Ex-Post Project Evaluation 2010: Package III-5 (Ghana, Kenya, Mozambique)

November 2011

JAPAN INTERNATIONAL COOPERATION AGENCY

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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 2008, and Technical Cooperation projects and Grant Aid projects, most of which project cost exceeds 1 billion JPY, that were mainly completed in fiscal year 2007. 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.

November 2011
Masato Watanabe
Vice President
Japan International Cooperation Agency (JICA)

Disclaimer

This volume of evaluations, the English translation of the original Japanese version, shows the result of objective ex-post evaluations made by external evaluators. The views and recommendations herein do not necessarily reflect the official views and opinions of JICA. JICA is not responsible for the accuracy of English translation, and the Japanese version shall prevail in the event of any inconsistency with the English version.

Minor amendments may be made when the contents of this volume is posted on JICA's website.

JICA's comments may be added at the end of each report when the views held by the operations departments do not match those of the external evaluator.

Ghana

Ex-Post Evaluation of Japanese Grant Aid Project
"Rehabilitation of Trunk Road"

External Evaluator: Keishi Miyazaki and Mitsue Mishima, OPMAC Corporation

0. Summary

The implementation of this project meets Ghana's development policy, developmental needs and Japan's ODA policy, therefore its relevancy is high. Although the project cost was within the plan, the project period was exceeded, therefore efficiency of the project is fair. Some effects were observed after the completion of the project, such as an increase in traffic volume, a decrease in travel expenses, savings in traveling time and improved velocity. In addition, there are positive impacts such as better convenience for local residents, support for agricultural development, activation of the local economy and support for the tourist industry. On the other hand, no improvements in road safety were observed and the relocation of local people is not yet complete. This problem still needs to be solved, as due to a change in the range of relocation targets during implementation of the project, there has been an increase in the number of residents and facilities for relocation. Accordingly, effectiveness of the project is fair. No major problems have been observed in the structural, technical and financial aspects of the operation and maintenance system, therefore sustainability of the project effect is high.

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

1. Project Description

Project Location

National Route N1
(Okyereco in Efutu Municipality)

1.1 Background

Ghana's road sector is under the control of the Ministry of Roads and Highways, and there are three agencies, the Ghana Highway Authority (GHA), the Department of Feeder Roads, and the Department of Urban Roads, that are responsible for roads based on their classifications. The implementing agency for this project was GHA, which was in charge of development as well as the operation and maintenance of national roads, inter-regional roads and regional roads in Ghana (total of 13,277 km), 58% of which were unpaved. In addition, approximately 50% of national roads had poor road surface conditions. The target road section under this project was part of National Road No. 1 which forms part of the ECOWAS highway that connects the ECOWAS (Economic Community of West African States) countries[1], and which is ranked as

[1] The ECOWAS member states at the time of ex-post evaluation are the following 15 countries: the Republic of

one of the most important roads in Ghana. Although improvements of National Route N1 had been taking place with the assistance of other development partners, the target section of National Route N1 did not satisfy the standards of international trunk highways and its rehabilitation to meet these standards was an urgent matter. Thus the Government of Ghana requested a grant aid project assistance from the Japanese government.

1.2 Project Outline

The project objective was to improve transport capacity and passenger and cargo movement in the country by the rehabilitation of National Route N1 road between Kasoa and Yamoransa (98.2km).

Grant Limit / Actual Grant Amount	(1) Detailed Design: 116 million yen / 104 million yen (2) First Phase (2003-2004): 2,776 million yen / 2,661 million yen (3) Second Phase (2004-2006) 3,763 million yen / 3,760 million yen
Exchange of Notes Date	(1) Detailed Design: October 2002 (2) First Phase (2003-2004): June 2003 (3) Second Phase (2004-2006): June 2004
Implementing Agency	Ministry of Roads and Highways (MoRH) Ghana Highway Authority (GHA)
Project Completion Date	(1) Detailed Design: December 2004 (2) First Phase (2003-2004): April 2005 (3) Second Phase (2004-2006): November 2007
Main Contractor	Taisei Corporation
Main Consultant	Katahira & Engineers International
Detailed Design	December 2002
Related Projects	The following rehabilitation projects were undertaken in locations on National Route N1 other than targeted by this project. • International Development Association (IDA), the World Bank Group: Kasoa – Accra (18 km), Agona Junction – Elubo (110km). • Kreditanstalt für Wiederaufbau (KfW): Tema-Akatsi (110 km). • Danish International Development Agency (DANIDA): Takoradi – Agona Junction (28 km). • Millennium Challenge Corporation (MCC), USA: Tetteh Quarshie – Malam (14 km).

Benin, Burkina Faso, the Republic of Cabo Verde, the Republic of Côte d'Ivoire, the Republic of Gambia, the Republic of Ghana, the Republic of Guinee, the Republic of Guinee Vissau, the Republic of Liberia, the Republic of Mali, the Republic of Niger, the Federal Republic of Nigeria, the Republic of Senegal, the Republic of Sierra Leone, and Togolese Republic.

2. Outline of the Evaluation Study

2.1 External Evaluator

Keishi Miyazaki, OPMAC Corporation
Mitsue Mishima, OPMAC Corporation

2.2 Duration of Evaluation Study

Duration of the Study: November 2010 – November 2011
Duration of the Field Study: June 4 – 19, 2011

2.3 Constraints during the Evaluation Study

None

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

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance with the Development Plan of Ghana

At the time of ex-ante evaluation, "Vision 2020", the Ghana's National Development Policy Framework prepared in 1996, set its long-term development objectives as: human development, economic growth, rural development, and urban development. For achieving the objectives, economic infrastructure development including road transport development was given priority.

The Medium-term National Development Policy Framework (2010-2013) at the time of ex-post evaluation also emphasizes the improvement of the trunk road network as a precondition for socioeconomic development. The Transport Sector Development Program (TSDP) (2008-2012) states its long term goals as, (1) to establish Ghana as a Transport Hub for West African Sub region, and (2) to create a sustainable, accessible, affordable, reliable, effective and efficient transport system that meets user needs. The Ministry of Road and Highways plans to apply the road fund[4] in order to conduct improvements in, and the operation and maintenance of, major roads as a first priority in road sector priority.

