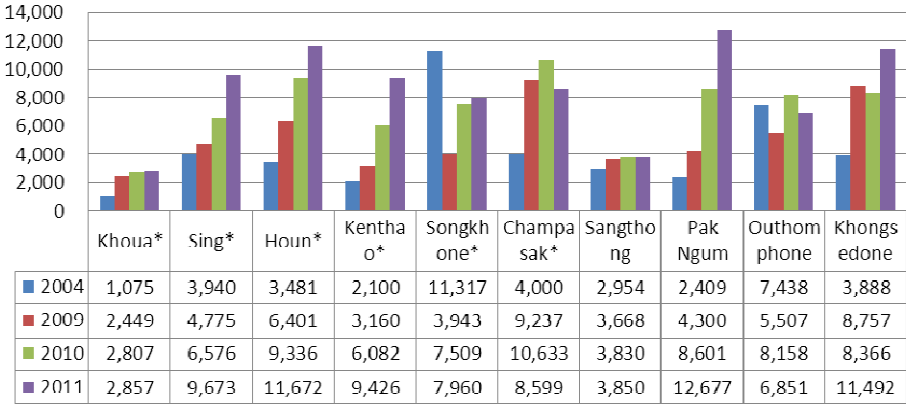
3.2 Effectiveness (Rating: ③)

3.2.1 Quantitative Effects

The project planning team set targets for the following basic indicators prior to the project implementation: the number of outpatients; the number of inpatients; the number of blood tests; the number of X-ray examinations; the number of deliveries; and the number of antenatal examinations. In order to examine the effects of all the major equipment provided under the project, a few indicators, namely the number of laboratory tests, the number of ultrasound examinations and the number of dental treatments, were added in the ex-post evaluation study.

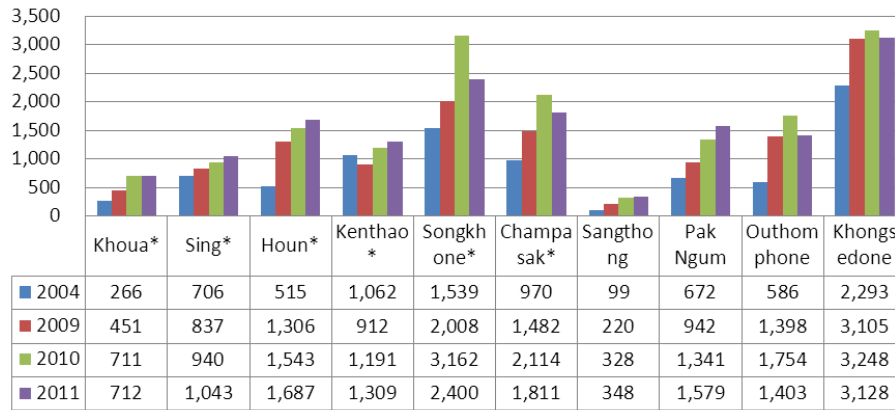
3.2.1.1 Number of Patients

The total number of outpatients treated in 10 target hospitals doubled from 51,826 in 2004 to 71,898 in 2010 and 85,057 in 2011. The number of inpatients also increased by about 80% from 8,708 in 2004 to 16,322 in 2010 and 15,420 in 2011. Performance by hospital is shown in Figure 1.



*Hospitals that received support for facility improvement under the project.
 Source: Target DHs
 Note: An approximate annual average before the project implementation is adopted as a baseline for Champasak Hospital and figures for the year 2003 for Sing DH and Khongsedone DH.

Figure 1 Number of Outpatients by Hospital



*Hospitals that received support for facility improvement under the project.
Source: Target DHs

Figure 2 Number of Inpatients by Hospital

Though the number of outpatients remarkably increased in most of the target hospitals, the data shows a large decrease in Songkhone DH in the southern province of Savannakhet and little change in Outhomphone DH in the same province. Songkhone DH officials explained that they had a large number of outpatients in 2004 due to various health projects that were going on in the year. On the other hand, MoH analysis holds that the Savannakhet Provincial Health Office is focusing on the enhancement of the health centers and therefore an increasing number of people visit health centers instead of DHs. Contrary to the two hospitals, Pak Ngum DH in the capital Vientiane shows a significant increase of outpatients. They attribute the increase to health promotion projects.

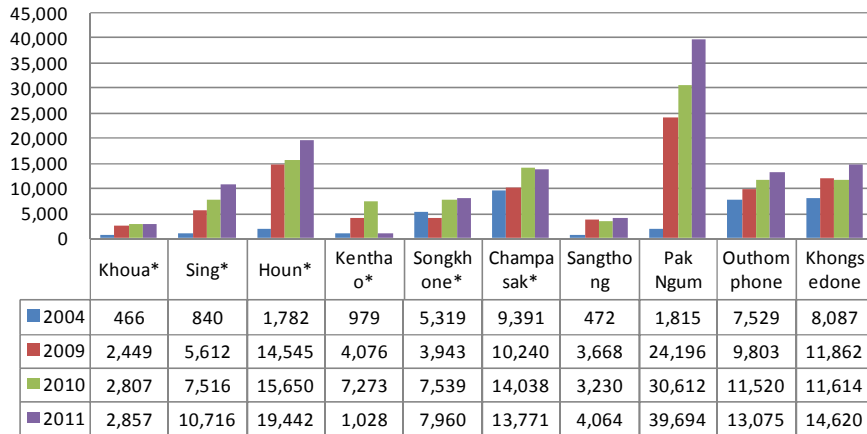
The number of inpatients increased in all of the 10 hospitals.

No significant difference in trends regarding the number of patients was identified between the six hospitals that received support for facility improvement under the project and the remaining four hospitals.

3.2.1.2 Number of Tests

The 10 hospitals conducted a total of 38,463 blood tests in 2010 and 41,508 in 2011, three times as many as in 2004 (13,459 tests). The number of laboratory tests also tripled from 36,680 in 2004 to 111,799 in 2010 and 127,227 in 2011. The main reason for the increase, apart from the increase in the number of patients, is that the range of test items has expanded due to new laboratory equipment provided under the project.⁵ The numbers of laboratory tests by hospital are shown in Figure 3.

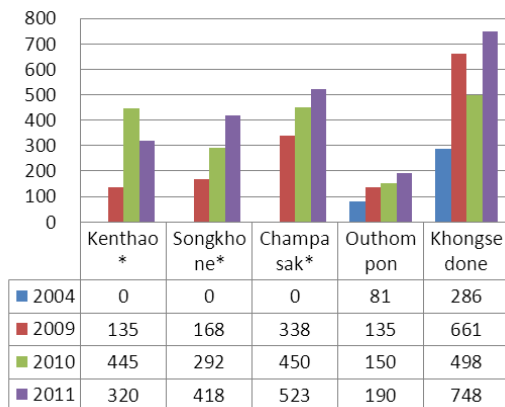
⁵ The target hospitals conduct laboratory tests on such items as kidney stones, hepatitis B, hepatitis C, HIV, uric acid level, bilirubin, glucose, cholesterol, etc., while testing was available mainly for malaria, tuberculosis and blood cell counts before the project.



*Hospitals that received support for facility improvement under the project.
Source: Target DHs

Figure 3 Number of Laboratory Tests by Hospital

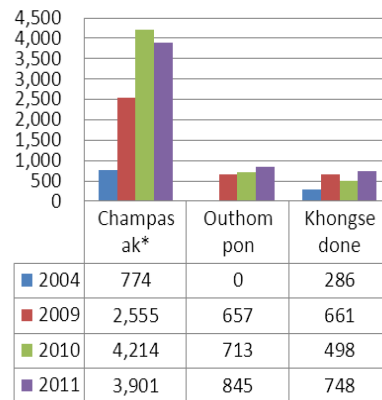
X-ray units and ultrasound scanners were provided only for those hospitals that have the skills to operate those machines. The number of X-ray tests and ultrasound tests is steadily increasing in each of those hospitals (See Figure 4 and 5).



*Hospitals that received support for facility improvement under the project.
Source: Target DHs

Figure 4

Number of X-ray Examinations by Hospital



*Hospitals that received support for facility improvement under the project.
Source: Target DHs

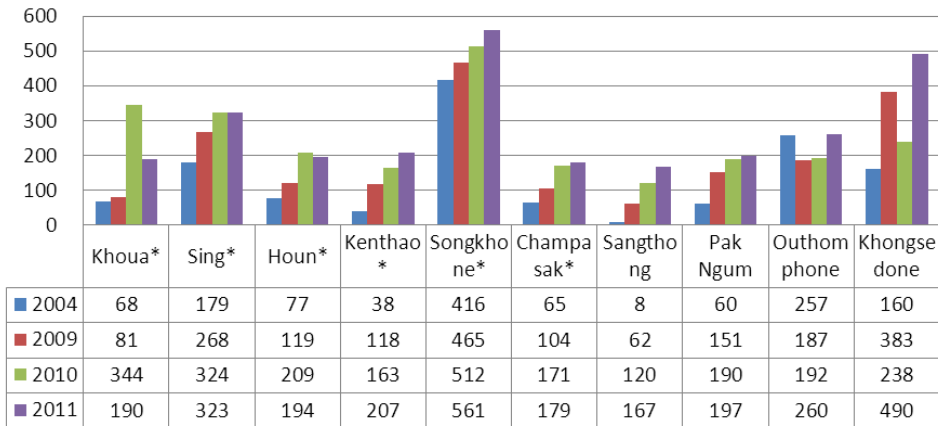
Figure 5

Number of Ultrasound Examinations by Hospital

3.2.1.3 Number of MCH Services

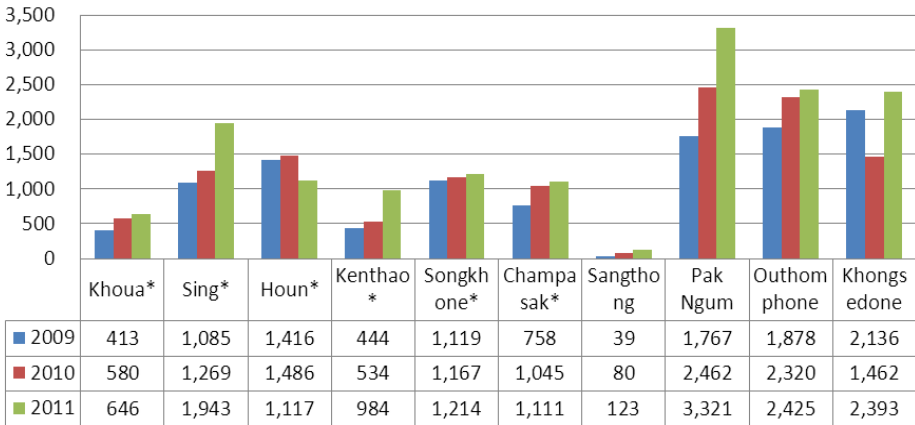
MCH services, one of the major responsibilities of the DHs, have shown great improvement in terms of the number of services offered. The total number of deliveries at the 10 target hospitals nearly doubled from 1,328 in 2004 to 2,343 in 2010 and 2,601 in 2011 (See Figure 6). The number of antenatal examinations also increased from 9,352 in 2004 to 12,405 in 2010 and 15,277 in 2011 — increases of 30% and 60% respectively (See Figure 7).

There is a large increase in the number of deliveries in nine out of the 10 target hospitals. Whilst the project has contributed to this trend, it owes largely to the free delivery campaign being carried out nationwide by the Lao Government. The number of antenatal examinations has also shown a steady increase in almost all of the hospitals over the last three years, though changes before and after the project cannot be examined due to a lack of baseline data. There is no profound difference in trend regarding the number of MCH services between the six hospitals that received facility support and the remaining four hospitals. However, figures indicate that in all of the six hospitals with new facilities, MCH cases are steadily increasing.



*Hospitals that received support for facility improvement under the project.
Source: Target DHs

Figure 6 Number of Deliveries by Hospital

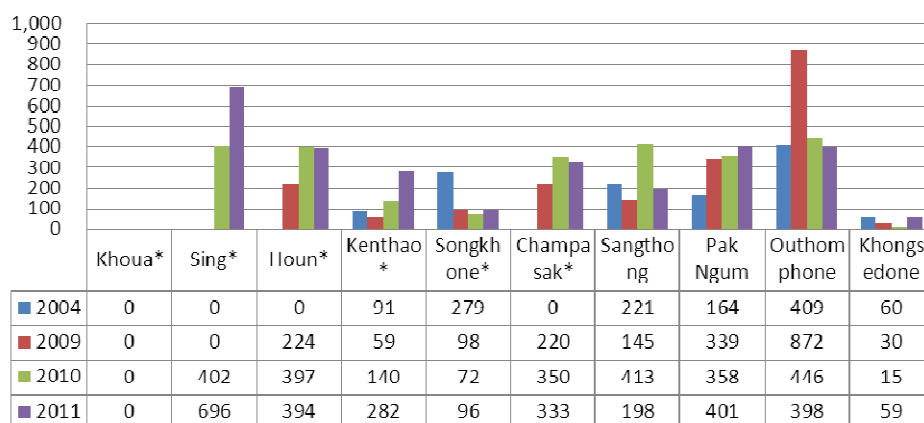


*Hospitals that received support for facility improvement under the project.
Source: Target DHs

Figure 7 Number of Antenatal Examinations by Hospital

3.2.1.4 Number of Dental Treatments

A dental unit was provided under the project for all of the 10 target hospitals, out of which four hospitals planned to start dental services. The total number of dental treatments offered by the 10 hospitals was 2,593 in 2010 and 2,857 in 2011, both of which were more than double the number in 2004. On the other hand, performance varied from hospital to hospital (Figure 8). Khoua DH in the northern province of Phongsaly has never offered dental services since they have no dentist. In Songkhone DH in the capital Vientiane, the number of treatments sharply decreased as, according to hospital officials, they had a larger number of dental patients in 2004 because of a dental health project. The number also reduced in Khongsedone DH in the southern province of Saravan where an official dentist was transferred to another position and a volunteer with a license is providing dental services. Since the number of treatments in other target hospitals is also not large, ranging from approximately 200 to 400, it appears that demand for dental services is not as high as other services.



*Hospitals that received support for facility improvement under the project.
Source: Target DHs

Figure 8 Number of Dental Treatments by Hospital

As seen above, the numbers of all of the major services except for dental services increased — mostly to a great extent — in eight hospitals, though the numbers of some services in the remaining two hospitals decreased or did not change. With regard to dental services, performance was not as remarkable as in other services, but the number of treatments increased or remains at the same level. Based on the above findings, it can be concluded that the project produced sufficient effects.

3.2.2 Qualitative Effects

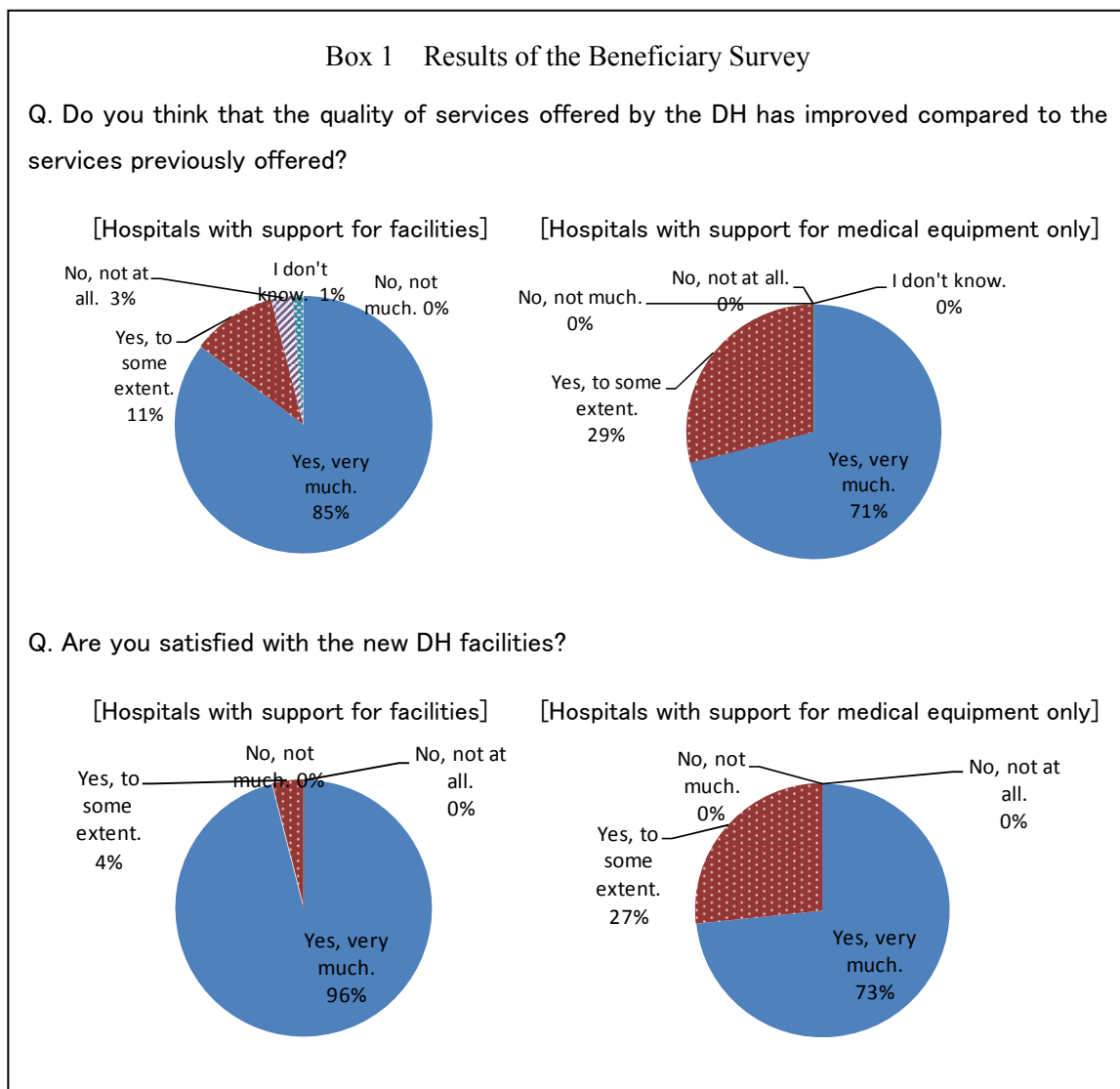
3.2.2.1 Satisfaction of Hospital Users

A beneficiary survey was conducted as part of the ex-post evaluation study in order to measure the level of satisfaction with services offered by target hospitals. 120 users of target hospitals,⁶ including

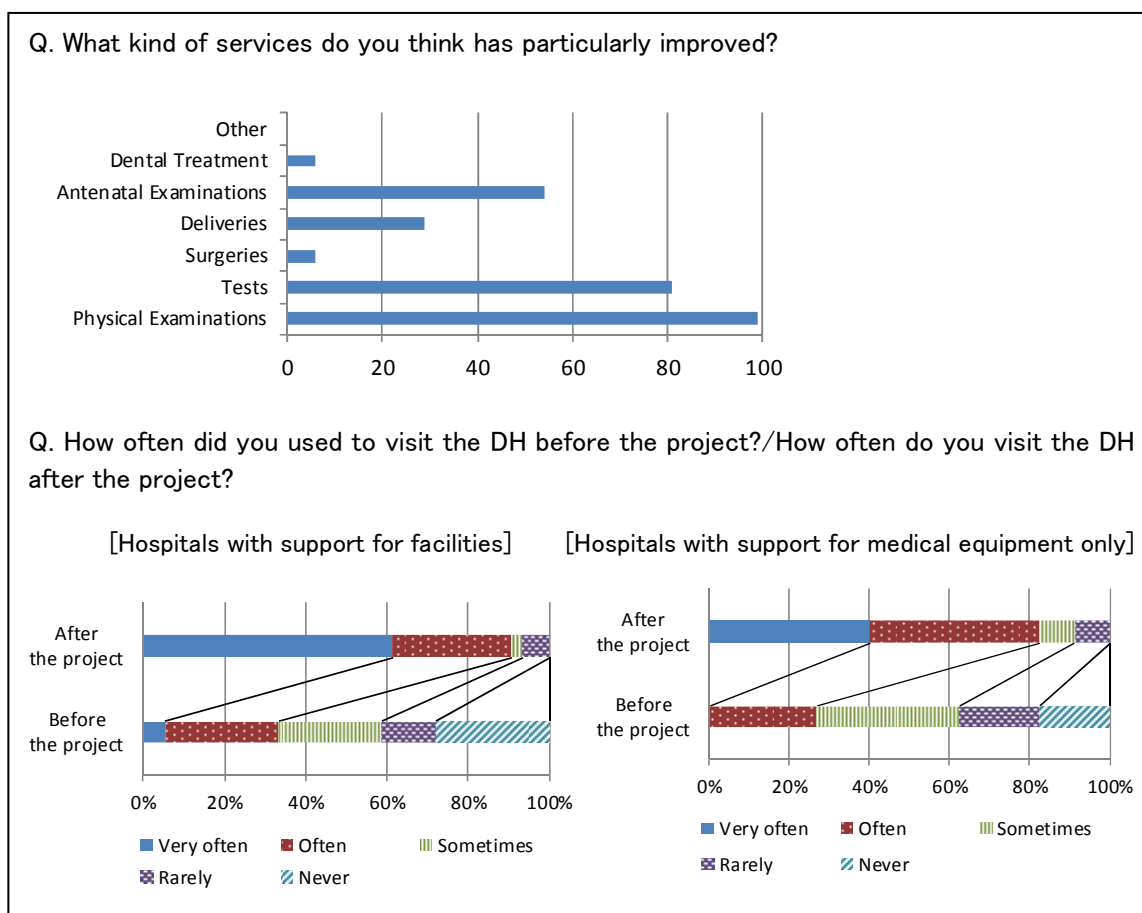
⁶ The survey was conducted in eight target hospitals other than Outhomphon DH and Songkhone DH.

patients and their family members, responded to the survey.⁷

The survey results show that the satisfaction level of hospital users is very high, particularly with physical examinations, tests and MCH services, all of which the project intended to improve. It is also found that frequency of visits has increased. The level of satisfaction with the quality of services and facilities is higher for those hospitals that received support for facility improvement under the project, though users of the remaining hospitals are satisfied too. Frequency of visits is also higher for the former.



⁷ 13 to 17 visitors responded in each hospital. Out of 120 respondents, 75 are users of the hospitals that received facility support and 45 are those of the remaining hospitals. By sex, 55 respondents are male and 65 female. By age, 52 respondents are teens or in their twenties, 43 in their thirties and forties, and 25 are aged 50 or older.



Comments from users mostly indicated a high level of satisfaction with services offered by the hospitals. However, there were some negative remarks as well. A few respondents in each of the surveyed eight hospitals gave negative opinions about the attitude of some doctors and nurses. Issues of the cleanliness of toilets were also raised for five hospitals.

3.2.2.2 Appropriateness of Constructed Facilities and Procured Equipment

Almost all the installed facilities and the equipment provided under the project are in use at the time of ex-post evaluation except for equipment under repair or to be repaired. JICA's follow-up study team on the project also found that the facilities and the equipment were mostly being used well.⁸

On the other hand, there are some facilities and equipment that are not in use or being used for unintended purposes as shown in Table 3 below. The middle surgery room was set up for emergency cases in the hospitals in the northern and central regions, in which no mid-scale surgery⁹ had been carried out.¹⁰ The X-ray room was installed not only for those hospitals that were to be provided with

⁸ Draft report on the follow-up study. The study team inspected current conditions of provided equipment.

⁹ According to the Ministry of Health standard, mid-scale surgeries refer to surgeries for, for example, appendicitis, caesarian sections, hernias, ovarian cysts and contraception.

¹⁰ Basic design study report (2005).

X-ray units under the project, but also for the other hospitals, taking future needs into consideration.¹¹

Table 3 Facilities and Equipment not in Use or in Use for Unintended Purposes

Facilities/Equipment	Hospitals	Reasons for Non-Use
Digital height and weight scale	All the 10 hospitals (some can be used for a few days with full battery charge)	The battery has run out but not been replaced due to the high cost involved in procuring a new one.
Middle surgery room and instrument set for middle-scale surgeries	Khoua, Sing, Houn, Sangthong, Pak Ngum DHs	It has been used only when doctors of upper level hospitals such as the Provincial Hospital visit since there are no doctors with skills to conduct middle-scale surgeries. Other than on those occasions, it is not used or is used for other purposes.
X-ray room	Khoua, Sing, Houn, Sangthong, Pak Ngum DHs	They do not have an X-ray unit.
Dental room and dental unit	Khoua DH	There is no dentist.
Toilets	Sing DH	They have been closed since they got clogged many times by foreign articles disposed by users.
Ultrasound scanner	Khongsedone DH	It broke down but they did not procure a required part to fix it due to the high cost. They instead purchased a new one made in China, which is cheaper than procuring the part.
Microscope	Kenthao DH	It broke down. They are using a microscope provided under another donor-supported project.
Autoclave	Kenthao DH	They use a larger one provided by another donor.
	Sangthong DH	The doctor that has the required skills to use it got transferred.

Source: Draft follow-up study report and interviews with hospital officials

With some exceptions, most facilities and equipment not in use differ among hospitals and the reasons for non-use also vary. In some cases, there is no doctor that has the required skills to operate a particular device (See 3.5.2 Technical Aspects of Operation and Maintenance). As far as digital height and weight scales are concerned, all the target hospitals share battery problems. The batteries have not been replaced in any hospital due to the high cost of replacement even when it was found to be no longer rechargeable (See 3.5.4 Current Status of Operation and Maintenance). Given this fact, a scale with a battery, which is easy to procure, or separate analogue scales for weight and height would have been more appropriate.¹²

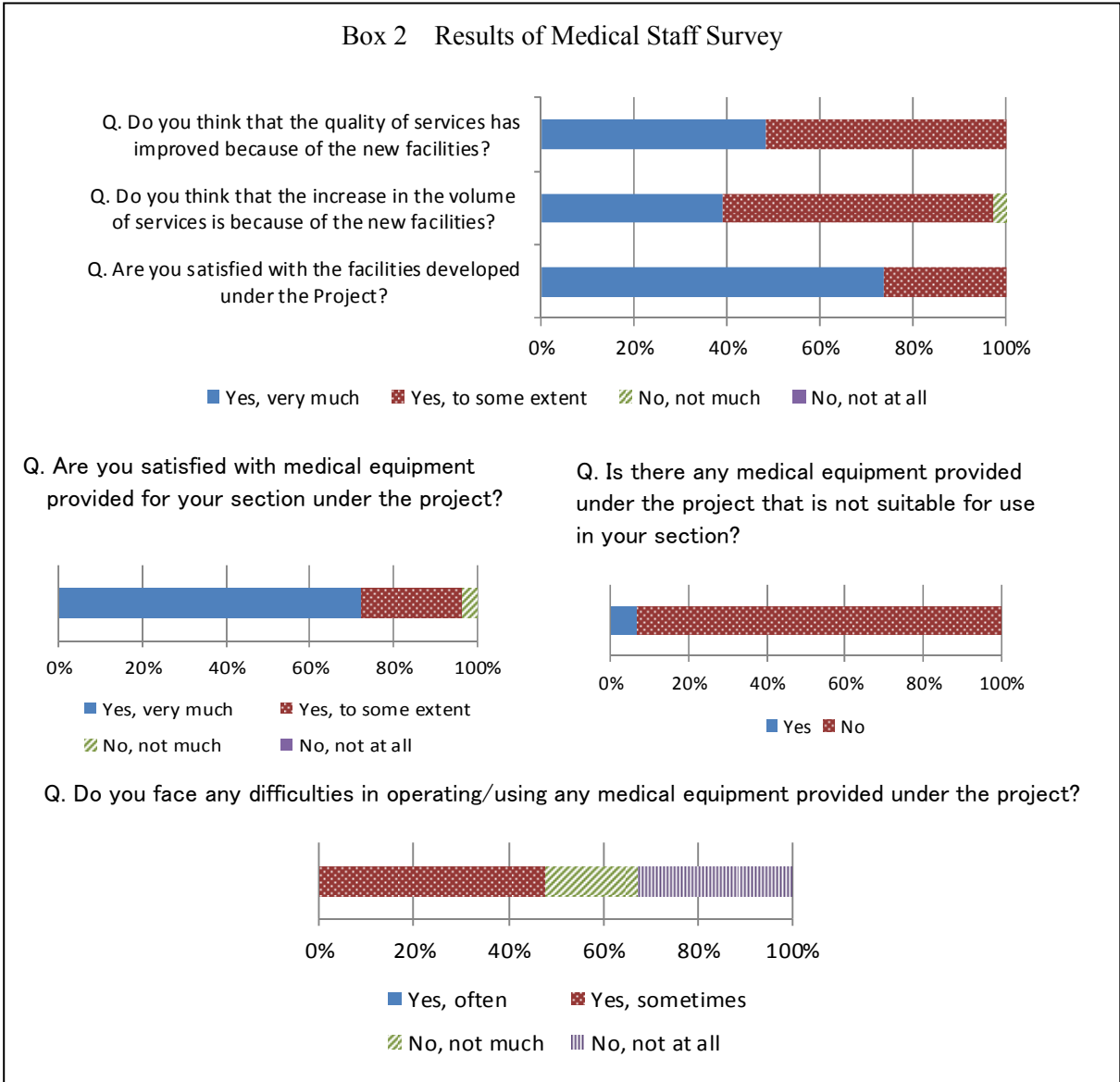
A survey of medical staff of the target hospitals¹³ conducted during the ex-post evaluation study revealed that they are mostly satisfied with the facilities developed and the equipment procured under

¹¹ Ibid.

¹² Some medical staff interviewed commented that analogue scales would have been better. A consultant for the follow-up study on the project also recommends analogue scales in view of the availability of parts. (Interview with the representative of the Medical and Educational Supporting Organization for Asian Children (MESOAC))

¹³ The survey was conducted in the same eight target hospitals as the beneficiary survey. A total of 57 medical staff members, 5–11 from each hospital, responded. Out of 57 respondents, 25 are doctors and dentists, 18 nurses, 7 laboratory technicians and 7 others.

the project. Almost 100% of the 57 respondents are satisfied and approximately 70% of them answered “very satisfied” (See Box 2). Almost all the respondents acknowledged the contribution of the project to increasing the number of patients and the improvement in the quality of medical services, though they believe that the project is not the sole reason. They consider that physical examinations, deliveries and tests have particularly been improved. Although few gave complaints about the constructed facilities, many of the respondents in one of the surveyed hospitals noted that an installed septic tank is too small (See 3.3.1 Environmental Impact).¹⁴ For questions regarding the operation of the equipment, the top answer was that they sometimes find it difficult to operate. However, this is mainly due to mechanical troubles, and common technical difficulties among different hospitals were not found. On the other hand, all the surveyed hospitals noted some difficulties in maintenance of the equipment (See 3.5.2).



¹⁴ The same issue was raised in another hospital that received assistance for renovation of some facilities under Japan’s Grassroots Grant Aid Scheme.

3.2.2.3 Improvement of Maintenance System

In addition to facility construction and equipment supply, some technical assistance was provided through workshops on hospital maintenance and monitoring visits by consultants. It aimed to define a hospital maintenance system in each target hospital and encourage them to engage themselves in routine maintenance activities.

According to a questionnaire and interview survey of hospital staff, each hospital has in place a routine checking system and a reporting system on the condition of medical equipment with a designated person in charge for the entire hospital or for each section.¹⁵ Routine checking sheets have been filled out more or less regularly in all the surveyed hospitals. An annual activity plan for maintenance introduced in the above-mentioned workshops has been prepared in some of the target hospitals. In other hospitals, the activity plan has been abolished and targets and indicators on maintenance activities have been set as part of minimum requirements (MRs) to meet for hospital operations, which is a concept that the MoH is promoting.¹⁶ In both cases, medical staff feel that planned maintenance activities have been implemented to some extent but not sufficiently.¹⁷ Medical staff in each hospital recognize the importance of maintenance and point out that they do not have sufficient skills and knowledge required for proper routine maintenance/checking.

3.3 Impact

3.3.1 Impacts on the Natural Environment

The project stipulated that waste from target hospitals be disposed through methods that reduce the burden on the environment. It was planned that wastewater from the laboratories, which contains small amounts of toxic substances, was to be discharged after undergoing a combined treatment, which is the same method through which other wastewater from the hospital is treated. This was considered appropriate as the number of tests is small, and little wastewater was expected to be produced from the tests. It was confirmed that wastewater from tests has been treated in the planned way at the six hospitals constructed under the project.¹⁸ Although the number of tests has increased substantially from the time of the project planning, combined treatment is a standard treatment method adopted by the MoH and therefore it can still be considered appropriate.

Developing fluid for X-ray film was, according to the basic design of the project, supposed to be

¹⁵ One hospital among the surveyed eight hospitals has no designated person in charge.

¹⁶ The concept of MRs was introduced under Japan's technical cooperation project for strengthening health services for children (2002–2007) and is being expanded across the country by the MoH. Although the annual activity plan introduced in the workshops was prepared applying the same concept, the MR concept that the MoH has adopted is intended for entire hospital operations, not only for hospital maintenance, and therefore maintenance issues are only partly dealt with.

¹⁷ Top answers given to the question of whether annual maintenance plans have been followed were: "Yes, very much" (33%) and "Yes, to some extent (51%). With regard to MRs on maintenance of medical equipment, answers were "All of them have been met" (36%), "Most of them have been met" (21%), and "Some of them have been met" (34%).

