

0. Summary

This project, which improved the function of road network by developing the bridges on major secondary trunk roads in Zambezia and Tete provinces, the northern parts of Mozambique, was highly relevant to Mozambique’s development plan and development needs as well as Japan’s ODA policy. Its effectiveness and impact were also high because alleviating vehicle weight limits of the bridges, eliminating traffic closures in rainy season and ensuring traffic safety at target bridges constantly contribute to regional economic growth and improved access to social services. The efficiency of this project is fair because both project cost and project period exceeded the plan by unsuccessful bidding, increase of the price of supplies and change of a part of the project scope. For operation and maintenance, a staff shortage at the implementing agency affects the current maintenance and operation conditions and the management of outsourcing contractors, including their technical aspect. Also, based on the financial aspect, further efforts are required to secure the necessary budget and implement appropriate maintenance and operation as well as to improve the budget allocation schedule in a timely manner. The sustainability of this project is therefore fair. In light of the above, this project is evaluated to be satisfactory.

1. Project Description



Project Location



Improved Bridge (Licungo Bridge)

1.1 Background

The road network in Mozambique was seriously damaged due to a prolonged civil war and a lack of road maintenance activities. Since the civil war ended in the mid-1990s, an emergency project to improve the road network has been implemented, assisted by foreign countries, and the major trunk

roads have been swiftly rehabilitated. The Mozambique government implemented the road/bridge improvement plan in three phases from 2001. Phase I involved maintaining the road network, implementing high-priority rehabilitation projects of road/bridge and formulating a long-term plan to improve roads. Phases II and III included plans for regular and periodical maintenance activities and rehabilitation of roads/bridges, which were categorized as high priority in phase I.

The projects for the road/bridge improvement plan that had been implemented were mainly for major trunk roads. The target road of phase II was placed on the regional trunk road but the secondary trunk road in the region was still outside the target scope. Conversely, there was a need to secure stable traffic on this road to enlarge the transportation volume of agricultural and mineral produce, which was essential to regional economic growth. To support the road/bridge improvement plan, a “Road Fund”, mainly financed by petroleum tax, was established to generate special revenue for road improvement by the Mozambique government. However, it primarily went to routine work involving maintenance of the existing road network system. Accordingly, most of the rehabilitation and improvement projects for the road network were carried out by donations from foreign countries and international organizations.

Under these circumstances, the Mozambique government requested the assistance of Japanese government with the bridges improvement project, which was part of the secondary trunk road network in the two northern provinces. In response, the Japanese government decided to implement the project with the expectation of substantial contribution to regional development¹.

1.2 Project Outline

The objective of this project is to improve a safe and smooth road network by rehabilitating and constructing bridges on major secondary trunk roads in Zambezia and Tete provinces, the northern parts of Mozambique.



Figure 1: Location of target bridges

Source: Basic design study report
 Note : ● Target bridge ■ Major city ● Port

¹ Basic Design Study Report

Grant Limit / Actual Grant Amount	1,889 million yen / 1,845 million yen
Exchange of Notes Date	May, 2007
Implementing Agency	National Roads Administration (ANE)
Project Completion Date	December, 2010
Main Contractor(s)	Konoike Construction Co., Ltd.
Main Consultant(s)	Chodai Co., Ltd., Nippon Koei Co., Ltd.
Basic Design	August, 2005 - December, 2006
Detailed Design	February - November, 2007
Related Projects	<p>Grant Aid Project</p> <ul style="list-style-type: none"> • “The Project for Reconstruction of Bridges on Main Roads” (1997 – 2000) Construction or rehabilitation of 13 bridges on national roads 1, 282 and 7. • “The Project for Reconstruction of Bridges on Main Roads(Phase 2)” (2000– 2003) Construction or rehabilitation of 14 bridges on national roads 8, 232, 104, 225. <p>Other International Organization</p> <ul style="list-style-type: none"> • World Bank “Roads and Bridges Management and Maintenance Program” (2001 – 2007) (2007 – 2013) • Sweden/EU/Italy “Design and Construction of Zambezi River Bridge, Mozambique” (2005-2009) Construction of 2,340 m long bridge on Zambezi river to connect national road 1

2. Outline of the Evaluation Study

2.1 External Evaluator

Hisae Takahashi, Ernst & Young Sustainability Co., Ltd.