3.1.2 Relevance with the Development Needs of Ghana

At the time of ex-ante evaluation, almost 50% of Ghana's national roads (13,277 km in total length) exhibited poor road surface conditions. The target road section under this project was a part of the National Route N1, which forms part of the ECOWAS highway that connects the ECOWAS (Economic Community of West African States) countries, and which was ranked as one of the most important roads in Ghana. Rehabilitation of National Route N1 had been carried out through the support of other development partners. However, the target section of National Route N1 under this project did not satisfy the international standards for arterial highways and improvement to meet the standards was an urgent matter.

At the time of ex-post evaluation, National Route N1, as a part of the ECOWAS highway, is still considered to be an important part of the road transport infrastructure that connects the West African countries and in recent years, the improvement and widening of National Route N1, including the target section of this project, has been continuously worked on with the support of other development partners. While the ECOWAS highway links economically dynamic cities such as Accra, Abidjan (Côte d'Ivoire), Lome (Togolese Republic), Lagos

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

[3] ③: High, ② Fair, ① Low.

[4] The road fund was established in 1997 to be used for road development and maintenance. 90% of the financial source for the Fund is fuel tax while the remainder consists of the registration tax of vehicles and toll fees for roads, bridges etc.

(Nigeria) and other capitals of the West African coastal cities, it is also a route that connects landlocked countries and harbors, and it plays an important role in the logistic infrastructure of the West African region. In Ghana, the National Route N1 is the most important trunk road, covering economically active regions, from Accra to Tema, or Cape Coast to Takoradi. The Central Region, where the target road section of this project is located, is one of the most populated regions of the country and has 1.86 million people. Furthermore, traffic demand for the National Route N1 is increasing in pace with economic development in Ghana and its neighboring countries. Demand is expected to be even higher since oil field development on the west coast of Ghana and crude oil production started in December 2010.

3.1.3 Relevance to Japan's ODA Policy

The need for the improvement of trunk roads was stated in Japan's County Assistance Policy for Ghana (FY 2002) at the time of project planning. The original plan was to implement the project as an ODA loan project; however since Ghana was ranked as a Heavily Indebted Poor Country (HIPC) in 2001, the project became a grant aid project. Ghana is considered to be one of the Japan's most important aid recipient countries, and it was a fair decision to implement this project as a grant aid project responding to urgent needs. Thus, the project was relevant to Japanese development assistance policy.

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

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

The planned output of the project was the improvement of the two lane road of the National Route N1, 98.2 kilometers in length, at the Kasoa and Yamoransa section (including improvement of road alignment, widening of lane width and improvement of pavement and drainage structures). The actual output was as planned (See Table 1). However, some malfunctions such as a crack and a depression of the surface were found in some sections of the second phase, additional repair works such as overlay and asphalt seal coat was done by the contractors to fix the problems during the period between the completion of the second phase and the final handover inspection. The target road section of the project on National Route N1 is shown in Figure 1.

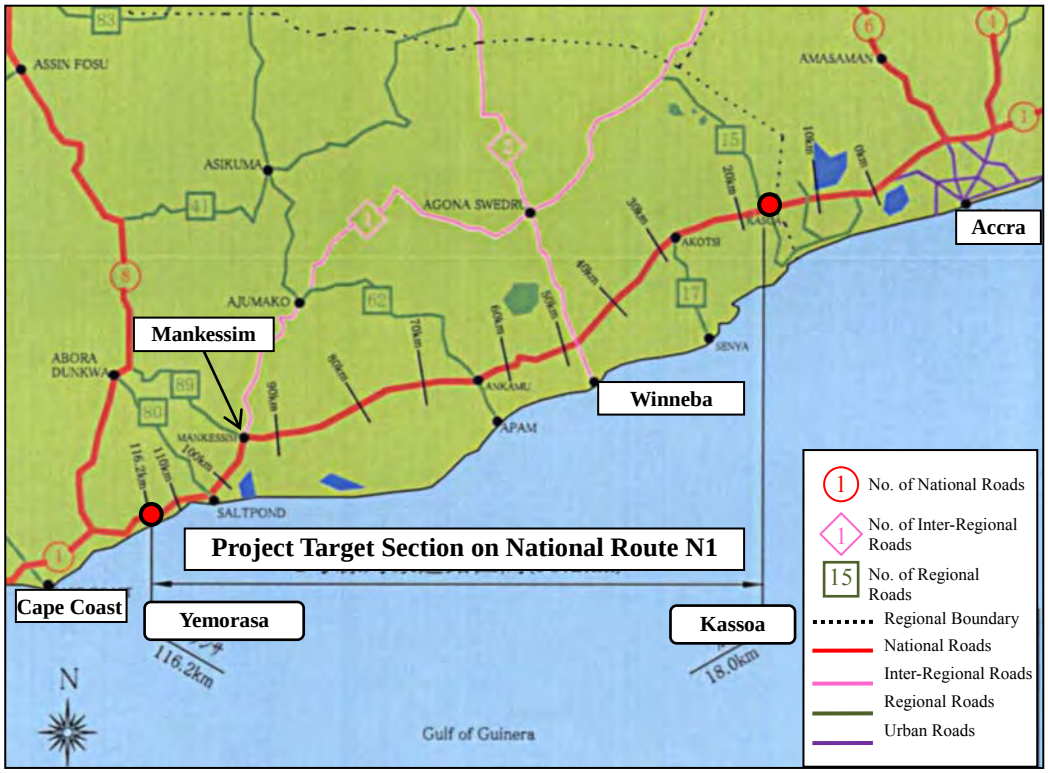
Table 1: Project Outputs

Japanese Side	
Plan (At the time of the Basic Design Study)	**Actual**
Improvement of the two lane road of the National Route N1, 1, 98.2 km in length, at the Kasoa and Yamoransa section (including improvement of road alignment, widening of lane width and improvement of pavement and drainage structures) • 2- Lane road for two directions, with a lane width of 3.65m and a total width of lanes and shoulders ranging between 12.3m and 14.3 m. • Asphalt concrete pavement, mechanically stabilized crushed stone sub-base course, crusher run, and bituminous surface treatment shoulder • Drainage structures: box culvert, improvement of bridge drainage system, etc. • Other facilities: guardrails, guide posts, road humps, road signs, road marking, bus stops, roundabouts, etc.	Total target interval 98.2km (First Phase: 41.0km、Second Phase：57.2km) was as in the plan. • Specifications described on the left were as in the plan.