¹⁸ On the other hand, in the remaining four hospitals that did not receive facility support from the project, wastewater from the laboratory is discharged untreated into a hole in the ground or into the drainage system.

stored in a tank and collected by the MoH. However, it has been treated in the same way as other wastewater in a septic tank at four hospitals out of the five hospitals that the project supplied X-ray units. At the remaining hospital, it has been discharged untreated into a hole dug in the ground. Although the MoH advises hospitals to store waste developing fluid, the Ministry does not collect it and there is no Ministry standard on a disposal method.¹⁹

In Champasak DH in the northern province of Champasak, the septic tank installed in the project is unable to treat all wastewater from the hospital and therefore excess wastewater is pumped out and released untreated into the drainage system. Septic tanks for hospitals in the south were designed and installed in consideration of high ground water levels, which makes percolation of wastewater into the soil difficult.²⁰ Furthermore, the capacity of the septic tanks was determined applying the standard design employed by the Ministry of Communications, Transport, Posts and Construction of Laos.²¹ However, as the number of patients increased more than anticipated, more wastewater was produced than initially estimated.²² Champasak DH plans to install another septic tank at their expense.

Regarding solid waste, all the target hospitals send some of their medical waste such as needles to Provincial Hospitals. It was recommended in the project plan that flammable waste be collected and buried. However, in the MoH's standard design of DHs, a locally manufactured incinerator was adopted, which generates dioxin when incinerating at low temperatures. Five of the six hospitals constructed under the project have been disposing flammable waste in the recommended way. Champasak DH, on the other hand, has been burning flammable waste dumped in a hole dug in the hospital's premises. Incineration has often been hampered in the rainy season causing waste to flow into a drainage ditch.²³ Waste has been incinerated also in Sangthong DH, Pak Ngum DH and Outhompon DH. In fact, many DHs do not have the budget to install an incinerator and there are no dumping sites for them designated by the district administrations. MoH is directing those DHs to incinerate waste in a hole, though they are aware of its environmental implications.

3.3.2 Other Impacts

The MoH plans to make the design of DH facilities developed by the project the Ministry's standard design and encourages the Provincial Health Offices as well as development partners to adopt the design. The Ministry intends to draft a standard guideline for designing of DHs in the near future²⁴.

No other impact, positive or negative, has been observed. Resettlement and land acquisition were not

¹⁹ Interview with the Department of Health Care, MoH.

²⁰ Interview with the main consultant of the project.

²¹ Basic design study report (2005).

²² Interview with hospital officials and the Department of Health Care, Ministry of Health. Kongsedone District Hospital in the south, which was renovated under Japan's grass-roots grant aid scheme, is facing the same problem.

²³ Champasak hospital officials.

²⁴ Interview with Department of Healthcare, MoH

required for the project.

Though some issues have been identified regarding waste management, the project has largely achieved its objectives and therefore its effectiveness is high.

3.4 Efficiency (Rating: ③)

3.4.1 Project Outputs

Under the project, hospital facilities were constructed in six of the 10 target DHs and medical equipment was provided for all the 10 hospitals. Technical assistance on hospital maintenance was also provided. Planned outputs of the project were produced. Details of the outputs are shown in the table below.

Table 1 Planned and Actual Outputs

Planned	Actual	Changes from the plan
Construction of facilities (Six DHs: Khoua, Sing, Houn, Kenthao, Songkhone, Champasak)		
Outpatient block, inpatient ward, MCH block, surgery block (with or without an operation theatre), administration block, utility block (electric facilities and water supply facilities)	Almost as planned	<ul style="list-style-type: none"> - Change in the location of the utility block (Champasak DH) - Change in the location of the utility block (Sing DH and Houn DH), a water tank (Sing DH) and a septic tank (Houn DH) - Minor additions, specification changes and location changes of facilities (all the six DHs)
Procurement of medical equipment (6 DHs in the northern and the central regions: Khoua, Sing, Houn, Kenthao, Pak Ngum, Sangthong)		
Outpatient consultation room: Examination table, examination light, instrument set for examination, height and weight scale Dental room: Dental unit, dental instrument set Laboratory: Microscope, centrifuge, refrigerator X-ray room: X-ray unit (for Kenthao DH only) Middle surgery room: Treatment table, instrument set for treatment, resuscitation set, sphygmomanometer, suction unit, stretcher Inpatient ward: Wheel chair, treatment trolley, stethoscope, sphygmomanometer MCH block: Examination table, gynecology, instrument set for MCH, delivery table, instrument set for delivery, infant warmer, weight scale for neonate	As planned	None
Procurement of medical equipment (Four DHs in the southern region: Outhompon, Songkhone, Khongsedone, Champasak)		
In addition to the above equipment, the following equipment was procured: Outpatient consultation room: Ultrasound scanner (for Outhompon DH, Khongsedone DH, Champasak DH only), X-ray room: X-ray unit, mobile X-ray Operating theater: Anesthesia apparatus, electrosurgical unit, X-ray film illuminator, operating table, operating light, stretcher, autoclave	As planned	None
Technical assistance (all the 10 hospitals)		

Workshops on hospital maintenance, monitoring and evaluation visit by consultants	As planned	None
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Source: Basic Design Study Report (2005), Project Completion Reports (2007, 2008, 2009), Reference documents provided by JICA.

There were some minor changes from the plan, such as location changes of a few facilities and addition of some facilities, none of which incurred additional costs and an extension of the project period.

Works and procedures that were to be undertaken by the Lao side prior to the project implementation, such as land levelling and acquisition of necessary permits and approvals were all carried out in each site as planned. In addition to those planned works, the Lao side took measures to prevent landslides around Khoua DH. Some utility works such as works to establish a connection to high-voltage electricity lines and to the public water supply network did not finish by the completion of the project but were completed shortly after. Exterior works such as road and fence construction were undertaken in each site after the project completion.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The actual cost of the project was as planned: amounting to 1,172 million yen — nearly 100% of the estimated cost of 1,174 million yen. The capital cost borne by the Lao side was 27 million yen, far exceeding the planned amount of 5 million yen.²⁵²⁶ This excess was due to costs of exterior works, which were not included in the original estimate.

3.4.2.2 Project Period

The project period (from the detailed design up to the project's completion) was 33 months: shorter than the planned 37 months.

Both the project cost and the project period were within the plan and therefore the efficiency of the project is high.

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

The finances of the target DHs are managed by the respective District Health Offices (DHO), as at the time of project planning. However, unlike at that time, the Director of each target DH is now separately appointed from the Director or the Deputy Director of the DHO. This is because the MoH is

²⁵ The actual costs borne by the Lao side do not include the costs borne by three of the four hospitals that received equipment support only since data was not available. However, the total estimated cost for the three hospitals was less than 100,000 yen according to the Basic Study Design Report.

²⁶ Converted at the exchange rates used in the basic design study (1 USD=110.69 yen) and at the time of the project completion (1 LAK=0.009 yen), respectively.

planning to separate the DHs from the DHOs. In the near future, the DHOs will assume a role in the implementation of health promotion campaigns and other MoH projects, whilst the DHs will be responsible for treatment and hospital management.²⁷

The manpower of most of the target DHs has been enhanced or even doubled in some cases, though it has not changed from the time of project planning in three of the DHs.²⁸ The number of high-level and middle-level staff²⁹ has increased in all of the target DHs. Most of the DHs have more doctors (high-level) and medical assistants (middle-level), in particular.³⁰ Despite such increases, all of the target DHs claims shortages of doctors, especially specialists, such as anaesthetists, gynaecologists, paediatricians and surgeons. New appointments, in terms of number and post, are determined by the MoH and DHs cannot be certain about the prospects of increases in medical staff. However, the MoH is planning to strengthen the manpower of DHs and of health centers.³¹

For the maintenance of hospital facilities and medical equipment, each target DH has a system for daily checking and reporting in place, as mentioned above. (See 3.2.2.3 Improvement of Maintenance System.)

3.5.2 Technical Aspects of Operation and Maintenance

No major issues regarding the operation of provided equipment were identified during the ex-post evaluation study. (See 3.2.2.2 Appropriateness of Constructed Facilities and Procured Equipment) Almost all the target hospitals have personnel with qualifications and skills to operate all the provided equipment. The personnel required to conduct X-ray tests and ultrasound examinations have been newly assigned or trained in those DHs that had an X-ray unit (5 DHs) and/or an ultrasound scanner (3 DHs) installed under the project for the first time. On the other hand, one of the target DHs has no dentist to operate the dental unit, which was also newly installed in some DHs, due to the resignation of the dentist who was to provide dental services after the project. Although there is a medical assistant undertaking dental training at his own expense, it is uncertain whether he will return to the hospital after the training. Though there has been no dentist in two other hospitals as well due to personnel reshuffles, both of the hospitals have a volunteer with a license to provide dental treatment. In the surgical arena, five target DHs in the northern and central regions do not have anaesthetists and/or surgeons to use the installed middle surgery room and the provided instruments for mid-scale operations. However, it should be noted that the project did not intend an increase in the number of operations in those hospitals, but rather their readiness in terms of facilities for emergency cases, as

²⁷ Interview with DH officials.

²⁸ However, there is a possibility that some target DHs include staff members on long-term leave for training in their staff numbers.

²⁹ According to the MoH's classification, high-level staff have expertise in relevant areas such as medicine or pharmaceuticals and middle-level staff have basic medical knowledge.

³⁰ In Khoua DH in the northern district of Phonsaly, 14 doctors/medical assistants are on long-term leave for training with financial assistance from the Asian Development Bank.

³¹ Interview with Department of Health Care, MoH. A decree to increase the manpower of DHs and health centers was issued.

explained earlier. (See 3.2.2.2)

Overall, each target DH is mostly capable of operating the provided equipment. However, in order to use the provided equipment more effectively and to expand services, the assignment of more doctors and medical assistants, as well as the enhancement of those already in service in target DHs, is necessary. As far as training is concerned, opportunities are limited for many of the target DHs, except for the hospitals supported by development partners. Furthermore, the DHOs have not provided any training for staff of the DHs under their jurisdiction.

Each target DH recognizes the shortage of knowledge required for routine checking of equipment and the need for training to overcome the problem. In the medical staff survey mentioned above, the top answer to the question about problems regarding equipment maintenance was that they do not have personnel with maintenance skills (70% of respondents). In addition, some respondents pointed out improper routine checking (14%). In fact, the above-mentioned follow-up study on the project found that some problems with equipment could have been avoided through proper cleaning and routine checking.³² Some medical staff of the target DHs also complained about services offered by the Medical Equipment Service (MES) of the MoH: 28% of the respondents of the medical staff survey answered that the MES does not have skilled maintenance staff, and 14% pointed out that responses from the MES to repair requests are slow.

3.5.3 Financial Aspects of Operation and Maintenance

DHs come under the DHO in their respective district, which looks after the financial management of the hospital. The expenditure of each DHO that controls a target DH has increased about two to four times from their budgets for 2004. The expenditure for the operation and management of the DH has increased accordingly — a three to nine times increase for the six DHs that received support for facility improvement on one hand, and five to 30% increase for the remaining four DHs on the other.

Although the expenditure of each DHO for the operation and management of the DH (excluding personnel expenditure) under their control has also increased, they are still seriously short of funds for that purpose, and its share of the total DHO expenditure remains at the same level as in 2004 (4–9% in 2011 and about 6% in 2004). The shortfall has been, to some extent, made up for by profits from the Drug Revolving Fund (DRF),³³ which has risen at a rapid pace over the last few years. The DHs have also increased their incomes from charges for certain services such as document preparation and testing, and for beds. Such an increase of DH revenue, however, is not sufficient to cover required maintenance costs and it remains difficult for them to procure parts that are expensive or require high transportation costs. As a consequence, in some cases, DHs purchase a cheap new product rather than

³² Draft follow-up study report.

³³ DHs can purchase consumable supplies such as medicine, bandages and X-ray films from the MoH via the Provincial Health Office and set selling prices by adding a premium of up to 25% of the original price.

procuring a part required for damaged equipment at a high cost, or they use old equipment instead of repairing the new one.

DHs can make requests to the government for the allocation of funds in the following year for repairing equipment, including procurement costs for parts if the entire cost is high. Although the chance of receiving the funds is limited, some requests have been accepted by the government.

3.5.4 Current Status of Operation and Maintenance

The current status of operation and maintenance of equipment provided under the project was scrutinized in the above-mentioned follow-up study on the project, which found some problems in all of the target hospitals. Common problems include: the reduction or expiration of battery life of digital height and weight scales (all the 10 DHs); the deterioration of the surface of sphygmomanometers (all the 10 DHs); the expiration of battery life of operating lights (9 DHs); problems with dental units (7 DHs); and problems with the illumination lamp or lighting circuit of microscopes (4 DHs).³⁴ Target DHs share problems because most of the common problems were caused by the conditions in which problematic equipment has been used, or the equipment's battery life has expired.³⁵ Some small instruments, such as sphygmomanometers, have often been used outside, which accelerates their deterioration. Even some batteries or simple parts need to be procured from outside the country, but it is often the case that DHs procure them by themselves without requesting the MES to procure them in an effort to reduce the procurement cost. As a result, DHs sometimes cannot find the necessary batteries or parts, leaving the equipment unusable for a long time, or they procure parts of the wrong size or of inappropriate quality. With regard to the dental units, supplied water containing a high level of calcium has caused clogging of pipes, plumber valves and handpiece nozzles. Though the problems were solved by proper cleaning by the follow-up mission team, the cleaning method may be difficult for medical staff to learn³⁶ and therefore it is likely that the same problems will occur again. In addition to these common problems, there are individual problems in each hospital. One or two hospitals have problems with such instruments as autoclaves, anaesthesia apparatus, ultrasound scanners and X-ray units. A few of the problems were caused by improper usage of the instruments without sufficient understanding of how they work or what they do.³⁷

There was no major problem found regarding the maintenance of installed facilities. Minor problems identified in the follow-up study or in the ex-post evaluation study include the suspension of the automatic water supply system (3 DHs) and the expiration of battery life of generators (2 DHs). The follow-up study mission found that the mishandling of the automatic water supply system at the time of power recovery caused its suspension.³⁸ In addition, there is no operation and maintenance manual

³⁴ Draft follow-up study report.

³⁵ Ibid.

³⁶ Ibid.

³⁷ Ibid.

³⁸ Ibid.

for the water supply system and therefore routine and regular maintenance has not been done. There were problems with toilets as well. Although the team for the one-year warrantee inspection of the constructed facilities commented that the DHs should educate users not to throw foreign articles into toilets, the toilets got clogged in three DHs and were made unusable for a long period of time in two of the three hospitals. One DH decided to close them for the time being as they found it difficult to educate users and have made old pit latrines available to them instead.³⁹

As seen above, some problems have been observed in terms of the technical and financial aspects of operations and maintenance and therefore the sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project was intended to improve the quality of healthcare services offered by ten target DHs by installing necessary facilities and equipment. This objective is in line with the development policy of the Lao Government, the development needs of the country, as well as Japan's assistance policy for Laos at the time of planning. Thus, the relevance of the project can be evaluated as high. The number of patients for major healthcare services has increased — in many cases to a great extent — in most of the target DHs, and the level of hospital user satisfaction with services offered by target DHs was found to be very high. In view of these findings, it can be concluded that the project has produced sufficient effects. Although wastewater and solid waste has been disposed of differently from the methods stipulated in the project plan, which raises some concern about environmental implications, the disposal methods practiced by some DHs are in most cases not violating the MoH's environmental standards or their advice. Taking this fact into consideration, the effectiveness and the impact of the project can be evaluated as high. The project was also efficiently implemented with inputs executed and outputs produced almost as planned. However, there are some challenges in respect to maintenance of provided equipment and therefore the sustainability of the project effect is considered fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) Provision of training opportunities

Although the medical equipment provided under the project is not difficult to operate, target DHs stress the need for training on maintenance and daily checking of the equipment. Since neither the MES nor the DHO has the budget for the provision of training, the only available opportunities are offered on special occasions, such as development partner-supported projects. It may be difficult for

³⁹ Officials of the three hospitals commented that the very low literacy rate in their districts made it difficult to educate users.

the MoH to provide training for DHs on a regular basis, but they can explore the possibility of offering it when the need is high. DHs are advised to present their specific training needs to the MES and the MoH in this regard.

(2) Establishment of a system that makes MES visits to DHs easier

The follow-up study mission supported by JICA solved many of DH's problems with medical equipment or clarified what to do with them. Target DHs are eager for such opportunities, specifically regular visits by the MES. However, the current system is that they visit DHs on a request basis and at the DH's expense. It is recommended that the MoH establish a new system to facilitate MES visits to DHs, such as joint requests by a few DHs located in the same district or neighbouring districts.

(3) Actions to reduce environmental load

The ex-post evaluation study found that environmental policies of the project has not been observed in some DHs. Developing fluid for X-ray films has been treated in the same way as other kinds of wastewater, while the project policy was that it should be stored by DHs and collected by the MoH. Although the MoH does not collect developing fluid, it has advised DHs to store and sell it. The MoH needs to ensure that such advice has been observed by the DHs. As far as solid waste is concerned, it has been burned in a way which raises concerns about the generation of dioxin in five target DHs despite the project plan's stipulation that it be buried in the government-designated sites. It is recommended that the MoH ensure through the Provincial Health Offices that all target DHs have a designated dumping site. The MoH should also take swift action through the Provincial Health Office to prevent the spillover of garbage when it rains in Champasak DH.

4.2.2 Recommendations to JICA

There is no particular recommendation to JICA.

4.3 Lessons Learned

(1) Instructions on maintenance of equipment

In the ex-post evaluation study, issues regarding the procurement of parts and the maintenance of medical equipment were identified. Since many parts for medical equipment are not available in the domestic market in Laos, the procurement of parts for new equipment is always difficult, particularly for hospitals in rural areas. However, there is room for improvement in routine checking and preventive maintenance by DHs, as well as procurement of parts. Given the fact that target DHs share problems with simple equipment such as sphygmomanometers, it would be effective in a project which involves the provision of medical equipment, to provide detailed technical assistance under the project on basic maintenance skills and procurement of parts. Careful examination of equipment to be provided is also important.

(2) Criteria on the selection of some equipment

Although it can be argued that medical equipment provided under the project was more or less appropriately selected (See 3.2.2.2 Appropriateness of Constructed Facilities and Procured Equipment), the ex-post evaluation study as well as the follow-up study on the project revealed that many DHs have not been able to procure batteries or parts for routinely used and relatively inexpensive equipment, such as height and weight scales and microscopes. Since DHs do not have sufficient financial resources for maintenance, it would be more appropriate, as far as simple and commonly used equipment is concerned, to give priority to equipment that does not involve high procurement costs for parts.

(3) Measures for environmental protection

The ex-post evaluation study revealed some environmental concerns. The above-mentioned issues over the disposal method of solid waste and of developing fluid for X-ray films are found throughout hospitals in Laos and are not regulated by the government. In such cases, it is necessary to build a consensus on specific measures through sufficient discussion between the Japanese and the recipient sides at the planning stage, and if it appears that the measures that the Japanese side find appropriate are difficult for the recipient government to execute, consideration should be given to include countermeasures in the project plan, such as the instalment of an incinerator in the case of this project.

Sri Lanka

Ex-post Evaluation of Japanese Grant Aid Project
“Construction of a New Highway Bridge at Manampitiya
in the Democratic Socialist Republic of Sri Lanka”

External Evaluator: Keiko Asato,
Foundation for Advanced Studies on International Development

0. Summary

This project, the construction of a new highway bridge, was implemented in order to solve traffic bottlenecks, such as 1) the blockade of automobiles during the passing of trains due to the dual function of the railway-highway bridge, 2) alternating vehicular crossing due to the narrow width of the bridge, and 3) the poor condition of travel conditions and traffic safety on temporary roads over the railway track due to the use of a modified road deck consisting of a simple floor slab.

The relevance of this project is high as it is consistent with the national development policy and sector strategy of the partner country, as well as with Japan’s aid policy. The project period and the cost were under the estimated plan, and the implementing process was efficient. This project shows good results: the traffic congestion time at the bridge has been solved, the automobiles’ passing speed has increased and the traffic volume has grown. The project has also contributed to economic and social development in the region by making people’s daily lives more convenient and bringing economic benefits to the agricultural, fishery, construction and tourism industries.

Other than the above mentioned, this project has large significance as economic infrastructure because it has greatly contributed to the reconstruction of areas damaged economically by the civil war (especially the Eastern Province). These effects are attributed to the construction of the target bridge (hereinafter referred to as “the bridge”), as well as the rehabilitation of National Highway 11 supported by World Bank at the same period (hereinafter referred to as the “A-11”) and the cessation of the civil war in 2009.¹ We can see clear synergy effects between these factors. Given these factors, we can evaluate the effectiveness and the impact of the project as high. In terms of the sustainability of the project, even though the budget preparation is to be

¹ This project was formulated in response to the cease-fire agreement in 2002 and aimed to support the reconstruction of the partner country. However, violation of the agreement was repeated, and in 2008 the agreement collapsed. This project was put into practice during the civil war. In May 2009, the civil war was finally terminated. Therefore, the effect of this project is attributed to the recovery of security conditions after the cessation of the civil war in 2009.

improved as there are currently insufficient funds for daily maintenance and a long-term rehabilitation budget is yet to be secured, we did not identify major problems in other areas of sustainability.

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

1 . Project Description



Project Location



Manampitiya Bridge

1.1 Background

The transportation network in Sri Lanka developed from inland transportation of agricultural products as plantations grew in the colonial era. At present, the principal industry in Sri Lanka is agriculture (such as production of tea, coconuts, rubber, rice and others). The smooth transport of these products is indispensable for the economic development of the country. At the time of ex-ante evaluation, the majority of the passenger and freight transport in Sri Lanka was carried out by inland transport. However, the low pavement ratio impeded smooth transport. In addition to this, most of the bridges on the trunk roads had problems relating to narrow width, unstable structure due to deterioration, and decreased load-carrying capacity due to corrosion of steel, which had been impeding the passage of large automobiles. Since 1999, the traffic volume has increased by 6% annually. Given this situation, it was an important issue to secure safety and reinforce the capacity of road transportation.

The Manampitiya bridge is located on the A-11, which connects Polonnawra and Batticaloa, which were designated as key cities in areas of fast economic development by the Government of Sri Lanka. Thus, the rehabilitation of the bridge was expected to contribute to economic development in the neighbouring area. This is because the bridge previously restricted vehicle travel during the passing of trains due to the railway-highway dual function, and because the narrow width of the bridge imposed alternate passing of cars from opposite directions and

increased congestion times for automobiles. These conditions hindered smooth traffic between Polonnarwa and Batticaloa, as well as regional economic growth.

In Sri Lanka, the civil war that began in 1983 finally ended with a cease-fire agreement in February 2002. The Government of Japan supported the reconstruction of the country by organizing the Conference on Reconstruction and Development of Sri Lanka in Tokyo in June 2003, with the USA, Norway and EU. This project was part of a commitment agreed in the Conference to provide support to Sri Lanka of up to \$1 billion over 3 years. The civil war created internally displaced persons (IDPs) in the Northern Province who sheltered in camps. Moreover, the regional disparity between the Northern Province and Eastern Province and other parts of the country was clear. For example, the average spending income in the Northern Province and Eastern Province was lower than that of the national average (Rs 14,251/month in the Northern Province and Rs 12,908/month in the Eastern Province compared to the national average of Rs 15,400/month in 2003/2004).² The availability of household equipment (such as refrigerators, telephones and televisions) in the Northern Province and Eastern Province is lower than the national average. Taking these situations into consideration, this project was expected to contribute to regional economic development and also to the reconstruction of the Northern Province and Eastern Province, which were economically impoverished during the civil war.

1.2 Summary of the Project

The construction of a new highway bridge was implemented in order to solve traffic bottlenecks such as 1) the blockade of automobiles during the passing of trains due to the dual function of the railway-highway bridge, 2) alternating vehicular crossing due to the narrow width of the bridge, and 3) the poorness of travel conditions and traffic safety of the bridge due to the use of a modified road deck.

Grant Limit/Actual Grant Amount		1,043 million yen/989 million yen
Exchange of Notes (hereinafter referred to as "E/N) Date		(Detailed Design) 3 February, 2005 (Construction) 27 May, 2005
Implementing Agency		Road Development Authority (hereinafter referred to as the "RDA"), Ministry of Highways
Project Completion Date		September 2007
Implementers	Main Contractor	Hazama Corporation

² Central Bank of Sri Lanka, "Economic and Social Statistics of Sri Lanka 2011".

	Main Consultant	Oriental Consultants Co., Ltd. (Japan), Nippon Koei Co., Ltd. (Joint Venture)
Basic Design (hereinafter “BD”)		July 2004~January 2005
Related Projects (if any)		Road Administration Advisor

2. Outline of the Evaluation Study

2.1 External Evaluators

Keiko Asato, Foundation for Advanced Studies on International Development

2.2 Duration of Evaluation Study

Duration of the Study: November 2011 – September 2012

Duration of the Field Study: March 24, 2012 – April 5, 2012

May 27, 2012 – May 31, 2012

2.3 Constraints during the Evaluation Study

None

3. Result of the evaluation (Overall rating: A³)

3.1 Relevance (Rating : ③)⁴

3.1.1 Relevance to the Development Plan of Sri Lanka

As stated below, this project is consistent with the development policy of the partner country at the time of both ex-ante and ex-post evaluation.

At the time of ex-ante evaluation, the National Physical Planning Policy (2002) designated five large urban areas. The bridge was located between two of these five urban areas: the Trincomalee-Anuradhapura large urban area and the Ampara-Batticaloa large urban area.⁵ The estimated population in 2030 of both urban areas combined is projected at 2.75 million (compared to 1 million in 2001). It was expected that this project would promote a smooth road network and bring social and economic benefits to the people of the region. Moreover, the bridge was located on the A-11, which connects Plonnarwa and Batticaloa, both of which are designated as key cities in the early development promotion area. The construction of the bridge

³ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

⁴ ③: High, ②: Fair, □: Low

⁵ ① “The Greater Colombo urban area”, ② “Trincomalee- Anuradhapura large urban area”, ③ “The Greater Hambantota urban area”, ④ “The Greater Jaffna urban area”, and ⑤ “Ampara-Batticaloa large urban area”.

was expected to facilitate the growth of a hub area for regional development. In addition, the Corporate Plan (2002-2007) listed four bridges including the bridge as a prioritized rehabilitation project. Among these, the bridge was the longest and needed techniques and funds for rehabilitation beyond the capacity of the partner country, therefore requesting support from outside of the country.

At the time of ex-post evaluation, the Sri Lanka New Development Strategy (2006)⁶ formulated by the Ministry of Finance and Planning raised the issue of maintenance and rehabilitation of the road network as a prioritized investment area. This strategy highlighted the necessity for the development of the Northern Province and Eastern Province, whose development had been impeded by the civil war. The National Road Master Plan (2002-2017) (hereinafter referred to as “NRMP”) designated the reinforcement of the road sector as an important project to solve the regional disparities throughout the country and to contribute to well-balanced national development. The Ministry of Construction, Engineering Services, Housing and Common Amenities formulated the National Physical Planning Policy and Plan (2011-2030) in 2011, after the cessation of the civil war in 2009. This policy provided regional development plans for the Eastern Province and Northern Province battered during the civil war. In order to execute these plans, the smooth transportation of goods through the A-11 and the bridge is important. From this perspective, we can say that the bridge contributes to the reconstruction of society following the civil war.

3.1.2 Relevance to the Development Needs of Sri Lanka

As stated below, this project is consistent with the development needs of the partner country at the time of both ex-ante and ex-post evaluation.

At the time of ex-ante evaluation, even though the bridge was an important part of the A-11 connecting Polonnarwa and Batticaloa, which were hub cities for the regional economy, it hindered the smooth flow of traffic in the area due to the dual function railway-highway bridge, and made the travel conditions and traffic safety low because temporary roads on the train track only used a simple, modified road deck. The bridge also had other physical problems: the width of the bridge was so narrow that automobiles congested the bridge; the curve radius of the access road was so short that the visual distance (distance to see an oncoming vehicle) was insufficient; and others. In addition to these problems, the bridge also confronted economic problems. For example, it impeded the efficient transportation of agricultural products produced

⁶ No description was found regarding the year in which the documents were prepared, but it is estimated that the documents were prepared after 2009 considering the data and other information stated in them.

in the North Central, Eastern and Uva Province near the bridge, and hindered the quick transportation of fish unloaded in the Eastern Province to the Greater Colombo Metropolitan Area and others.

From the point of view of strengthening the road network, at the time of ex-ante evaluation the improvement of transport of commodities was important because 94% of the total passenger transport and 98% of the total freight transport in Sri Lanka was carried out by inland transport. The total length of national roads in Sri Lanka was 27,200 km and the road density was high, 1.5km/k m². However the pavement rate was only 23%, and there were 3,900 decrepit bridges over the trunk road constructed 50-100 years ago during the British colonial era. Most of them were not wide enough, had unstable structures and decreased load-carrying capacities due to corrosion of the steel. These problems impeded the passing of large automobiles and made it difficult to respond to the 6% annual increase in traffic volume.

At the time of ex-post evaluation, according to the NRMP the maintenance of the road network in Sri Lanka was still not satisfactory. Appropriate and efficient maintenance of the road network is necessary for the social and economic development of the country. However, the budget for the road network has not been expanded in line with the increasing number of registered automobiles during the period of 1997-2006. In 2007, more than 50% of the road network needed rehabilitation.⁷ It was said that the urban population rate, which was 30% in 2007, will increase to 50% in 2015. To keep the road network in good condition (including the rehabilitation and reconstruction of bridges), it is necessary to solve the economic disparity between the cities.

3.1.3 Relevance to Japan's ODA Policy

As stated below, this project is consistent with Japan's ODA policy and also with the aid strategy for Sri Lanka after the termination of the civil war.

The country aid plan (2004) for Sri Lanka was composed of two pillars: (1) support for the consolidation of peace and the reconstruction of the country, and (2) support for mid- and long-term development plans for the partner country. In order to implement the latter pillar, 1) the improvement of economic infrastructure, 2) the enhancement of foreign currency acquisition capacity, and 3) a strategy for poverty reduction were considered to be necessary. Improvement of the trunk transportation and communication network was one method to achieve 2) capacity enhancement of foreign currency. In the country project implementation plan (2004), (1) support

⁷ NRMP (2007).

for the consolidation of peace and the reconstruction of the country and (2) support for mid- and long-term development plans for the partner country were also set as prioritized aid issues. In this plan, to achieve the latter pillar, a transportation program was planned as a part of the improvement of economic infrastructure.

Moreover, this project is part of support for Sri Lanka of up to \$1 billion committed by the Japanese Government in response to the cease-fire of 2002.

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

3.2 Effectiveness⁸ (Rating : ③)

3.2.1 Quantitative Effect

As stated in Table 1, the quantitative indicators set in the BD have been achieved.

Table 1: The achievement of indicators set at ex-ante evaluation

Indicators (unit)	2004 (basis)	2009	2011	2012 (actual)	2013 年 (target)
Congestion time for automobiles during a train passing (minutes/day)	80 minutes (20 minutes x 4 times)	0 (solved)	0 (solved)	0 (solved)	0 (solved)
Congestion time caused by alternating vehicular crossing (minutes/day)	180 minutes (5 minutes x 3 times/hour x 12 hours)	0 (solved)	0 (solved)	0 (solved)	0 (solved)
Velocity of vehicle (km/hour)	10-15km/hour	N.A.	50-60 km/hour	36-54 km/hour	40-50 km/hour
Traffic volume (PCU/day) ⁹	4,600	7,608	9,046	10,304 ¹⁰	increase

(Source) 2004 (basis)/2013 (target): BD (2005).

2009-2012: Answer provided to the RDA through a questionnaire and site survey.

3.2.1.1 Vehicle congestion time

This project changed the originally narrow and dual function railway-highway bridge into a two-track bridge exclusively



Continuously passing automobiles

⁸ Sub-rating for Effectiveness is to be put with consideration of Impact

⁹ This figure was calculated by the formula of Passengers Car Unit (PCU)

¹⁰ This figure is the average number of passing cars surveyed from 5 a.m. to 5 p.m. on May 12 (Sat), 2012

for the passing of automobiles, which solved the congestion time caused by passing trains and alternating vehicular crossing. With these improvements, the smooth flow of automobiles has been attained.

3.2.1.2 Velocity of automobiles

The velocity of automobiles on the bridge was 50-60km/hour (2011) according to a report by the RDA. It was 36-54 km/hour (2012) according to the actual site survey undertaken at the time of ex-post evaluation, which means that the current vehicle velocity is in line with the planned indicator of 40-50km/hour. No physical restrictions caused by the bridge structure nor traffic jams affecting the passing velocity have been identified.¹¹

3.2.2 Traffic volume

The volume of traffic across the bridge has been increasing, as stated in Table 2. However, this effect is attributed not only to the construction of the bridge, but also other factors as described below.

1) Expansion of the A-11

After the completion of the project, the expansion of the width and overlay of the A-11 was undertaken for the Maradankadawela – Habarana – Trikonadiadamu stretch (127km) in 2008-2010, supported by the World Bank. This rehabilitation project improved the traffic conditions on the A-11, which brought automobiles previously passing through other routes to the A-11. This causes the increased traffic volume on the A-11.¹² According to the RDA planning division, the expansion of the A-11 was not planned at the time this project was formulated. After securing the budget from overseas for the recovery from damage caused by the tsunami in December 2004, the rehabilitation project of the A-11 was designed.

2) Increase of traffic volume of vehicles after termination of civil war

After the termination of civil war in 2009, lots of check points set during the war had been abolished, and the vehicles started to pass with no obstacles. Also the regional development plan for Eastern Province began to be put into practice, so the

¹¹ Automobiles or lorries with heavy loads pass slowly, so the cars following these automobiles were also obliged to pass slowly. Under such conditions, some frustration at the slow pace was expressed at the time of site survey. Without these heavily-loaded automobiles, most automobiles were passing at 50-54km/hours.