2.2 Duration of Evaluation Study

Duration of the Study: August, 2013 – September, 2014

Duration of the Field Study: January 14 – February 14, 2014, April 22 – May 7, 2014

3. Results of the Evaluation (Overall Rating: B²)

3.1 Relevance (Rating: ③³)

3.1.1 Relevance to the Development Plan of Mozambique

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

³ ③: High, ② Fair, ① Low

The Mozambique's mid-term development plan, "National Reconstruction Plan (PRN)" (1993), at the time of project planning had promoted national reconstruction after the civil war. The target of this plan was cited as "resettlement and reintegration" initially, followed by "reconstruction and development". To achieve this target of this plan, with the focus on improving transportation capability, the government developed the "Roads and Coastal Shipping Project (ROCKS)" (1993-2000) and decided to reconstruct trunk road to the major harbor cities for transportation and the north-south trunk road connecting the capital with main or north harbor cities. In addition, the development plan at the time of ex-post evaluation, "Poverty Reduction Action Plan (PARP)" (2011-2014), set the goal of reducing the poverty rate to 42% to combat poverty and promote improvement of a workforce through comprehensive economic growth and reduction of national poverty and vulnerability. The priority areas of PRAP are as follows: 1) boosting production and productivity in agriculture and fisheries 2) promoting employment 3) human and social development 4) governance and 5) macroeconomic and financial management. Among these priority areas, the importance of developing road network is shown in 1), since it is cited as infrastructure development to boost the agriculture and fisheries sector.

The road and bridge sector at the planning stage developed "Road III", a decade-long plan comprising three phases, in 2000, to improve roads and bridges. Although work to maintain and improve major trunk roads was mainly implemented to facilitate access between major cities, the policy highlights the importance of maintaining secondary trunk roads connecting major regional cities; aiming to redress north-south economic gaps and vitalize regional economic growth by providing the stabilized distribution of products. At the time of ex-post evaluation, the "Road Sector Strategy (RSS)" (2007-2010) is in the process of updating⁴. The plan aims to secure the mobility needed to boost productivity and expand a reliable road network to promote regional development; both of which spawn a strong society and economy. RSS is the basis for the "Integrated Road Sector Program (PRISE)". PRISE is developed every three years and shows an investment plan, including human development, regular and periodical maintenance activities, rehabilitation and renovation of paved and unpaved roads and also construction of new roads.

Accordingly, this project, which implemented the improvement of bridges on major secondary trunk roads, was highly relevant to Mozambique's development plan at the planning stage as well as ex-post evaluation.

3.1.2 Relevance to the Development Needs of Mozambique

The 2004 actual data on transportation in Mozambique⁵ shows that 43.6% and 97.2% depend on roads for freight and passenger transportation, respectively, so improving the road network is expected to contribute to the economic development of the country. The data has not been updated since 2004 but interviews with the implementing agency and Road Fund indicate continuing heavy

⁴ Based on interviews with the Mozambique Road Fund, an updated RSS will follow and continue the current RSS because many plans in RSS (2007-2010) were not implemented due to budget shortfalls.

⁵ Basic Design Study Report

dependence on the road.

The country's economy has been developed around Maputo, the Mozambique capital, in the southern region, meaning the northern region remains behind the curve in terms of economic development. In fact, at the time of the project planning, 67% of roads were unpaved in Zambezia province and 60% in Tete province of the northern region, as compared to the 55% national average⁶. Although both provinces have the potential for further economic growth, with farm products in Zambezia province and mineral resources in Tete province, maintenance of roads and bridges has not been properly implemented for transporting products to major cities. At the time of ex-post evaluation, the levels of unpaved roads in Mozambique and Zambezia province were still 59% and 62%, respectively. Considerable room for improvement also remains in Tete province, although the fact that many foreign companies started up mineral resource businesses led to infrastructure improvement, resulting in a 54% unpaved rate, slightly exceeding the national average of 59%⁷. In addition, at the planning stage, 22% and 49% of total bridges had not been properly maintained in Zambezia and Tete provinces, respectively⁸. Bridges devastated by civil war, flooding, heavy trucks or deterioration hindered transportation to cities as well as regional economic activities. No current data on inadequate bridges is available but a list of bridges is being compiled by the implementing agency, which suggests that they acknowledge the importance of bridges. Thus, the unpaved rates of roads and bridges are still high; hindering smooth transportation at the time of ex-post evaluation. Accordingly, there is still a considerable need to improve bridges.

3.1.3 Relevance to Japan's ODA Policy

The priority aid areas in the Country Program for Mozambique at the time of planning include social sector, agriculture and rural development and human resource development⁹. The social sector indicates that reducing delays in the development of roads and bridges is prioritized for poverty reduction and economic growth; both of which are relevant to Japan's ODA policy.

Considering the above, this project was highly relevant to Mozambique's development plan and needs, as well as Japan's ODA policy; therefore its relevance is high.

3.2 Effectiveness¹⁰ (Rating: ③)

3.2.1 Quantitative Effects (Operation and Effect Indicators)

3.2.1.1 Alleviation of the Vehicle Weight Limit

The vehicle weight limit is expected to be alleviated at four bridges (Licungo II, Licungo III, Cuacua I and Cuacua II) after the replacement at this project. At the time of ex-post evaluation,

⁶ Basic Design Study Report

⁷ Report of Transit Ability Condition – second quarter, 2012

⁸ Basic Design Study Report

⁹ 2005 Country data book

¹⁰ Sub-rating for Effectiveness is to be put with consideration of Impact.

the implementing agency confirmed that the strength had been improved and the vehicle weight limit was alleviated from 25 to 48 tons at 3¹¹ bridges (see Table 1 below). Consequently, the traffic of the bridges, which was impassable before the project implementation, is available for heavy trucks year-round.