Ghanaian Side	
Plan (At the time of Basic Design Study)	**Actual**
Resettlement of residents and relocation of electric poles and water pipes by widening of road.	Relocation of the obstacles such as houses and facilities within the planned area at the time of Basic Design Study was implemented as the plan. The initially planned relocations area for the First phase section was within the area between the end of the road shoulder and 3 meters distance from it (which was 15.3-17.3 m from the center of the road). However, the relocation area was widened to the area up to the boundary of the Right of Way (ROW) of this road which was 30 meters from the center of the road because GHA took the decision to apply the policy that the houses and facilities located in the ROW should be cleared for the future 4-lane widening project of Narional Route N1. As a result, the number of relocated houses and facilities increased in the Second phase of this project. (The relocation issue is discussed later in **3.4.2 (2) Impact on the Social Environment**).

Source: JICA and GHA documents.

Note: The Right of Way (ROW) of this target road was the area which was 30 meters from the center of the road in both side, and ROW as well as a part of land ownership of the area was already acquired by the government. Therefore, principally the entire area of this ROW was to be a relocation area. However, at the planning stage of this project, the relocation area was limited within the area between the end of the road shoulder and 3 meters distance from it. The reasons were: (i) it was considered that even if the relocation was implemented in the limited area between the end of the road shoulder and 3 meters distance from it, it would not affect the construction work of this project as well as car traffic flow of the road after project completion, and (ii) the relocation cost would be less than the cost for entire ROW area.



Source: JICA "Basic Design Study on the Project for the Rehabilitation of Trunk Road in the Republic of Ghana" (2002)

Figure 1: Location of the Project Target for National Route N1

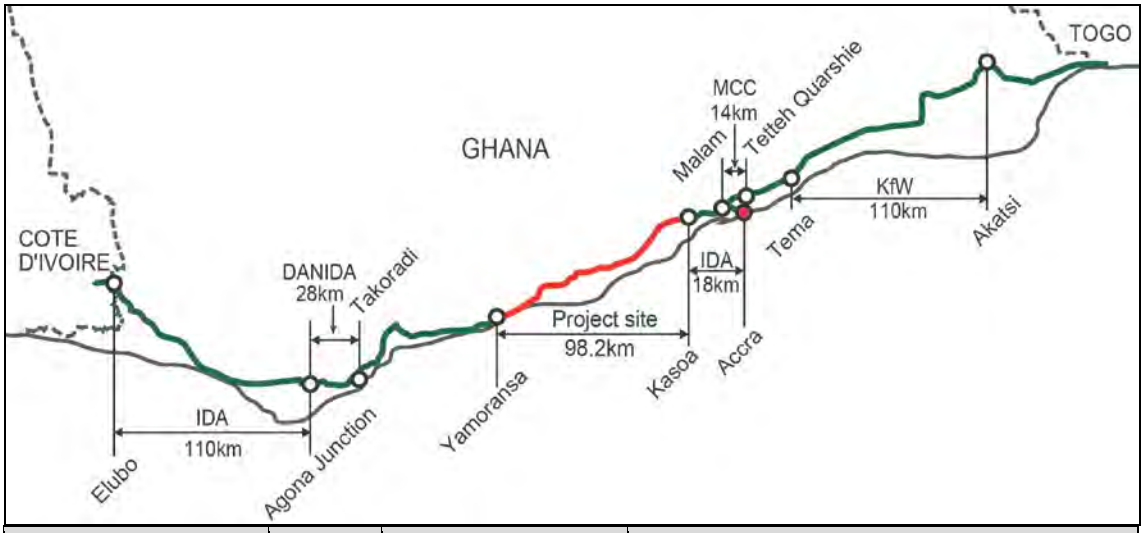
Before Project

After Project (As of May, 2011)

Source: Photo before project is from JICA "Basic Design Study for the Project for the Rehabilitation of Trunk Road in the Republic of Ghana" (2002)

Photo 1: Beginning of the Project Road (Near Kasoa): Before and After the Project

Other development partners supported the improvement of the National Route N1 along with this project, and a section of 280 kilometers out of the total of 533 kilometers (52% of the overall length) has already been, or is in the process of being improved (See Figure 2).



Section	Distance	Status (As of May, 2011)	Donor
Kasoa - Accra	18 km	Completed in Dec 2006	International Development Association (IDA), the World Bank Group
Tema - Akatsi	110 km	Completed in Oct. 2008	Kreditanstalt für Wiederaufbau (KfW), Germany
Tetteh Quarshie - Malam	14 km	In Progress	Millennium Challenge Corporation (MCC) , USA
Takoradi - Agona Junction	28 km	To be commenced in 2012	Danish international Development Agency (DANIDA)
Agona Junction - Elubo	110 km	To be commenced in 2012	International Development Association (IDA), the World Bank Group

Source: GHA

Figure 2: Rehabilitation Projects of the National Route N1 by Other Development Partners

3.2.2 Project Inputs

3.2.2.1 Project Cost

The actual project cost was 65.26 million yen, which was lower than the planned cost of 67.45 million yen (98% of the planned cost). Around the same time as the project, Germany's Kreditanstalt für Wiederaufbau (KfW) carried out a road improvement project (2-lane road for each direction) for 110 kilometers between Tema and Akatsi on the National Route N1. The actual project cost for this was 53,000 US dollars per kilometer, which was approximately the same as the cost of this project: 50,000 US dollars per kilometer.

At the time of ex-ante evaluation, the cost for Ghana's relocation of houses and public facilities was estimated at 5 billion cedi. However at the time of ex-post evaluation, the actual relocation cost for this project cannot be identified since GHA could not trace the records on relocation including the actual relocation cost for the first phase of the project as well as for the actual relocation cost for the public utilities. The relocation cost was relatively small, only 1.4% of the total project cost, therefore it was decided not to include it as part of the project cost analysis in this ex-post evaluation.

Available records indicated that the relocation cost was revealed to be approximately 88.82 billion cedi, which was 18 times more than the planned cost as shown in Table 2. The reasons for the overrun were: (1) the planned relocation cost was estimated using a preliminary survey of only a part of the target road sections of the first and second phase; the overall relocation area was not covered, and the estimation did not include compensation for farms and crops, (2) the target relocation area was expanded during the second construction phase, and affected numbers houses and facilities for relocation increased, and (3) during the process of obtaining the approval of the government's National Land Valuation Board for the GHA relocation cost estimate, real estate values and compensation costs were revised which resulted in the increase in the compensation amount (See **1.9.2 (2) Social and Environmental Impact**s for more details).