¹² The public bus service from Batticaloa and trucks carrying agricultural products from the Eastern/Central Provinces to Polonnarwa Agricultural office, which were previously passing through mountainous areas such as Kandy or Nuwara Eliya, are now utilizing the A-11 and the bridge due to better travel conditions following the rehabilitation project (according to the interviews with the officers in Polonnarwa office of Ministry of Agriculture and the passengers of buses at bus terminal in Batticaloa).

construction industry and other regional economy came to be activated¹³. This situation stimulated the number of vehicles passing the Bridge and A-11 which connect eastern and western areas¹⁴. This project was originally proposed and formulated responding to the cease-fire agreement in 2002. However, this agreement had not been observed repeatedly, and the cease-fire agreement had collapsed in 2008. In May 2009, the civil war has finally terminated, and after that, the social security has been recovered, which contributed to exert the remarkable project effect.

3) Increase in the number of automobiles registered nationwide

The number of registered automobiles nationwide in Sri Lanka has increased. In particular, the rate of increase in the Northern Central Province, where the bridge is located, and in the Eastern Province and Northern Province, which were controlled by anti-government powers during the civil war, is much higher than the national average rate. The increase in the number of registered automobiles in these provinces explains the increase of automobiles that pass over the bridge, as automobiles coming from the Northern Central and Eastern Province to the capital have to pass over the bridge.

Table 2: The transition in the number of registered automobiles

	2002	2008	2009	Change from previous year (%)	2010	Change from previous year (%)	Change from 2002 (%)
Northern Central	49,163	116,571	120,972	103.8	173,890	143.7	353.7
Northern	26,173	39,740	47,031	118.3	62,744	133.4	239.7
Eastern	39,464	99,895	110,760	110.9	192,260	173.6	487.2
Total	1,104,383	2,163,123	2,280,006	105.4	2,659,847	116.7	240.8

(Date source)

2008-2010 data: formulated by the evaluator taking data from "Economic and Social Statistics of Sri Lanka 2011"

(Central Bank of Sri Lanka)

2002 data: BD (2005)

3.2.2 Qualitative Effect

As stated below, safety and travel conditions have improved compared to before the project.

¹³ An interviews with headquarter, Polonnarwa and Batticaloa office of RDA.

¹⁴ RDA headquarter (Engineering Service Division (Bridge Design)) estimates the traffic volume will continue to increase as a result of the development of Eastern Province and will reach its peak around 2015.

3.2.2.1 Safety and travel conditions¹⁵

The expansion of width in order to accommodate two tracks for vehicle crossing has reduced the accidental contact with bridge railing. The diminishing of potholes on the surface of the bridge has lessened the number of accidents and disorder of automobiles. The exclusive use of the bridge for automobiles facilitates safer travel. Given this, it is considered that the safety of the bridge has been improved. Travel conditions have also been improved owing to the flat and smooth surface of the new bridge.¹⁶

Due to these improvements, the velocity of the automobiles has increased. Traffic accidents related to this improvement have not been reported according to the Polonnarwa Police Office.¹⁷

3.2.2.3 Effect of floods

This project prevents the new bridge from being rendered unavailable due to rain and floods. Before the project, automobiles could not cross the bridge during heavy rain. However, the height of the new bridge was examined and decided based on the record of the highest water level since 1983. No cases have occurred in which the new bridge and new access road are unusable due to heavy rain.¹⁸

3.3 Impact

3.3.1 Achievement of intended impact

At the time of ex-ante evaluation, as an impact of the project, the bridge was expected to contribute to the social and economic development of the system C area¹⁹ which expands from Uva Province to Eastern Province, attributed to the improvement of transportation route from that area to the western area, and also to be contribute to the reconstruction of Northern Province and Eastern Province through the progress of peace agreement. At the time of ex-post evaluation, contributions to several sectors including the agricultural sector was identified: the improvement of transportation of fish caught in the Eastern Province, the active transportation of construction materials, the facilitation of smooth transportation of tourists, and others.

¹⁵ An interview with 8 drivers of public buses, ambulances and tricycle cars was conducted on March 31 and April 2 on the national road before and behind Batticaloa and the bridge.

¹⁶ Before the project, the bridge was used as a dual purpose railway-highway with a modified road deck on the train track. This made the surface of the bridge unstable.

¹⁷ A Polonnarwa police office said that the increase in traffic volume on the A-11 has brought about an increase in the number of traffic accidents in their jurisdiction area. However, the traffic accidents occurring around the bridge have not increased. Only one accident was identified in which the vehicle turned off from the access road not realizing the extent of its curve due to the absence of street lights.

¹⁸ According to an interview with the RDA and passengers of public buses.

¹⁹ System C is famous area for its production of rice, which extends to Uva Province to Eastern Province.

The impact of this project is categorized into two types; the first is directly attributed to this project, and the second is the combined result with other factors. These other principal factors are, as stated in 3.2.1.3, the traffic volume, the rehabilitation of the A-11 by the World Bank, and the termination of the civil war. Even though the rehabilitation of the A-11 was not planned at the time of the project formulation,²⁰ combined with this rehabilitation, the impact of bridge construction by the project becomes greatly significant.

In this ex-post evaluation, both the direct impact caused by this bridge and contributions from this project to producing the social and economic synergy effects were evaluated. As a result, it was observed that in both aspects, this project showed contributions to regional social and economic development as well as reconstruction of the Eastern Province.

3.3.1.1 Impact on the neighbouring residents

Direct positive impacts of this project were seen in the health sector and the movement of people in the region.

1) Health sector²¹

The district hospitals around Polonnarwa are not equipped with sufficient medical facilities so they have to send patients by ambulance to well-equipped hospitals in Polonnarwa when necessary.²² For example, in the case of the Manampitiya district hospital, it previously took 40-50 minutes to reach Polonnarwa before the project as a result of waiting for trains and oncoming automobiles at the bridge. However, at the time of ex-post evaluation, the ambulances consistently reached Polonnarwa Hospital in around 20 minutes due to the rehabilitation of the bridge. Previously, the patients sometimes reached critical condition while waiting for trains passing over the bridge.²³ At present, such situations no longer occur due to reduced time required to transport patients.

2) The transport of residents around the bridge²⁴

The public bus services which cross the bridge are 1) short distance services which run in the surrounding areas of the bridge, and 2) long distance services which connect the core cities in

²⁰ Interview with the RDA planning division.

²¹ Interview with hospitals in Manampitiya, Welikanda and Batticaloa.

²² Most of the cases are related to acute asthma, acute cardiac disease, poisoning and childbirth.

²³ In cases related to childbirth, the ambulance stopped for some time at the bridge, and the medical condition of the women became fatal.

²⁴ Interview conducted at a bus station near the bridge and Batticaloa bus terminal with 12 passengers who use the bus service crossing the bridge.

the region.²⁵ The short distance services are utilized by local people for daily use, such as to go to hospitals and banks, to go shopping and for visiting relatives and friends. According to the passengers, the time to travel to Polonnarwa has been reduced, which increases the frequency of their visits to Polonnarwa. In regards to other benefits stemming from the bridge construction, comments have been noted from passengers such as: “we can pass the bridge even during heavy rain”, “we can move as planned with a predictable arrival time”, “the number of traffic accidents has decreased”, “the patients can reach the hospital in the city faster”, and others.

Regarding the long distance bus service that cross the bridge, at the time of ex-post evaluation daily regular services had been resumed: four times to Jaffna, seven times to Colombo, once to Mannar, and once to Vavuniya from Batticaloa per day. Such services were impossible during the civil war. One bus can carry 42 passengers with seats. During the busy season or on weekends, the passengers exceed the number of seats on these bus services. The time required to travel to Colombo has also decreased. With such improved bus services as well as shorter travel time via the new route, cases have been recorded of passengers who previously had passed through mountainous areas such as Kandy or Nuwara Eliya changing their route to the flat and comfortable route, now passing through the A-11 and the bridge.

As stated above, the bridge makes daily life more convenient and facilitates traffic between the east and west areas of the neighbourhood.²⁶ This change contributes to the promotion of the tourism industry as stated later.

Other than the effect stated above, the construction of the bridge, combined with the effects of the rehabilitation of the A-11 and the termination of civil war, contributes to the social and economic development of the neighbouring region and the reconstruction of the Eastern Province after the civil war.

3.3.1.2 The impact on logistics and economic activities

1) Agricultural sector

Sri Lanka has an agricultural distribution system based on harvests being purchased and distributed throughout the whole country through the Ministry of Agriculture. The harvests in the Northern and Central Province, Eastern Province and Uva Province are transported by land to the office of the Ministry of Agriculture in Polonnarwa. These three provinces are called the grain belt because the production volume of rice from these provinces amounts to 60% of that

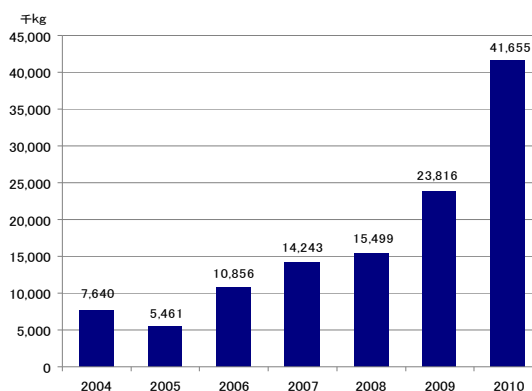
²⁵ Polonnarwa, Colombo, Jaffna, Mannar, Vavuniya, Batticaloa and others.

²⁶ The RDA showed other positive impacts to students who live on the eastern side of the bridge can more conveniently go to schools in Polonnarwa and Krunegala.

of the whole country. Before the project, agricultural products were transported to the above-mentioned Polonnarwa office through the mountainous area (Kandy or Nuwara Eliya) due to the inconvenient traffic on the A-11 and the bridge, as well as unsafe conditions in the Eastern Province. However, the transportation of heavy loads such as agricultural products was dangerous when passing through the mountainous area, and the travel time was long. At the time of ex-post evaluation, the route through the A-11 and the bridge had been improved to make it flat and easier to pass with reduced travel time. This attracts the farmers in these regions and they now prefer to take the improved route, rather than the mountainous route, to transport their products to the Polonnarwa office.²⁷ In the Eastern Province, especially in Amparo district and Batticaloa district, the agricultural sector has been revived after the termination of civil war. This project contributes to the increased volume of agricultural products transported in these districts.

2) Fishery sector

During the civil war, the restriction of fishing areas and approval procedures discouraged fishery activities. After the termination of the civil war, these restrictions were abandoned, which brought about an increase in the volume of fishing in the Batticaloa district (refer to Graph 1). The principal destination of the fish caught are cities in the Western and Central Provinces, such as Colombo, Negambo, Kandy, Krnegala and Matale. Shipping from Batticaloa to these cities requires passing via the A-11 and the bridge.



(Source) Elaborated by the evaluator from the “Statistical Data, Batticaloa District Secretariat (2010-2011)”

Graph 1: The transition of volume of fish unloaded at Batticaloa district

The travel time from Batticaloa to Colombo was more than 10 hours before the project. At the time of ex-post evaluation, it had been shortened to 5-6 hours.²⁸ The reduction of travel time is mostly attributed to the rehabilitation of the A-11. However, the bridge is the longest bridge on the A-11. Without the construction of the new bridge under the project, the rehabilitated A-11 would not have been able to exert its maximum impact. From this perspective, the significance

²⁷ Interview at the Polonnarwa office of the Ministry of Agriculture.

²⁸ Interview with the fishery cooperation at the Walacheni port in Batticaloa Province and the intermediate person.

of the project is large.

Moreover, the reduction of travel time to the destination enables saving on fuel costs as well as the reduction of post-harvest losses. This effect maintains the freshness of the fish caught and thus prevents the falling of the price of fish due to deterioration of freshness during transportation. The tuna transported to Colombo port is now durable enough to even be exported to the EU. The export of fish caught brings foreign currency and leads to boosted income for the fishermen. Expecting the expansion of fish exports, the Ministry of Fisheries deploys training programs for the fishermen and intermediate business persons on quality control and maintenance of freshness of fish caught.²⁹

According to interviews with fishermen at the time of ex-post evaluation, their disposable earnings had increased, and are spent on the fuel costs associated with going fishing, the repair of fishing equipment, the expansion and rehabilitation of houses, the purchase of electronic devices, cars and motorbikes, education for children and others, and increasing the sales volume of fish caught.

3) Construction sector

Since the termination of the civil war in 2009, the regional development plans in the Eastern Province and North Province have been put into practice, which have contributed to the expansion of the construction business in these areas. As the construction sector has been boosted, the transportation of construction materials over the bridge has been increasing. Moreover, the sand extracted from the riverside of the Mahaweli river is famous for its good quality,³⁰ and is transported throughout the whole country via the bridge. The sand mining supplier reported that the quantity of sand extracted from the Mahaweli river has increased from 100-150 trucks per day in 2008 to 350-400 trucks per day in 2012. According to the supplier, they cannot extract the sand beyond the upper limit set by the Department of Wild Conservation (hereinafter referred to as “DWC”). The quantity mentioned above for 2012 is within this limitation, and does not negatively affect the environment. Given this situation, we can consider that the bridge contributes to the smooth transportation of increasing volumes of construction materials.

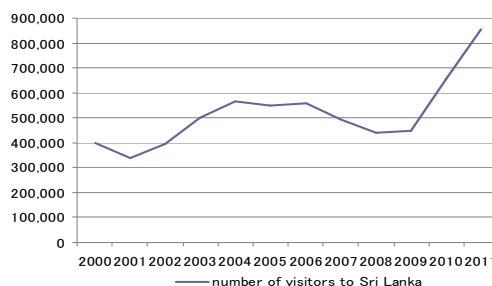
²⁹ At the time of ex-post evaluation, the Ministry of Fisheries was giving guidance to the owner of multi-day boats (MDB), fishermen and intermediate business persons on how to treat the fish caught in order to maintain freshness in collaboration with NIFNE (National Institute of Fisheries and Nautical Engineering).

³⁰ Sand mining suppliers say that the Mahaweli river provides high quality sand with minute uniform grains.

The RDA planning division estimates that the boom in projects stemming from regional development plans in the Northern Province and Eastern Province will continue until 2015. The rehabilitation of the A-11 and the bridge and the improvement of the road network are important for these businesses.

4) Tourism sector

The North Central Province, where the bridge is located, is famous as a tourism destination, with “ancient areas” in Polonnarwa, Sigiriya and Dambulla.³¹ After the termination of the civil war, tourists from abroad have been increasing (refer to Graph 2). This area is one of the main destinations for tourists. Even without having obtained quantitative data, it is possible to say that the number of local residents who travel from the Eastern Province to the ancient area in the North Central Province or who go from the Western and Central Provinces to coastal areas of the Eastern Province is growing³². As stated in 3.3.1.1, the repair of the bridge encourages the movement of local people, and contributes to the active movement of domestic tourists to the tourist areas.



(Source) Elaborated by the evaluator from the “Annual Statistical Report 2009 (Sri Lanka Tourism Development Authority)”

Graph 2: The transition of tourists from abroad

As explained above, with the synergy effect of the rehabilitation of the A-11 and the termination of the civil war, the project contributes to the encouragement of logistical and economic activities across broad sectors, such as agriculture, fishery, construction and tourism.

3.3.2 Other impacts

3.3.2.1 Impact on the natural environment

According to the headquarters and Polonnarwa office of the DWC, the construction of the bridge has not negatively affected animals and plants in the national park, nor has contaminated the Mahaweli river. The Initial Environmental Examination (hereinafter referred to as "IEE") set conditions relating to environmentally-friendly measures, such as measures against flooding, the minimization of soil erosion, the prohibition of the removal of trees, the replantation of indigenous plant species and horticulture spices, and the limitation of noise from construction areas. According to the DWC headquarters, the RDA and the DWC Polonnarwa office have

³¹ According to the Sri Lanka Tourism Development Authority Annual Statistical Report 2009, in 2009, 19% of accommodation of the whole country is located in this ancient area.

³² Interview with the RDA Polonnarwa office.

been monitoring compliance with these requests and have reported that these obligations have been observed as stipulated.

3.3.2.2 Land acquisition and Resettlement

At the time of ex-ante evaluation, a pump facility, a high voltage feeder and some private houses were located on the left bank. On the right bank there were several houses belonging to the sand supplier, other private houses, a banyan tree, a low voltage feeder, a telephone line connected to the police campsite, and a generator.

Through the detailed design survey, the pump facility on the left bank and the banyan tree and generator on the right bank did not need to be relocated. The high and low voltage feeders were transferred by the electricity company, the cost of which was borne by the RDA.

The number of houses which needed to be relocated was 14 (8 on the right bank, and 6 on the left bank). However, as they were illegal residents in the national park, they were not eligible for relocation compensation provided under national law. They therefore moved their houses at their own expense, and have not expressed dissatisfaction with this procedure. The DWC is aware of these illegal residents in the national park. However, neither their number nor the environmental burden on the park are so big that the DWC has taken any measures to relocate these residents to outside of the national park. In their long-term administrative plan for the national park, the DWC is discussing the treatment of these illegal residents, but it is not considered an urgent issue.³³



Newly issued 50 rupee bill issued in February 2011

At the time of ex-ante evaluation, 150-200 sand mining suppliers were operating their businesses around the project site. However, considering the environmental burden caused by sand extraction operating in the national park, the DWC requested them to move the extraction site to another location by the end of 2004. At the time of ex-post evaluation, it was confirmed that the sand extraction was being operated 1 km upstream from the project site, as instructed by the DWC.

Other than these impacts mentioned above, the bridge is used as an icon on the 50 rupee bill, which was newly issued in February 2011. Through this new bill, people in the country are

³³ Interview with the DWC headquarters.

familiar with the bridge. Other than these impacts, no negative impacts have been confirmed.

In light of the above mentioned, this project has largely achieved its objectives, therefore its effectiveness and impact are high.

3.4 Efficiency (rating : ③)

3.4.1 Project Outputs

This project was expected to produce outputs from the Japanese side, such as construction of the bridge and access road, as stated in Table 3.

Table 3: Output on Japanese side

	Bridge length (m)	Super-structure	Substructure	Foundation	Bridge width (m)
Bridge	302	Prestressed concrete (PC) 6 spans continuous girder box	Reverse T-type abutments: 2 abutments Wall-type piers: 5 piers	Cast-in-place concrete piles (Φ1.0 m)	10.4 Carriageway: 7.4 Sidewalk: 3.0
Access Road	Right bank (m)	Left bank (m)	Road width (m)		
	182	264	13.4 (Carriageway: 7.4) (Sidewalk: 6.0)		

(Source) Report offered by JICA

The acquisition of land for project construction, temporary offices, accommodation, storage, workshops, a site for acquiring construction materials, and relocation of public facilities and private houses at the project site were responsibilities of the recipient country. The relocation of public facilities and private houses at the project site was conducted approximately as planned, as stated in 3.3.2.2. Land acquisition and Resettlement. The acquisition of land for storage, workshops, and a site for acquiring construction materials was also put into practice without problems.

3.4.2 Input

3.4.2.1 Project Cost

The cost borne by the Japanese side is as stated in Table 4.

Table 4: The cost borne by the Japanese side

(Unit: thousand yen)

	Plan (2005)	Actual (2007)			
		Total	Procurement		
			In recipient country	In Japan	In third country
Construction	920,793	920,700	265,729	364,253	290,718
Design and administration	69,000	69,000	3,100	65,900	0
Total	989,793	989,700	268,829	430,153	290,718

(Source) Planned amount : JICA's internal documents Actual amount : Completion report

The cost borne by the Sri Lankan side is as stated in Table 5.³⁴

Table 5: The cost borne by the Sri Lankan side

(Unit: thousand yen)

Items	Plan (2004)	Actual (2007)
Tax exemption	Covered by domestic budget	Covered by domestic budget
Acquisition of land for project implementation	None	None
Temporary offices, accommodation, storage, workshops	None	None
Site for acquiring construction materials	None	None
Relocation of public facilities		
High voltage feeder	1.40	2.309
Low voltage feeder	0.27	
Houses of sand suppliers	0.17	0
	1.84	2.309

(Source) Answers to the questionnaire undertaken by the RDA

The amount at the EN was 1,043 million yen. The project cost stated above is 95% of the EN amount, which is lower than planned. Even though the amount borne by the recipient country exceeded the original plan, the total cost borne by both countries is lower than planned.

3.4.2.2 Project Period

³⁴ At the time of ex-post evaluation in 2012, the actual amount was 2,264 million Rs. However, to compare with the plan, the figure stated in Table 5 has been recalculated in line with the exchange rate of September 2007.

This project started on 10 March 2005 (contract date of detailed design survey) and ended on September 27, 2007. This equals a total of 30.5 months, which is 94% of the original plan of 32.5 months. The actual project period is shorter than planned.

In light of the above mentioned, both project cost and project period were within the plan, therefore, efficiency of the project is high.

3.5 Sustainability (rating : ②)

3.5.1 Structural Aspects of Operation and Maintenance

Under the supervision of the operation, maintenance and construction division of the RDA, the Polonnaruwa office of the RDA is in charge of the operation and maintenance of the bridge. The number of the staff allocated to the Polonnaruwa office is listed in Table 6.

Table 6: The number of staff at the RDA Polonnaruwa Office

	Ex-ante evaluation (2004)	Ex-post evaluation (2012)
Representative	1	1
Deputy representative	2	1
Engineers	1	2
Chief technicians	4	2
Principal workers	7	7
Workers	14 (132)*	60
Administrative officers	7	7
Total	36 (132)	80**

* The number of workers in parentheses in 2004 is the number of temporary workers working at the site.

** The 80 staff in 2012 also include the temporary workers.

(Source) 2004: BD

2012: Answers to the questionnaire undertaken by the RDA Polonnaruwa office.

Among the staff listed in Table 6 (representing the whole Polonnaruwa office), the staff members involved in the operation and maintenance of the bridge are one representative, one deputy representative, one engineer and five other members (workers who check and inspect the bridge on a daily basis).

A deputy representative secures the budgets and materials for operation and maintenance. Under the supervision of an engineer, the workers conduct the daily operation and maintenance,

including the cleaning of the bridge. They also carry out regular inspections on the road and bridge under the supervision of RDA headquarters. According to the deputy representative of the Polonnarwa office, the number of technical staff is sufficient, but there are insufficient workers to conduct exceptional inspections, such as the removal of sediments from the piers of the bridge after the rainy season. In Table 6, it is apparent that the number of workers had reduced at the time of ex-post evaluation compared to at ex-ante evaluation. This means that there is an insufficient allocation of staff.

3.5.2 Technical Aspects of Operation and Maintenance

The RDA Polonnarwa office says they recruit staff members who are well equipped with professional knowledge, following the recruitment criteria in terms of academic career, professional qualifications and work experience. The RDA headquarters offer various training opportunities to the technical staff in order to strengthen and maintain the technical skill levels of their staff. The RDA, professional training institutes and universities organize training programs as well as technical seminars and workshops in their own country. The RDA staff are also provided with the opportunity to participate in training programs abroad organized by the training institutions.³⁵ These opportunities are provided in order to maintain and strengthen the technical level of staff members. The workers at the project sites are also offered guidance on occupational safety. Considering the situations mentioned above, it is considered that the RDA staff are equipped with the required technical skills to conduct daily maintenance and operations.

On the other hand, the operation and maintenance manual for the bridge was prepared at the time of the completion of the project, but this manual is not made use of by the RDA staff members during regular inspections. The staff fill in the form designated by the RDA headquarters instead of following the instructions detailed in the manual. However, the engineers at the Polonnarwa office do not experience technical difficulties when inspecting the bridge on a regular basis without the manual.

The RDA headquarters' Japan-aided project management unit considers that making use of the availability of advanced equipment for the operation and maintenance of the bridge is still lacking, as is capacity enhancement. They consider that the maintenance of the bridge requires more advanced skills compared to the road, and RDA staff have not reached the sufficient technical level required to make full use of this advanced equipment.

³⁵ The engineer responsible for this project participated in technical training twice and budget management training once in 2011. The deputy representative also had the experience of participating in manager training.

3.5.3 Financial Aspects of Operation and Maintenance

According to the NRMP (2007-2017), 19% of the planned investment budget is allocated to the maintenance of the road, and 2.9% of the budget is assigned for the rehabilitation and maintenance of the bridge. A high priority is put on the road maintenance, and some of the budget for the bridge maintenance has been appropriated for the road. Because of this, the budget for the bridge maintenance is not sufficiently secured. Moreover, the budget for the bridge is mainly used for daily maintenance and is not allocated for long-term rehabilitation. Since December 2004 when the tsunami occurred, a large volume of overseas aid funds has flowed into the RDA. Given this situation, the ratio occupied by overseas funds in the RDA entire budget has increased from 20-30% at the time of ex-ante evaluation to 60-70% in 2010-2014 (refer to Table 7). Consequently, the RDA does not feel the necessity to secure the budget for large-scale rehabilitation by itself, and is prone to depending on the overseas budget to cover costs. This is because the national budget is not able to respond to the cost needs of long-term rehabilitation. However, the RDA planning division has warned of this situation, and made calls to cover the cost from the national budget for long-term rehabilitation.

Table 7: The transition of annual revenue and domestic and overseas ratio of financial source

(Unit: million rupees)

Financial source	2000	2001	2010	2011	2012 (Request)	2013 (Estimation)
Total	8,673	9,486	112,085	131,866	144,568	154,139
Domestic	6,702	7,925	40,365	42,910	42,409	49,329
Overseas	1,971 (23%)	1,561 (16%)	71,720 (64%)	88,956 (67%)	102,159 (70%)	104,810 (68%)

(Source) 2000-2001 : BD (2005)

2010-2013 : Ministry of Ports and Highways “Budget Estimates” (2012)

In 2012, the Road Maintenance Trust Fund (hereinafter referred to as the “RMTF”) was established to secure the budget for the operation and maintenance of the road and bridge³⁶. It is of great significance that the special account exclusively secured for operations and maintenance was established. However, in this trust fund, the account for the road and bridge is not clearly separated. Therefore, still more efforts are needed to secure the budget for bridge maintenance.³⁷

³⁶ One rupee per liter of gasoline had been collected by the RDA for a long time. What is new in this trust fund is that the purpose of the fund is exclusively restricted to the operation and maintenance of roads and bridges.

³⁷ Interview with the RDA Planning division.

In the case of the RDA Polonnarwa office, the budget is mainly allocated to daily inspections and regular maintenance; 70% is designated to the road, and the rest is for the bridge. The budget was insufficient at the time of ex-post evaluation, so the RDA Polonnarwa office puts the priority on cases of bad damage or urgent need of repairs. In addition, the RDA Polonnarwa office checks potholes and damaged points on the road and bridge after the rainy season and floods, and takes necessary measures. The expenditure details in 2009 at the RDA Polonnarwa office were as below.

Table 8 Expense amount and its ratio (2009)

Items	Amount (mil Rps)	Ratio (%)
Routine maintenance	11,768	28.5
Periodic maintenance	14,250	34.5
Drainage & structure improvements	5,148	12.4
Bridge maintenance	2,481	6.0
Maintenance of & road furniture	619	1.5
Special Maintenance	817	2.0
Others	6,264	15.1
Total	41,347	100

(Source) Formulated by the evaluator from documents obtained from the RDA Polonnarwa office

3.5.4 Current Status of Operation and Maintenance

The regular inspection of the superstructure, such as cleaning of sand clogging the joints between the Prestressed concrete (PC) girders, checking and repairing potholes, cleaning drainage systems, pulling out weeds, repainting railings and other tasks, is done every three months as instructed by the RDA and reported to the RDA headquarters based on the designated



Sand clogging joints due to lack of cleaning

format (inspection sheet). In cases in which problems are found, they are reported to headquarters with pictures. If significant problems that require serious measures are found, they are also reported on the occasion of the regular inspections.

In regards to the substructure, cracks along the piers, the condition of the bridge bearings, the tightening of nuts and bolts, and the condition of scoring should be inspected. However, the bridge is still new, so these inspections have yet to be undertaken since the completion of the construction of the bridge, and the inspection sheet was submitted

without a description. The Northern and Central Provincial office of the RDA has yet to report on this situation, nor has given guidance on this issue. For the other bridge, the Polonnarwa office of the RDA checks the condition of the scoring, bridge bearings and the cracks on the piers by taking photos or observing directly by using ladders in the dry season. At the time of ex-post evaluation, much sand was piled up on the surface of the bridge, and it was observed that cleaning was insufficient. The sand clogging the joints prevented the flexible movement of the PC spans, which made the connection between the super and substructure of the bridge rigid. This situation places an unnecessary burden on the entire physical structure of the bridge. Many automobiles carrying sand pass over the bridge, so cleaning every three months at the time of the regular inspections is insufficient to keep the bridge in good condition. The Polonnarwa office of the RDA is aware of this situation, but the number of workers who are responsible for cleaning the bridge is insufficient. This makes it difficult to conduct frequent cleaning.

The control of over-loading and speed violations, which affects the durability of the bridge, is carried out everywhere in collaboration with the police. However, a survey on over-loading conducted in June 2011 by the RDA revealed that 94% of large lorries (over 8.5 ton) violate the over-loading regulations (the maximum legal weight including the weight of vehicle is 15.275 ton).³⁸ The RDA is to continue to reinforce the crackdown on over-loading in collaboration with the police.

In light of the above mentioned, some problems have been observed in terms of finances and operation and maintenance. Therefore, sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented in order to solve traffic bottlenecks, such as 1) the blockade of automobiles during the passing of trains due to the dual function of the railway-highway bridge, 2) alternating vehicular crossing due to the narrow width of the bridge, and 3) the poorness of travel conditions and traffic safety on temporary roads over the railway track due to the use of a modified road deck consisting of a simple floor slab.

The relevance of this project is high as it is consistent with the national development policy and sector strategy of the partner country, as well as with Japan's aid policy. The project period and the cost were under the estimated plan, and the implementing process was efficient. This project shows good results: the traffic congestion time at the bridge has been solved, the automobiles'

³⁸ The breakdown of over-loading is 93% sand, 8% machines, 1.19% rice and 1.09% metals.

passing speed has increased and the traffic volume has grown. The project has also contributed to economic and social development in the region by making people's daily lives more convenient and bringing economic benefits to the agricultural, fishery, construction and tourism industries.

Other than the above mentioned, this project has large significance as economic infrastructure because it has greatly contributed to the reconstruction of areas damaged economically by the civil war (especially the Eastern Province). These effects are attributed to the construction of the target bridge (hereinafter referred to as "the bridge"), as well as the rehabilitation of National Highway 11 (hereinafter referred to as the "A-11") and the cessation of the civil war in 2009. We can see clear synergy effects between these factors. Given these factors, we can evaluate the effectiveness and the impact of the project as high. In terms of the sustainability of the project, even though the budget preparation is to be improved as there are currently insufficient funds for daily maintenance and a long-term rehabilitation budget is yet to be secured, we did not identify major problems in other areas of sustainability.

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

4.2 Recommendations

4.2.1 Recommendations to Implementing Agency

- Secure sufficient budget for the bridge

<RDA Headquarters >

A bridge is a physically complex structure, which requires more costly measures than roads as its condition deteriorates. In order to delay the process of deterioration and minimize the cost of future maintenance, continuous maintenance is important. However, the budget secured by the RDA for maintenance is allocated specifically to road maintenance. It is recommended that a sufficient budget is also secured for the bridge, with good balance.

- Secure a sufficient budget for long-term rehabilitation

<RDA Headquarters >

The RDA has not secured a long-term rehabilitation budget to cover incidences such as the repair of pavements, railings, curves, drainage and slopes on a 10-year basis from the national budget, and the budget for the rehabilitation of the deteriorated bridge is expected to be covered by overseas aid. Since the tsunami in 2004, the dependency of the budget on overseas aid funds is remarkable. To establish a long-term stable operation and maintenance system in the country, it is recommended to secure long-term rehabilitation funds through their own national budget.

- Reinforcement of inspection and monitoring

<Northern and Central Provincial office of the RDA>

At the time of ex-post evaluation, the inspection sheet had not been fully utilized, and inappropriate bridge inspection practices were overlooked. The provincial office of the RDA should give guidance to the regional office, which conducts inappropriate inspections and submits imperfect inspection sheets, or should work with the RDA headquarters to secure the budget to respond to requests for repairs that require funds. With these efforts, the RDA provincial office should try to reinforce the establishment of a monitoring system so that the regional office can implement appropriate inspections and the related office can take responsive actions as a result of the inspection.

<RDA Polonnarwa office>

The bridge is still new, so the RDA Polonnarwa office has not yet inspected the substructure. Considering the increasing traffic volume passing over the bridge, from now on it is recommended to conduct continuous maintenance of the substructure as well. The RDA headquarters have acknowledged the necessity of upgrading maintenance equipment (such as bridge inspection cars and others) and of the enhancement of the technical capacity of regional office staff who can make use of this advanced equipment. However, in order for this equipment to be utilized fully and appropriately, it is indispensable to enforce a system in which the daily inspections, reporting and responsive actions are undertaken appropriately.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

In this project, we cannot dismiss the effect of the combination of the rehabilitation of the A-11 for the effective use and social and economic impact of the bridge. This project shows how larger impacts are brought by selecting a bridge located in a very important place within the entire road network, producing a synergy effect with the other road.

While formulating a bridge project, it is critical to select and formulate the project considering the location within the entire road network, and expected synergy effects with surrounding roads.

Bhutan

Ex-Post Evaluation of Japanese Grant Aid Project
“The Project for Reconstruction of Bridges (Phase II)”

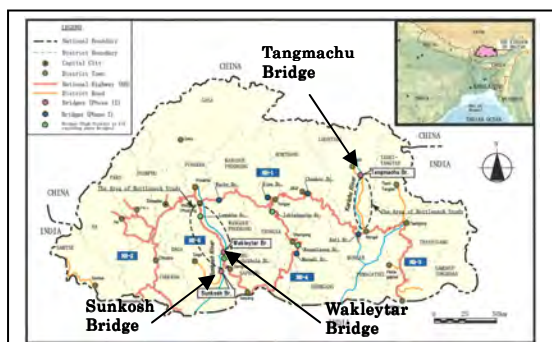
External Evaluator: Keiko Watanabe, FASID

0. Summary

The project was implemented to improve access to the capital or district road by reconstructing three deteriorated bridges (the Wakleytar, Tangmachu and Sunkosh Bridges). The project is highly relevant with government policies as well as the development needs of the country because the bridges play very important roles to secure smooth traffic and given that in Bhutan there are almost no alternative means of domestic transport other than roads. The project also achieves high effectiveness and impact. All the project targets including the increase in allowable loads, the reduction in bridge crossing times, and the increase in the kinds of heavy vehicles, have been met. Besides, the project has contributed to revitalizing the local economy, enhancing safety, and improving living standards. In addition to the points above, the project functioned as a part of a road network in conjunction with improved linking roads and made it possible to transport heavy equipment to conduct large scale infrastructure projects in the surrounding regions. The project period and the cost were within estimated plan, and efficiency of the project is high. Regarding maintenance, there was still room for improvement in regards to the periodical checking practices and therefore sustainability is fair.