Table 1 Vehicle weight limit at target bridges

Bridge	Baseline (2005)	Planning target (2010)	Actual (2013)
Licungo II	Limit of 25 tons	Alleviate vehicle weight limit	Limit of 48 tons
Licungo III			
Cuacua I			
Cuacua II			Canceled

Source: Basic design study report and documents provided by the implementing agency

The Cuacua II bridge (Cuacua II), which was canceled under this project, was still limited to a capacity of 28 tons at the time of the ex-post evaluation¹². In fact, the Cuacua I bridge (Cuacua I) is also unavailable for vehicles weighing over 28 tons because Cuacua I and II are adjacent. However, the conditions of Cuacua I and II, which were impassable during certain periods of the rainy season before implementing the project, have far improved. As the capacity of Cuacua II is still limited to 28 tons, Cuacua I is also under the same situation. Thus, a question for the exceeded design of Cuacua I was raised because currently no major issues emerged with the vehicle limitation of 28 tons. However, the project complied with the South African Technical Textile Cluster (SATTC) standard, which set a standard for weight limit of only 48 tons or 9 tons. Since the design for 9 tons was not able to respond the situation, the target bridges of this project were designed for 48 tons. Accordingly, the design of Cuacua I is considered reasonable¹³. Furthermore, ANE explained that the construction of the Cuacua I with the design for 48 ton, as a permanent bridge, has a great significance for future regional economic development.

3.2.1.2 Increase in Traffic Volume

The project neither originally indicated any increase in traffic volume as an operation and effect indicator nor set any target volume. However, the information on traffic volume before and after the project was available at the implementing agency and was thus used as a reference.

As shown in Table 2, the traffic volume have nearly doubled for the Licungo II bridge (Licungo II), the Licungo III bridge (Licungo III) and more than tripled for the Chueza bridge (Chueza) compared to 2010 (before the replacement or construction) and 2013 (after the replacement or construction). The major factors explaining any increase in these volumes include

¹¹ The replacement of Cuacua II was cancelled in this project, See 3.4.1 output for details.

¹² Cuacua II was replaced with a temporary bridge by the Mozambique government. However, the vehicle weight limit remains at 28 tons. Based on interviews at the time of ex-post evaluation, there are no plans to replace it in the near future due to budget constraints.

¹³ Based on interviews with Road Fund staff

smooth traffic during the rainy season by replacing old bridges and constructing new one as well as the increased traffic volume of pickup trucks and heavy vehicles brought about by strengthening of the bridges. In 2012, flooding which affected the entire northern region caused difficulties of traffic in surrounding area of the target bridges. Accordingly the traffic volume decreased in 2012 compared to levels in 2011 and 2013¹⁴. Although the flood also affected Cuacua I, the traffic volume increased, although no clear explanation for the increase was given by the implementing agency. Unlike in 2012, traffic volume of Cuacua I decreased in 2011, following the completion of the project, due to 2010 road work in Mopeia, a short distance from Cuacua I. This construction led to a temporary increase in traffic volume through construction vehicle traffic, whereupon the traffic volume increased in 2010 before declining in 2011¹⁵. The decrease in 2013 was due to traffic taking detours due to the condition of the connecting road to bridges, which were getting worse since 2013. However, improved road conditions as well as increased traffic volume are expected, based on the fact the implementing agency started rehabilitation work at the time of ex-post evaluation¹⁶.

Table 2 Traffic volume of each target bridge (Average daily traffic volume)

(Unit: Number of cars)

	Licungo II, III				Cuacua				Chueza			
	2010	2011	2012	2013	2010	2011	2012	2013	2010	2011	2012	2013
Car	34	64	32	28	37	23	41	32	14	76	61	74
Pickup Track	9	30	13	51	15	15	32	13	12	51	38	58
Mini bus	11	18	9	34	15	20	22	14	0	0	2	0
Bus	6	4	5	5	2	0	0	0	0	0	0	0
Heavy Vehicle	29	56	31	61	32	32	14	24	24	44	25	35
Tractor	0	2	1	1	0	0	0	2	0	0	0	14
TOTAL	89	174	91	180	101	81	109	85	50	171	126	181

Source: Documents provided by the implementing agency and Road Traffic Reports (2010, 2011, 2012, 2013)

3.2.2 Qualitative Effects

3.2.2.1 No Traffic Closure during the Rainy Season

Before implementing the project, traffic at Chueza was closed during the 2-month rainy season as a portion of the bridge was destroyed in flooding and vehicles had to traverse the riverbed. However, the bridge remains open year-round at the time of ex-post evaluation because of the constructed bridge. Accordingly, the objective at the planning stage, “No closure during the rainy season at Chueza”, was achieved.

The traffic closure of Licungo is not included as an indicator of effectiveness. However, it was checked during the ex-post evaluation. It has become passable during the rainy season, although detours to Mocuba were previously required when traveling from Maganja to Namacurra (forward to Quelimane) in a rainy season¹⁷ as a part of the bridge was submerged.