Table 2: Project Cost

Items	Plan (At the time of E/N Signing)	Actual
[Japanese side]		
Detailed Design	11.6 million Yen	10.4 million Yen
Construction supervision and civil works	6.539 billion Yen	6.421 billion Yen
Total	**6.745 billion Yen**	**6.526 billion Yen**
[Ghanaian side]		
Resettlement and facility relocation costs	5 billion Cedi[1)] (90 million Yen)	88.82 billion cedi[2)]

Source: GHA

Note 1: Currency unit was changed from the old cedi to new the cedi in 2007, by conducting denomination 1: 10,000. In this table, The Ghanaian cost in cedi was calculated in old cedi.

Note 2: Only Actual relocation cost revealed based on the available data. The relocation cost of public utilities such as water pipes is unknown.

3.2.2.2 Project Period

The actual project period from the commencement[5] of detailed design to project completion was 53 months, against the planned period of 50.5 months, which represents a 2.5 month delay (104% of the planned period). As seen in Table 3, the first phase was 16 months against the planned period of 19 months, which was 3 months shorter. On the other hand, the

[5] In evaluation analysis, the commencement of grant aid project is generally defined as the time of signing Exchange of Notes (E/N). For this project, however, the Basic Design Study report did not indicate a project period from E/N, and thus the comparative analysis of the plan and actual project period was carried out based on the assumption that the commencement of detailed design was the start of the project, not the signing of E/N.

second phase was 32 months against the planned period of 24 months, which represents an 8 month delay. The reason for the delay was that water pipe transfer along the national road took longer than originally planned. As described in the section of **3.2.1 Outputs**, for a year between the completion of the second phase and the final handover inspection, there was additional repair works to fix some distress; however, during this period, the road could be used.

Table 3: Project Period

Item	Plan (As in Basic Design Study)	Actual
Total Project Period (From Start of Detailed Design to Completion of all road construction works)	50.5 months	53 months
Detailed Design	5.5 months x 2 times	Phase 1: July to September, 2003 (3months) Phase 2: July to December, 2004 (6months)
Tender	2.5 months x 2times	Phase 1: From Tender to Contract: July to September, 2003 (2 months) Phase 2: From Tender to Contract: January to March, 2005 (2 months)
Construction Works	Total: 42 months Phase 1: 19 months Phase 2: 24 months	Total: 47 months Phase 1: November, 2003 - April, 2005 (16 months) Phase 2: April, 2005 - November, 2007 (32 months)

Source: JICA Documents

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

3.3 Effectiveness (Rating: ②)

3.3.1 Quantitative Effects

(1) Increase in Traffic Volume

The daily average traffic volume on the project target section between 2008 and 2011 significantly exceeded the target figures set in 2007 (the planned project completion year) and 2010 (three years after project completion) (See Table 4). Probable reasons for the increased traffic volume were: (i) the increase in the traffic volume of the National Route N1 due to improved convenience and better transportation functions overall after the rehabilitation and widening of other road sections by other development partners, in addition to the target road section of the project, and (ii) the increase in the traffic volume of the National Route N1 as the result of the economic development in Ghana and its neighbouring countries which promoted inter-regional trading, distributions and transfers. In addition, because there is one year's difference in the planned target volume and the actual figure when assessing the achievement ratio to target traffic volume, it can be thought that this have affected more or less the reason why the achievement ratio to target traffic volume in 2008 and 2011 was high (Please refer Note 1 of Table 4)..

Table 4: Average Daily Traffic Volume in Each Section of the Project Target

Section		2002	2008	2011
Kasoa - Winneba	Plan[*1]	—	11,974 (2007)	14,262 (2010)
	Actual	**8,948**	**11,212 (94%)**	**25,265 (177%)**
Winneba - Mankessim	Plan[*1]	—	6,615 (2007)	7,878 (2010)
	Actual	**4,943**	**10,172 (154%)**	**9,904 (126%)**
Mankessim - Yamoransa	Plan[*1]	—	5,518 (2007)	9,904 (2010)
	Actual	**4,123**	**14,826 (269%)**	**13,246 (202%)**

Source: Predicted traffic volumes are from "Basic Design Study for the Project for the Rehabilitation of Trunk Road in the Republic of Ghana" (2002), JICA. Actual figure in 2008 from GHA and actual figure in 2011 are from the results of a sampling traffic volume survey conducted upon the ex-post evaluation survey.

Note1: Since no estimated figures for 2008 and 2011 for each section were specified in Basic Design Study, the actual figures were compared with those from 2007 and 2010 respectively. Figures in ( ) are the achievement ratio to predicted figures.

Note 2: The sampling traffic volume survey carried out by this ex-post evaluation survey was conducted for 24 hours, 2 days, namely, 24 hours from June 17, 2011 (Fri) 6:00am to June 18, 2011 (Sat) 6:00am, and 24 hours from June 18 (Sat.) 6:00 am to June 19, 2011, 6:00 am. It was implemented at the three target sections above. The average daily traffic volume in 2011 in Table 4 is the average traffic volume for the two days described above.

As shown in Figure 2, other road sections of the National Route N1 were improved by other development partners in recent years especially the road section adjoining this project, between Accra and Kasoa, which was improved with financial assistance from the International Development Association (IDA). Therefore, the increase in the traffic volume on the target road section of the project was also caused by improvements in other road sections of the National Route N1 at around the same time.

(2) Decrease in Vehicle Operation Costs

According to the International Roughness Index (IRI) which indicates the smoothness of a road surface, there was a level of 9 before the implementation of the project (2002). This improved significantly post-project to 3 in 2007 and 1.9-2.7 in 2010, as seen in Table 5. The aim in the plan was IRI=3 or less. This was the design standard of the ECOWAS Highway, and the goal was achieved. According to the GHA, vehicle operation costs improved significantly along with the improvement in road conditions, and the vehicle operation cost reduction effect was higher than estimated at the time of the Basic Design Study in 2007.

Interviews with road users (private transportation association representatives) revealed that frequency of vehicle maintenance decreased thanks to the road improvements and therefore the effect of the project in decreasing vehicle operation costs can be acknowledged (refer to later "Box").