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

1. Project Description



(Project Locations)



(Wakleytar Bridge)

1.1 Background

Bhutan is a landlocked country located between Tibet (southwest China) and Assam

(northern India) and has Himalayan Mountains peaks, higher than 7,000m. The road network of Bhutan has been built through these steep mountains and rapid streams. Transportation in Bhutan relies mainly on a road network passing through mountainous terrain and therefore establishing an efficient and safe road network is essential for social and economic development.

The road maintenance and improvement including reconstruction of bridges on the main trunk roads have been implemented by the Department of Roads (DOR), the Ministry of Works and Human Settlement based on the 9th five-year plan of Bhutan. There were many Bailey bridges (temporary steel bridges) on the trunk roads, most of which were constructed before the 1980 and had reached their expected life. These bridges became bottlenecks for providing safe and smooth traffic and for promoting regional development. DOR has been undertaking projects to reconstruct or strengthen these bridges, however, due to their financial and technical constraints, they have been slow to deal with bridges more than 10m long.

Under these circumstances, Japan, in 1997, conducted the study on National Highway Bridge Replacement Project (master plan) for 22 bridges on the trunk roads which were managed by DOR and identified 12 bridges as most urgently in need of replacement. In 2003, 5 bridges out of these 12 priority bridges were replaced with the assistance of Japanese Grant Aid as “the Project for Reconstruction of Bridges”. In August 2003, in order to proceed with the master plan the Government of Bhutan requested the replacement of another 3 bridges out of the 12 priority bridges identified in the Phase II project of “the Reconstruction of Bridges”.

1.2 Project Outline

The objective of this project is to improve access to the capital or district road by reconstructing three deteriorated bridges (the Wakleytar, Tangmachu and Sunkosh Bridges).

Grant Limit/Actual Grant Amount	1,348 million yen / 1,342 million yen
Exchange of Notes Date	Detailed Design: February 15, 2005 Construction: May 27, 2005
Implementing Agency	Department of Roads (DOR), Ministry of Works and Human Settlement
Project Completion Date	October 27, 2007

Project	Main Contractor	Dai Nippon Construction
Implementer	Main Consultant	Construction Project Consultants, Inc.
Basic Design (hereinafter “BD”)		June-December 2004, March 2005 (Supplementary Study)
Related Projects		< Technical Cooperation > 1997: Study on National Highway Bridge Replacement Project 1998-2007: Long-term Experts (Bridges, four in total) 2004-2007: Transportation-Capacity Development for Transport Sector 2009-2012: Senior Volunteers (Bridge Design, two in total) < Grant Aid > 2001: Reconstruction of Bridges 2004: The Project for Improvement of Equipment for Road Construction and Maintenance 2009: Reconstruction of Bridges (Phase III)

2. Outline of the Evaluation Study

2.1 External Evaluator

Keiko Watanabe, Foundation for Advanced Studies on International Development (FASID)

2.2 Duration of Evaluation Study

Duration of the Study: November, 2011 – September, 2012

Duration of the Field Study: March 25, 2012 – April 6, 2012,

May 28, 2012 – June 1, 2012

2.3 Constraints during the Evaluation Study

Impact from this project is expected not only from the construction of the bridges but also from the synergy effect with the linking road as a road network since the project was designed as part of a trunk road network improvement. However, at the time of the ex-post evaluation, the traffic flow was not smooth since the linking roads were still under rehabilitation and some parts were temporarily blocked due to nearby development projects. Therefore, the economic effect, such as the revitalization of the local economy by the improvement of road network, could not clearly be demonstrated. In addition,

changes in the regional disparity before and after the project could not be judged quantitatively because disaggregated quantitative economic indicators by region (such as agriculture production and volume of distribution) were not available. Furthermore, the poverty rate by region has not been updated since 2004.

3. Results of the Evaluation (Overall Rating: A¹)

3.1 Relevance (Rating: ③²)

3.1.1 Relevance with the Development Plan of Bhutan

The project remains in line with the development policy of Bhutan.

Domestic transport in Bhutan relies almost on highway that makes up main road network. Therefore, establishing an efficient and reliable road network is indispensable for social and economic development for the country. However, given the severe natural condition of Bhutan, improving and maintaining Bhutan's road network was a challenge for DOR.

At the time of Basic Design Study, the investment in a road network for economic development was a priority issues in the 8th five-year plan of Bhutan (1997-2002). The overall goals of the sector program in the 9th five-year plan (2002-2007) were also to “upgrade living standard of rural community through improvement of access to social services”, to “establish a road network not depending on roads situated in India”, and to “improve convenience and safety by establishing reliable road network”. Accordingly, much importance was given to the reconstruction of bridges establishing an efficient and reliable road network.

The current 10th five-year plan (2008-2013) prioritizes the expansion of strategic infrastructure and emphasizes that a good and efficient road and transportation network is an absolute requisite for the broader economic and social transformation of Bhutan, a land-locked country with its mountainous and rugged terrain. It also stipulates, “Further development of the road network as an important part of the expansion of strategic infrastructure program will effectively contribute to the reduction of poverty”.

3.1.2 Relevance with the Development Needs of Bhutan

The economy of Bhutan depends much on its exports to India. The ratio of exports to India accounted for 45% of Bhutan's total exports in 2001 and 83% in 2010, of which electricity was the major export product. Thus, since the 1980's, many small and

¹ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

² ③: High, ②: Fair, ①: Low

large-scale hydro-power projects have been initiated with assistance from India, the World Bank and Japan. The road network which sustained these projects had many Bailey bridges constructed at that time. Most of these bridges were deteriorated, damaged badly and passed their service lives, which affected the reliability and safety of road traffic. Additionally, the allowable loads of those Bailey bridges were small (10 to 30 tons), which has become a constraint to efficiently implement development plans such as constructions of hydro-power plants, and road networks including agricultural and feeder roads. They have also affected the establishment of the economical distribution network for lively economic activities. Therefore, this project which aims to remove the bottlenecks for regional development, caused by the existing bridges, met with the development needs of the country.

The three bridges chosen to be reconstructed by this project were selected from the 12 priority bridges identified by the study on National Highway Bridge Replacement project (master plan) completed in 1997 for the following reasons.

- (1) The three bridges have longer spans than the other priority bridges. At the time of the construction, it was technically impossible for the Bhutanese side to reconstruct longer span bridges (more than 30m span);
- (2) All three bridges were Bailey suspension bridges and had been severely damaged; and
- (3) The Wakleytar Bridge and the Sunkosh Bridge on National Road 5 are situated on the transportation route servicing the construction of national hydro-power projects³.

3.1.3 Relevance with Japan's ODA Policy

Japan has assisted the democratization process of Bhutan by focusing on four priority areas, "Agriculture and Rural Development", "Economic Infrastructure Development", "Improvement of Social Services" and "Good Governance". Road and bridge construction is given priority in the area of "Economic Infrastructure Development". Therefore, this project's aim to improve the road network to become the foundation for economic development is aligned with Japan's ODA policy at that time.

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

3.2 Effectiveness⁴ (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

³ Projects are such as Punatsangchhu hydro-power project and Dagana hydro-power project.

⁴ Sub-rating for Effectiveness is to be put with consideration of Impact

Three quantitative indicators set in the Basic Design (BD) were achieved as shown in Table 1.

Judging from actual observation as well as interviews with DOR officials and bridge users including local construction companies, bridge crossing times for transportation of heavy cargo has been reduced. The single lane bridges became double lane, allowing vehicles to cross the bridges without waiting for oncoming vehicles. In addition, heavy vehicles loaded with construction equipment no longer needed to dismantle or re-assemble large equipment in order to cross the bridges as was often necessary in the past.

Table 1: Achievement of Quantitative Indicators

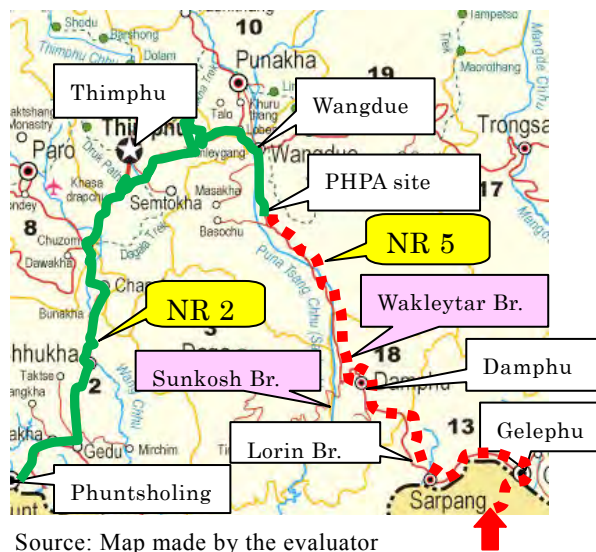
Indicators	Plan		Completion time (2007)	Present (2012)
	Baseline figure (2005)	Expected target (2007)		
Increase in Allowable loads	Wakleytar : 18t Tangmachu : 8t Sunkosh : 12t	40t for all three bridges	As expected	As expected
Reduction in crossing time of the bridges for transportation of heavy cargo	Takes 2 days to dismantle and re-assemble 12t standard size equipment for the Tangmachu Bridge which has only 8t capacity. Takes 30 minutes even for the Wakleytar Bridge which allows trailers loading self-propelled machinery without being dismantled and re-assembled. However, it needs to be unloaded and transported separately from trailer.	Heavy vehicles which loaded construction equipment can cross the bridges less than one min. without waiting for oncoming vehicles. Vehicles loading construction machines do not have to dismantle and unload them when crossing the three bridges.	As expected	As expected
Increase in kinds of heavy vehicle which can pass over the bridges	Only two axle trucks with a loading capacity less than 8t can pass (average traffic volume 26 cars/day at Wakleytar, 9cars/day at Tangmachu, and 13 car/day at Sunkosh)	More than three axle trucks and trailers will be able to pass over the three bridges	As expected	As expected

Source: "Baseline figure" and "Expected target" are from BD (2004), Data for "Completion time" and "Present" are from questionnaire results for DOR and actual observation by ex-post evaluator

However, the ex-post evaluation could not determine whether the total transportation time as a road network has shorten because some parts of the road have been temporarily blocked due to the construction of feeder roads and other development projects. Nevertheless, the effectiveness of the project is expected to be higher in the future when the following construction projects and road network development are completed.

For example, as shown in Chart 1, currently construction equipment and

materials for the Punatsangchhu hydro-power project (PHPA) are transported from India through border town Phuntsoling and Thimphu on National Road 2 (NR 2) and down through Wangdue (NR 5) to PHPA site (green route in Figure 1). It takes about 14-16 hours by heavy vehicles. When the Lorin Bridge is reconstructed by the Phase III project of “Reconstruction of Bridges” by Japanese Grant Aid, the shorter routes crossing the Wakleytar Bridge on NR 5 will be available. It goes from Bongaigaon (India side) through border town Gelephu, Sarpang, Lorin Bridge, Damphu, and the Wakleytar Bridge to PHPA site (red route in Figure 1). The new route will reduce the transportation time by more than half and it will take only 6-7 hours from Gelephu.



Source: Map made by the evaluator

Chart 1: Route to PHPA project site

3.2.2 Qualitative Effects

In order to see the qualitative effects, interviews were conducted with the three DOR Field Division Offices which administer each bridge, residents nearby bridges, hospitals, public bus drivers, construction companies and police officers at the checkpoint for the Wakleytar Bridge⁵. All interviewees pointed out the improvement in safety and reliability compared to before the project. As the condition of the former bridges was very bad, they were unstable and sometimes nails were sticking out from the wooden surface. In this regard, responses from interviews include; “I had to be careful for crossing the bridge

⁵ The interviewees include 5 residents and shop owners nearby each bridge (there were no residents nearby Wakleytar Bridge since it is located on the highway), Checkpoint police officers at Wakleytar Bridge, 3 public bus drivers, 1 doctor, 2 nurses and 2 ambulance drivers at the Hospitals at Damphu and Lhuntse Districts, 4 Construction truck drivers, 2 major construction companies (Lakhi and Nima).

even there was no big baggage but I feel safe when crossing the new bridge”, “Children are able to cross the bridge without getting hurt by the nails after the new bridge was built”, “No traffic accidents have happened since the new bridges were built”, and “patients are able to be transported by ambulance safely”. The improvement in durability, load allowance and two-way traffic reduced accidents caused by heavy vehicles. Therefore, it can be said that the improvement effect of safety has been achieved.

In addition, a great improvement in the living condition of the community by the project was confirmed. Before the project, more than four accidents occurred on the Tangmachu Bridge when heavy vehicles such as excavators and trailer truck carrying excess tons of materials were passing on the bridge in July 2000, August 2000, September 2003 and April 2005. Those accidents damaged its truss and cable which required 1-2 weeks for repair after each accident. During repairs, no vehicle movement over the bridge was possible and people had to walk far to catch buses and carry heavy stuff. The Sunkosh Bridge also had a similar accident in January 2004. Some of hanger ropes were dropped off when an overloaded vehicle was crossing. A shop owner nearby the Sunkosh Bridge appreciated the project since accidents had prevented him from bringing goods for his shop and no such accident which blocked traffic had happened since the project was completed. In addition to that, the Tangmachu Bridge is the only access for the Lhuntse district and the Sunkosh Bridge is the only access for the Dagana district. If these bridges were closed, the community of Lhuntse and Dagana would have been isolated.

As observed above, it was confirmed in the interviews of bridge users that the project surely improved the safety and reliability of the bridges. In addition, the project reduced the risk of isolation in the event that traffic to the Lhuntse and Dagana communities was stopped: effectively contributing to their living conditions.

3.3 Impact (Rating: ③)

3.3.1 Intended Impacts

3.3.1.1 Promotion of local economic activities

In order to assess the expected impact on promotion of local economic activities, the changes in daily traffic volume was assessed using existing data from DOR and conducting interviews with bridge users including residents and shop owners nearby the bridges.

As shown in Table 2, traffic volumes over each bridge have been increasing. Especially that of the Wakleytar Bridge which saw a five-time increase on busy days in 2009

compared to the period before the project. The traffic over the Tangmachu Bridge increased about three time in 2011 compared to after the completion of the project (October 2007). The traffic over the Sunkosh Bridge has doubled.

Table 2: Traffic Volume of three bridges per 12 hours⁶

	Before the Project (2004)	1-2 years After the Construction (2008-09)	3-4 Years after the Construction (2010-11)
Wakleytar Bridge	98-107 vehicles	332-525 vehicles (March 2009)	238-322 vehicles (April 2011)
Tangmachu Bridge	11-28 vehicles	27-109 vehicles (April 2008)	30-46 vehicles (February 2012)
Sunkosh Bridge	60-96 vehicles	105-179 vehicles (September 2008)	109-161 vehicles (March 2012)

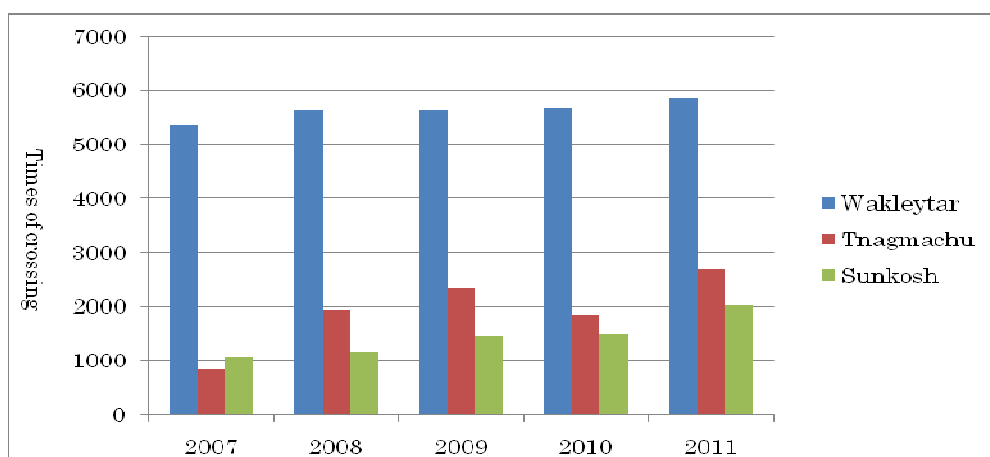
Source: DOR

Chart 2 demonstrates the increase trend in public buses crossing the three bridges⁷. The bus traffic volume over the Wakleytar Bridge was already heavier than that of the other two bridges even before the project since it is situated on the main national highway. Nevertheless it has been increasing slightly year on year responding to the demand. However, it should be noted that the increase in traffic over the three bridges was due largely to the increase in the number of construction vehicles related to infrastructure projects. In the case of the Wakleytar Bridge, the number of vehicles increased in relation to the road rehabilitation and hydro-power projects serviced by National Road 5, and the Phase III project of the “Reconstruction of Bridges” by Japanese Grant Aid which started in 2009. Also for the Sunkosh Bridge, it is assumed that traffic increased due to the Dagana Hydro-power project. For the Tangmachu Bridge, the construction of feeder roads and the Buddha project⁸ affected the increase in the traffic over the bridge.

⁶ The figures are from data available in a traffic count survey done by each Field Division Office. A 12 hours traffic survey (from 6 a.m. to 6 p.m.) for 7 days including Saturday and Sunday is conducted by each Field Division Office basically every six months. The data for the Wakleytar Bridge was from a traffic count done between Wangdue and Wakleytar and collected at the check point nearby the bridge. The data for the Tangmachu Bridge was done between Lhuntse and Thimphu and collected at Gangora. The data for the Sunkosh Bridge was done between Damphu and Sunkosh and collected at the intersection going to Sunkosh from NR 5.

⁷ Annual number of crossing times of public busses over the bridges.

⁸ The construction of a big Buddha is on-going by the private sector in Lhuntse.



Source: Road Safety & Traffic Authority

Chart 2: Annual number of crossing times of public busses

According to the farmers and residents, the distribution of agricultural products improved as did the access to the market⁹. They noted that after the project even perishable products which could only be sold at the local markets such as spinach, mangos, oranges and eggs can now be brought to the bigger markets in Punakha, Wangdue and Thimphu.

In this way, positive impact has already been observed. However, it should be noted that the impact on local economic activities cannot be assessed solely based on the construction of the bridges but must include the synergy effect with the connecting road as a total road network. At present the connecting road has been under construction or rehabilitation, therefore, the explicit impact of the project was difficult to be observed. Nonetheless, it can be said that the construction of the bridges created positive economic impact considering that large scale projects such as Dagana hydro-power and road rehabilitation projects could not have been realized without the bridges which have a 40t allowance load. The increase in traffic volume of public buses over bridges and the improvement of access to market for agricultural and livestock products resulted in the active movement of people and goods. Therefore, it can be said that the project has helped to stimulate the regional economy.

⁹ In Bhutan, most farmers depend on subsistence agriculture and the agriculture cooperatives have not been established yet. The Department of Agriculture Cooperatives was only established in 2010 and the agricultural local data including production and distribution has not been established well. Therefore, the quantitative comparison of access to the market before and after the project could not be done.

In addition, according to the Department of Agricultural Marketing & Cooperatives, Ministry of Agriculture & Forests, a new project which aims to deliver agricultural and livestock products for workers at the Punatsangchhu hydro-power project (PAPH) is underway in contract with farmers groups in the Damphu, Punakha, Wangdue and Tsirang districts. The success of the project depends on the access (road and bridges) from these districts to the PPHA site. The Wakleytar and Sunkosh Bridges are located on the way to PPHA from these districts. In this way, the benefit from this project will increase more in the future.



Road construction by NFW



Trucks carrying construction materials

3.3.1.2 Reduction of economic disparity among districts

Since disaggregated economic indicators by districts and regions were not available at the ex-post-project period, the degree of economic disparity among districts could not be backed-up with explicit data. However, it is noted that the project prevented these communities from isolation since the Sunkosh and Tangmachu bridges, which provide the only exit means respectively to the communities of Dagana and Lhuntse, now can avoid closure due to damages by overloaded vehicles. By stabilizing traffic, the project reduced one of the factors that can enlarge economic disparity. On the other hand, it was not clear yet at the time of ex-post evaluation that the project has contributed to reduce economic disparity among regions.

3.3.1.3 Improvement of living standards of people in the district

The project has realized positive effect on the living standard of the communities in terms of people's access to hospitals and income generation. According to interviews with several hospital personnel who use the project bridges for carrying patients to referral hospitals by ambulance, they all appreciated the improvement of the bridges in terms of their safety, smoothness and accessibility.

When referring patients to hospitals in Thimphu (about 20-30 times per month), the Dagana District Hospital uses the Sunkosh and Wakleytar Bridges, whereas the Lhuntse District Hospital relies on the Tangmachu Bridge. The hospital staff stressed some positive impacts in statements such as, “the project made it possible to carry patients and pregnant women safer and more stably at least when crossing the bridges” and “the project shorten travel time since we no longer had to stop before the bridge when oncoming cars were crossing”. In this way, the improvement effect of the bridges has been positively realized.

An additional positive impact was on the income generation of the communities nearby the construction sites, especially the income of shop owners. Since the construction workers for this project used the shops near the project sites to purchase goods and foods, the income of these shops increased. Even after the project many construction workers and people are still using these shops because the project intensified the people’s movement. Especially that was apparent to the shops near the Sunkosh Bridge. The newly constructed bridge enabled to implement large development projects such as the Dagana hydro-power project, so that many people including those involving in development projects have been using the shops. Most of the shop owners interviewed near the Sunkosh Bridge answered that their business improved after reconstruction of the new bridge.

It should be noted, however, that the above mentioned impacts from the improved three project bridges on the regional economy, economic disparity and living standard were realized with the help from the improvement of 15 other small and medium sized bridges along the same road network from the capital, Thimphu. Strengthening or reconstructing these 15 bridges as a precondition of this project was supposed to be borne by the Bhutanese side.

The ex-post evaluation confirmed from DOR and from actual observation that the Bhutanese side has fulfilled its obligation almost as planned as shown in Table 3 below. The current status of these 15 bridges is also shown in the table and most of them will be reconstructed as permanent bridges by the end of 2012.

Table 3: Small and Medium Bridges

Bridges		Around the time of the project	Situation at the ex-post evaluation (2012)
Thimphu — Wangdue — Wakleytar — Sunkosh Route			
1	Hesothankha	Strengthened bridge surface from wood to steel by PHAP project	Concrete bridge is under construction by PHPA
2	Lawakha	Constructed by-pass road	Completed by Japan's Grant Aid Project of "Reconstruction of Bridges (Phase III)" (2011)
3	Basochu	Strengthened bridge surface from wood to steel (2008)	Completed by Japan's Grant Aid Project of "Reconstruction of Bridges (Phase III)" (2011)
4	Rurichu	Strengthened bridge surface from wood to steel (2009)	Concrete bridge is under construction by the financial assistance from Government of India.
5	Baychu	Strengthened bridge surface from wood to steel (2009)	Completed Concrete bridge by the financial assistance from Gov. of India (2011)
6	Kamichu	Strengthened bridge surface from wood to steel (2009)	Completed Concrete bridge by the financial assistance from Gov. of India (2011)
7	Nyarachu	Strengthened bridge surface from wood to steel (2009)	Under construction by Japan's Grant Aid Project of "Reconstruction of Bridges (Phase III)"
8	Mechekola	Constructed by-pass road (2009)	Concrete bridge is under construction by the financial assistance from Government of India.
9	Burichu	Strengthened bridge surface from wood to steel (2009)	Under construction by Japan's Grant Aid Project of "Reconstruction of Bridges (Phase III)"
10	Chachey	Strengthened bridge surface from wood to steel (2009)	Completed by Japan's Grant Aid Project of "Reconstruction of Bridges (Phase III)" (2011)
Thimphu — Lingmethang — Tangmachu Route			
1	No. 4 (Gongola)	Strengthened bridge surface from wood to steel (2008)	Concrete bridge is under construction by DOR
2	Rewanchu	Strengthened bridge surface from wood to steel (2005)	Concrete bridge is under construction by DOR
3	Phawan	Strengthened bridge surface from wood to steel (2008)	Concrete bridge is under construction by DOR
4	Kama Shangshong	Strengthened bridge surface from wood to steel (2006)	Reconstructed in the future by DOR
5	Rongmanchu	Strengthened bridge surface from wood to steel (2006)	Concrete bridge is under construction by DOR

Source: Interview by DOR and actual observation

3.3.2 Other Impacts

3.3.2.1 Impacts on the natural environment

The project acquired environmental clearance from the National Environment Commission in accordance with the National Environment Assessment Act of Bhutan before the implementation. It was confirmed by interviews with the neighboring community and DOR staff that no negative issues on environment such as construction noise, dust, and garbage were identified. In addition, according to the interview with the Department of Forest and Park Services, Ministry of Agriculture and Forestry, no short term environmental impact had been caused by the project's construction garbage and human waste in the potentially affected areas of Bundeling Wildlife Sanctuary and the Thrumshing la National Park, part of which border the construction site of the Tangmachu Bridge.

3.3.2.2 Land Acquisition and Resettlement

There was no resettlement issue for this project.

Regarding land acquisition, it was confirmed by the Japanese project contractor that the project sites for the three bridges had been acquired before the implementation of the project as planned.

As for Tangmachu Bridge, it was necessary to acquire land from a private owner (a fruit farm). DOR obtained mutual agreement from the land owner and issued a letter for land expropriation in June 2004, before the construction started. An interview with the land owner confirmed that the process of the land expropriation was appropriately done and that compensation for the fruits (Mango and Oranges) was paid accordingly by DOR.

Interviews with DOR and the community also found that communities affected by the project had been well informed on the project by DOR staff and by community meetings organized by the Minister of Works and Human Settlement at that time.

3.3.2.3 Unintended Positive/Negative Impact

All three bridges were well acknowledged as “Japanese” bridges by the neighboring community, bridge users and even construction companies in Thimphu. The project enhanced the reputation and credibility of Japan which had been nurtured from Phase I of the “Reconstruction of Bridge” project. This reputation includes the high quality and the design of the bridges, as well as the work ethic and behavior of the Japanese workers during the construction.

The project also contributed to an upgrade in the technical skills and knowledge of DOR staff and helped develop Bhutanese construction workers. The project was coordinated with an on-going JICA technical cooperation project which trained DOR staff on execution supervision and design

of bridges using construction sites of this project as OJT sites. Besides, the project employed only local Bhutanese as construction laborers in view of human resources development of Bhutanese, while most construction projects in Bhutan usually use Indian laborers who are much cheaper than Bhutanese. In this project, a total of 75,000 Bhutanese workers were employed for short- and long-term periods. Some of them started work on the Phase I project and continued to work through to the current Phase III project. Seven workers among them upgraded their skills and became foremen in the Phase III project. According to the Japanese contractor, there was not much opportunity for Bhutanese workers to upgrade their skills like in this project. In addition, those Bhutanese workers who have acquired some technical skills in electricity, welding and machinery from the project became more accessible to other employment opportunity in the construction field.

Another positive impact which was noted in interviews is the enhancement of community's ownership of the bridge. The community near the Sunkosh Bridge organize voluntary cleaning of the bridge every week in addition to the cleaning done by the DOR contracted cleaner. It demonstrates the community's high appreciation and ownership in the bridge.

In light of the above, this project has largely achieved its objectives; therefore its effectiveness is high.

3.4 Efficiency (Rating: ③)

3.4.1 Project Outputs

Planned outputs of the project borne by Japanese side were produced as planned. Details are shown in Table 4. The project used atmospheric corrosion resistance steel (weathering steel) as the bridge material. With this material, it is not necessary to paint and repaint the material, which greatly eased bridge maintenance burden.

Table 4: Design of the Three Bridges

Bridges	Bridge Length (m)	Span Length (m)	Carriageway Width (m)	Bridge Type
Wakleytar	86.0	84.6	6.0	Steel Langer Arch
Tangmachu	70.0	68.6	5.5	Steel Langer Arch
Sunkosh	95.2	93.8	5.5	Steel Langer Arch

Source: Project Completion Report (2008)

Three minor design changes were confirmed as follows. One of them was a modification for the location of the bridge centerline on the Tangmachu Bridge. During the excavation of the base of abutment of the Tangmachu Bridge, the earth at the back slope partially collapsed due to heavy rainfall. Protection measures have been carried out by providing sandbags and cement grout on the slope; however, it was difficult to place an abutment at the originally planned location. Therefore, the centerline of the Tangmachu Bridge shifted by 5m further upstream from the planned location. Second, the height of the retaining wall of the Tangmachu Bridge and the Wakleytar Bridge were changed slightly since the types of soil around each retaining wall were different than initially assumed in the Detailed Design Study. Therefore, the retaining wall of the Tangmachu Bridge was lowered from 5m to 2.5m and that of the Wakleytar Bridge raised by 2.5m. Third, considering the landform and water levels during the rainy seasons, gabion walls were added to both the Tangmachu and the Wakleytar Bridges.

The Bhutanese side requested these changes and they were approved by the Japanese government after the verification of technical justification. They did not undermine the project efficacy, safety and cost.

The Bhutanese side undertook almost all its required work without delay as specified in the Minutes of Discussion of the Basic Design Study including; securing land and providing appropriate compensation, removing the existing three bridges after completion of the project's construction, constructing approach roads at each bridge, strengthening or reconstructing 15 small and medium bridges on the road network affecting accessibility to the project's reconstructed bridges. However, one obligation was not realized. That obligation was to lease the construction equipment which had been procured by Japanese Grant Aid project for "Improvement of Equipment for Road Construction and Maintenance" (2004) for the project. This was justified because the Bhutanese side chose to lease the equipment to private construction companies to conduct national priority projects (road and dam construction). At that time, most of the private construction companies in Bhutan were small and not well-equipped to undertake such large projects. It was confirmed that the project period and cost were not affected by this.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The actual cost of the project was lower than planned; amounting to 1,342 million yen (1,296 million yen for Construction and 46 million yen for Detailed Design). This amount was equivalent to 99.5% of the planned cost of 1,348 million yen. The Bhutanese side

bore some expenses to the project but the actual amount could not be identified. According to the DOR HQs, the cost born by the Bhutanese side was almost as estimated.

3.4.2.2 Project Period

The project period (from the detailed design up to the completion of the project) was shorter than planned. It was 30.7 months (920 days) equivalent to 94.4% of the estimated period of 32.5 months (975 days)

Table 5: Planned and Actual Project Period

Planned	Actual
32.5 months/975 days (including detailed design and bidding periods)	April 20, 2005 (Detailed Design Study) ~October 27, 2007 (Completion Day) (30.7 months/920 days)

Source: Project Completion Report (2008)

Both project cost and project period were as planned, therefore efficiency of the project is high.

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

DOR is in charge of operation and maintenance of the bridges. Daily maintenance including cleaning of roads and bridges is basically organized by the local DOR Field Division Offices, but since 2011 maintenance of some parts of the roads and bridges has been outsourced to private companies as a trial. As for the three project bridges, the Lobesa Field Division Office is in charge of the Wakleytar Bridge and the Sarpang Field Division Office is in charge of the Sunkosh Bridge. The Lingmethang Field Division Office used to be in charge of the Tangmachu Bridge, however since May 2011 the route between Lhuntse and Galagpa, including the Tangmachu Bridge has been outsourced and maintained by the Construction Development Corporation Limited (CDCL), which used to be a mechanical division of DOR. Daily maintenance including sweeping, cleaning drainage and jungle clearing are actually done by the National Work Force (NWF) under contract with DOR Field Division offices or by external contractors. NWF is a Bhutanese labor organization registered at DOR.

Table 6 shows the number of staff of DOR HQs and the relevant DOR Field Division Offices.

Table 6: Number of Staff at DOR HQ and Relevant Field Division Offices

DOR Offices	Executive Engineer	Engineer /Junior Engineer	Other staff	Total no. of staff
DOR Headquarters	4	4	2	10
Lobesa Field Division (Wakleytar)	6	11	25	42
Lingmethang Field Division (Tangmachu)	3	12	20	35
Sarpang Field Division (Sunkosh)	6	8	32	46

Source: Each DOR office

35-46 staff members have been allocated to each Field Division Office. 30-40% of the staff in each office has a certain degree of technical skills to conduct daily technical maintenance. In terms of manpower no problem has been raised so far given that the bridges were constructed with atmospheric corrosion resistance steel which minimizes the burden of maintenance and also because daily cleaning is done by the NWF. Therefore, to date, no structural issues have been observed.

3.5.2 Technical Aspects of Operation and Maintenance

As stated above, the steel used for the bridges minimizes the maintenance burden and no technical problem in maintenance has been reported so far. In case there is a technical problem or major rehabilitation issue which cannot be taken care of at the field level, the Field Division office will request the DOR HQs for assistance. Engineers at the HQs have received training from Japanese experts and JICA volunteers on planning, design, and construction of bridges starting from Phase I and continuing on through Phase III projects, as well as during past technical cooperation projects. It is assumed, therefore, the engineers at HQs can cope with almost any technical maintenance issues.

However, the ex-post evaluation study found that periodical maintenance has not been practiced. A systematic maintenance system should be established. Neither the HQs nor the Field Division Offices have used the bridge maintenance manual provided by the Japanese project consultant. Also, although there is a reference of bridge maintenance in DOR (formulated in 2005 by DOR), it has also not been used. According to DOR, they are currently formulating a “standard guideline for operation and maintenance of bridges” based on the above 2005 reference and will finalize it in the middle of 2012. In order to be more effective maintenance, the new guideline should include a checklist of periodical maintenance and should be printed as early as possible.