¹⁴ Based on interviews with staff on the traffic volume analysis of the implementing agency

¹⁵ Based on interviews with staff on the traffic volume analysis of the implementing agency

¹⁶ Based on interviews with staff on the bridges of the implementing agency

¹⁷ Based on interviews at neighboring Licungo bridges during the site visit

Also, the traffic between both sides of towns of Cuacua during the rainy season, which was not possible before implementing the project, became available as of the ex-post evaluation.

3.2.2.2 Trunk Road Safety

Before implementing the project, the temporary bridges or river bed were used since the target bridges were damaged by aging or flooding in rainy season. Then, it caused the safety issues when crossing the bridges. The target bridges of this project were replaced or constructed based on SATCC design and load standards, meaning the safety of all target bridges was improved compared to before the project. Accordingly, the traffic safety targeted at the planning stage was ensured.

Although no information was available on the number of accidents, the beneficiary survey¹⁸, conducted during the ex-post evaluation, showed that 97% of respondents chose “very safe” or “safe”. Respondents explain the main reasons as “The bridge also had improved strength and remained available, even for heavy vehicles, after replacement” and also “There is no problem for traffic during the rainy season and no need to detour, though crossing the bridge in rainy season was not safe before the replacement”.

At Chueza, where the traffic volume tripled compared to the pre-project level, both traffic volume and the number of speeding cars increased¹⁹. Accordingly, at Chueza, which was constructed as a single-lane road, the safety of pedestrians and neighbors²⁰ become relevant issues, particularly due to increasing traffic volume as well as speeding cars, which mean consideration to secure safety and any action minimizing accidents would be required.

3.3 Impact

3.3.1 Intended Impacts

The impact of this project was expected in terms of the following two points at the planning stage:

- To expand the market area and vitalize regional industry as well as economic growth by connecting to major trunk roads.
- To increase traffic convenience to the provincial capital and facilitate access to medical and educational facilities.

The survey at the time of ex-post evaluation confirmed the impacts noted below.

¹⁸ A brief outline of the beneficiary survey: conduct a direct interview around (1) Licungo, (2) Cuacua, (3) Chueza bridges, at neighboring markets and the corner of secondary and major trunk roads, totaling 99 persons (neighboring residents: 67, merchants: 16, pedestrians: 5, truck drivers: 3, other drivers: 8).

¹⁹ Based on interviews at neighboring Chueza and an inspection survey of vehicles during the site surveys

²⁰ Although no data on the number of pedestrians was available, as well as vehicles, a large number of pedestrians also went across the Chueza to move to the other side of the bridge, according to interviews with an implementing agency, areas neighboring Chueza and an inspection at the site survey. Furthermore, as residences and small shops are located near Chueza, it was confirmed that children and shoppers frequently came and went around the area.

3.3.1.1 Vitalization of Regional Economic Growth

No reliable statistical data on regional agriculture and industrial sectors to clarify the vitalization of regional industry was available during the survey. However, based on interviews with pedestrians and merchants near the bridges in Zambezia province at the time of the site survey, replacing Licungo facilitated access between Maganja and Namacurra districts, located in either end of Licungo, which made the transportation of farm products from Maganja, the major rice production area, to Quelimane, the neighboring major city, through Namakura more efficient. Also Cuacua, connecting Mopeia and Luabo district, was assessed as “regional distribution and trade were vitalized with greater availability of basic goods and construction materials, which were brought by heavy vehicle’s availability for traffic.” In Tete province, there is a need to traverse Chueza to transport cotton and timber produced in the south part of Tete province to Tete city, as well as potatoes and beans produced in the northern region to Beira port. Before implementing the project, the temporary bridge was damaged by flooding. Accordingly, the construction of Chueza promoted smooth transportation of the farm products in Tete province²¹.

A beneficiary survey, conducted mainly among residents next to the bridges and bridge users also showed that 93% of respondents realized the positive change in the local economy after the replacement of bridges. For instance, “increase in the number of vehicles transporting food and goods”, “enabling the transport and sale of farm products (beans and rice, etc.) on a wider scale at the market” or “increase in the number of minibuses”. In response to an inquiry on the importance of the bridges for regional economic growth, 93 % of respondents described it as “very important” or “important”.

3.3.1.2 Increase in Traffic Convenience to the Provincial Capital and Improved Access to Social Service Facilities

Based on interviews with the implementing agency, provincial offices and neighbors of the target bridges, the convenience to those neighboring the provincial capital has increased after the bridges were replaced. In Zambezia province, home to Licungo II, III and Cuacua, access to Quelimane, the neighboring city, and other cities with markets has improved. Chueza in Tete province also helps facilitating access to Mutarara, the neighboring city.