Table 5: International Roughness Index (IRI) in the Project Target Section

Before Project (2002)	Target After Project (2007)
9	3
Actual Figure After Project (each section) (2010)	
Kasoa - Akatsi	2.4
Akatsi - Winneba Junction	2.2
Winneba Junction - Apam Junction	1.9
Apam Junction - Mankessim	2.3
Mankessim - Saltpond	2.7
Saltpond : Yamoransa	2.3

Source: GHA

(3) Savings in of Traveling Times and Improvements in Average Velocity

According to the GHA, as a result of the rehabilitation of the road, traveling times have decreased by 40% since 2007 (after project completion) compared to 2002 (before project implementation). Average velocity has improved from 50 km/hour to 80 km/hour (See Table 6). With the road surface improved by the project, velocity of vehicles was enhanced and traveling time reduced. On the other hand, problems in safety emerged due to the improvement in the velocity of vehicles (for details, refer to **3.2.2 Qualitative Effects (1) Improved Safety**).

Table 6: Traveling Time and Average Velocity in the Project Target Section

Section	2002		After 2007	
	Traveling time (Minutes)	Average Velocity (km/h)	Traveling time (Minutes)	Average Velocity (km/h)
Kasoa - Winneba	38.0	50	23.5	80
Winneba - Mankessim	54.0	50	34.0	80
Mankessim - Yamoransa	34.2	50	21.0	80

Source: GHA

Note: The designed speed on the project target road followed the design standard of GHA design: 100 km/h in flat terrain, 80 km/h in rolling Terrain, and 50 km/h in populated area.

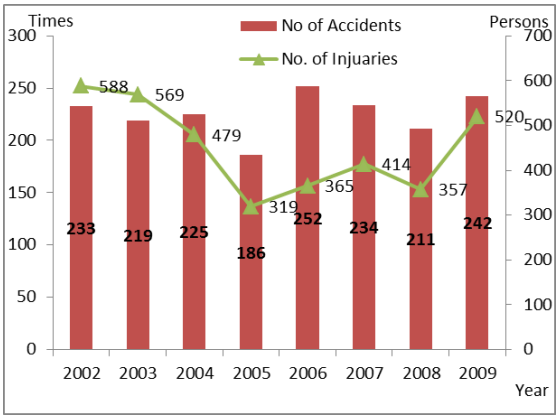
3.3.2 Qualitative Effects

(1) Improved Safety

The target road is a national trunk road that links ECOWAS countries, as well as being a community road for local residents. For traffic safety policy, the project implemented the following, in addition to the improved road alignment: (i) speed restraint with 50 km/h within the 36 towns and villages on the target section, (ii) widening of road shoulders in 24 locations in the above 36 towns and villages where there are many pedestrians, and the setting of curb stones at the roundabouts of Winneba and Mankessim, and (iii) setting up of pedestrian crossing and road signs in 22 locations. In addition, road humps[6] were set in 12 locations at accident prone spots.

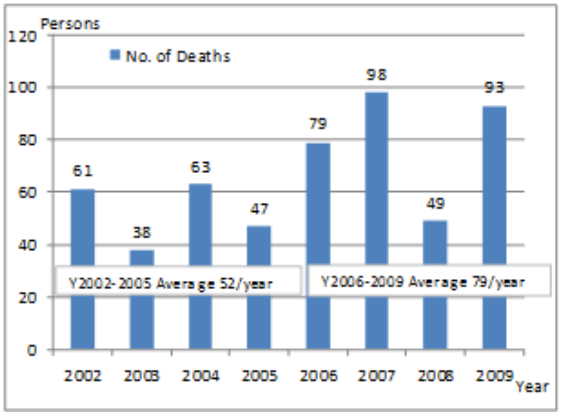
However, data showed no significant change in the numbers of traffic accidents and injuries pre and post-project, as seen in Figure 3 and 4, and thus no improved safety effect can be seen in the project. The annual average of fatal accidents between 2002-2005 (pre-project) was 52 deaths/year, whereas this number increased to 79 deaths/year between 2006-2009 (post-project). The number of deaths increased around 2006 when the project was completed. According to the local police in the target area, there is an awareness of the increase in pedestrian accidents and of more severe accidents since the implementation of the project. In some cases, the road humps themselves have caused accidents as drivers do not always reduce their speed when they enter road hump areas. GHA and local residents have also mentioned the issue of the increase in pedestrian accidents.

[6] Raised ridges to reduce vehicle speed.



Source: GHA

Figure 3: Number of Traffic Accidents and Injuries (Kasoa-Yamoransa Section)



Source: GHA

Figure 4: Number of Deaths (Kasoa-Yamoransa Section)

After an analysis of the overall accident trends and the opinions of relevant people, the reasons why traffic accidents increased immediately after the project are considered to be enhanced velocity through improvement of the road, together with drivers' actions such as speeding as well as a low level of awareness about the issue of traffic safety on the part of pedestrians and drivers. The Basic Design Report of the project proposed to the Ghana side that "improvement of the road condition by the project will increase vehicle velocity. Ghana is thus required to conduct a traffic safety awareness campaign for local residents and drivers in order to avoid severe accidents". However, this proposal was not implemented until project completion.

Currently, the Government of Ghana is taking this problem seriously, and the National Road Safety Commission plans measures for increased traffic safety. GHA is in the process of strengthening traffic safety policy by replacing road humps with speed tables[7] as there was no sufficient speed reduction effect seen from the road humps, while in fact they have been a cause of accidents. On the other hand, in order to improve traffic safety, it is necessary to improve road design and facilities, promote safety education for local residents and drivers, and government agencies and police are required to reinforce regulations against offenders. GHA is being encouraged to make efforts to prevent traffic accidents by promoting consultations and cooperation between local communities' residents, the police and other related agencies.

From the above, it can be seen that although some effects of project implementation were observed, effectiveness is fair due to the issues remaining to be solved in terms of the social environmental impacts of the resettlement of local people, as mentioned later.