DOR HQs also need to instruct the guideline to the Field Division Offices, monitor their practice, and provide feedback.

Regarding future bridge construction and rehabilitation plans, DOR has formulated a plan and incorporated it into the 11th five-year plan. Based on the assessment of the current situation, (assisted by a JICA senior volunteer on bridge design dispatched from 2009) DOR has identified priority bridges for construction and rehabilitation for the next five years.

3.5.3 Financial Aspects of Operation and Maintenance

The budget for the maintenance is Nu. 26,000 (about 40,000 yen) per completed bridge per year. The amount of the budget is requested to the Ministry of Finance through DOR HQs and has been approved every year without any reduction. The amount covers personnel costs for NFW, daily checking, cleaning materials, replacing bridge surface, and simple repair. Some bridges do not need the full amount of the budget and any reserves can be allocated to other bridges. So far no critical shortage for the maintenance has been reported. In case of necessary major repair such as those caused by accidents, DOR HQs, upon application from the Field Division Office, will request the Ministry of Finance to disburse a supplementary budget. Since roads and bridges are one of the highest priority issues in Bhutan and the project bridges are situated on major roads, an immediate response can be assumed. In addition, in consideration of an increase in NWF wages, the maintenance budget was increased (Nu. 30,000 per bridge per year) for the 11th five-year plan starting from 2013.

As observed above, considering roads and bridges as high priority issues in Bhutan's policy, operation and maintenance cost has been allocated as budgeted and it is expected to continue to secure the financial sources for them. Accordingly, any financial issue has not been identified.

3.5.4 Current Status of Operation and Maintenance

All three bridges have been maintained in good condition without any sand sediment on the surface which was pointed out in the inspection report. It was observed that the NFW has been cleaning the bridge surface and drainage almost every day for the Wakleytar Bridge and the Sunkosh Bridge, and every week for the Tangmachu Bridge. As mentioned before, the community near the Sunkosh Bridge has organized themselves to undertake

weekly cleaning such as removing weeds and garbage.

Simple checking is being done by each Field Division Office every week for the Wakleytar Bridge and the Tangmachu Bridge. Since the Sunkosh Bridge is far from the Lingmethang Field Office, it was found that checking is done when necessary. The HQs have undertaken monitoring once or twice every year.



Cleaning bridges by NWF

On the other hand, it was found that although periodical checking was recommended in the Basic Design as well as in the DOR's maintenance reference of 2005, such checks have not been made. It was found that the monitoring of periodical checking from the HQs has not been done. Although with simple daily maintenance like cleaning and checking no serious problems have been reported, it is still useful to establish a periodical checking mechanism. The mechanism should include specifying who, what, when and how the check will be done. It also will be useful to estimate the time and scale of any major repairs.

For instance, the ex-post evaluation study found that the left side of gabion wall of the Wakleytar Bridge (lowered by the flood in 2009) has not been repaired yet. Since it was considered not urgently affecting the effectiveness and safety of the bridge, the wall remained un-repaired and the time of repair was not specifically planned. If a maintenance mechanism was established including a practice of periodical checking, such matter could have been responded promptly. Following the ex-post evaluation, DOR will undertake



Lowering gabion wall of Wakleytar Br.



Uninstalled name plate at Tangmachu Br.

repair of the gabion wall of the Wakleytar Bridge in the next fiscal year since there are no constraints in terms of budget, technical skills and manpower. In addition, the name plates of the Tangmachu Bridge will be installed by DOR next fiscal year which was also pointed out by the ex-post evaluation.

Some problems have been observed in terms of periodical maintenance practices, therefore the sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project was implemented to improve access to the capital or district road by reconstructing three deteriorated bridges (the Wakleytar, Tangmachu and Sunkosh Bridges). The project is highly relevant with government policies as well as the development needs of the country since the bridges played very important roles to secure smooth traffic given that in Bhutan there are almost no alternative means of domestic transport other than roads. The project also achieves high effectiveness and impact. All the project targets including the increase in allowable loads, the reduction in bridge crossing times, and the increase in the kinds of heavy vehicles, have been met. Besides, the project has contributed to revitalizing the local economy, enhancing safety, and improving living standards. In addition to the points above, the project functioned as a part of road network in conjunction with improved linking roads and made it possible to transport heavy equipment to conduct large scale infrastructure projects in the surrounding regions. The project period and the cost were within the estimated plan, and the efficiency of the project is high. Regarding maintenance, there was still room for improvement in regards to the periodical checking practices and therefore sustainability is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

- It is necessary to establish a periodical checking mechanism that includes stipulating who, what, when and how the check will be done. The mechanism will be useful to estimate the time and scale of major repairs. The mechanism should include: identification of items to be checked, the actual practice of checking, making plans for repair based on the checking result, the actual repair, and

follow-up monitoring by HQs. This kind of periodical checking procedure should be included in the new standard guideline for maintenance being formulated by DOR in referring the maintenance manual which the project has formulated.

- DOR HQs should undertake an initiative to instruct the Field Division Offices to undertake periodical checking based on the new guideline, conduct monitoring of the practice, and provide feedback to Field Division Offices based on the results.

4.2.2 Recommendations to JICA

There is no particular recommendation to JICA.

4.3 Lessons Learned

- One aspect which has enhanced the project's sustainability is that the design of the project took the operation and maintenance capacity of the executing agency into consideration. In this project, the design of the bridge minimized the burden of cost and workload on the executing agency, which enabled the operation and maintenance without establishing additional structures and cost. When designing the project the capacity as well as the conditions surrounding the executing agency should be well looked into.
- When a bridge construction project is formulated, it should keep the following in mind so that the expected impact will be enhanced: seeing bridges as part of road networks and taking account of contribution to the entire road network. In this project, the Wakleytar and Sunkosh Bridges are located on the NR 5 that has been strategically important as a transport route from India and has handled traffic with construction materials for large scale national projects. In addition, the Sunkosh and Tangmachu Bridges are essential for people in Damphu and Lhuntse districts to access other regions: the project actually resulted in enhancing road accessibility from/to these districts. The project's synergy effect was also enhanced as the project decided to include improvements on small and medium bridges on the road network as a part of project design. The on-going Phase III project of reconstruction of bridges is also taking the view of bridges as a part of the road network and therefore decided to target the 6 bridges on the important NR 5 road, and this will further enhance the effectiveness of this project.

Ethiopia

Ex-Post Evaluation of Japanese Grant Aid Project “The Project for Rehabilitation of Trunk Road (Phase III)”

External Evaluator: Sachiko Matsumoto, FASID

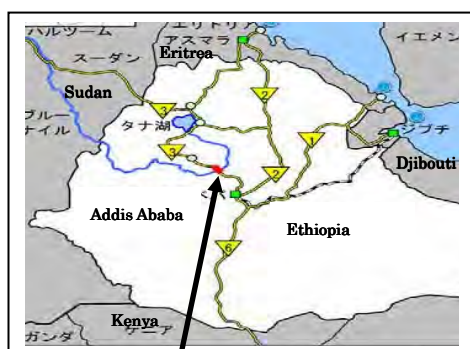
0. Summary

Through the rehabilitation of a 40km (approx.) section of National highway No.3 connecting Ethiopia’s capital Addis Ababa to the northwest regions of Ethiopia and the construction of a new Abay bridge (303m), this project aims to improve the transportation of goods and people and to ensure the road safety of the existing road network.

The objectives of the project are consistent with the strategy of the road development program of the Government of Ethiopia and the route (Goha Tshion – Dejen) is important for transporting agricultural products to the whole country as well as exporting and importing goods with the neighbouring country of Sudan, thus the relevance of the project is considered high. In terms of the project’s effectiveness; the following were confirmed at the time of this evaluation: improvement in driving speed, eliminating the day of closed road throughout the year, and invigoration of socio-economic activities. However, one of these improvements was strongly influenced by other projects implemented after the completion of this project. For that reason, the effectiveness of this project is fair. During construction a landslide caused the project to exceed its budget and therefore efficiency of the project is also fair. The sustainability of the project effects is high based on the appropriate operational skills and organized structure for the maintenance of the road and the bridge.

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

1. Project Description



(Project Location¹)



(Abay Gorge and Rehabilitated Road)

1.1 Background

In Ethiopia, after the military regime was put to an end in 1991, the interim administration began the

¹ Map from the report from “The Project for Operation and Maintenance of Trunk Road : Goha Tshion – Dejen across Abay Gorge (Equipment Supply)”

process of democratization and economic development. However, the civil war that lasted 17 years and several large-scale droughts caused the socio-economic conditions of the country to remain under extremely severe condition. The population living under the poverty line in 1999 is high: 44.2%². Also, 80% of the population live in agricultural areas, surrounded by poor living environment and they engage in agriculture. In addition, the road density is one of the lowest among the countries in Africa³. Under such circumstances, the Ethiopian Government regards food security as a matter of great importance and set the agricultural sector as its principal axis for promoting the industrial and third sector development.

As a result, in recent years the increasing numbers of investments in the agricultural sector and expansion of the service industry are seen as a trend in development. However, the domestic food supply is still insufficient and still urgently depends on food aid from foreign countries. For the development of the agricultural sector and to establish food security in Ethiopia, the maintenance of its road network is indispensable for social economic development and is an urgent matter.

The Ethiopian government conducted a road development study in 1996 and settled on a northwest highway maintenance plan (Addis Ababa – Debre Marcos section, approximately 300km). With a request of the Ethiopian Government, the Japanese Government has already carried out two phases of the road rehabilitation plan since 1998 from Addis Ababa to Goha Tshion (approximately 180km). This project is a road rehabilitation plan of the remaining section between Goha Tshion and Dejen including constructing a bridge across the Blue Nile River in the Abay Gorge⁴.

1.2 Project Outline

The objective of this project is to improve the transportation of goods and people and to ensure road safety of the existing road network by rehabilitating the road between Goha Tshion and Dejen (approx. 40km) and constructing a new Abay Bridge (303m).

Grant Limit / Actual Amount	4,832 million yen / 4,825 million yen
Exchange of Notes Date	May, 2005
Implementing Agency	Ethiopian Roads Authority (ERA)
Project Completion Date	January, 2009
Main Contractor	KAJIMA Corporation
Main Consultants	Oriental Consultants Co., Ltd.

² Millennium Development Goal Indicators, mdgs.un.org,
³ Road density of Ethiopia is 29.0km/1,000sq. Km (ERA, 2003). In Sub-Saharan Africa, among the 25 countries which have available data, Ethiopian Road Density is 21st. (World Bank Development Indicators)
⁴ The rest of the unpaved section from Dejen to Debre Marcos (65.5km), the road from Dejen to Rumame (30.5km) is currently under construction by “The Project for Rehabilitation of Trunk Road, Phase IV” (2011-2014).

	Japan Engineering Consultants Co., Ltd.
Basic Design	“The Project for Rehabilitation of Trunk Road (Phase III)” October 2003-March 2004
Detailed Design	August, 2004- March, 2005
Related Projects	<p>【Technical Cooperation】 Dispatch of an Expert “ERA Bridge Management” (2002.7-2004.7, 2004.7-2006.7) “Project for Capacity Building of the <i>Alemgena Training and Testing Center</i> of ERA” (2002.4-2006.3) “Capacity Development Project on Bridge Management” (2007.1-2012.7) “Experts for Landslide Countermeasure works and Horizontal Drainage Drilling”(2010-2011) “Project for Developing Countermeasures against Landslide in the Abay River Gorge” (2010.3-2012.3) “Capacity Development Project for Countermeasure Works for Landslide” (2011.6-2016.3)</p> <p>【Grant Aid】 “The Project for Rehabilitation of Trunk Road, Phase I” (1998-2001) “The Project for Rehabilitation of Trunk Road, Phase II” (2001-2004) “The Project for Rehabilitation of Trunk Road, Phase IV” (2011-2014) “The Project for Operation and Maintenance of Trunk Road : Goha Tshion – Dejen across Abay Gorge (Equipment Supply)” (2010.6-2012.5)</p>

2. Outline of the Evaluation Study

2.1 External Evaluator

Sachiko Matsumoto, Foundation for Advanced Studies on International Development

2.2 Duration of Evaluation Study

Duration of the Study: November, 2011- October, 2012

Duration of the Field Study: February 19th – March 4th 2012, May 28th – June 1st 2012

2.3 Constraints during the Evaluation Study

The road section of this project contains some parts which are easily damaged by landslides during the rainy seasons; however, the field study was conducted during the dry season. Thus the evaluator was not able to observe rainy season road conditions. In regards to rainy season road conditions, the evaluator gathered information by interviewing people who work at the road section as well as reviewing the written documents.

3. Results of the Evaluation (Overall Rating: B⁵)

3.1 Relevance (Rating: ③⁶)

3.1.1 Relevance with the Development Plan of Ethiopia

In Ethiopia, "Agricultural Development Led Industrialization" (ADLI) was introduced by the interim administration after the military regime collapse in 1991, and a development strategy aiming at industrial development led by the agricultural sector had begun. "Development, Peace, and Democracy Programme" (also known as the "Five-Year Plan") and other development policies from when the start of the Federal Democratic Republic in 1995 placed agriculture in their top priority issue in conformity with a basic policy of ADLI and raised the issue of poverty reduction of the rural regions and assurance of food security. In "Sustainable Development and Poverty Reduction Program" (SDPRP) (2002/03-2004/05), which was the mid-term development program at the time of the appraisal, the road sector was counted as one of the five top priority issues⁷ for accomplishment of poverty reduction. It was also specified in the policy paper that the road development carries a decisive role for improvement of agricultural productivity and rural development promotion. As transportation, particularly road transportation, is a success factor for many other socio-economic sectors such as agriculture, manufacturing, mining, tourism, education and health it is prioritized in the mid-term development program at the time of ex-post evaluation, "Growth and Transformation Plan" (GTP) (2010/11-2014/15).

Additionally, in the road development policy of Ethiopia, the "Road Sector Development Program" (RSDP) was introduced in the Five-Year Plan of 1995, and concrete targets were set in regards to expansion of road network and improvement of quality of road. RSDP has been carried out since 1997, from phase I (1997/98 - 2001/02), phase II (2002/03 - 2006/07), phase III (2007/08 - 2009/10) and phase IV (2010/11 - 2014/15) and the improvements are steadily seen in the road network expansion and maintenance works of Ethiopia. RSDP phase IV has become a main strategic pillar of GTP, aiming to improve rural network expansion and capacity building for the administrative body's organizational management.

The project of this evaluation study is the road rehabilitation of the main highway (National highway No. 3) to link Ethiopian agricultural regions in northwest to the capital city, and the objective is consistent with the Ethiopian development policy and the road sector development program at the time of both the appraisal and the ex-post evaluation.

3.1.2 Relevance with the Development Needs of Ethiopia

This project road is a section of national highway No. 3 which is the only national highway

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

⁶ ③: High, ②: Fair, ①: Low

⁷ Five top priorities sectors are Agriculture, Water, Road, Education and Health

connecting the active agricultural regions of the northwest and the capital Addis Ababa, as well as the Sudanese border. Therefore this route is very important for domestic and foreign goods transportation, and the needs of the road maintenance are extremely high from the viewpoint of food security and international trade. The northwest regions (Amhara and Oromia regions) that National highway No.3 cuts across, the domestic production of cereals is high as of 35% of the whole country at the time of appraisal (2003/04) and 36% at the time of ex-post evaluation (2010/2011)⁸, thus the route is important to manage the steady supply of food for the country as a whole. In addition, since this highway leads to the Sudanese border, it became the most suitable land route for trade with Sudan (the import of oil products and the export of agricultural products and daily necessities). As a result, there is heavy traffic including tank lorries and large size trucks. However, the road surface before the rehabilitation was heavily damaged and the road consisted of many narrow and sharp curve sections, which limited the driving to lower speeds. The Abay Bridge was also at risk of collapse due to its deteriorated condition, thus only one vehicle was allowed to pass at one time. Considering Ethiopia's economic growth and related increase in transportation needs, the needs to rehabilitate the section of the road -and construct the new Abay Bridge is still very high.

3.1.3 Relevance with Japan's ODA Policy

At the time of appraisal in 2003, the Government of Japan did not make an assistance plan of the Ethiopian country, but the basic policy of assistance in Ethiopia is to respect the needs and ownership of Ethiopia⁹. Thus, the assistance project went along well with the development program of Ethiopia. This project section is part of the northwest highway maintenance plan that Ethiopia conducted in 1996 (Addis Ababa – Debre Marcos section, approximately 300km), and Japan has already been carrying out a road rehabilitation program (Addis Ababa – Goha Tshion section, approximately 180km) since 1998. The policy priority and the needs for road development in Ethiopia were very high, and Japan's assistance to Ethiopia reflected such policy and the needs of Ethiopia. The economic infrastructure development including road development was one of the five important areas set by the ODA taskforce of Ethiopia in 2003. With the diplomatic aspect, "the third Tokyo International Conference on African Development" (TICAD III¹⁰) was held during the same period of this project planning in 2003, and this project was part of Japan's assistance to African countries announced Prime Minister Junichiro Koizumi. In TICAD III, Japan presented one of the three pillars of assistance as "poverty reduction through economic growth" and placed infrastructure in the priority issues. In addition, the bridge designed by this project is high in durability and easy for maintenance which demonstrates the high level of Japanese bridge construction technology.

⁸ The Central Statistical Agency (CSA) of Ethiopia

⁹ Ethiopia Country Assessment Report (2004, Chapter2.p34)

¹⁰ TICAD III was held in Tokyo from 29th September 2003 ~ 1st October 2003. Ethiopian Prime Minister Meles and 23 Prime Ministers and former Prime Ministers, total of 89 countries and 47 organizations participated.



(Abay Bridge (New/front, Old/back))

This project at the time of the appraisal is consistent with Japanese policy and Japanese technical superiority in conducting this type of project is high.

This project has been highly relevant with the country’s development plan, development needs, as well as Japan’s ODA policy, therefore its relevance is high.

3.2 Effectiveness¹¹ (Rating: ②)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

The operation and effect indicators set at the time of the appraisal and the actual data at the time of the ex-post evaluation are shown in the table 1.

Table 1 Effect Indicators

Type of Indicators	Base Year (2003)	Goal Year (2012) 3 years later	Actual (2012)
Driving Speed 【Normal】 【Heavy】	20-30 km 10-15 km	40-60 km 20-30 km	<u>40-60 km</u> <u>20-30 km</u> ¹² 5- 15 km ¹³
Driving Time (Goha shion-Dejen) 【All Types】	2-4 hour/ one way	1-2 hour/ one way	<u>1-2 hour/ one way</u> ¹² 3-4 hour/ one way
Frequency of closed road traffic (Day)	6-8 day/ year	0 day/ year	<u>0 day/ year(2011)</u>

Source: Data of the base year and goal year is from Basic Design, actual data of diving speed and time were measured during this study, the day of closed road traffic is the interview result of a consultant of “Capacity Development Project for Countermeasure Works for Landslide”.

As shown in Table 1, shortening of the driving time (during the dry season), improvement in the driving speed, elimination of road closing days in 2011 were all accomplished at the time of the ex-post evaluation, therefore, it is considered that the transport efficiency of goods and people of this road is improved. On the other hand, during the rainy season (June to September), there were 40-50 cases of vehicles getting stuck due to road subsidence at large-scale landslide points (Near Sta.1 and

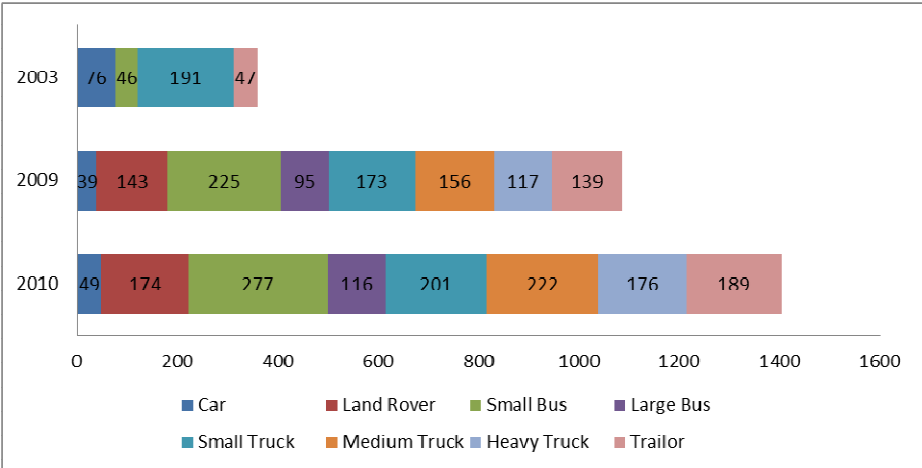
¹¹ Sub-rating for Effectiveness is to be determined in consideration of Impact

¹² Heavy vehicles are large buses and trucks

¹³ Tank lorries and heavy trailers are not included because they are driven slowly regardless of road conditions

Sta.28¹⁴). During the rainy season road conditions become unpleasant, however, these road sections are carefully patrolled by the ERA local office staff and traffic police several times every day and they perform traffic control immediately when they encounter stuck case to let other vehicles pass in alternation using one traffic lane, therefore smooth traffic is secured without the road being closed.

The traffic on this road increased greatly indicating an invigoration of socio-economic activities in the project area and in areas neighbouring the project. Figure 1 shows a change in the volume of traffic before the project (2003) and after the project (2009 and 2010)¹⁵. The means of transportation has increased remarkably in the project area, which indicates that transportation of people and distribution of goods has also improved. Especially noticeable are that there are many more minibuses and that the movement of people from the local areas to the cities and vice versa has become easier. In addition, the newly constructed Abay Bridge ensures a safe road network. Previously, large trucks avoided using this road¹⁶ for fear that the bridge may collapse, but since the project constructed the new Abay Bridge, there is no need to restrict vehicles one side at a time. At the field visit during this study, multiple vehicles were able to be driven on the bridge at the same time without any problem.



Source: ERA
 Note: The categories of 2003 differ from 2009 and 2010. Car (Dark Blue) includes Car and Land Rover, Small Bus (Green) includes Small and Large Bus, Small Truck (Blue) includes Small, Medium, and Large Truck.

Figure 1 Annual Average Daily Traffic (Goha Tshion – Dejen)

3.2.2 Qualitative Effects (Improvement of the road safety, less road damages by improving the drainage facilities)

In regards to road safety, the danger of collision and minor collision was lowered by; widening the width of the road at sharp curve sections, improving road alignment, and installing safety facilities

¹⁴ The start point of construction in Goha Tshion is numbered as 0(zero), then 2km distance point is Sta.2, and 2.5km point is Sta.2+500.
¹⁵ A traffic target figure was not set at the appraisal
¹⁶ Interview with the Deputy Director General, Road Asset Management Directorate of ERA

such as guard posts, road traffic signs and painting section lines. In addition, paving the road has improved visibility by reducing dust during the dry season which provides greater safety for drivers and pedestrians¹⁷.

In regards to the road condition, the severe road environment such as landslides, a high temperature, a steep grade, the overloaded vehicles damage the pavement surface and some parts are deformed. The poor road condition was reported as 23% (approximately 9km)¹⁸ in January 2012, and through the visit of this study, it is observed that 70-80% of the damage is related to Rutting¹⁹ and Corrugations²⁰. Rutting and corrugations lower driving comfort compared to flat sections, but the level of damage is not a major obstacle for normal driving. In the landslide section, a gradual slope exists due to road subsidence²¹. Although drivers need to reduce their speed for safe passage, the road is fine to be driven.

In addition, concern over road damage from water was one of the main issues prior to the project, the road damage from water has been reduced by installing gutters and crossing pipes to function as drainage for handling rainwater.

Thus, at the time of the ex-post evaluation, although some damage to the road exists, all sections of the road are passable and the project has already brought the effects assumed at the time of the appraisal.

3.3 Impact

3.3.1 Intended Impacts

(1) Invigoration of Socio-economic Activities (Agriculture and International Trade)

Agriculture is the main industry in the area where National highway No. 3 cuts across, the Amhara region and Northwest Shewa of the Oromia region, in which cereal production is prosperous. Those agricultural products produced in the regions are transported to the markets of Addis Ababa over this project road. The amount of cereal production for the year 2010/2011 almost doubled in comparison to the 2003/2004 year. Although this project cannot be credited for the increase in production, it can undeniably be credited for the smooth distribution of these agricultural products. In addition to the smooth distribution of agricultural products, this road also functions as a means for transporting people, goods, and information. The improvement in agricultural productivity is also evident in that it

¹⁷ Interview with the Head, Goha Tshion Woreda Police Station and School Director, Filiklik Elementary School

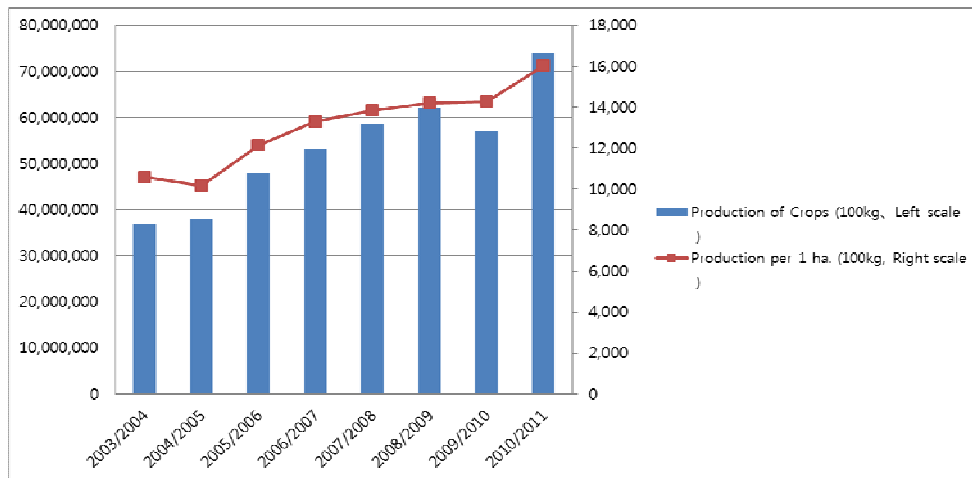
¹⁸ The road condition is described in page.17, Sustainability 3.5.4.Current Status of Operation and Maintenance

¹⁹ A rut is a depression or groove worn into a road by the travel of wheels. It tends to appear on roads which have heavy loaded traffic

²⁰ A corrugation is a series of parallel ridges and furrows that occur on the road surface When it occurs at one place it triggers a chain reaction

²¹ At the time of ex-post evaluation, 8-9 gradual slopes up to 30 cm were observed (The first field visit in February 2012)

provides easier access to imported fertilizers and new farming techniques²².

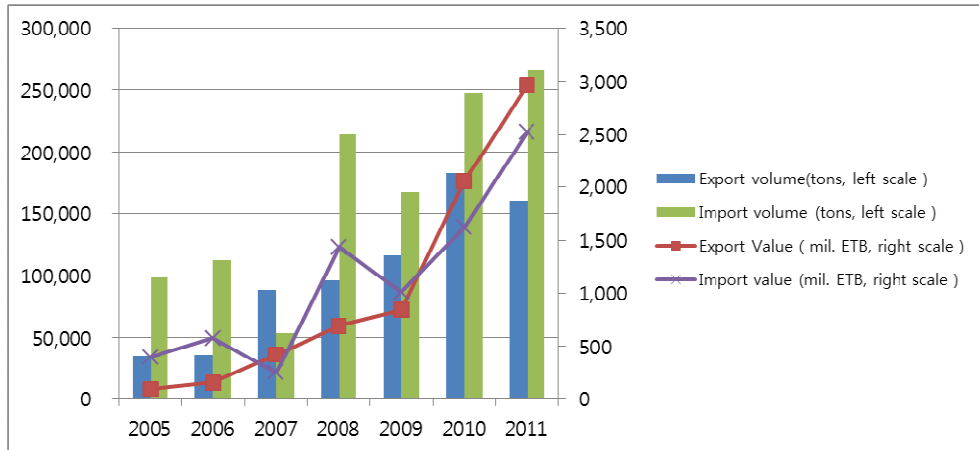


Source: The Central Statistical Agency of Ethiopia

Figure 2 Trend of Crop Production (Amhara Region and Northwest Shewa of Oromia Region)

Furthermore, the impact to the socio-economic condition by this project is not limited to the surrounding towns of the project area but has spread throughout Ethiopia. Trade with the neighbouring country of Sudan is one such example as land transportation between the Sudanese border and Addis Ababa rely on this project road as well as the road of the phase I, II, and IV to bring goods to the market of Addis Ababa then to circulate them to the rest of Ethiopia. Imports from Sudan increased approximately 2.7 times from 98,667 tons in 2005 (monetary value as 399 million ETB) to 266,080 tons in 2011 (2,528 million ETB) (figure 3). Since July 2011, Ethiopia has imported 100% of its gasoline from Sudan so this highway has also become an important route for the steady supply of the gasoline for the country. Exports to Sudan such as agricultural products, domestic animals, luxury goods and daily necessities have also increased approximately 4.7 times between 2005 and 2011. In this way, the rehabilitation of National highway No. 3 (including the section covered by this project) is contributing greatly to the economic development of Ethiopia.

²² Interview with the Deputy Head, Office of Agriculture, North Shoa Zone



Source: Ethiopian Revenues and Customs Authority

Figure 3 Ethiopia – Sudan Import and Export Trend (Overland Only)

(2) Improvement of the access to schools and medical institutions

The project area includes two towns (Goha Tshion and Dejen) and 2 villages (Filiklik and Kurar) in which schools and health centres exist.

Since both elementary and junior high school students go to school on foot, no change in the access to schools was found which could be attributed to the road rehabilitation. In terms of access to high schools; however, some improvement was found. Because the number of high schools is limited in the area, about half of all high school students are from distant villages²³. On weekdays, students from distant villages generally stay in lodgings around the high school and return to their parents' house on the weekend and/or during vacation. With more available transportation such as minibuses, the time to spend for traveling has been shortened for those who previously had a hard time to find appropriate modes of transportation. Thus, it can be said that the access to high schools has been improved for students from distant villages.

In regards to access to medical institutions, commuting time by car and minibus for patients needing emergency procedures was reduced. Although the health centres of the towns and the villages do not own an ambulance, in emergency cases, patients are conveyed to the health centre in town office vehicles or in any car happening to be on the road. Cases of patients being referred to a larger medical institution in a town or city from the health center of the village and conveyed by the project road include: Tuberculosis, bleeding of pregnant woman, and traffic accident injuries²⁴.

(3) Income increase of community people by being hired for road construction

Before the road project, income sources other than agriculture were limited so that during the

²³ No high school in villages, and only in towns (Goha Tshion and Dejen)

²⁴ Referral record of Kurar Health Center (September to December in 2011)

construction period, many local residents were employed as construction workers. As for the number of employed people, 300-800 people per day were employed for approximately 24 months²⁵. Not only men but also women were employed. Their main works were piling-stones and undertaking work required to produce concrete asphalt materials. The cash income earned by this employment was used to repair houses and to purchase daily commodities such as clothing, food and daily necessities²⁶. Some residents were still being employed as road maintenance workers after the project had ended.

3.3.2 Other Impacts

(1) Impacts on the natural environment

The whole area of the project site does not have high trees, and shrubs grow in some spots. Since this project made use of existing road alignment for rehabilitation, the felling of trees was minimized. Planting after construction was not carried out. No particular negative influence on animals and plants were reported.

(2) Landslides

A landslide occurred in February 2006. It started as a pavement crack near Sta.2 during the construction and afterwards spread to a wider area. Since there was a history of landslides in this section, laying earth increased load and the heavy rainfall in 2006 on such ground condition, which exceeded the yearly average, caused a large-scale landslide. Since then, especially during the rainy season, landslides occurred repeatedly at several sites. The main landslide incidents during the construction and the response of both governments are shown in table 2. During the construction, the contractor removed earth and repaired the damage to secure traffic. Although the scale of the landslide which occurred during the project was large, it did not cause any human damage and damages to houses and other facilities was also minimal. The project area's slope instability is such that damage (such as slope collapse and the mud flood) is limited to the rainy season when rainfall is most intense. Normally, landslide cause the earth to move slowly to the lower part and it starts with some signs such as cracks on the land surface. The main damage is to the road facilities due to road subsidence and rise of the surface with the earth movement, but so far no human deaths or casualties have taken place among residents, drivers, and the construction workers. There is also no reported damage to houses primarily because there are no houses located in the areas affected by the landslides. As for a negative effect on the community, a local church which stood on the hill of Dejen's town entrance collapsed when the sliding of the earth progressed at the time of construction during the rainy season in 2007 (the church already had cracks on its wall from a previous landslide)²⁷.

Prior to the construction, this area has experienced slope instability problems including landslides, and

²⁵ Interview with the officer in charge of the construction from KAJIMA Corporation

²⁶ Interview with the Head of Office, Goha Thion Woreda Administration, and the Head, Dejen Woreda Administration

²⁷ Currently the community is constructing a new church.

in order to avoid traffic problems the ERA had to carry out restoration works such as earth removal and the repair of the gabions. Due to the technical limitation of the ERA, landslide mitigation measures were not previously performed and neither the scale nor the causes of landslides in the area were studied. The details of landslide investigation and prevention measures considered or taken at the time of this project appraisal will be explained in the next criteria under efficiency.