Medical and educational facilities and markets are located on either side of each bridge, in Licungo, Cuacua and Chueza. Accordingly, improving accessibility to the other side of the bridge also improves access to such social service facilities. The results of the beneficiary survey also indicates that 99% of respondents acknowledged the easier access to social service facilities as well as neighboring major cities by replacing the target bridges of this project. More accessible facilities were selected by 99 respondents as follows (multiple answers applied): 84 for medical facilities, 82 for markets and 81 for educational facilities. Accordingly, it was concluded that developing the bridges helped increase traffic convenience in the provincial capital and facilitate

²¹ Based on interviews with ANE provincial office staff in Tete province

access to social service facilities, e.g. medical, education or market.

3.3.2 Other Impacts

3.3.2.1 Impacts on the Natural Environment

At the planning stage, the Ministry of Environment of Mozambique (MICOA) concluded that no environmental impact assessment was required for this project because it was considered as having no impact on the natural environment, and the project sites were outside a natural reserve such as a national park. However, MICOA asked the implementing agency to develop an environmental management plan. The implementing agency agreed to develop the plan and receive the approval after the basic design and drawing had been completed by the Japanese side.

According to the implementing agency, there was no environmental impact before and after implementing the project and all the environmental requirements specified in environmental management plan (construction noise, dust management and rubble removal upon completion of the construction) had been fully complied with²².

3.3.2.2 Land Acquisition and Resettlement

The project replaced the existing bridges and constructed new bridge next to existing bridge. It did not involve any resettlement of residents or land acquisition. Based on inquiries made to the implementing agency and site observation, no issues emerged.

The weight limit of Cuacua I is 28 tons, since Cuacua II was not replaced in this project. However, the smooth traffic has been unaffected to date and traffic closures during rainy season have been eliminated, ensuring traffic safety, vitalizing regional economic growth by transporting more supplies and improving access to the provincial capital as well as social service facilities. In this sense, this project has largely achieved its objectives. Therefore its effectiveness and impact is high.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

The project replaced existing bridges and constructed new bridge; both of which were located on the secondary trunk road in Zambezia and Tete provinces. Table 3 below shows a plan/actual comparison.

²² Although the basic design study report indicated that MICOA concluded the environmental impact assessment was unnecessary, the implementing agency confirmed that implementing the assessment was a regular practice and also required for this project.

Table 3 Output plan/actual comparison

Province	Bridge	Construction / Replacement	Plan (Length m)	Actual (Length m)
Zambezia	Licungo II	Replace a temporary bridge	50.25	As planned
	Licungo III	Replace a bridge	80.70	As planned
	Cuacua I	Replace a bridge	110.90	As planned
	Cuacua II	Replace a bridge	44.30	Canceled
Tete	Chueza	Construct a bridge	110.90	As planned

Source: Basic design study report and provided by the implementing agency

In this project, replacing Cuacua II was cancelled. Minor changes were made in the foundation pile and road alignment of Licungo II and III. The major reasons of these changes are as follows.

- Cancelation of replacing Cuacua II: the cancelation was due to a higher-than-expected contract price²³, the rise in the price of supplies and the effect of the realized exchange loss. Accordingly, the cancelation of replacing the bridge was inevitable to comply with budget constraints. The cancellation of replacing Cuacua II was chosen since it would have the lowest impact, considering the aging conditions of the bridges and their expected effectiveness.
- Foundation pile of Licungo II: Following a geological survey, the foundation was located in a deeper layer than expected. Accordingly, the location of the foundation pile was changed.
- Change of road alignment and location of drainage of Licungo III: The bridge location was moved upstream due to certain obstacles found under the ground of the planned area. Despite no change to the bridge length, the connecting road was extended with changes in the location of revetment work and drainage and also the volume of construction works for slope adjustment and vegetation.

The changes on Licungo II and III were considered appropriate in line with the actual circumstances and safety design. As Licungo II and III were effectively used at the time of ex-post evaluation (see 3.2 Effectiveness for more details), these changes did not affect the expected effectiveness.

The Mozambique government was responsible for the following:

- Removal of temporary bridges (Licungo II, Licungo III, Cuacua I)
- Removal of existing bridge (Cuacua I)

Although all temporary bridges had already been removed, the existing Cuacua I bridge (currently an old bridge) has not been removed due to budget shortages²⁴. According to the implementing agency, there was no practice to remove old bridges in Mozambique and the priority was low. Accordingly, no removal plan is expected to be implemented within a couple of years. The old bridge was located downstream of the current Cuacua I and is considered less affected by

²³ The only one bidder participated in this tender and the presented price was much higher than estimated. Accordingly, this tender was cancelled.

²⁴ The edge of the bridge wasn't connected to the road and available to use.

the collapse of the bridge, for instance. However, the removal was agreed to in a Record of Discussion²⁵, meaning immediate action is desirable with the safety environment in mind.