3.4 Impacts

3.4.1 Intended Impacts

Key informant interviews with the Central Region Development Commission (CEDECOM), Mfantsman Municipality, West Gomoa, Awtu Senya District office, Central Region Tourism Board, local transporters, and local agricultural and commercial businesses were conducted, together with a focus group discussion for local residents, in order to understand the impacts of the project (for details, refer to "Box" mentioned later). Results revealed that impacts had been assumed from the beginning. Most of the interviewees and

[7] A speed table is lower in height and longer in distance than a road hump and its structure prompts gentle speed reduction. According to GHA, speed tables are already in use on other road sections, and there has been a stable speed reduction effect.

discussion participants responded that they were satisfied with the project. The beneficiary population was 870,000 in the provinces alongside the project, and approximately 1,860,000, including the Central Region, where the road section of the project was located.

(1) Improvement in Convenience for Local Residents

After project implementation, social service access such as for schools, hospitals, and urban markets improved. Thus it can be said that the project contributed to an enhancement in convenience for local residents along the road.

(2) Support for Rural Development

Although there was no data related to agricultural products obtained in the target areas, some positive impacts were seen, such as time savings during the transportation of agricultural products, decreased transportation costs, improved access to markets, and decreased post-harvest losses (damaged agricultural products discarded during transportation). For this reason, farmers are now capable of selling more products than before and this has resulted in an increase in their income. Accordingly, it is deemed the project had had positive impacts in supporting rural development in the target area.

(3) Development of the Local Economy

After the implementation of the project, new branches of financial institutions appeared in the target area. The agriculture, tourism and service industries as well as commercial and transportation industries were stimulated, and an increase in employment opportunities in these industries was observed. At the same time, land prices in the project area increased. Therefore the project has had some positive impacts in activating the local economy.

(4) Support for Tourism Sector Development

According to the Central Region Tourism Board, following project implementation, there was an increase in the number of visitors to Kakum National Park, Fort of Cape Coast, to beach resorts along the coast and also to the number of hotels along National Route N1. Although in recent years there has been ongoing tourism promotion in the Central Region, with political support, bigger impacts in the above mentioned areas have been brought about by road improvement. Thus, the project has had positive impacts on the aspect of support for tourism in the target area.

(BOX) Summary of Beneficiary Survey Results After the Improvement of the National Route N1 (Kasoa - Yamoransa)

A beneficiary survey was carried out in order to analyze the project's effectiveness and impacts. Key informant interviews were conducted with the Central Region Development Commission (CEDECOM), Central Region Tourism Board, Gomoa West District, Awutu Senya District, Efutu Municipality, Mfantsiman, Ghana Private Road Transport Union (GPRTU), woman's agricultural products retailers groups, police stations along the National Route N1, gas stations and restaurants. Also Focus Group Discussions (FGD) were conducted with three communities in Konmantse, Abandze in Mfantsiman municipality and Ankamu in Gomoa West. These communities were selected from those located at the starting point (near Accra) and the end point (near Cape Coast) of the project, along the road and near junctions, with the idea that they could see project impacts from various aspects.

The results of the beneficiary survey are as following:

FGD at Amkamu Community

FGD at Kormantse and Abanze Communities

Interview with a group of woman retailers of agricultural products

[Reduced travel and transportation expenses]

- Transport costs for products and services between the local market centers (Kasoa, Mankessim, Cape Coast) were reduced (CEDECOM).
- Car maintenance costs were reduced. Repairs were necessary every three months before the project, but now the frequency of maintenance has lessened (GPRTU).

[Safety]

- Road humps were set in many places and they are causing accidents (CEDECOM, Gomoa West District, Efutu).
- There are many curves and they are dangerous for road users (Mfantsiman).
- Accidents are caused because the road near Okyereco and Abofo is extremely narrow, and it floods after rain (GPRTU, Efutu).
- There have been more accidents because of speeding after road improvement (West Gomoa District, Efutu, Mfantsiman, gas station owner). Accidents have increased especially after road improvement (restaurant worker). Accidents have increased as the traffic volume has increased (Efutu). Pedestrian accidents have increased (Mfantsiman).
- Accidents have decreased after setting up speed tables. A major cause of accidents is the human factor (police station along the road).

[Improvement of the local resident's convenience]

- The project has contributed greatly in the transportation of emergency patients to hospitals in Kasoa and Cape Coast as access to these cities has become easier with the improved road (CEDECOM, Mfantsiman, Gomoa West District).
- There are several junior high schools with a good nationwide reputation in Cape Coast. After the completion of the project, it has become easier to access Cape Coast and more students have enrolled in the schools there (CEDECOM).

[Support for rural development]

- Transportation time for agricultural products from Cape Coast and Accra has been reduced with the improved road, and post-harvest loss (damaged agricultural products discarded during transportation) has decreased (CEDECOM, Mfantsiman, Gomoa West District).
- There is more investment in local crop production, and as a result, agricultural production has increased (Awutu Senya District).
- Yam distributors around Cape Coast used to buy in Kumashi, which meant a higher cost for transportation, but since the National Route N1 has become more convenient, buying takes place in Kasoa instead. As its result, transportation costs and time have been reduced (CEDECOM).
- Reduction in the transportation cost of agricultural products has resulted in the distribution of more agricultural products than before (Mfantsiman, Efutu Municipality).
- I have been selling gari (processed cassava) for 20-30 years, and I used to carry them to the processing factory. After the improvement of the road, a transportation service has become available so more cassava can be transported, and income has increased (female retailer).
- It is now easier to get materials (fertilizers, etc.) and the cost has been reduced (Gomoa West District, Efutu, Awutu Senya District).
- Employment opportunities for young people have increased in the local area and there are more young people working in the local agricultural industry (CEDECOM, Gomoa West District, Efutu Municipality).