Table 2 Landslide Occurrence and measures taken by Ethiopian and Japan Side

Occurrence	Landslide Area	Damages	Ethiopian Side		Japan Side
			Emergency work/ Geological Survey (2007)	Restoration Work (2008)	Design Change of this Project
Feb.-Sept. 2006	Sta.2+570-2+940	Crack, Subsides, Rock fall, mud flood	○	-	Change of Alignment
	Sta.4+880-5+160	Destructio of Guard Walls, Pavement Damages	○	○	Spec.down of Pavement, Asph.curb installation
June-Sept. 2007	Sta.0+800-1+080	Subsides, Pavement and Gutter Damage	-	○	Spec.down of Pavement Elimination of Small bridge Alignment Change, Repair of Pavement and Drainage Facilities
	Sta.26+840-28+600	Subsides, Pavement, Gutter, Pipe Damage	-	○	Spec.down of Pavement Alignment Change, Repair and Add of Drainage Facilities
	Sta.30+700-31+500	Subsides, Pavement and Gutter Damage	-	○	Spec. down of Pavement
	Sta.33+340-33+640	Subsides, Pavement Damage	-	○	Spec. down of Pavement
June-Oct. 2008	Sta.10+455, 10+660	Subsides, Pavement Damage	-	-	Repair of Pavement
	Sta.22	Pavement Damage by Hill side destruction	-	-	Alignment Change
	Sta.26+340, 26+540, 26+680	Subsides, Pavement Damage	-	-	Repair of Pavement
	Sta.31+600, 31+800,31+900	Subsides, Pavement Damage	-	-	Repair of Pavement
	Sta.32+250-32+400	Gutter cracks from Hill side destruction	-	○	-

Source: The Evaluator's composition based on the documents of design changes (November 2008)

Despite the fact that the topography of the area is threatened by landslide problem, it is considered that this project destabilized ground condition at several sites. The site studies after landslide occurrence reported that one of the causal factors for landslides occurred at Sta.1, Sta.2, Sta.5, Sta.33 of Table 2 is construction works of this project. On the other hand, having been confronted with these landslide issues, both the government of Ethiopia and Japan decided to devise and implement a medium-and-long term plan for landslide measures in the Abay Gorge. After this project completion, the Ethiopian Government set up the "Landslide Task Unit" (LTU) to make a plan for landslide countermeasures and "Emergency Work unit" (EWU) to carry out restoration and maintenance works, as well as guarantee a special budget for landslide measures. The Japanese Government also granted equipment for conducting landslide measures, began to assist in detail investigation (geo-technical and geophysical) to find out the landslide mechanism, and also started a technical cooperation project for five years to strengthen the LTU staff's capacity to develop a plan for landslide measures and manage the construction works, which as a whole has become a comprehensive program for the landslide

mitigation measures²⁸.

(3) Land Acquisition and Resettlement

Since this project designed to make use of existing road alignment to rehabilitate, removal for the right of way was restrictive such as the walls of residents' houses in Dejen town and telephone poles. Project site acquisition was conducted by the ERA according to their rule by which the article affected by the right of way is compensated for and new land is provided. Thus, there was no problem about the site acquisition occurred.

In addition, measures led by the contractor to prevent the spread of HIV were carried out during the construction²⁹ therefore an increase in the HIV infection rate among residents during and after the construction period was not reported.

As described above, the effect indicators for determining the effectiveness have been accomplished and therefore the project purpose has been achieved with the improvement of transport of people and distribution of goods with high increase in traffic, and the invigoration of socio-economic activities. However, about the elimination of "the day of closed road" among the effect indicators, although there was no closed day in 2011, it cannot be considered an effect of this project since this achievement was heavily dependent on the equipment which was procured after this project was completed. In April of 2009 just after the completion of this project, a study report about the landslide condition of this project site pointed out that due to the large-scale landslide which occurred during this project, there were four spots which become hazardous and potential obstacles for traffic. Some of those hazardous points were highly threatened by slope instability problems which needed to be dealt immediately to avoid losing a road function such as closing of the road³⁰. To avoid such a situation, the study team concluded that heavy construction equipment should be stationed near the landslide site for immediate restoration work. In June 2010, necessary equipment was provided through a grant aid by the Government of Japan. Landslides occur during rainy seasons up to now and elimination of the day of closed road would not have been possible without this equipment at the landslide spot of the project site. Therefore, when considering the effect of this project, it is appropriate to consider the improvement of the driving speed³¹, and the driving time and safety of transport across the bridge as effects but not the elimination of road closing days because elimination of road closing days relied heavily on the external factor, additional equipment, after the completion of the project.

²⁸ The landslide related projects are 4 projects (2009 – 2011) from the related Projects in page 3 and Ethiopian road restoration project conducted by using the Counterpart Fund.

²⁹ The hygienist of the contractor (KAJIMA Corporation) conducted HIV prevention education and distributed contraceptives to the construction workers.

³⁰ Feasibility Study Report of Abay Gorge Landslide Measures Project, p.7-8, 30 (April 2009)

³¹ Driving Speed during dry season is achieved at all sections of the project road during the dry season. During the raining seasons, driving speed is achieved at all the sections excluding the landslide part (approx. 37km) (Interview with the Deputy Director of Road Asset Management ERA)

As stated in the above, this project has somewhat achieved its objectives, therefore its effectiveness is fair.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

Road rehabilitation and bridge construction were carried out as shown in the table below.

There were a number of specification changes from the plan, due to the landslides³² including: the exclusion of small bridges; changes in alignment and the repairing of the damaged pavement; the addition of drainage facilities; and change in specifications of the parking area in the Dejen town due to the lack of cement materials. Those countermeasures were examined appropriately according to the situation at the time of construction and decisions were made based on the discussions with ERA, thus the procedures and the contents for the changes were appropriate.

Table 3 Comparison of Plan and Result

	Plan	Result	Difference from the Plan
Road Rehabilitation	Section Goha Tshion - Dejen Road Length 40.60km Width (Standard) 10m=(Shoulder)1.5 m+(Driveway)+3.5 m x2+(Shoulder)+1.5 m Pavement Asphalt Concrete Drainage Cross Pipe(D900-1200) U Shape Gutter(600 × 600) Stone Gutter	Section Same as Planned Road Length ³³ 40.45km Width Same as Planned Pavement Same as Planned Drainage Cross Pipe(D1000-2000) U-Shaped Gutter(600x600) Stone Gutter, Box Culvert(H2.5xW2.5)	(1) Alignment Change (2) Spec. down of Pavement at 5 Landslide Section(3.42km) (3) Exclusion of 2 small bridge construction from the plan (4) Pavement and Gutter Repair and Additional Drainage Facilities (5) Change of Pavement Type used for the Parking Space of Dejen Town
Bridge Construction	Bridge Length 303m Width 9m=(Shoulder)1 m+(Drive way) 3.5mx2+(Shoulder)1m Foundation Method 5 Spread Foundation Super Structure PC 3 Extra dosed bridge Sub-Structure Rigid Framed Abutment1, Wall Piers 1, V-Shaped Pier 2, Reverse T Pier 1	Same as Planed	Same as Planned

Source: Plan is Basic Design Study Report, Result is JICA Internal Report

³² Due to the influence of the landslide, the asphalt pavement was repeatedly damaged with subsiding and uprising of the road surface and the pavement works were unable to be completed. Thus, the landslide affected damages were excluded from the defect objects.

³³ The slight difference of the Road Length (150m) is the difference between the measurement taken for the BD and the actual measurement

The main responsibilities of the Ethiopian side, including construction site acquisition, clearance of the construction road, transference and the compensation for the right of ways were carried out as scheduled. The water current meter facility near the Abay Bridge was left at the site since there was no approval for its removal as it was under the jurisdiction of the ministry of water, but its removal did not pose an obstacle for the bridge construction. Additionally, some activities that were not in the original plan such as the repair works of the road facilities damaged by landslides (seven locations, with a total of 4.4km) were carried out. Specifically, earthworks (removal of earth and weight laying by earth), removal of the earth off the road, repair of gutters and pipes, re-pavement of the damaged pavement and a landslide survey (Drilling investigation) were carried out.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The results of the total expense of this project, 5,629 million yen, is higher than the planned amount of 4,841 million yen (the actual is 116% of the plan)³⁴. In total project expense, the exchange of notes (E/N) ceiling was 4,832 million yen for the Japan side and the Ethiopian budget was 9.8 million yen, whereas the actual expenses were 4,825 million yen for Japan and 804 million yen for Ethiopia³⁵.

There are two reasons for the increase in cost for the Ethiopian side. One is that the amount of the compensation paid for the clearance of the right of ways exceeded the planned amount of 9.6 million yen with the actual cost of 68 million yen. The other is that the expenses for additional activities for restoration and countermeasures for landslides which were not in the plan but implemented by using the Counterpart Fund of Ethiopia³⁶. The reason for the excess cost for the removal was that by widening of road in Dejen town more numbers of inhabitants' facilities such as walls needed to be compensated. The Counterpart Fund allocated during the construction for landslide damages was 387 million yen in 2007 and 349 million yen in 2007. As the additional expenditure related landslides is particularly large, the process for studying landslide measures at the time of appraisal is explained in the section below.

(Study of landslide measures at the time of appraisal)

The project section between Goha Tshion – Dejen forms special gorge topography. Indications, even at the initial appraisal stage, were that road rehabilitation would be difficult. The risk of landslides and

³⁴ Additionally, the contractor (KAJIMA Corporation) also bore the cost of repair and emergency work from the initial period of landslide occurrence in Feb.2006 to March 2007. However, this cost was not added to the project cost because it was difficult to separate the additional cost from the originally planned cost. After March 2007, road restoration work was carried out mainly by using the Counterpart Fund of Ethiopia.

³⁵ To calculate the planned cost for the Ethiopian side in the BD, the exchange rate 1ETB=12.99 Yen was used and for the actual cost used the exchange rate of project completion month was 1ETB=9.257Yen.

³⁶ Counterpart Fund is a sum of money accrued in a local currency arising from goods or services received from the Government of Japan (through loan and grant aid project). It can be used by developing countries for socio-economic development projects within the country.

the need to measure such risks were pointed out in the field study by the person in charge of grant aid project in 2000, and during the preliminary investigation in 2003. While suggesting the landslide measures should be kept to a minimum amount (since covering the entire section would be enormously expensive), the report mentions the possibility of large-scale landslides and falling rocks in the area. At the time of the appraisal, the risks of natural disasters including landslides were investigated and some measures were considered during the Basic Design study, and, as a result, it was suggested to conduct further study during the Detailed Design such as additional drilling and the study of underground water level. Landslide measures were scrutinized by the disaster mitigation expert at the Detailed Design. As a result, some mitigation measures planned in the Basic Design was considered as difficult for implementation and expensive thus other measures which were low cost and effective for landslide mitigation were implemented. However, the alternative solution could not reduce underground water which caused a landslide at the same section³⁷. At the time of construction, the instruction about landslide risk was not given to the contractor and the monitoring of the rainfall and the underground water level was not carried out until a landslide occurred.

There were discrepancies between the Basic Design and the Detailed Design, however since the topography and the geological feature of this project site is complicated and it is also difficult to point out potential landslide spots³⁸, even if some activities which were indicated in the Basic Design had been performed it is uncertain to what extent the measure could be effective for predicting or preventing the landslides.

3.4.2.2 Project Period

The project period was slightly longer than the planned period of 42.5 months to 43.3 months (102%). During construction, it took approximately one year to decide how to deal with landslide sections but since the contractor dealt with the repair work during that period voluntarily, the schedule of the whole construction period was not affected. The extension of the project period for about one month was due to the construction of additional drainage facilities for the sections that were damaged by the landslide which occurred during the rainy season in 2008.

Both the project cost and the project period slightly exceeded the plan, therefore efficiency of the project is fair.

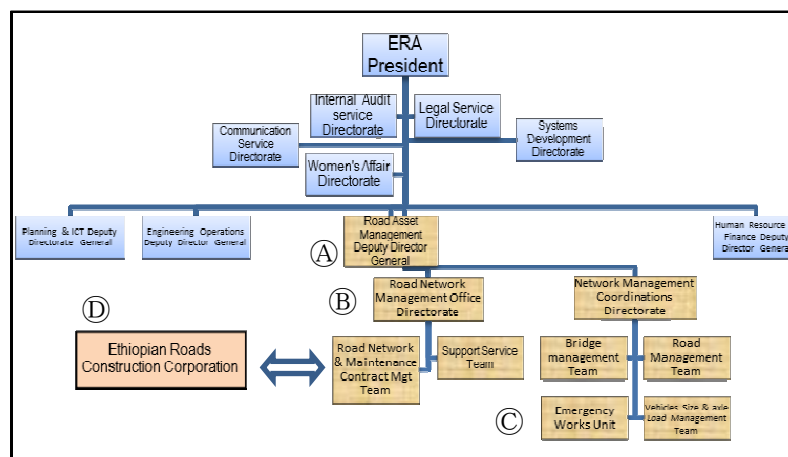
³⁷ In addition, the horizontal boring measure around Sta.28 which was deleted in the Detailed Design is being carried out through the above-mentioned technical cooperation project.

³⁸ According to the experts from “Project for Developing Countermeasures against Landslide in the Abay River Gorge” and “Capacity Development Project for Countermeasure Works for Landslide”, it is found from the analysis of landslide mechanism performed after 2010 that the special geological feature and topography cause small and medium scale landslide in the whole area, and it is almost impossible to prevent landslides around the gorge.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

Since the ERA underwent organizational restructuring in 2010 and 2011, the current organizational arrangement for maintenance is different from the assumptions made at the time of the appraisal. At the time of the ex-post evaluation: regarding road network maintenance, the road asset management directorate (figure 4, ①) performs a master plan; regarding on-site maintenance plan, development and construction control are carried out by the ERA Alemgena Road Network Administration Office (②), and the ERA Emergency construction unit (EWU³⁹, ③) possess and manages the equipment of landslide measures given by the Japanese grant aid after this project's completion, the Alemgena Office of the Ethiopian Roads Construction Corporation (ERCC⁴⁰) (④) undertakes maintenance work and the repair. Because the ERA cooperates with the ERCC in regards to maintenance, there is no problem in particular in securing necessary human resources and equipment and operating the maintenance system.



Source: ERA

Figure 4 Organizational Tree of the maintenance work related departments (ERA and ERCC)

In addition, around 60-130 people per month are employed from the local community as maintenance workers to clean and conduct repair works so that the on-site work staff also does not have a problem.

3.5.2 Technical Aspects of Operation and Maintenance

The technical skills for maintenance work for this project road is categorized into three as described in the table.

³⁹ EWU was founded in November 2011 with a mission to take charge of landslide repair works and mitigation measures of the whole country of Ethiopia.

⁴⁰ ERCC was separated from ERA at the reorganization in 2010. Up to 2010, ERCC was named District Road Maintenance Contractors (DRMC) and worked as the department in charge of construction works and maintenance works.

Table 4 Technical Skills for Maintenance Work

Type of Maintenance Work	Work Description	Technical Skills of ERA and the contractors at the moment
(1) Daily and regular maintenance work	Making a maintenance work plan and implementation of regular road condition checking, cleaning and regular repair works	There is no technical problem in regards to the planning by ERA and the maintenance work by the ERCC
(2) Repair Work for Corrugation	Making a plan for pavement testing, analysis of test result and repairmen work with the quantity of most suitable asphalt	ERA has knowledge about the pavement test, but no experience with construction control. However, depending on the scale and technical difficulty of the testing and the repair work, ERA is able to employ a consultant so that there is no technical problem.
(3) Restoration and Landslide Mitigation Measure	Conducting the landslide investigation, earth work for road restoration, planning and conducting landslide mitigation measures	ERA has technical skills for earth work for the road restoration. As for the long-term landslide mitigation measures to reduce the landslide incidents, technical skills of ERA staff are insufficient, but the technology transfer is being carried out now by JICA technical cooperation project.

(1) Daily and Regular Maintenance Work

There is no issue as the ERA and contractors such as ERCC have enough knowledge, technical skills and experience to conduct daily and regular maintenance work.

(2) Repair Work for Corrugation

Testing appropriate pavement materials is the most important point in repairing corrugations and the ERA has the knowledge to conduct appropriate examinations and understands the necessity to undertake this work⁴¹. In addition, the technical proposals was submitted from the project consultant to ERA at the completion of the project, in which the repair method taking into consideration this road section's special road environment is described. ERA staff do not have the field experience to supervise large-scale corrugation repair work however, the ERA can employ appropriate outside consultants to cover for any technical or human resource shortage, so that there will be no problem implementing repair work when necessary.

(3) Restoration and Landslide Mitigation Measure

Although landslides occur frequently during the rainy season, since completion of the project, there

⁴¹ Interview with the Directorate Director, Alemgena Road Network Management, ERA

has been no loss in road function or in human life. The technical skills necessary to maintain the road effect of this section is mainly removal of earth around the road facilities and to deal with vehicle stuck during the rainy season. Before this project, roads had been kept functioning by the landslide repair work of ERA, so ERA staff do have the technical skill necessary to sustain the road's effect. In addition, there is the equipment to deal with the stuck case stationed at the project site and ERA staff and ERCC staff are capable of operating the equipment so that there is no technical problem for clearing obstacles from the road.

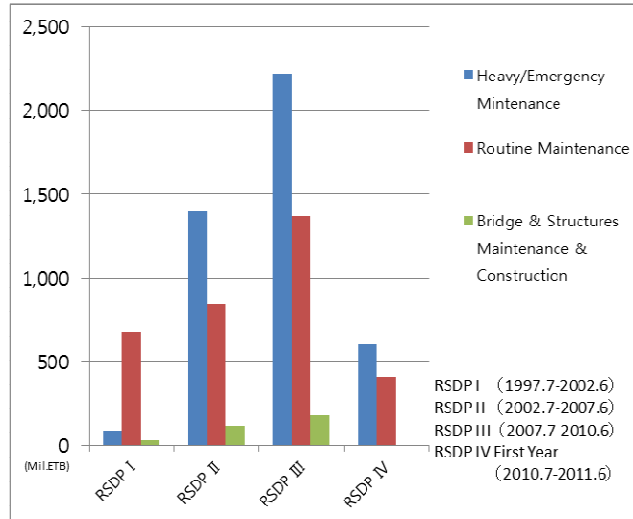
Although the above mentioned restoration work is an immediate remedy and is enough to maintain the project's effect, longer term landslide mitigation measures to reduce the risk of landslide disaster has been introduced from July 2011 by JICA in a technical cooperation project called " Capacity Development Project for Countermeasure Works for Landslide " and technical skills are being transferred to ERA staff. At the time of ex-post evaluation, ERA staff does not yet have the technical skills to conduct landslide investigations and mitigation measures by themselves, however, through the current technical cooperation project, they will become capable of reducing the risk of landslide in this section in future which will further ensure the sustainability of this project⁴².

For the maintenance of the bridge, large-scale repair work is designed to be conducted approximately 20 years later. At this moment, the periodic checking up and cleaning of the river wall and the base part of the bridge are carried out appropriately, and there is no technical problem.

3.5.3 Financial Aspects of Operation and Maintenance

Basically, the budget for national road maintenance work in Ethiopia comes from the "Road Fund". The Road Fund obtains revenue from fuel taxes and government subsidies and is a special expenditure fund which can only be used for road network maintenance. As for the road fund, stagnation was a concern due to the rise and fall of the fuel consumption, but, the total sum tends to increase every year. The actual expenditure in the maintenance of RSDP (Ethiopian road development program) I~IV is shown in figure 5. (Phase IV only shows the first year (2010.7 - 2011.6))

⁴² This technical cooperation project targets Landslide Task Unit to perform a landslide study, make plan of mitigation measures, make budget and instruct contractors (2011-2016)

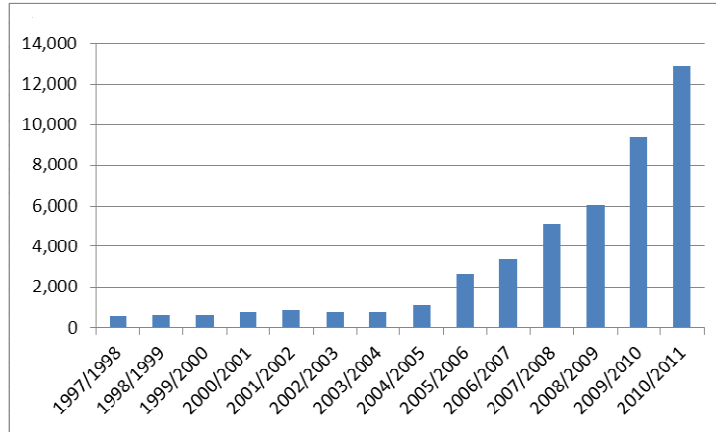


Source: Assessment of 14 years performance road sector development program, p7-12

Figure 5 Expenditure for Road and Bridge Maintenance in RSPD I~IV

However, different resources other than Road Fund are used for this project road since the maintenance cost exceed the budget scale of the Road Fund due to the repair work necessary for landslide damage and corrugation works. After this project's completion, a Counterpart Fund (41.6 million ETB, approximately 312 million yen⁴³) was approved in September 2009, and as of January, 2012, 40 million ETB of this fund was expended mainly for landslide measures of this section. About the budget after 2012, it is decided to allocate Ethiopian Government money, not from the Road Fund. The policy priority of Ethiopian Government on road development is high, and the recent Government expenditure has increased for accomplishment of RSDP (the figure 6, Ethiopia Government expenditure results). The Ethiopian Government set a special budget for landslide measures in 2011, and 80 million ETB has been allocated for six landslide measures projects of the country in the year of 2011/2012. This project site did not use the expenditure from this special budget in the year of 2011/2012 since the above mentioned Counterpart Fund has been used, but for the year of 2012/2013, 25 million ETB has been requested for this road section. After landslide incidences are reduced, the maintenance expense is going to be paid through the normal Road Fund budget. About the financial affairs of the road network maintenance, the ERA has a strong will to work on maintenance including landslide measures, and there is a special government budget thus there are no particular financial problems.

⁴³ The exchange rate of 1ETB=7.520Yen (September 2009)



Source: ERA

Figure 6 Expenditure of Ethiopian Government for RSDP I~IV⁴⁴

3.5.4 Current Status of Operation and Maintenance

The whole section of this project road and bridge function throughout the year. In regards to road maintenance work, the ERA implements a road condition survey three times a year. In addition, especially during the rainy season when the slope instability problem becomes imminent, the ERA, the ERCC and the traffic police work together for the maintenance of the road patrolling the road and traffic conditions every day and carrying out repair work whenever necessary. However, since the earth at the landslide point undergoes continuous movement, after conducting repair work the surface of the road changes its form so that frequent repair is necessary. At the time of the ex-post evaluation, 8-9 subsided road points were observed, but the road condition did not cause trouble for normal driving. At some of the road subsidence points, road markings were provided so that drivers would be warned in advance.

The road condition for January 2012 is as shown in table 7 (the left figure): good section was 51.63%, fair section was 25%, and poor section was 23.37%. The ratio of good road conditions kept for this road is slightly less than the average condition of the whole country in 2011 (figure 7, the right figure), but considering the special topography of the gorge and the technical difficulty for maintaining this section due to landslide damage, it is fair to claim that the maintenance level of this road falls within the range that can be considered average road condition for Ethiopia. Rutting and corrugations account for between 70-80% of the poor section of the road.

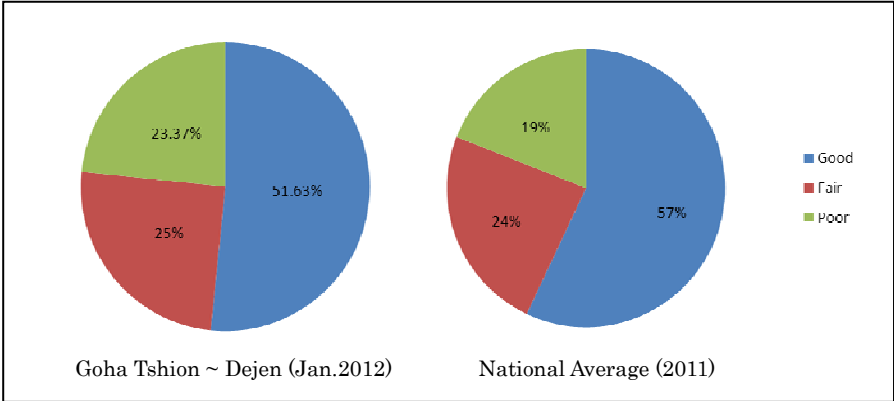
Although the ERA recognizes the necessity of corrugation repair⁴⁵, priority for repair work has been given to the landslide section and repairing corrugation has not yet started due to its relatively low level of emergency. It should be said that although rutting and corrugations reduce driving comfort, they do not cause trouble in regards to the flow of traffic. Therefore, although poor sections exist, they

⁴⁴ The road rehabilitation, upgrading and maintenance works are included in the expenditure

⁴⁵ Interview with the Director, Planning & Program Management Directorate and the Deputy Director General, Road Asset Management Directorate of ERA

have not spoiled the highway function and maintenance work is being performed to sustain the road’s positive effect brought on by this project.

There is no sedimentation such as garbage and the state of the river wall and the base of the bridge have not changed since the completion, so the maintenance situation of the bridge is good.



Source: (Left) Alemugena Road Network Management Office, (Right) Assessment of 14 years performance road sector development program, p.25

Figure 7 Road Conditions of the Project Site and National Average

No major problems have been observed in the operation and maintenance system, therefore the sustainability of the project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

Through the rehabilitation of a 40km (approx.) section of National highway No.3 connecting Ethiopia’s capital Addis Ababa to the northwest regions of Ethiopia and the construction of a new Abay bridge (303m), this project aims to improve the transportation of goods and people and to ensure the road safety of the existing road network.

The objectives of the project are consistent with the strategy of the road development program of the Government of Ethiopia and the route (Goha Tshion – Dejen) is important for transporting agricultural products to the whole country as well as exporting and importing goods with the neighbouring country of Sudan, thus the relevance of the project is considered high. In terms of the project’s effectiveness; the following were confirmed at the time of this evaluation: improvement in driving speed, eliminating the day of closed road throughout the year, and invigoration of socio-economic activities. However, one of these improvements was strongly influenced by other projects implemented after the completion of this project. For that reason, the effectiveness of this project is fair. During construction a landslide caused the project to exceed its budget and therefore efficiency of the project is also fair. The sustainability of the project effects is high based on the appropriate operational skills and

organized structure for the maintenance of the road and the bridge.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

Within this project section, it is recommended to repair the pavement where it subsides. It is also desirable to increase the frequency of undertaking road condition surveys and repair works, since the ground where landslide influences is unstable and road surface subsidence needs frequent repair. When it is not possible to make immediate repairs for reasons such as a large scale landslide or a technical issue it is suggested to reduce the risk of accidents by painting road marking so that drivers are warned of irregularities in advance. In addition, it is desirable that the ERA refer to the technical proposal which was submitted by the project consultant and thoroughly discuss the methodology of corrugation repair works at the time of ordering construction work.

4.2.2 Recommendations to JICA

Nothing in particular.

4.3 Lessons Learned

In this project, the risk of landslide occurrence was pointed out prior to its implementation and as a landslide did occur, it influenced the effectiveness and the efficiency of this project. Thus, when a project takes place where there is a risk of natural disasters such as landslides, 1) the findings of the preliminary investigations and other related documents of the project site should be shared among the people concerned and landslide mechanisms and disaster occurrence should be analysed during both the Basic Design study and the Detailed Design study. In addition, based on the result of the study, 2) specific instructions during construction and a countermeasure should be stated, and a disaster prevention activity item should be examine in detail with a contractor in order to figure out the best management method together. During the course of dealing with natural disasters such as landslides, decisions on measures should be made in timely manner. Thus, it would be effective to decide in advance how to deal with disaster situations such as cost disbursement for landslide measures⁴⁶, and foresetting the criterion for suspension and postponement of construction.

⁴⁶ In regards to establishing a cost disbursement method, an emergency budget for investigation and emergency works which can be disbursed immediately through a simple application at the time of an emergency is useful. When making a judgment, it is effective if there is a rule to stop the construction work when the cost of additional work by disaster damage exceeds the planned budget of that section.

development including development of roads due to their strategic importance. Hence, the government has been making special efforts to improve the standard of existing road networks and road maintenance works. During the economic crisis in the early 1980s, road development was stagnant and roads seriously deteriorated. This affected even major trunk roads, which led to negative impacts such as longer transportation time and damage of vehicles. Tanzania joined the “Road Management Initiative” (hereinafter “RMI”), an initiative that was undertaken by the World Bank since the early 1990s targeting 17 countries in Sub-Saharan Africa, and started a reform of its road sector. In July 2000, the Tanzanian National Roads Agency (hereinafter TANROADS) was established as the sole organization responsible for the development and maintenance of trunk roads, and has been undertaking development of the road network and its maintenance. TANROADS utilizes 70% of the Roads Fund (government fund sourced from tax revenue, including a fuel levy) and contracts maintenance works to private construction companies. However, TANROADS suffers from insufficient capacity and its staff lack experience, resulting in unnecessary actions and prolonged time for procedures, inappropriate contract planning, and improper project management and reporting procedures. This resulted in only a 70–75% implementation rate of its road works in the fiscal year 2002/2003 (1,500 contracted works and 800 works implemented by TANROADS itself).

Given these circumstances, the government of Tanzania requested Japan to undertake a technical cooperation project aiming at capacity development in terms of procurement, contract and project management of TANROADS. In response to this, a JICA Ex-ante Evaluation Team was dispatched to Tanzania in October 2004, the JICA Tanzania Office and TANROADS signed the Record of Discussions (R/D), and the project was commenced. Two years later, the Tanzanian government requested that Japan include in the target of the project cooperation both a “Constructors Registration Board” (hereinafter CRB), which is responsible for capacity development of contractors who are engaged in construction works, and a “Roads Fund Board” (hereinafter RFB), which manages the Roads Fund resourced from a levy tax. This resulted in an approximate one-year extension of the project. Afterwards, a Terminal Evaluation Survey was conducted from late February until early March in 2009.

1.2 Project Outline

Overall Goal	Good road conditions <Goal> To implement appropriate maintenance
Project Objective	To improve TANROADS’s capacity for road maintenance management

		<p>To improve the CRB's capacity for training of contractors</p> <p>To improve the RFB's capacity for monitoring and evaluating usage of the Roads Fund as well as capacity to increase the Roads Fund</p>
Output(s)	Output 1 <TANROADS>	<ol style="list-style-type: none"> 1. Improved work procedures 2. Training program was designed and trainings were conducted 3.1 Training programs and activities of the JICA team were evaluated and necessary modifications were made 3.2 Seminars for contractors were implemented and contractor capacity on procurement has improved
	Output 2 <CRB>	<ol style="list-style-type: none"> 1. Improved training framework, training programs, training methods and training materials 2. Increased number of participants who attend the training courses offered by the CRB 3. Increased number of qualified trainers
	Output 3 <RFB>	<ol style="list-style-type: none"> 1. Improved technical auditing 2. Improved performance indicators 3. Improved quality of management of the Roads Fund
Inputs		<p>Japanese Side:</p> <ol style="list-style-type: none"> 1. Experts 5 experts (63.70M/M, or men per month) 0 long-term, 5 short-term 2. 5 trainees received (5 for counterpart training in Japan) (Breakdown: 2 in FY2005, 3 in FY2006) 3. 0 trainees for third-country training programs (total) 4. Equipment and local cost 175.19 million yen 5. Other (incl. dispatch of related missions) 19.76 million yen <p>Tanzania Side:</p> <ol style="list-style-type: none"> 1. Counterparts TANROADS: 3 (including Chief Executive, Director of Maintenance) CRB: 3 (including Assistant Registrar, Head of Training Unit) RFB: 2 (including Roads Fund Manager) 2. Trainees TANROADS: engineers and managers

	<p>CRB: SSTP¹ trainers</p> <p>3. Facilities, project office, utilities Project office (TANROADS 2005-2007, CRB 2007-2009) electricity, water</p> <p>4. Local cost TANROADS: 25 million Tshs² CRB: 672 million Tshs. RFB: 10 million Tshs.</p>
Total Cost	280.53 million yen
Period of Cooperation	February 24, 2005–February 23, 2008 February 24, 2008–March 31, 2009
Implementing Agency	Ministry of Infrastructure Development, TANROADS (Counterpart organization since commencement), CRB, RFB
Cooperation Agency in Japan	None
Related Projects (if any)	<Technical cooperation project> Project for Capacity Strengthening on Labor Based Technology Training, <Yen Loan> Arusha-Namanga-Athi River Road Construction Project, <Grant aid> Project for widening of Kilwa Road, Project for Up-grading Masasi-Mangaka Road, <Other donors> Road Maintenance Management Information (RMMI, Denmark), Road Maintenance Management, Road Maintenance Initiative (RMI, the World Bank), Tinde – Mwanza/Shy Border (Shinyanga) Project (EU), Nzega – Tinde – Isaka (Shinyanga) Project (EU), Backlog Maintenance of Morogoro – Dodoma Road (Morogoro) (EU)

1.3 Outline of the Terminal Evaluation

1.3.1 Achievement of the Overall Goal

It is difficult to measure achievement of the Overall Goal at the time of the Terminal Evaluation, as the improvement of road conditions is expected to take at least five years. It is anticipated that the project will contribute to the Overall Goal to some extent because the fostering of approximately 5,000 small and medium contractors for construction

¹ The Sustainable Structured Training Program (SSTP) is the CRB's original training program.

² This figure is the approximate cost of the Road Maintenance Handbook Seminar. There were other costs borne by TANROADS, but data on the amount was not available because their financial records were not kept separately from general administration cost of TANROADS.

works is regarded as positively influencing the Overall Goal.

1.3.2 Achievement of the Project Objective

Firstly, due to the participation of the project counterpart from TANROADS in the handbook development and implementation of training, the capacity of TANROADS staff has improved. However, improvement of the indicators of the Project Purpose, such as the budget disbursement rate and reduced cost of the maintenance works, was not seen. Secondly, improvement was observed in the CRB's capacity for training of trainers (TOT), since the examination results after training showed significant improvement when compared with those from before training. Thirdly, the RFB did not achieve an improvement in audit reporting, because the Technical Audit Manual developed by the project was not applied to auditing before the end of the project period. (The Technical Audit Manual will be utilized for auditing starting from November 2009, i.e., after the project completion, due to the timing of when the Technical Audit Manual was completed).