Replaced bridge (Cuacua I)



Constructed bridge (Chueza)

3.4.2 Project Inputs

3.4.2.1 Project Cost

The actual project cost of the Japanese portion was 1,845 million yen, which was lower than the original plan (1,889 million yen). However, given the fact that Cuacua II was outside the target and the original plan showed that the replacement cost of Cuacua II was estimated as 15% of the total cost, the project cost was actually higher than planned. The total planned project cost was 1,895 million yen, including the Mozambican portion of 6 million yen. As the actual cost data of Mozambican portion was unavailable, the plan and actual total cost could not be compared.

3.4.2.2 Project Period

Although the planned period for the project was 34 months, including a detailed design survey and its bidding period, the project actually took 42.4 months; starting from May 28, 2007 through December 10, 2010, which was longer than planned (125% of planned). The main reasons were the need for rebidding due to bid price exceeding the planned price and also the fact that a design change was required for Licungo III due to obstacles found at the construction location of the bridge pier. Unsuccessful bidding was attributable to external factors and the design change of Licungo III was necessary from feasibility and safety aspects, as obstacles emerged after starting the construction work at the site.

As mentioned above, both project cost and project period exceeded the plan. Therefore efficiency of the project is fair.

²⁵ A Record of Discussion is an official document agreed upon and signed by JICA and implementing agencies on a project context during a starting project.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

The operation and maintenance (O&M) of roads and bridges in Mozambique are implemented by the maintenance department and each provincial office of the implementing agency, namely, National Roads Administration (ANE). Of the total 487 ANE staff, 173 work at headquarters and 314 at provincial offices. Basically for O&M works on trunk roads and bridges, the maintenance department and provincial offices are responsible for national and regional roads respectively. For the O&M of bridges targeted in this project, Licungo II and III and Cuacua I are under the Zambezia provincial office and Chueza under the Tete provincial office. Each provincial office basically implements periodical maintenance for each road via outsourcing²⁶.

Although the actual maintenance work is conducted via outsourcing, ANE’s management system for supervising those contractors is not fully functional due to staff shortages in ANE’s provincial offices. In fact, some parts of the target bridges have not been properly maintained (see 3.5.4 Current states of Operation and Maintenance). For instance, Zambezia and Tete provincial offices accommodate only 4 and 7 staff members each for total road lengths of 4,489km and 2,970 km respectively. The staff shortage is not only a problem of the implementing agency but the whole governance office, so it is likely to be difficult to resolve this problem immediately by the implementing agency alone.

Accordingly, staff shortages in provincial offices along with a maintenance management system remain issues for the institutional aspects of O&M.

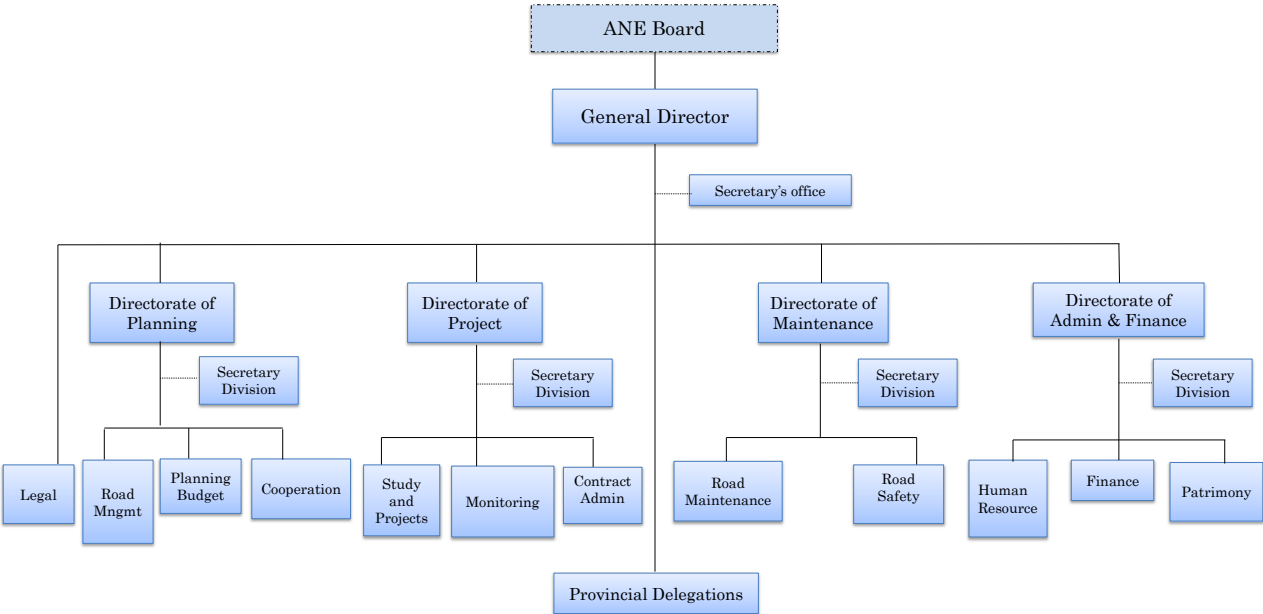


Figure 2: ANE organization

Source: Provided by the implementing agency

²⁶ Outsourcing contractors are selected by open competitive annual bidding.