[Development of the local economy]

- A new agricultural produce processing plant (processing tropical fruits such as pineapples) has been constructed and the number of gas stations, restaurants, small retailers and shops has also increased (Mfantiman, gas station owner, Awutu Senya District). A new cement plant has been built after the road improvement (Gomoa West District).
- The income of transportation carriers has increased as the need for mass transportation and minibus operation has increased (GPRTU).
- Income has decreased since there is more competition with other newly opened restaurants (restaurant worker in Mfantsiman)
- There are new eight bank branches in Mfantsiman, and the city has become a center of business (Mfantsiman). In Awutu Senya District, new financial institutions have been opened in the past four years, and currently, there are four banks and five non-bank financial institutions (Awutu Senya District).
- There are more employment opportunities as more people are doing business along the roadside of the National Route N1 (CEDECOM).
- There are new telecommunication companies and the local telecommunication environment has improved. Many young people work as venders of recharge cards for mobile phones and there are more employment opportunities for them (Mfantsiman, Gomoa West District).
- The population has grown and housing construction has increased. 15,706 houses in 2006, and 45,896 houses in 2008 were newly built (Awutu Senya District).
- The district revenue has increased (Gomoa West District)

[Support for the tourism sector development]

- In the surrounding areas of the project target road, 34 new hotels were built between 2004 and 2010 (CEDECOM, Efutu).
- There has been an increase in visitors to local tourism facilities since the improvement of the National Route N1. Visitors increased from 108,000 in 2006 to 180,000 in 2010 at Kakum national park, and from 59,000 in 2006 to 89,000 in 2010 at the Cape Coast Fort (Central Region Tourism Board).
- There is an annual Aboakeyer festival in Winneba in May, and the number of tourists who visit the festival increased after the road improvement (Central Region Tourism Board, Efutu). More people visit the Akomosi festival in Apam (Gomoa West District). More tourists visit the coastline beach resort (Mfantsiman).

[Satisfaction level of the project beneficiaries]

A survey was conducted with the participants of the focus group discussion, and more than 80% of them were “very much satisfied” or “satisfied to some extent” with the project. There were some people who were “not satisfied at all”, but there appears to be a background of discontent to do with resident compensation or road accident measures.

Level of Satisfaction	Kormantse and Abanze (Mfantsiman, total 17 persons)	Ankamu (West Gomoa, total 14 persons)
Very much satisfied	3	1
Satisfied to some extent	15	9
Not much satisfied	0	0
Not satisfied at all	1	4
Do not know	0	0

Source: Result of interview upon Ex-post evaluation survey.

3.4.2 Other Impacts

(1) Impacts on the Natural Environment

No impacts on the natural environment were assumed at the time of ex-ante evaluation, as the project was an improvement of the existing road. Neither the result of the project site inspection nor the hearing from GHA at the ex post evaluation revealed negative impacts on the natural environment.

(2) Impacts on the Social Environment (Relocation and Compensation)

GHA reported that resident relocation and compensation was processed according to public procedures and explained to residents. However, as described in the section of **3.2.2.1 Project Cost**, the overall result of the first construction period was not clearly verified.

As for the second construction period, the target number of relocation and compensation was 2,754 of which, 930 were huts and houses, and 1,664 were crop and farm compensations. An investigation conducted by the consultant of the project just before the beginning of the second phase period reported that there were 888 huts and houses; thus there had been an increase in number. Also, because the estimate did not include crops and farms which were in fact subjects for compensation, the number of compensation cases significantly increased. At the time of ex-post evaluation, it was confirmed that 120 cases had not yet received compensation. This was due to: (i) residents in the target relocation area had not moved to outside the Right of Way (ROW) of this road, (ii) some of the residents disappeared and their current contacts could not be identified, and (iii) ownership of property was in dispute due to death of owners or for other reasons.

The result of interview to representatives of three communities revealed that: (i) explanation from GHA on the relocation procedure had not been sufficient, (ii) the amount of compensation was not sufficient and they would suffer loss, and (iii) some residents received compensation without their houses being demolished while others did not receive money although their houses were demolished. In dealing with these issues, GHA reported that they had taken all the administrative procedures that were required.

Within the limited range of the interview survey at the time of the ex post evaluation it was not possible to judge whether or not there had been problems in the procedure for resettlement. It should be noted, however, that documentation on the results was incomplete and there had not been enough communication between the residents and GHA regarding the relocation procedures. These points need to be improved in the future.

According to GHA, there are plans to expand the target road from a two-lane single carriageway to a four-lane dual carriageway (a feasibility study has already been completed by GHA). Once the plan is implemented, those who currently have not been moved to outside the ROW will need to be relocated. Compensation will have to be paid fully at the time of actual construction in the future. This problem needs to be solved at the earliest time possible.

3.5 Sustainability (Rating: ③)

3.5.1 Structural Aspects of Operation and Maintenance

The operation and maintenance agency for the project target road, National Route N1, is the Ghana Highway Authority (GHA) under the Ministry of Roads and Highways. GHA is in charge of the development as well as the operation and maintenance of national roads, inter-regional roads and regional roads (total of 13,367 km). As of 2010, there were 1998 GHA employees, of which 197[8] were in charge of operation and maintenance. The organization is seen in Figure 5.

About 90% of both daily and routine maintenance work is outsourced to the private sector, while GHA itself conducts direct maintenance and operation work (daily inspection of road conditions, patrolling and simple maintenance) as well as contract management, supervision of operations, quality control of outsourced maintenance administration works, control of GHA owned road construction equipment, and the establishment of annual operation and maintenance plans including budget planning.

[8] At the time of ex-ante evaluation in 2002, the total number of employees in GHA was 3,300, of which 615 were operation and maintenance staff. Therefore, the number was 40% overall. A total of 70% of operation and maintenance staff was reduced between 2002 and 2010. According to GHA, the reasons for this significant decrease in numbers of staff were: (1) the employee count at ex-ante evaluation included temporary workers and, (2) while people retired or left work, GHA refrained from hiring new people.

The operation and maintenance offices and the branches in charge of the project target section of National Route N1, are the GHA Regional office in Cape Coast which is the regional capital of the Central Region of Ghana, and the GHA Area Offices in Cape Coast and in Winneba. There is a total of 30 technical staff. After analysis of the interview results to the director of the head office operation and maintenance department and the director of the region office in Cape Coast, it was concluded that there is no particular problem with the number of operation and maintenance staff in the project target road section.