1.3.3 Recommendations

- (1) To implement the Action Plan "Sustainable Training Program of TANROADS": the Action Plan created under the project can contribute to the implementation of a sustainable training program.
- (2) To prepare an Implementation Strategy for SSTP Evaluation: it is suggested that the CRB take actions to implement the recommendations made by the SSTP Review during the project.
- (3) To enhance the RFB Technical Audit: the Technical Audit Manual produced by the project is expected to be utilized for auditing.
- (4) To maintain appropriate levels of funding for road maintenance: it is recommended that appropriate funding levels for road maintenance be maintained for better management of road maintenance works.

2. Outline of the Evaluation Study

2.1 External Evaluator

Mayumi Hamada, Foundation for Advanced Studies on International Development

2.2 Duration of Evaluation Study

Duration of the Study: November, 2011–October, 2012

Duration of the Field Study: February 4, 2011–February 16, 2012

May 12, 2012–May 20, 2012

2.3 Constraints During the Evaluation Study

Nothing in particular.

3. Results of the Evaluation (Overall Rating: A³)

3.1 Relevance (Rating: ③⁴)

3.1.1 Relevance to the Development Plan of Tanzania

This project supports the realization of the Tanzania Road Development Plan (hereinafter, TRDP, 2001–2010), which stresses the importance of road maintenance in road sector development, and was in line with this at the time of project completion in 2009. Tanzania has the lowest rate of road density among East African countries and a low pavement rate (7.4%). Due to these factors, the TRDP emphasized road maintenance, especially the maintenance of trunk roads, which are strategically important for economic growth. Also, roads are regarded as an important sub-sector in the transportation sector, which shares the largest amount of transportation both in terms of cargo and passengers among the four sub-sectors, i.e., roads, railways, marine and aviation. Therefore, it can be judged that the project direction was consistent with the government policy of Tanzania from the Ex-ante Evaluation until project completion.

3.1.2 Relevance to the Development Needs of Tanzania




From the project planning stage until project completion, roads played a major role in transportation in Tanzania, being the major means of transportation of people and cargo, forming part of its social and economic development.⁵ Furthermore, after two years of cooperation, both governments came to recognize that an integrated approach was necessary for i) promoting the implementation of road maintenance to include proper management of the Roads Fund, which is the source of funding for road maintenance, ii) the enhancement of monitoring, such as technical auditing of TANROADS (RFB), and iii) capacity development of the CRB, which is responsible for fostering contractors who implement road maintenance works. These are in addition to the capacity development of TANROADS as originally planned. The project dealt with flexibility with the newly identified needs, and it was agreed by the governments in February 2007 to add the RFB (which manages the road fund) and the CRB (which is responsible for capacity development of contractors) as counterpart organizations of the project.

³ A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

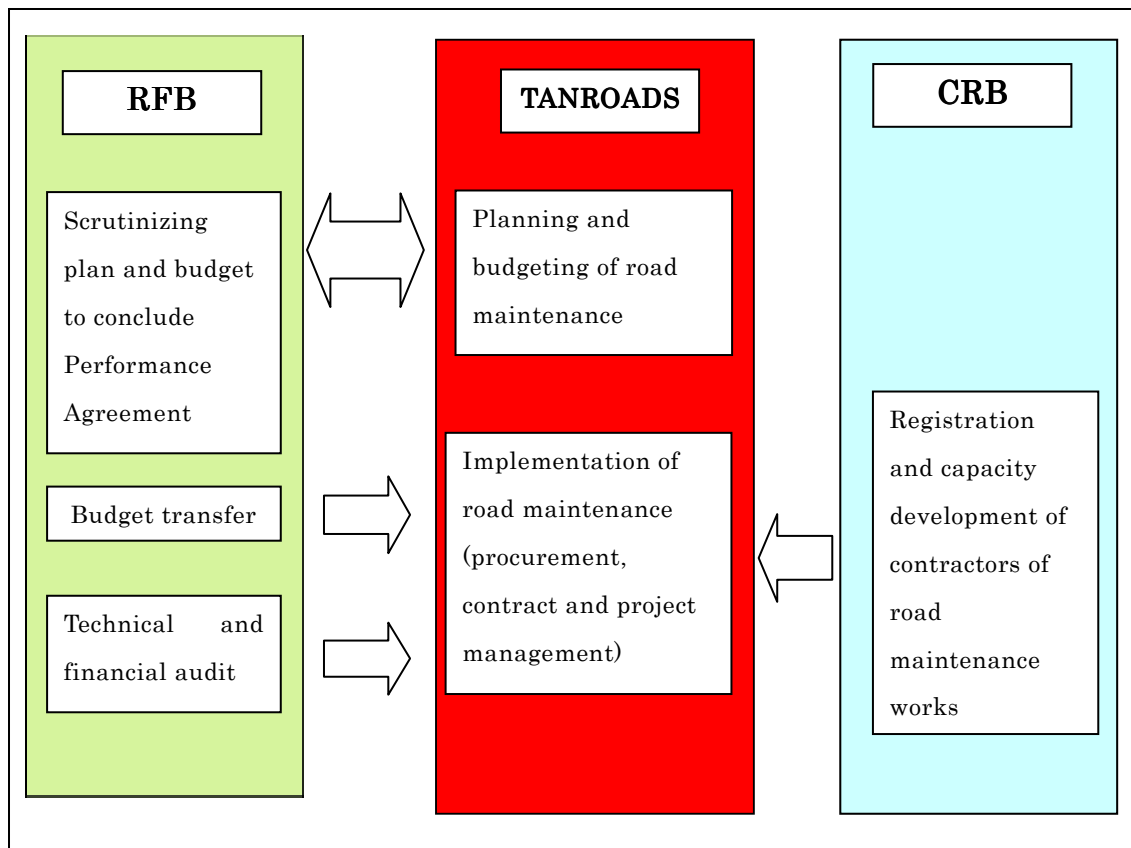
⁴ □: High, □ Fair, □ Low

⁵ For example, among the four sub-sectors (road, railway, marine and aviation), road transportation accounted for 64% of the total cargo transportation, and 80% of the total passenger transportation, which is greatly significant (TSIP, 2007-2012).

Table 1: Objectives of Counterpart Organizations

	TANROADS (Tanzania National Roads Agency): To develop and maintain trunk roads and regional roads, utilizing 70% of the Road Fund for maintenance.
	RFB (Roads Fund Board): To manage the Roads Fund, and to monitor the road maintenance budget
	CRB (Contractors Registration Board): To register construction contractors (including those who are not involved in road works) and conduct training for them

(Source) Produced by the surveyor based on documents from JICA



(Source) Produced by the surveyor based on the documents from JICA

Chart 1: The Relationship among TANROADS, the RFB and the CRB in Road

Hence, the project direction is in line with the needs for roads, which are significant for Tanzania's transportation, as well as with the needs of the organizations concerned with

road maintenance in Tanzania. The relationship between TANROADS, the RFB and the CRB is shown Table 1 and Chart 1.

3.1.3 Relevance to Japan's ODA Policy

The establishment of a domestic road network is identified as one of the development issues in a priority area of support in the section of "Enhancement of living environment by improved basic infrastructure in urban areas" in Japan's Country Assistance Program for the Republic of Tanzania issued by Ministry of Foreign Affairs, Japan in June 2000.

Furthermore, in another version of the same program issued in June 2008, "transportation, mainly focused on roads" is stated as a priority area in "Growth and Income Poverty". This is also stipulated in the National Strategy for Growth and Reduction of Poverty (NSGRP) (2005-2010) released by the Tanzanian government.

3.1.4 Relevance to Project Planning

The specific capacities of (mainly) TANROADS that the project intended to enhance, and the function of counterpart organizations in the road maintenance cycle are shown in Chart 2.

Namely, at the time of the Ex-ante Evaluation and Implementation Study, the project aimed to pursue improvement of road conditions through procurement capacity, and contract and project management for construction contractors (as shown in yellow in Chart 2). Due to situational changes brought on by TANROAD's enlargement of contract sizes before commencement, the project team collected information on the latest situation and identified priority areas again. As a result, capacity development in monitoring road conditions through the development of a "Road Maintenance Handbook", and timely financial management and road maintenance planning in accordance with the annual schedule through the development of the "Guidelines for Workflow for Road Maintenance Management (as shown in green in Chart 2) were added to the project scope to be achieved during the project period. Furthermore, the Tanzanian side recognized the necessity of enhancing the capacity of the CRB (which deals with training of contractors), as well as of the RFB (which is responsible for managing the Roads Fund) in order to improve road conditions. Hence, a request was made by the Tanzanian side to add some project components, i.e., capacity development for training contractors by the

(one-third of the previous amount) by increasing the size and the amount of money for each contract in its own efforts to improve the disbursement rate. Hence, the project was forced to review its implementation plan at the time of commencement.

In the meantime, the project team recognized this situation and undertook information collection and analysis to comprehend the latest issues and tasks related to the management of TANROADS, and slightly modified the initial project design according to the clarified needs. With this modification to the project plan, the project direction was shifted slightly towards pursuing the enhancement of management capacity through standardization of procedures. To this end, common methods were clarified and shared among those concerned. Therefore, although some confusion was observed at the initial stage, the above-mentioned problem did not cause serious negative effects.

This project has been highly relevant to the country's development plan and development needs, as well as to Japan's ODA policy, and the problem in the initial project design was already solved. Therefore, the project relevance is high.

3.2 Effectiveness and Impact⁷ (Rating: ③)

3.2.1 Project Outputs

3.2.1.1 Project Output

The Project Outputs are categorized into three groups, because the project has three counterpart organizations following its extension.

(1) TANROADS Output

1) Output 1: Improved work procedure

(Indicator 1: Road maintenance system determined by July 2005)

The result of analysis on the road maintenance management of TANROADS was compiled in a report entitled "The Review and Evaluation on Current Road Maintenance Management Ver. 2" in September 2005. Hence, Indicator 1 was achieved, although it took two more months than planned.

(Indicator 2: Increased quality and timeliness of internal communications (e.g. surveys and reports) during the project period)

Based on the "The Review and Evaluation on Current Road Maintenance Management

⁷ The rating is made for Effectiveness, integrating the assessment of Impact.

Ver. 2” mentioned above, “The Guideline on the Road Maintenance Management Workflow” was produced in 2005. This guideline identified procedures to be taken by the regional offices and reported to headquarters according to the annual schedule, so that staff assigned to the regional offices of TANROADS comprehend the whole annual schedule and perform their works accordingly. TANROADS staff that participated in training took part in a questionnaire survey.⁸ As for the improvement of internal reporting and communications about the budget and execution through utilization of the above-mentioned Guideline, the answers were as follows: one for “very much improved”, eight for “improved”, zero for “not improved so much” and “not improved at all”, and two did not answer (out of a total of 11 respondents). Although the reliability of the information above is not so high due to the small sample size and limited rate of responses, all the respondents except for the two who did not answer replied either “very much improved” or “improved”. It can therefore be assumed that certain improvements have been made on reporting and communications concerning the budget and execution.

During the interview with TANROADS staff in the field survey of the ex-post evaluation, some TANROADS staff did however mention that there are too many guidelines and manuals to be able to distinguish which is the one that this project developed. In two regional offices that were visited during the field survey, none of the staff had seen the above-mentioned Guideline, and could not identify it even when the actual Guideline was shown to them. Hence, it is not clear that the respondents to the questionnaire actually identified the Guideline produced by the project when they replied to the question. Therefore, causality between Indicator 2 and utilization of the Guideline could not be made clear⁹.

(Indicator 3: Number and range of existing manuals and guidelines identified by July 2005)

As indicated previously, since there were many manuals and guidelines that had not been kept in order, the project compiled a “Directory of Manuals/Guidelines Used in regional Offices” and delivered it to 21 regional offices. Therefore, this indicator was achieved.

⁸ The questionnaire was distributed through TANROADS to the 23 staff that received training under the project, and 11 responded among them.

⁹ As increase in the number of reports does not necessarily mean an improvement of procedures, since the number of reports can even decrease if unnecessary reports are reduced through streamlining processes. Hence, Indicator 2 is not exactly appropriate for measuring improvement in procedures. However, in this project, it was set as the indicator because frequent delays in procedures, such as reporting and communications from regional offices to the headquarters including budgeting, was causing serious delays in the broader procedures of TANROADS.

(Indicator 4: Development of new manuals and guidelines during the project)

A “Road Maintenance Handbook” was developed and its hardcover final version was printed and submitted in February 2009 (while the “final draft” was completed and the explanatory seminar was held in December 2007). Since it is indispensable that those who are concerned with the conduct of road maintenance management use common methodology and terminology in order to secure quality of road maintenance, this handbook targeted engineers who are engaged with road maintenance at the regional offices. It clarified basic road maintenance technical terms with photos, possible causes of deterioration of roads, effects when each problematic situation is left without any action, means of reporting, tools required for inspection, etc. Also, forms to be filled out for reporting inspection results for each inspection type, types of road defects and their ranking, recommended frequency of inspections, basic rules that inspectors must follow for their safety, and so on were identified and printed in two volumes of A5 size. These are convenient for site inspections and were distributed to all the regional offices of TANROADS. Therefore, this indicator was achieved.

Given the above reasons, Output 1 was mostly achieved with the exception of Indicator 2. As for the achievement of Indicator 2, this could not be made clear.

2) Output 2: Training program designed and training conducted

(Indicator 1: Human resources development plan prepared by September 2005)

Based on the result of the Training Needs Assessment, the “Human Resources Development Plan for Road Maintenance” was produced in September 2005. Therefore, this indicator was achieved.

(Indicator 2: Training plans and modules for TANROADS maintenance staff designed and implemented during the project period)

A “Three-Year Training Plan for Road Maintenance” was developed in September 2005, and 12 training modules¹⁰ were suggested. The plan was carefully designed based on a situation analysis, taking training costs into consideration. Therefore, this indicator was achieved. (As for training implementation, please refer to Indicator 3 below.)

¹⁰ Each teaching unit in a whole training course.

(Indicator 3: Number of courses delivered and staff/contractors trained during each stage of the project)

During the project period, 21 training courses were held, in which 535 TANROADS staff participated.

Due to confusion caused by large-scale personnel reshuffles and organizational changes in TANROADS in 2007, some planned modules of the technical training were replaced with managerial training. Two technical training modules (i.e., seven days in total) were reduced compared to the initial plan. However, TANROADS urgently needed managerial training, because a large number of new managers were transferred to TANROADS in accordance with its organizational reform. The project dealt with the needs of TANROADS with the flexible change in the training plan.

The training for construction contractors was removed from this Output during the project period, since it was included in the CRB's Output at the time when the CRB joined the target organizations. Therefore, it will be analyzed in Output 2 of (2) the CRB later.

Based on the above, implementation of the training was almost completed, although its content was partially modified due to significant changes in TANROADS's structure and personnel.

3) Output 3.1: Training programs and activities of JICA Team evaluated and necessary modifications made

(Indicator 1: Increase in knowledge gained from each course)

In relation to the training implemented under the project, an "Evaluation of Training Courses Implemented in the 2nd Year" was issued. Similar reports were made for the training in 2007 and 2008.¹¹ According to these reports, improvement was observed in terms of levels of understanding at all the trainings in which an assessment was made.

As already mentioned, although some of the technical training modules were reduced because of large internal personnel reshuffles at TANROADS, training for managers was increased. Also, the knowledge gained by the participants increased, judging from the assessment test, when comparing before and after the training.

¹¹ These correspond with the Japanese Fiscal Year (April to March).

(Indicator 2: Training plans and modules for TANROADS maintenance staff and contractors evaluated during the project)

An “End of Training Report” was issued for every training course for the total of 21 courses, in which scores, participant course assessments and recommendations were included. Furthermore, based on the training results, recommendations were compiled and submitted as an Action Plan to be undertaken by TANROADS after project completion, with its applicable training contents and means, in September 2008.

The training contents for contractors, as mentioned in Indicator 3 for Output 2 above, will be analyzed in Output 2 of (2) the CRB below, because it was omitted from this Output during the implementation stage. Therefore, Indicator 2 was achieved.

- 4) Output 3.2: Seminar for contractors implemented and contractors capacity for procurement improved

(Indicator 1: Number of courses designed and delivered to contractors trained during the project)

As already indicated, the project included CRB capacity development in its project scope from the 4th year, and training for contractors was omitted. Therefore, it will be discussed in Output 2 of (2) the CRB.

Therefore, the Outputs for (1) TANROADS were achieved, except for Indicator 2 of Output 1 and Output 2 (which was removed), by the project completion.

(2) The CRB’s Output

- 1) Output 1: Improved training framework, training programs, training methods and training materials

(Indicator 1: Number of reviewed/improved curriculum, syllabus, materials, etc. by March 31, 2009)

In July 2007, the SSTP of the CRB was reviewed, with clarification of the contractors’ needs, and analysis and recommendations on the training modules (20 in total) in seven on-going training courses for contractors that were already developed to meet various needs of companies of differing sizes. According to the CRB, the quality of this review

was fully satisfactory in terms of its content, and positively evaluated.¹² Therefore, Indicator 1 is judged as achieved.

- 2) Output 2: Increased number of participants who attend the training courses offered by the CRB

(Indicator 1: Number of participants in training courses offered by the CRB)

As mentioned before, the number of participants in CRB training courses and the improved capacity of contractors are part of Output 3.2 and Output 2 for (1) TANROADS as mentioned above. The number of contractors who participated in the CRB's training courses is as follows (Table 2).

659 contractors participated in training from FY2007, when the CRB was added to the project counterpart organizations, until the project completion. There was little change between 241 participants in FY2006 (the year proceeding project commencement), and 246 participants in FY2007 (the 1st year for the CRB). However, the number increased to 293 in FY2008 (an increase of 50 participants, or 19%) compared with the previous year. Since the duration of project cooperation for the CRB is only two years in the latter half of the whole project, and the project was completed at the end of March 2009, the number of participants in the last year seems small. However, in contrast with other governmental organizations in Tanzania, the fiscal year for the CRB starts in January and ends in December. The figure actually means that it achieved 41% of the total number of the previous year by the 1st quarter.

Table 2 The Participants of the Training by CRB (until the project completion)

Unit: persons

Fiscal Year	Number of participants
2007	246
2008	293
2009	120
Total	659

(Source) Produced by the surveyor based on the returned questionnaire from CRB

(Remarks) The fiscal year for CRB starts from January and ends in December, but the above figure for 2009 shows that until the project completion, i.e., from January to March.

¹² According to the interview with the CRB.

Hence, the number of participants is judged to have increased by project completion, although it cannot be proved that the increase was solely brought about by the project activity.

In regards to the comprehension level of contractors who participated in CRB training, among 13 contractors who responded to the questionnaire,¹³ three chose “completely understood”, 10 chose “almost understood”, and zero chose “not well understood” and “not understood at all”. This means 100% of the total answers was for “completely understood” and “almost understood”. Furthermore, as for the usefulness of the training content for their actual work, six answered “very useful”, five answered “useful”, zero answered “not so useful” and “not useful at all”, and there were two who did not answer at all. Hence, the total of “very useful” and “useful” made up 85% of the total responses.

Based on the above, the number of participants has shown a clear increase, and the comprehension level and usefulness are regarded as high.

3) Output 3: Increased number of qualified trainers

(Indicator 1: Number of trainers who have successfully completed “Training of Trainers”)

The “Training of Trainers” (hereinafter, TOT) program was conducted twice. At the 1st TOT, 13 candidate¹⁴ trainers completed all the sessions, and nine participants among 13 were judged as qualified for the trainer’s job by the trainer of TOT. Also, 11 participants, including six out of the nine qualified candidates mentioned above, participated in the two-day refresher course in August 2008. A questionnaire survey was conducted with 11 TOT participants, and six of them responded. In regards to the extent of knowledge acquired through TOT, four answered “very much acquired”, three answered “acquired to some extent”, zero answered “not acquired so much” and “not acquired at all”, and two did not choose any answer. In the interviews with TOT participants, recognition of the improved knowledge and skills is high.

Since there is no information on the number of trainers to be trained in the project plan, it cannot be judged whether the target level has been achieved or not. However, it is certainly an “improvement” that the nine trainers were qualified for the two courses, “Pre-Contract Practice” and “Contract Management”, which were difficult to implement

¹³ The questionnaire was sent to 32 contractors who participated in the training courses offered by the CRB based on information from the CRB.

¹⁴ Two participants out of 13 were trainers in different subjects at the CRB, but participated for the sake of improving their teaching skills.

due to a lack of trainers. Also, the self-evaluation of the TOT participants on the level of skills acquired and usefulness for improving performance at work was high.

Based on the above, Outputs for (2) the CRB were almost achieved.

(3) The RFB's Output

1) Output 1: Improvement in technical auditing

(Indicator 1: Establishment of standardized schedule and procedures for technical auditing)

In September 2008, a Technical Audit Manual showing the schedule, procedure and auditing method was developed. Also, a workshop explaining the manual was held in September 2008. Hence, Indicator 1 is judged as achieved.

2) Output 2: Improved performance indicators

(Indicator 1: Improved satisfaction of RFB members on the Performance Indicators)

As mentioned before, the RFB concludes a contract on the annual plan and budget (i.e., Performance Agreement) with TANROADS every year. However, some of the indicators (Performance Indicators) were not sufficient or appropriate to measure achievement of the objectives in the agreement. For example, a performance indicator to measure "Road Maintenance Level" was "No road closure for more than two days", while there was no indicator to measure the safety of traffic. Therefore, the project compiled a series of recommendations, including the addition of performance indicators such as "No debris or trash left between road shoulders". The RFB revised the Performance Indicators, reflecting those recommendations. Furthermore, an evaluation of the revised Performance Indicators was conducted by RFB Board members at the time of project completion, and the satisfaction level of the board members was enhanced. Therefore, Indicator 1 was achieved.

3) Output 3: Improved quality of management of the Roads Fund

(Indicator 1: Improved documents published by the RFB to promote an increase of the Roads Fund)

Since 2007/2008 (starting from July 2007), the revenue of the RFB doubled due to an increase in fuel levies. Because of this, the project activities planned for promoting an increase of the Roads Fund were omitted. The RFB regards this judgment on omission

as appropriate.

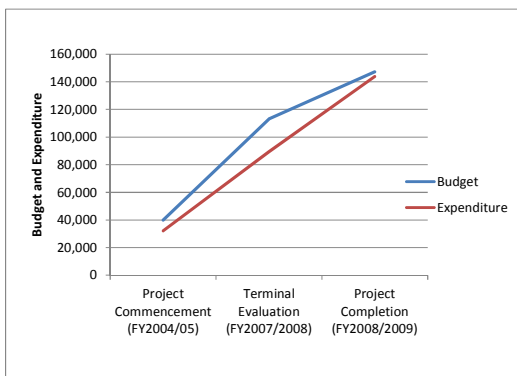
Therefore, Outputs for (3) the RFB were achieved except for Output 3, which was omitted during the implementation stage.

3.2.1.2 Achievement of Project Objectives

In this project, a project purpose was set for each of the three counterpart organizations.

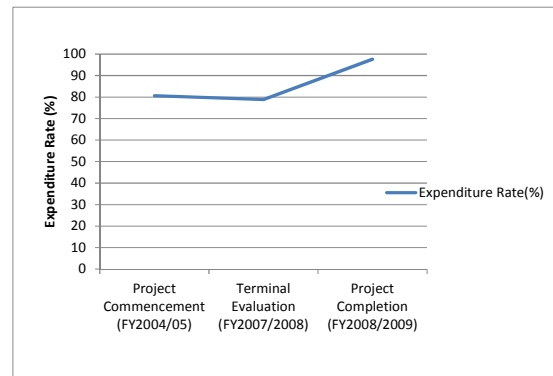
(1) TANROADS: To improve TANROADS' capacity for roads maintenance management (Indicator 1: Percentage of expenditure at the end of each financial year)

The achievement is shown in Chart 4. The rate of expenditure improved by 17% from the time of project commencement till project completion. The rate decreased by 1.5% at the time of the Terminal Evaluation (FY2007/2008), compared with the situation at Project commencement. However, the budget amount in that fiscal year increased by 2.8 times compared to the previous year. As there was little decrease in the expenditure rate in spite of a drastic increase in budget, the low expenditure rate (which was a serious issue for TANROADS) is regarded as having already been resolved at this stage. Hence, Indicator 1 is judged as having been achieved by the end of project duration.



(Source) Produced by the surveyor based on the documents from JICA and returned Questionnaire from TANROADS

Chart 3: Budget and Expenditure of TANROADS (till Project Completion)



(Source) Produced by the surveyor based on the documents from JICA and returned Questionnaire from TANROADS

Chart 4: Expenditure Rate of TANROADS (till Project Completion)

(Indicator 2: Reduced cost/km of maintaining roads to specification during the project)

The achievement is shown in Table 3. The cost per km of maintaining roads decreased by 0.28 million TShs in FY2006, but increased by 0.36 million TShs the following year. Hence, it cannot be judged that the cost per km decreased. Also, the same data was not collected in FY2008, although different type of data exist, which makes it difficult to compare with previous years. Furthermore, this indicator is hardly usable for measuring capacity enhancement of TANROADS brought about by this project, as many other elements¹⁵ influence the cost of roads maintenance.

Table 3 The Cost per km of maintaining roads (Trunk Roads)

Unit: million TShs.

Fiscal Year	Cost
2004/05	0.86
2005/06	0.86
2006/07	0.58
2007/08	0.94
2008/09	N/A

(Source) Produced by the surveyor based on the documents from JICA and returned Questionnaire from TANROADS

Therefore, judging the achievement of the Project Purpose by utilizing Indicator 2 is not possible.

<Other information related to achievement>

- Utilization of knowledge gained through training at work

In addition to the Indicators shown in the Project Design Matrix (hereinafter, PDM), the extent of utilizing knowledge gained through training is regarded as another means for measuring achievement of capacity development under the project. The result of the questionnaire survey mentioned previously shows that in regards to utilization of knowledge and skills gained through the training by the end of the project duration, no respondents replied “utilized very much”, nine replied “utilized”, none replied “not utilized much”, one replied “not utilized at all”, and one did not reply to the question. This means 82% is comprised of the total of “very much utilized” and “utilized”. As for

¹⁵ For instance, price increases, the cost of raw materials affected by changing exchange rates, and the appropriateness of cost estimations by construction contractors are regarded as influences.

the usefulness of the training, the number of respondents who replied “very useful” was three, “useful” was seven, “not so useful” was one, and “not useful at all” was zero. This shows that the total respondents who answered either “very useful” or “useful” made up 91% of the total. Furthermore, in regards to the improvement of work performance by gaining knowledge through the training, the number of respondents who answered “very much improved” was two, “improved” was seven, “not so much improved” was two, and “not improved at all” was zero. This shows that 82% of the respondents answered either “very much improved” or improved”. Although the data above is not so reliable due to the limited number of responses, most of the staff that participated in the training utilized the knowledge gained at work, which was useful to some extent. The result was that their performance is recognized to have improved by themselves.

- Development of a Road Maintenance Handbook and capacity development of staff

As mentioned previously, a “Road Maintenance Handbook” targeting engineers at the regional offices was developed in order to share common definitions on basic terminology about road maintenance, as well as to standardize the methodology of how to cope with the situation at the sites. In the questionnaire survey given to the training participants on the Handbook’s contribution to improving management of road maintenance, among 11 respondents, the number of staff who replied “contributed very much” was one, “contributed” was seven, “did not contribute much” and “did not contribute at all” was zero, and three did not answer the question. This shows “contributed very much” and “contributed” made up 73% of the responses. The Handbook is regarded as having contributed to improving the work performance of staff,¹⁶ being utilized mainly by young and middle generations at road maintenance sites covered by the regional offices.

- A project supporting TANROADS (RSSP) by the Danish International Development Agency¹⁷ (hereinafter, DANIDA)

DANIDA implemented the Road Sector Support Program (2005-2010) as a technical cooperation project with TANROADS at almost the same time as this project. The purpose of the project was efficient and effective road maintenance through capacity development of TANROADS staff and improvement of management systems such as through the development of a database. The major components included: 1)

¹⁶ According to the interviews at TANROADS regional offices (Coat, Dar es Salaam, Morogoro).

¹⁷ An internal organ of the Foreign Ministry of Denmark, and implementing organization of humanitarian assistance and development cooperation to developing countries.

establishment and reinforcement of a database on the road maintenance plan and its budget management (Road Maintenance Management System, hereinafter RMMS), 2) development of manuals (for engineers at regional offices), and 3) training, etc.¹⁸ The Danish project is similar to this project in the sense of being a technical cooperation project aimed at capacity development of TANROADS at its headquarters, including the road maintenance section¹⁹ and the regional offices. TANROADS regards the Danish project highly, especially from the viewpoint of its effects on enhancing work performance through database development. Furthermore, both projects have affected each other, resulting in complementary effects. For instance, JICA developed a manual (the Road Maintenance Handbook) for the sake of appropriate and quick action on road maintenance at sites, while DANIDA's manual is aimed at improving road maintenance from the medium and long-term perspective, including recurring prevention measures, etc. Hence, both projects produced complementary effects on each other, and are regarded as having contributed to the development of the management capacity of TANROADS.

As explained above, in terms of the Project Purpose of TANROADS, Indicator 1 was achieved, and Indicator 2 cannot be utilized as it is not appropriate, while it was not achieved. On the other hand, many of the training participants utilize the knowledge gained through the training at work. It is judged that certain achievements were made in the capacity development of TANROADS due to the utilization of knowledge through the training, as well as the complementary effects of the DANIDA project.

(2) The CRB: To improve the CRB's capacity for training of contractors
(Indicator 1: Increase of knowledge through training)

The achievement of this indicator is as follows.

- The ratio of correct answers before the test: 32% (average of all the 12 participants)
- The ratio of correct answers: after the test: 85% (average of nine participants)

Basically, "improvement of understanding" is included at the level of Output, because it is a result of implementing training courses, i.e., activities. Hence the CRB's capacity for training contractors cannot be measured solely by this indicator. On the other hand, it is regarded that the project purpose for the CRB had to be limited, as the CRB was

¹⁸ RAMBOLL (2010) *Consultancy Services for Provision of Technical Assistance to TANROADS Project Completion Report, Final*

¹⁹ Staff in charge of the database in the planning section are included in the target group of the Danish project, in contrast with this project. Managers at headquarters and regional offices are common targets of both projects.

added to the counterpart organizations in the latter half of the project duration, with only about two years of cooperation. Since it is difficult to enhance the whole capacity of CRB's training within two years, what the project intended is not regarded to be the enhancement of all the seven courses which the CRB offered, but fostering trainers for only two of the courses within in which trainers were in severe shortage. Therefore, this indicator is utilized for the evaluation.

<Other information related to achievement>

1) Capacity development of the CRB through TOT

- Improved performance of the TOT participants

With regard to the improvement in performance as a trainer of TOT participants by the end of the project duration, in the questionnaire to which six TOT participants responded, the number of replies for "very much improved" was four, "improved" was one, "not improved much" and "not improved at all" was zero, and one respondent did not give an answer to the question. The total of the respondents who answered "very much improved" and "improved" made up 83% of the total. It is observed that many of the participants perceive that their performance as a trainer improved through TOT.

- Utilization of trainer candidates trained

In the questionnaire given to the TOT participants, in regards to how many times the participants experienced trainer jobs by the project completion, the number of replies for "one to five times" was five, and one respondent did not answer the question. However, not all the participants who experienced trainer jobs were engaged by the CRB, as teaching experience at a university and at seminars at private companies are included above. Only two TOT participants were engaged with training at the CRB as trainers by the end of the project duration, while the rest were not.²⁰ This is because the CRB focused on the best TOT participants based on advice from the TOT trainer, and the CRB's budget for training was limited and the number of courses could not be drastically increased. However, the advice to intensively utilize the best participants for accumulating experience is adequate, in consideration of the limited opportunities for the trainers.

2) Capacity development of the CRB in training contractors

- Comprehension level of contractors who participated in the training by the time of the

²⁰ According to an interview at the CRB.

project completion

In the questionnaire survey given to the thirteen contractors who participated in the training by the CRB, in regards to understanding of the training, the number of replies for “very well understood” was three, “mostly understood” was ten, and “not so well understood” and “not understood at all” was zero. As it shows, the total of “very well understood” and “mostly understood” make up 100%, so it is regarded that the comprehension level of the participants of the training contents improved. Also, there were favorable comments on the training from contractors such as, “I could understand the training content” and “the lecture was easy to understand”, etc., made at the interview survey with the contractors.

- Usefulness of training

In the same questionnaire survey given to the contractors, as for the improvement of work performance through the training, the number of replies for “very useful” was six, “useful” was five, “not so useful” and “not useful at all” was zero, and two respondents did not answer the question. As the total of “very useful” and “useful” made up about 85% of the total, it is regarded that many of the participants recognize that the training was useful. In the interview survey with contractors who attended the training courses as well, most of the contractors made comments that the training was useful.

Based on the above, 1) Indicator 1 for the Project Purpose of the CRB was achieved, 2) the participants of TOT recognize that work performance was improved through the training, and 3) the contractors who participated in the CRB training also highly evaluated the utilization of knowledge gained through the training, as well as the improvement of work performance as a result.²¹ Therefore, the Project Purpose for the CRB was mostly achieved by the end of the project duration.

(3) The RFB: To improve the RFB’s capacity for monitoring and evaluating usage of the Roads Fund as well as capacity to increase the Roads Fund
(Indicator 1: Improved quality of auditing reports)

Although the final draft of the Technical Audit Manual was completed in September 2008, it was not in time to be applied to the Audit Report because the Audit Report has to be completed by November every year and the time is therefore limited. Therefore, Indicator

²¹ According to interviews with the contractors who participated in the training.

1 for the Project Purpose of the RFB was not achieved by the end of the project duration.