3.5.2 Technical Aspects of Operation and Maintenance

During the planning stage, the staff at the implementing agency were civil engineers; considered to have proper technical skills for O&M on this project. In fact, the implementing agency confirmed at the ex-post evaluation interview that all staff had skills for basic maintenance work. However, as noted above, staff shortages resulted in improper maintenance for some parts and most of the actual maintenance work depended on outsourcing due to the provincial offices acknowledging that O&M was implemented under the responsibility of the outsourcing contractors²⁷. Moreover, the staff of the ANE headquarters pointed that the technical capacity of outsourcing contractors to implement O&M of bridges and roads with proper knowledge and experiences as well as the extensive future maintenance required with appropriate and suitable equipment was insufficient. Mozambique is still in a developing stage and not having enough experiences to foster outsourcing contractors under the current situation. Although ANE recognizes that it would be effective to provide trainings to foster the technical skills of outsourcing contractors, no such systematic training system exists due to staff shortages and budget constraints.

Accordingly, as described above, for the technical aspect of O&M, although ANE's staff have the proper technical skills required to implement O&M, it is acknowledged that private sector technical skills of outsourcing contractors were insufficient for proper maintenance work.

3.5.3 Financial Aspects of Operation and Maintenance

According to the PRISE developed under national strategies in Mozambique (see Table 4 below), the annual focus is on asphalt paving of national roads. Nevertheless, the budget for maintaining roads and bridges has been also increased.

Table 4 PRISE budget for O&M of road

(Unit: Thousand MZN)

	2012	2013	2014
Operating cost	474,989	909,570	906,181
Training, research	177,964	556,071	271,250
O&M of road / bridge	3,762,418	3,801,015	6,190,356
Construction & rehabilitation of bridges	1,388,133	1,592,472	2,436,806
Rehabilitation of regional roads	392,254	203,865	624,375
Asphaltic pavement	520,103	287,867	837,007
Rehabilitation of national roads	1,125,520	2,725,742	505,245
Asphaltic pavement of national roads	6,992,926	10,901,993	8,074,798
Road safety	305,973	63,290	92,043
Others	0	8,157	0
Total	15,140,280	21,050,042	19,938,061

Source: Provided by Road Fund

²⁷ Based on interviews with directors and deputy directors at each provincial office

The maintenance cost of constructing the new bridge and connecting road at the planning stage was estimated at an average 748,000 meticals²⁸ (MZN) per year. Although detailed information on each target bridge from each provincial office was unavailable, the maintenance budget for the roads and target bridges is shown in Table 5 below.

Table 5: Maintenance budget for roads including target bridges

(Unit: Thousand MZN)

Bridge	2012	2013	2014
Licungo II and III	1,838	2,024	2,841
Cuacua I	1,197	1,138	4,323
Chueza	1,500	4,391	4,351
Total	4,535	7,553	11,515

Source: Provided by the implementing agency

According to the staff of each provincial office, O&M budget for the road, where the target bridges are located, has shown increasing tendency.. However, each provincial office recognizes that the current budget is insufficient for implementing the O&M as planned. For instance, the actual distribution for Zambezia province was 370 million MZN in 2012 for the request of 650 million MZN, while the 2012 distribution for Tete province was 400 million MZN, which is insufficient for appropriate maintenance but only a minimum level.









In addition to this budget shortage, another issue is the inability to distribute the budget on a timely basis, which meant shortfalls when funding is required for planned projects. One case to be resolved is the fact that the budget is not distributed until a few months to the end of fiscal year, leaving no time to spend the budget appropriately. Moreover, it is unclear when and where the budget distribution is delayed when interviewed with parties related to budget allocation, namely, ANE, provincial offices and Road Fund. Accordingly, ANE should review the budget distribution process used to determine the cause of delay and discuss resolving those issues for smoother and timelier distribution.

3.5.4 Current Status of Operation and Maintenance

The current status of maintained bridges was surveyed at the time of the ex-post evaluation and is shown on Table 6.

²⁸ About 3,516 thousand yen. Exchange rate: 1MZN=4.70 yen (as of January, 2006)

Table 6: Current status of target bridges at the time of ex-post evaluation

Bridge	Current status		
Licungo II	<ul style="list-style-type: none"> • Main bridge mostly in good condition • Clogged drains • Water pit clogged by grass • Damaged bridge name plate 		
Licungo III	<ul style="list-style-type: none"> • Main bridge mostly in good condition • Clogged drains • Damage to the surface of the connecting road to the bridge • Water pit clogged by grass • Wire stolen in gabion • Damaged bridge name plate 		
Cuacua I	<ul style="list-style-type: none"> • Main bridge mostly in good condition • Graffiti on guardrail • Damage to the surface of the connecting road to the bridge^{Note} • Water pit clogged by grass • Removal of old bridge incomplete • Damaged bridge name plate 		
Chueza	<ul style="list-style-type: none"> • Main bridge mostly in good condition • Water pit clogged by grass • Damaged bridge name plate • A part of rough dirt road to the bridge 		

Source: Based on site visit

Note: The implementing agency started maintenance work on a secondary trunk road which has access to the connecting road. As the connecting road is included in the target project scope, maintenance of the connecting road should be implemented shortly.