(Indicator 2: Improved documents published by the RFB to promote an increase in the Roads Fund)

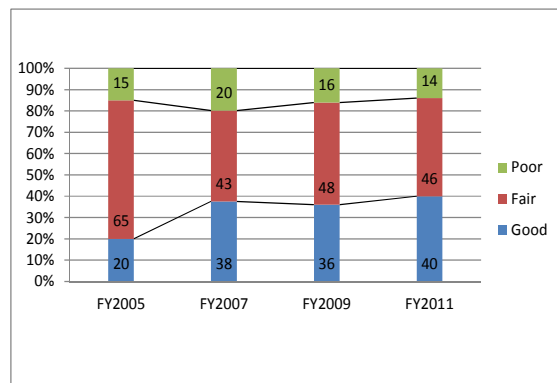
After the project commencement, the revenue of the RFB was doubled in FY2007/2008 (starting from July 2007) as the fuel levy was raised. Because of this, the activities to promote an increase in the Roads Fund were omitted from the project plan. Therefore, its achievement is not evaluated.

Therefore, the Project Purpose for the RFB was not achieved by the time of project completion, as Indicator 1 was not achieved and Indicator 2 was omitted from the plan.

Based on the above, this project has largely achieved its objectives, except for the ones that were omitted due to the change in the project plan, or were not appropriate, and Indicator 1 for the RFB. Therefore, its effectiveness is high.

The improvement of knowledge gained through training and its utilization at work, as well as the development and utilization of the handbook contributed to the improvement of the expenditure rate of TANROADS (of which the project duration was the longest among the three organizations), by the time of the project completion. As for the CRB, which joined the project when it was extended, focusing the project purpose on a specific area led to a high level of achievement.²² As for the RFB,

the planned time for completion was too short for the Technical Audit Manual (one of the Outputs) to be applied to the Auditing by the end of the project duration.



(Source) TANROADS Road Condition Trend
(Remarks) Impassable roads are not included.

Chart 5: Road Condition of Trunk Roads and Regional Roads

²² However, for the same reason, the project's effect on capacity enhancement of the entire CRB is limited.

3.2.2 Impact

3.2.2.1 Achievement of the Overall Goal

Overall Goal: Good road conditions

(Goal: Appropriate maintenance implemented.)

(Indicator 1: Road condition (good, fair, poor)²³)

This indicator is in line with the three levels of evaluation criteria on road condition utilized by TANROADS. The average of the paved and unpaved roads throughout the project duration is shown in Chart 5.²⁴

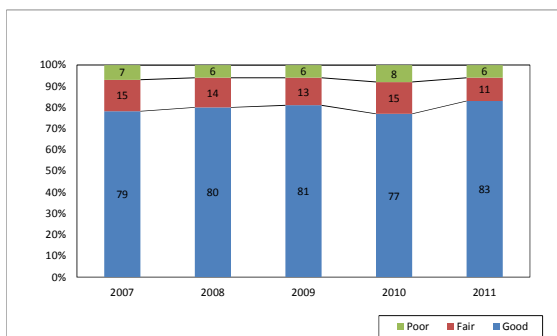
As this project intended to develop capacity for road maintenance management, it is appropriate to emphasize the extent of the decrease in the incidence of “poor” categorization among the three levels. The data for the average of all the roads under TANROADS management does not show a decrease in the “poor” categorization in regards to Indicator 1.

On the other hand, the data for Indicator 1 for Trunk and Regional Roads and paved and unpaved roads respectively are shown in Charts 6–9. Namely, the three categories except for the trunk and paved roads show a decrease in the incidence of “poor” categorization, while the incidence of “poor” categorization for trunk paved roads is almost the same as at the project commencement time. The incidence of “poor” categorization for unpaved roads slightly increased in 2009, but the reason was aggravation of road conditions caused by heavy rain.²⁵

²³ The evaluation criteria of road conditions adopted by TANROADS. According to the interview with TANROADS, “travel speed of vehicles” and “Roughness Index” (both are included in the indicators for the Overall Goal) are taken into consideration when the data is calculated. Furthermore, it is recognized by TANROADS that this evaluation criteria does not strictly indicate the change in road conditions over time, due to periodic changes in classification of roads from roads under management of local governments to that of TANROADS (information from JICA Tanzania Office).

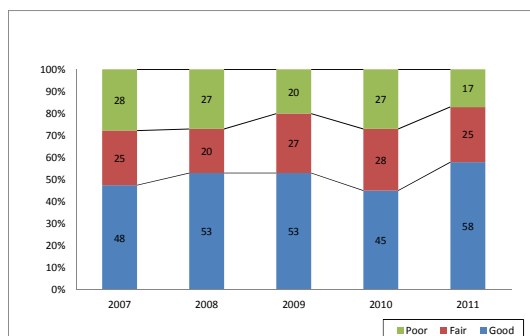
²⁴ The data for this indicator for 2008 adopted in the Terminal Evaluation Report was good 55.8%, fair 33.9%, and poor 15%. However, it was revealed that the reliability of this data is low because there were two types of data collection methods simultaneously utilized by TANROADS, and the data above was collected through the “Quarterly Report Data Collection Method”, which was less reliable. Therefore, the data from the RMMS database was adopted at the ex-post evaluation survey. According to the interview with TANROADS, the reliability of data collected through the “Quarterly Report Data Collection Method” is low, because this simple method was utilized for the sake of quickly grasping the latest situation on a quarterly basis, without waiting for the formal data collection (once a year).

²⁵ TANROADS Operational Plan FY2012/13



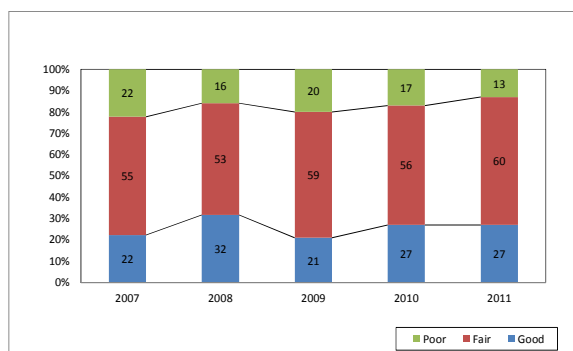
(Source) TANROADS Operation Plan
FY2012/2013

Chart 6 Condition of Paved Trunk



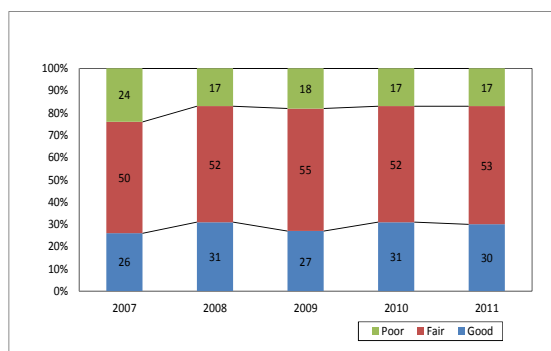
(Source) TANROADS Operation Plan
FY2012/2013

Chart 7 Condition of Paved



(Source) TANROADS Operation Plan
FY2012/2013

Chart 8 Condition of Unpaved Trunk



(Source) TANROADS Operation Plan
FY2012/2013

Chart 9 Condition of Unpaved Regional

(Remarks) Impassable roads are not included in Chart 6 – 9 above.

As stated before, a decrease in the incidence of “poor” categorization signals the appropriate implementation of road maintenance works. Also, among the roads managed by TANROADS, the three categories (especially unpaved roads), except for paved trunk roads, make up an overwhelmingly large portion.²⁶ Therefore, Indicator 1 is regarded as achieved.

2) Indicator 2: Travel speed of vehicles

There is no existing data on the travel speed of vehicles on the roads under TANROADS management. Instead, the data for Indicator 1 (average of all the roads) is made open to the public annually.

²⁶ For example, the total length of all roads under TANROADS management was 86,472 km in FY2011. Paved trunk and regional roads were 7,092km (8.2%) and 91.8% was unpaved roads (Joint Infrastructure Sector Review 2010).

3) Indicator 3: Smoothness of ride (Roughness Index)

There is no existing data on the smoothness of ride (Roughness Index) for the roads under TANROADS. Instead, the data for Indicator 1 (average of all the roads) is made open to the public annually.

4) Indicator 4: Decrease in the percentage of disqualified bids

Information on the assessment of the qualification of bidders (construction contractors who participated in the biddings of road maintenance works) and the results of biddings are not made open by TANROADS. Also, the data is kept by each regional office, and not compiled in the same way as the information of the entire organization of TANROADS. Hence, the data on disqualified bids (that might have shown the sign of improved capacity of contractors) in TANROADS was not available.

Based on the above, the Overall Goal was mostly achieved in terms of the target indicators available. Therefore, its impact is high.

3.2.2.2 Other Impacts

- (1) Impacts on the natural environment: Nothing in particular.
- (2) Transmigration of residents, land acquisition: None.
- (3) Other impacts: As shown below.

● Change in TANROADS staff who participated in the training

The following changes are recognized by TANROADS staff, according to the interviews and questionnaire survey.

- It was recognized more clearly that appropriate planning and management of road maintenance management contracts was necessary in order to effectively utilize limited resources.
- The project led us to conduct our work in a timely manner.
- We have acquired a way of thinking that promotes thinking ahead and starting preparations in advance.
- The importance of “standardization” and “common procedures” was emphasized and is now well recognized.
- We understand the importance of a systematic way of thinking.

- Utilization of knowledge of contractors at work

In regards to the utilization of knowledge gained by contractors who participated in the CRB training in their work at the time of ex-post evaluation, in the questionnaire survey to which 13 contractors responded, the number of replies for “very much utilized” was four, “utilized” was six, “not utilized so much” was two, and “not utilized at all” was one. The respondent who answered “not utilized at all” also answered another question, making the comment, “the knowledge gained through the training was very useful, and I have been trying to further improve my capacity through my daily work”. Therefore, it is probable that the previous answer was chosen by mistake. Furthermore, 10 out of 13 participants (77%) answered either “very much utilized” or “utilized”, so it is regarded that many contractors utilize the knowledge gained through the training at work.

- Contribution of CRB’s training to improvement of work

As for the usefulness of the training for contractors to improve work performance, in the questionnaire survey to which 13 responded, the number of replies for “very useful” was six, “useful” was five, “not so useful” was one, and “not useful at all” was zero. Since the total of “very useful” and “useful” makes up 85% of the responses, participation in the training is recognized as useful by the participants.

- Utilization of the Road Maintenance Handbook outside of TANROADS

A local government (Dar es Salaam) expressed intentions to utilize the Road Maintenance Handbook developed by the project, and some handbooks were offered to them. This is a ripple effect of the project on other roads (under the management of the “Prime Minister’s Office Regional Administration and Local Government,” or PMORALG), as its usefulness was recognized by the local government.

- Negative impacts

No negative impact was observed.

This project has largely achieved its objectives, except for the project purpose of the RFB. As for the Overall Goal, an improvement of road conditions was observed, together with other effects seen mostly as planned. Therefore, its effectiveness is high.

3.3 Efficiency (Rating: ③)

3.3.1 Inputs

Inputs	Plan	Actual Performance
(1) Experts	<p>4 (No indication of M/M) There was no specification about long or short-term, while the possibility of “shuttle type dispatchment,” or dispatching short-term experts repeatedly or frequently instead of dispatching a long-term expert, was indicated.</p> <p>1. Chief Advisor/Road Maintenance Plan 2. Organization Enhancement/Human Resources Development 3. Road Maintenance Monitoring/Road Maintenance System 4. Procurement</p>	<p>0 for long-term 5 for short-term (63.70M/M)</p> <p>1. Chief Advisor/Road Maintenance Plan 2. Human Resources Development I 3. Road Maintenance System 4. Procurement 5. Human Resources Development II</p>
(2) Trainees Received	<p>Field(s) of training: N/A 2 trainees per year</p>	<p>Field of training: Road management administration 5 trainees (2 in FY2005, 3 in FY2006)</p>
(3) Third-Country Training Programs	<p>N/A</p>	<p>None</p>
(4) Equipment	<p>Equipment required for training activities</p>	<p>PC, projector, screen, video, etc.</p>
Total Project Cost	<p>Approx. 200 million yen</p>	<p>Approx. 280.53 million yen</p>

Total Local Cost	Approx. 10 million yen ²⁷	TANROADS: 25 million TShs. ²⁸
		CRB: 672 million TShs.
		RFB: 10 million TShs.
		TOTAL: 707 million TShs.
		Approx. 39 million yen ²⁹

3.3.1.1 Elements of Inputs

(1) Experts

The actual figure of dispatching experts was five (63.70M/M), while the initial plan was four. However, as there is no record of the targeted figure on the volume of works by Japanese experts to be dispatched on M/M basis at the planning stage, comparison between the planned and actual figures is hardly possible. Although TANROADS was the only counterpart organization in the initial plan, the addition of two organizations (the CRB and the RFB) led to the extension of the project duration, and an increase in project purposes and outputs for the extended period. To cope with these additional objectives, an increase of one more expert is not judged to be excessive.

(2) Trainees received

Two trainees were received in the second year, and three in the third year, although two trainees were expected to be received per year in the initial plan. The topics covered in the training-in-Japan program include Japan's road administration, road maintenance management, and the Roads Fund. The program was designed with an appropriate combination of lectures and field visits (such as to Hanshin Superhighway), and was efficiently planned to be implemented within a limited duration of nine days.

(3) Equipment, etc.

Equipment required mainly for the training was provided, such as a projector, screen, PC, video, etc.

3.3.1.2 Project Costs

Project costs surpassed the initial plan by about 80 million yen. However, it was mostly as planned, or still within an appropriate level, considering the increase in the project

²⁷ Material offered by JICA.

²⁸ The figure is the cost for implementing the seminar for the Road Maintenance Handbook. There were other costs borne by TANROADS, such as travel costs of participants for seminars on the Guidelines, etc. However, they are not included as there is no record of them, as the project costs were not managed separately from other general costs of TANROADS.

²⁹ The exchange rate was adopted for the year of 2009, when the project was completed, although it is the rate as of June.

purposes and outputs.

3.3.1.3 Period of Cooperation

This project was extended for approximately one year and one month, because the project purposes, outputs and activities required concerning the CRB and the RFB were added. As explained in 3.2.1 Effectiveness (1), the outputs concerning with TANROADS which has been the counterpart organization from the beginning, were mostly achieved by the end of the initial planned project duration, except for the printing of a hardcover version of the Handbook³⁰ and training of contractors, which was omitted from the project plan.

In the meantime, PDM was not established for the project at the time of the Ex-ante Evaluation, and the expert consultant team was instructed to make it after project commencement (in the scope of work in the contract for the second year). As a result, it gave the impression to the Tanzanian side at the discussion with TANROADS that some of the requests were disregarded, and it consumed more time than expected for the expert consultant team. If PDM were established before the project commencement as per usual, it would have been possible to execute the tasks more efficiently. However, this problem did not have a serious negative influence on this project.

Hence, although the project duration was slightly longer than planned, it was mostly as planned considering the increase of the project purposes, outputs and activities.

Therefore, the inputs were appropriate for producing outputs and achieving the project objectives, and project costs and the period of cooperation were mostly as planned. Therefore, the efficiency of the project is high.

3.4 Sustainability (Rating: ③)

3.4.1 Policy Related to the Project

In “The Tanzania Development Vision 2025”, the government put top priority on investment in infrastructure, especially development of the road network as the pivot of regional development.³¹ Also, “The Tanzania Five Year Development Plan” (2011/2012-2015/2016) indicates the importance of the development of the road network, which is indispensable to economic growth, and the promotion of a road corridor through construction, rehabilitation and maintenance of roads in order to optimize distribution

³⁰ The development of a softcover version of the handbook was completed and distributed within the project duration as initially planned (3.2.1. Effectiveness).

³¹ The Tanzania Development Vision 2025 P20.

and services for strategically important sectors and regions.³² Also, in the “Short Transport Sector Investment Plan (2011–2014), the budget of TANROADS comprises 80% of the total budget, which shows the importance of trunk and regional roads in transportation.³³

Therefore, Tanzanian policy emphasized road sector development and road maintenance at the time of ex-post evaluation. Also, this policy direction is expected to continue in basically the same way for the next few years, considering the targeted duration of the policies above.

3.4.2 Institutional and Operational Aspects of the Implementing Agency

At the time of ex-post evaluation, the roles and positions of the counterpart organizations were the same as before, and there was no problem in terms of their mutual relationships. The specific situation for each organization is as follows.

(1) TANROADS

As for the institutional aspect of TANROADS, there was a comment that the allocation of staff as trainers is not necessarily sufficient. Also, some of the vacant posts for engineers at regional offices are not filled because not all staff that retire are replaced with newcomers due to the lack of budget. However, this problem is not so serious enough to endanger the continuity of work for TANROADS.

Also, at the interview with TANROADS, it was explained that a human resources development plan exists, although its details and the extent of correlation with the personnel plan were not made clear. However, it is a favorable factor that the “Action Plan”, which was developed and described in a report produced by the project and is concerned with recommendations on the future staff training of TANROADS, was shared with the person responsible for human resources development in TANROADS through this evaluation survey.

(2) The CRB

As for the institutional aspect of the CRB, there was a reply in the questionnaire survey that the number of staff who were engaged in training was not sufficient. As mentioned before, not many of the participants of TOT have continuously been utilized. This is

³² The Tanzania Five-Year Development Plan (2011/2012-2015/2016): unleashing Tanzania’s Latent Growth Potentials (June 2011) PP60-61.

³³ Short Transport Sector Investment Plan (TSIP Three-Year Rolling Plan 2011/12-2013/14 (Dec 2011) P25.

because the targeted course for which the project conducted TOT is focused on two courses out of seven, and the number of the targeted courses per year cannot be drastically increased due to budget limitations. On the other hand, most of the participants of TOT are not CRB staff but have other main jobs as consultants or contractors.³⁴ Sometimes, they cannot accept requests to give lectures due to other engagements, and at other times, it is difficult to teach a five-day course alone because of the same reason.

Because of this, from 2012 the CRB started to invite expressions of interests from external consultants who are possible candidates for trainers in order to secure a sufficient number of trainers. The CRB will make course modules, secure about four trainers for each course, and establish a new system in which a team of trainers teaches one course. Also, by the end of 2012, the CRB will conduct a TOT for the newly secured trainers as well as the trainers fostered under the project. Therefore, the institutional aspect of the CRB has been gradually strengthened although there are some issues.

(3) The RFB

The RFB has established a stable implementation system for technical auditing by securing a sufficient number of staff. This was possible as they could secure external auditors by outsourcing in addition to utilizing internal personnel.

3.4.3 Technical Aspects of the Implementing Agency

(1) TANROADS

The main target of the training under the project is managers, engineers at regional offices and managers at the headquarters, etc. In the questionnaire survey, in regards to whether or not the participant shared what he/she learned with other staff, the number of replies for “yes” was six, “no” was two and three respondents did not answer the question (from a total of 11 respondents). As for with whom participants shared knowledge with, the number of replies for “subordinate or junior staff” was three, “colleague” was three, out of six respondents (it was acceptable to give more than one answer). As for the number of people who had knowledge shared with, the number of replies for “1-5” was three, “6-10” was one, and “more than 11” was two. This shows that many participants shared the training contents with subordinates or junior staff at the same office.

³⁴ As mentioned before, among nine participants who completed TOT, three of them were acknowledged as “qualified as trainers” by the trainer of TOT. Among the three participants acknowledged, two of them were hired by the CRB in the form of supporting a trainer who was already working for the CRB (material offered by JICA).

With regard to the utilization of knowledge gained through training at the time of ex-post evaluation, among eleven respondents to the questionnaire, the number of replies for “very well utilized” was two, “utilized” was seven, “not utilized much” was zero, “not utilized at all” was one, and one respondent did not answer the question. As the total of “very well utilized” and “utilized” made up more than 80% of the total, the knowledge gained through the training is regarded as being mostly utilized by the participants.

As for “The Road Maintenance Management Handbook” developed by the project (Indicator 4 for Output 1 of (1) TANROADS), it is widely recognized at TANROADS and utilized mainly by the young and middle group of engineers at regional offices.³⁵ In the meantime, “The Guideline for the Workflow of Road Maintenance Management” (Indicator 2 for Output 1. of (1) TANROADS) is not clearly recognized by the staff and is confused with other guidelines, as there are many other guidelines in spite of the development of the “Directory of Manuals/Guidelines Used in Regional Offices” (Indicator 3 for Output 1). At three of the regional offices visited during the field survey, the above-mentioned guideline was not utilized, and none of the staff met has seen it before. On the other hand, the procedures are taken in the order and schedule as instructed in the guideline, because the headquarters keep sending letters of instruction to the regional offices in accordance with the workflow described in the guideline above. Hence, the problem of delays in internal procedures caused by late reporting and communications is regarded as having been solved already, and a smooth and timely management system has been already established. The guideline is regarded as having contributed to the standardization of procedures at the headquarters level.

Also, the project has been contributing to capacity development in terms of planning, procurement, and project management of road maintenance management, coupled with other donors’ support at the time of ex-post evaluation. In regards to support from other donors to TANROADS, CTCP-2 (Central Transportation Corridor³⁶ Project II) is being implemented simultaneously with the upgrade of the Central Corridor with support from the World Bank. This is following CTCP-1, in which training of TANROADS staff has been conducted on road management in general in and out of Tanzania (South Africa, Swaziland, Ghana, etc.). Furthermore, the African Development Bank has been

³⁵ The interviews at TANROADS (Regional Offices of Coast, Morogoro and Dar es Salaam)

³⁶ The international trunk road, which is 463 km, stretches from Dar es Salaam Port in Tanzania to Kigali, the capital of Rwanda, by way of the south side of Victoria Lake. It is called the “Central Corridor”, which is recognized as the major international economic corridor. The World Bank has been conducting CTCP project Phase 2, in which improvement of roads as well as development of management capacity on road management are included.

supporting TANROADS's capacity development in project management and improvement of expenditure rate as a part of TSSAP-2 (Tanzania Road Sector Support Project 1).

Although its budget is not abundant, TANROADS has been supporting 20 staff members in acquiring master's degrees (through support for school expenses, provision of convenience to leave office at 4pm, etc.).

(2) The CRB

As for the quality of trained trainers at the CRB, both the self-evaluation of the trainers and evaluation by the contractors who participated in the training was high, even at the time of ex-post evaluation. However, the opportunities for the participants of TOT to accumulate experience as trainers at the CRB training are not sufficient, as the CRB cannot increase the number of courses due to budgetary reasons. Also, many of the TOT participants shared the knowledge and skills gained through TOT with their colleagues, but have not reached the level of fostering a new trainer by themselves. If the TOT that is now planned by the CRB is implemented (as mentioned in 3.2.1.1.(2)), it will contribute to the capacity of the CRB to train trainers, providing a good opportunity for brushing up for the participants of the TOT provided by the project, especially for those who do not have sufficient experiences so far, and enhancing capacity of trainers to be recruited under the new system.

(3) The RFB

During the technical audits by the RFB, the Technical Audit Manual developed by the project has been applied since FY2009.³⁷ Also, the RFB expressed its intentions to continue utilizing it in the future as well. The RFB evaluates the Technical Audit Manual highly, and is determined to improve it if necessary.

The RFB has been receiving support for capacity development from the African Development Bank, and for capacity development in technical and financial management from DANIDA. Complementary effects on the capacity enhancement of staff are recognized, which is regarded as further increasing the possibility of maintaining the quality of technical audits in the future.

³⁷ Interview with the RFB.

3.4.4 Financial Aspects of the Implementing Agency

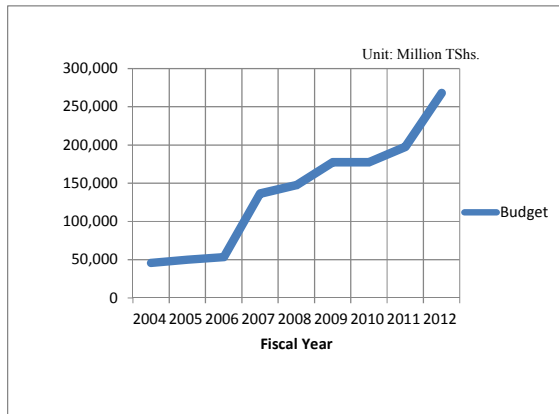
(1) TANROADS

The transition in the amount of the road maintenance budget of TANROADS is shown in Chart 10, which shows a constant increase. It increased by 5.9 times for the last eight years since project commencement, without any decreases at all. In FY2012, it increased by 36% compared with the previous year. As a result, the gap between the maintenance needs (requested amount) and the budget (accepted amount) was narrowed to 16%,

making a significant difference from 30% in the previous year. The main reason for this budget increase is the increased consumption of diesel, which is a taxable item under a fuel levy, caused by decreased illegal mixing of diesel with kerosene.³⁸ Kerosene used to be non-taxable, but the government has changed its policy to make it taxable.

There is some uncertainty regarding the financial aspects from a future perspective. It is not assured that the Roads Fund will increase in the future like this year, since there is criticism against making kerosene taxable (some say it will put pressure on households),³⁹ while maintenance needs keep increasing due to an increase in road construction and the degradation of roads. At the same time, the tax rate is almost at the highest level under the present framework of the Roads Fund.

Moreover, a part of District Roads⁴⁰, which used to be under the management of local governments, is “upgraded” or put into another category of roads, i.e., trunk or regional roads, under the management of TANROADS. This puts financial pressure on TANROADS because the budget for these newly “upgraded” roads is not provided to TANROADS. This “upgrading” occurred three times: July 2010, November 2011, and



(Source) Produced by Surveyor based on the returned questionnaire from TANROADS

Chart 10 Transition of Road Maintenance Budget of TANROADS

³⁸ If there had been no change in the taxability of kerosene, the gap between the maintenance needs and the budget was expected to remain at about 30% (28% specifically), as the budget was expected to be 228,545 TShs. (TANROADS Operational Plan FY2012/13)

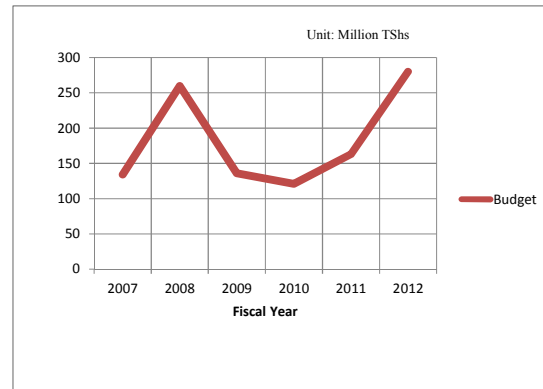
³⁹ Interview at the RFB.

⁴⁰ The local governments are also responsible for management of urban roads and feeder roads in addition to district roads. However, the roads mentioned here are only district roads (interview with TANROADS).

May 2012. These roads total 5,259 km without a budget allocation. Within the total length, only 7.5km is paved, and the rest (5,252 km) is unpaved road, which is susceptible to damage caused by weather. These are matters of concern for further improvement of road conditions in the future.

(2) The CRB

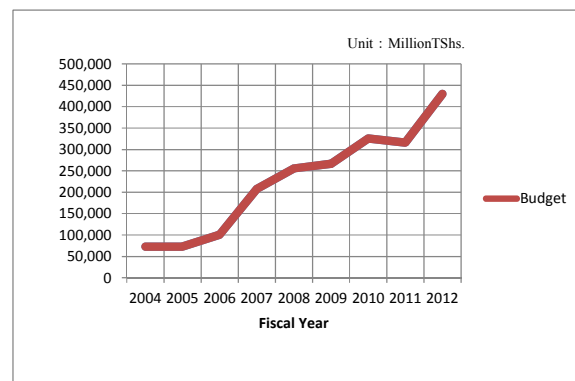
The transition of the CRB budget is shown in Chart 11. The CRB does not receive any government budget and the main source of revenue is the registration fee, member fee and the tuition fee collected for the contractor training courses. The annual budget fluctuates depending on the year, and drastically increased in 2008, decreased in the next year, and increased again from the 2010. Hence, it is not certain whether this increasing tendency will continue in the future.



(Source) Produced by Surveyor based on the returned questionnaire from CRB

Chart 11: Transition of Training Budget of CRB

In the meantime, the CRB has been gradually increasing the ratio of costs borne by participants for training, according to the government policy. At present, the CRB covers 40% and the participants cover 60%. The CRB will continue to increase the ratio gradually, so the possibility that the revenue will drastically decrease is low, although a drastic increase cannot be expected either. There were some comments from the contractor side that the burden of costs for training is not too heavy, considering the expected performance improvement of companies to be brought about by a high training effect.⁴¹



(Source) Produced by Surveyor based on the returned questionnaire from RFB

Chart 12: Transition of Road Maintenance Budget of RFB

⁴¹ Interviews with the contractors who participated in the training by the CRB, and their bosses.

(3) The RFB

The transition of the budget of the RFB is shown in Chart 12, which illustrates a constant increase. The RFB has been making efforts to make suggestions and requests for the budget of the Roads Fund every year, including raising fuel levies, etc. As the expected revenue from the fuel levy is almost at the maximum level already, however, the RFB is planning to hire a consultant in order to conduct a survey and examine a new framework for the future.

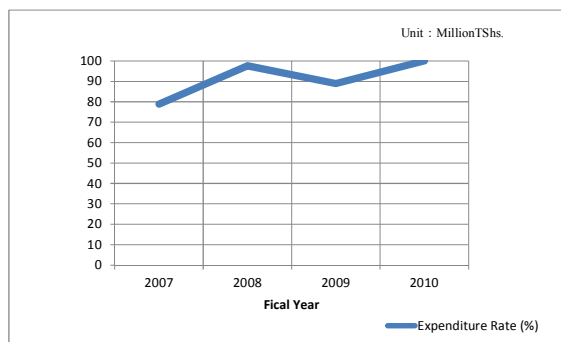
Based on the above, the sustainability from the financial aspect is high, as the budget of TANROADS and the RFB has been increasing constantly, and the gap between the maintenance needs and the budget has decreased.

3.4.4 Continuation of Project Effects

(1) Expenditure rate of TANROADS (Project Purpose)

Among the indicators for the Project Purpose of TANROADS, which is the core counterpart organization of the project, the expenditure rate is the only indicator for which the latest data is available. The expenditure rate from the project commencement till the ex-post evaluation is shown in Chart 13.

Although the expenditure rate after the project completion decreased in FY2009 by 8.7% compared with the previous year, it increased by 11.1% to make it 100% in FY2010. The reason for the decrease in FY2009 was the delay in the remittance of money by the RFB (received three or four days before the end of the Fiscal Year).⁴² The rate increased by 19.4% compared with the time of the project commencement (80.6%) until the time of ex-post evaluation. It remains high after the project completion, with slight fluctuations.



(Source) Produced by Surveyor based on the returned questionnaire from TANROADS

Chart 13: Expenditure Rate of TANROADS

(2) Future perspective on road conditions (maintenance/improvement)

As mentioned before, paying attention to the incidence of “poor” categorization among

⁴² Interview at TANROADS.

the three levels of criteria, i.e., “good”, “fair” and “poor” categorizations of road conditions, the ratio of “poor” categorization decreased in all the three categories of roads except for “paved trunk roads”. It is especially important that the ratio of “poor” categorization decreased in unpaved roads, which are susceptible to damage caused by weather conditions such as heavy rains. This is regarded as having been brought about by the enhancement of the management capacity of the headquarters and regional offices through standardization of procedures and sharing common methods; improvement of the Performance Agreement and Technical Audit (which became a stimulus for TANROADS);⁴³ and support from other donors including DANIDA (which further strengthened the system and knowledge of TANROADS staff).

Considering the above-mentioned situation and the policy, institutional, technical and financial aspects, a certain level of improvement can be expected for the road conditions of trunk and regional roads in the future as well, although there are minor matters of concern, such as upgrading roads without budgetary allocations.

No major problems have been observed in the policy background, or the structural, technical and financial aspects of the executing agencies. Therefore, the sustainability of the project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented aiming at capacity development of organizations concerned with road maintenance management for the goal of improving road conditions in Tanzania. In Tanzania, roads form part of development needs, since they are the major means of transportation. This is highly in line with Tanzanian development policy, as well as with that of Japan. Therefore, the relevance is high. The Effectiveness and Impact are high, because the outputs and project purposes were mostly achieved by the end of the project duration, and the Overall Goal (improvement of road conditions) was mostly achieved. Although project costs and the project duration surpassed the initial plan, it was appropriate enough as they were caused by the addition of Outputs, etc. Therefore, efficiency is high. Since no major problems have been observed in the policy background, or the structural, technical and financial aspects for continuation of the project effects, sustainability is high.

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

⁴³ Interview at the RFB.

4.2 Recommendations

Recommendations based on the above for the counterpart organizations and JICA are as follows.

4.2.1 Recommendations to the Executing Agency

(1) TANROADS

The Action Plan developed by the project concerned with training for TANROADS staff should be examined and utilized for future personnel development planning.

(2) The RFB

It is recommended that examination of the means for securing sustainable roads funds as well as continuous budget requests to cope with the increasing needs of road maintenance be undertaken.

(3) The CRB

It is recommended that continuous efforts are made to increase the frequency of the training courses to cope with the training needs of contractors.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

(1) Points to consider when supporting newly established organizations

In supporting a relatively new organization after its establishment like TANROADS in circumstances in which social, economic and political changes are rapidly occurring within a short time span, it is possible to have significant changes even after the Ex-ante Evaluation until the time of project commencement. If there are any significant changes after the Ex-ante Evaluation until project commencement related to points that are essential to the project cooperation, such as the result of analysis of the problems and needs that became the basis for the whole project planning, it is difficult to cope with during the implementation stage. In such cases, it is very important to pay attention to the future aspect of the change more carefully than usual, and collect sufficient information to be reflected in the project planning.

(2) Establishment of PDM before project commencement

Establishment of PDM after project commencement requires more time for mutual

understanding than usual. It can sometimes lead to distrust among organizations concerned and a delay in activities. It should be avoided to establish PDM after project commencement, so that a draft of PDM is established at the Ex-ante Evaluation, and mutual understanding at the R/D mission is secured, in order to maximize project effects within the limited project duration.