As shown above, the target bridges are mostly in good condition. However, the site visit revealed certain maintenance issues, including clogged drains or weeds around the water pit and connecting road. This clogging may lead to damage to the road surface of the bridges, requiring extensive repair. Although the outsourcing contractor explained that for O&M, daily management and periodical inspection were performed as planned, it seemed to require more timely actions

Maintenance Works for Project Bridges

- Implemented inspections and maintenance
- Maintenance of drainage & surface (twice a year)
 - Maintenance of Handrail (once in 5 years)
 - Scouring Protection of River bed and Embankment (After flooding)
 - Pavement Resurfacing (Every 5 years)

Source: Interviews with the implementing agency

suiting each situation, such as more frequent cleaning during the weedy rainy season²⁹.

In addition, the neighbors of the target bridge have concerns over speeding due to the improved bridge condition and increase in traffic. Taking traffic control measures would be difficult to implement by the implementing agency alone. Accordingly, the implementing agency must enforce traffic control in cooperation with police.

Some problems were observed in terms of the institutional, technical and financial aspects of O&M. Therefore the sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project, which improved the function of road network by developing the bridges on major secondary trunk roads in Zambezia and Tete provinces, the northern parts of Mozambique, was highly relevant to Mozambique's development plan and development needs as well as Japan's ODA policy. Its effectiveness and impact were also high because alleviating vehicle weight limits of the bridges, eliminating traffic closures in rainy season and ensuring traffic safety at target bridges constantly contribute to regional economic growth and improved access to social services. The efficiency of this project is fair because both project cost and project period exceeded the plan by unsuccessful bidding, increasing the price of supplies and changing part of the project scope. For operation and maintenance, a staff shortage at the implementing agency affects the current maintenance and operation conditions and the management of outsourcing contractors, including their technical aspect. Also, based on the financial aspect, further efforts are required to secure the necessary budget and implement appropriate maintenance and operation as well as to improve the budget distribution schedule in a timely manner. The sustainability of this project is therefore fair. In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

- The old bridge (Cuacua) had not been removed at the time of ex-post evaluation, although its removal was planned after the project under the responsibility of Mozambique. The old bridge is currently unused and aging. If untouched, it may hinder efforts to ensure the safety of neighbors due to the bridge collapsing during the rainy season. The implementing agency needs to strive to secure sufficient budget and remove the old bridge.
- Some cases of inadequate maintenance work, including clogged drains or weeds around the water pit and connecting roads emerged at the time of ex-post evaluation. Accordingly, there is a need to examine the necessary measures such as reviewing the frequency of maintenance work to prevent the serious damages, which require extensive repairs, under the proper O&M .

²⁹ The sites were visited in early February, during the rainy season in Mozambique.

- Though outsourcing contractors are private companies, improving their technical skills as well as enhancing the awareness of provincial offices for management and supervision are critical when implementing appropriate maintenance in future. Thus, it is desirable to establish a framework to manage and supervise the technical skills of outsourcing contractors as well as staff at the implementing agency and to monitor the maintenance status properly. Currently, maintenance work is implemented by outsourcing contractors and provincial offices tend to lack a strong sense of being supervisors. Accordingly, the implementing agency must work to boost the awareness of each provincial office for their supervision tasks.
- Distributing the budget to each provincial office tends to delay which becomes an issue as the necessary maintenance works cannot be implemented in a timely manner. One case highlights an issue to be resolved as the inability to distribute the budget until a few months to the end of the fiscal year, which meant there was no time to spend the budget appropriately. Accordingly, the implementing agency should review the budget distribution process in detail to determine the cause and stage of delay, and try to resolve those issues for smoother and more timely distribution.
- From the safety aspect, neighbors of the target bridges have concerns over speeding due to the improved bridge condition and increased traffic. Since taking thorough traffic control measures would be difficult by implementing agency alone, the implementing agency must enforce them in cooperation with police. In Chueza in particular, there is a need to consider securing space for side walk by setting a boundary for pedestrian safety.

4.2.2 Recommendations to JICA

N/A

4.3 Lessons Learned

- Securing Safety

Chueza was constructed as a single-lane road without securing space for side walk, and there are currently concerns over safety, particularly of pedestrians and neighbors, due to increasing traffic volume as well as speeding cars. Although the implementing agency proposed a double lane at the planning stage due to the expected increase in traffic, a single lane was constructed and no sidewalk was included in the design based on the forecast traffic volume, consistency with the width of the existing road and budget constraints. Safety must be ensured by, for example, setting speed-limit signs or providing thorough instructions on traffic regulations to drivers and residents. However, considerations to ensure the safety, including setting boundaries for side walk, should be taken for the bridges with heavy pavement traffic such as Chueza, despite budget constraints at the planning stage.