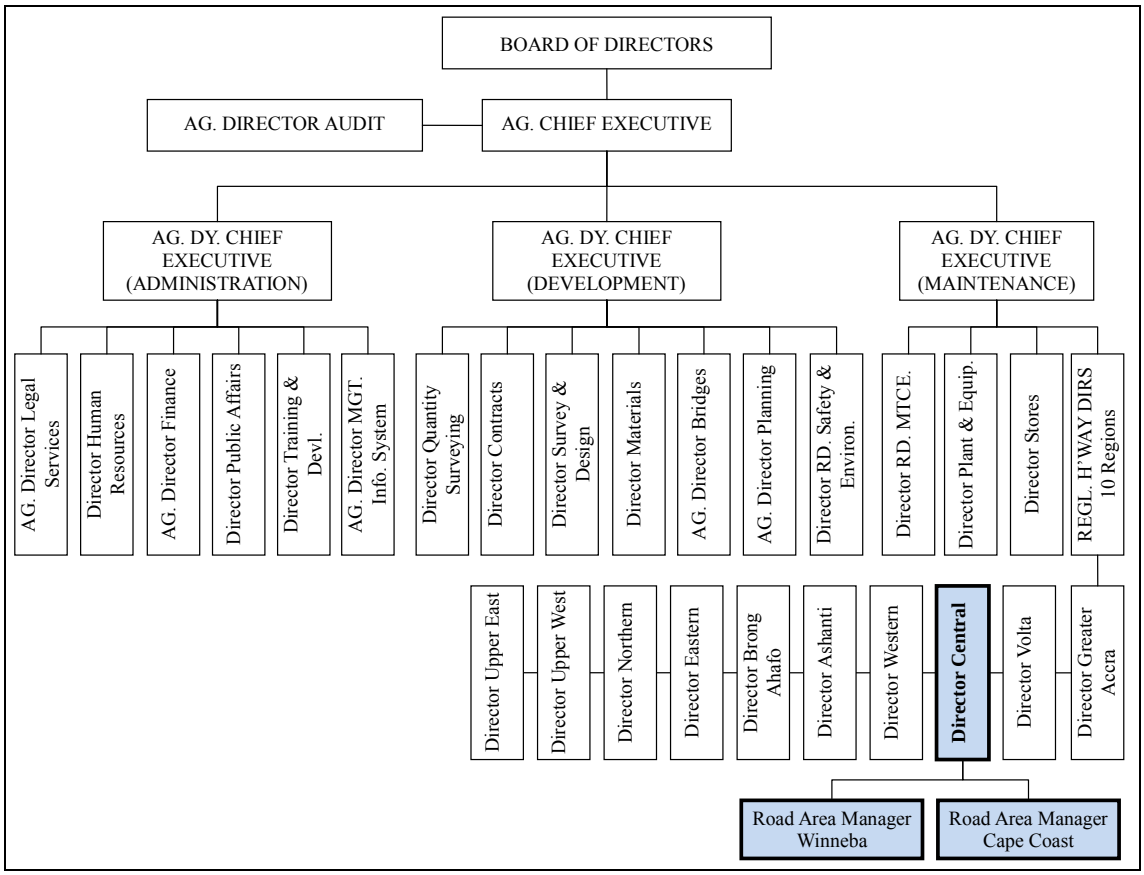


Figure 5: Organization Chart of GHA

3.5.2 Technical Aspects of Operation and Maintenance

About a half of the operation and maintenance staff at GHA (97 people) are qualified engineers with an average of 26 years employment history. GHA has a road operation and maintenance manual, and the operation and maintenance work is conducted based on the manual. As regards training for the engineering staff, GHA conducts an increasing number of training courses in addition to the ones financed by the World Bank and other development partners. The interview results to key staff of GHA at Head Office and the Central Regional Director of GHA in Cape Coast concluded that there was no concern regarding the technical level of their engineering staff considering past experience.

As mentioned earlier, although 90% of GHA road operation and maintenance works are outsourced, GHA explained that there is no concern regarding the technical level of the outsourcing agencies.

From the above, it can be concluded that there is no major issue in the technical level of the GHA operation and maintenance staff for maintaining the required road condition.

3.5.3 Financial Aspects of Operation and Maintenance

The operation and maintenance cost of the project target section of the National Route N1, between Kasoa and Yamoransa, increased yearly during the past four years from 172,000 cedi in 2007 to 268,000 cedi in 2010. Of the total GHA operation and maintenance cost, 0.3-0.7% is distributed for the operation and maintenance of the project target section and the executed budget equals the budgetary request. While there was a 46% decrease in the overall operation and maintenance cost of GHA between 2009 and 2010, the cost for the National Route N1 has increased by 35%, which implies that the National Route N1 is high priority in the operation and maintenance budget (See Table 7). According to GHA, the National Route N1 has the highest priority among all National Roads, and therefore its operation and maintenance budget is given preferential distribution.

The operation and maintenance cost is allocated from the road fund, the main source being fuel levy, which is contributed to the Fund anytime fule is purchased by motorists. Although the main source of revenue is based on the road fund, some high cost and or large scale repairs such as overlays are funded by the general account or through financial assistance by development partners. The sustainability of operation and maintenance budget for the project target road is therefore considered to be secured at certain level.

Table7: Operation and Maintenance Budget of GHA and Project Target Section

Unit: 1,000 cedis

Fiscal Year	O&M Budget for GHA	O&M Budget for National Route N1 (Entire section)	O&M Budget for Kasoa and Yamoransa (98.2km)
2007	39,750	930	172
2008	47,560	939	174
2009	66,310	1,074	199
2010	38,700	1,447	268

Source: GHA

However, the following need to be improved in order to secure sufficient operation and maintenance budget.

First of all, there is the issue of delayed budget execution. The interview result to the director of the Central Region office revealed that there is a procedural problem in that “the budget disbursement from the road fund takes time, and payment to the operation and maintenance contractors tends to be late”. The procedure for the budget execution needs to be improved and speeded-up.

Secondly, the road fund needs to be expanded. Currently the road fund is in cedi, Ghana’s local currency (cedi), while outsourced road maintenance contracts are in U.S. dollars as well as in Ghana cedis. This potentially causes difficulty when the value of the cedi is reduced against the U.S. dollars as this result in increases in the contract price in dollars. In addition to the exchange rate risk, there is also a problem in the source of revenue for the road fund coming from fuel levy. The base unit price of 0.06 cedi/liter has not been revised since its establishment of the road fund in 1997 despite changes in the economic environment such as inflation. While the road operation and maintenance cost continues to increase, it is necessary to strengthen and expand the road fund in order to assure the budget.

3.5.4 Current Status of Operation and Maintenance

As for the current status of operation and maintenance, overall quality of the road is relatively high. GHA introduced a Pavement Maintenance Management System (PMMS[9]) and

[9] The Road Operation and Maintenance Department of GHA was equipped with a Pavement Maintenance and Management System (PMMS) with the support of German Technical Corporation (GTZ). With the data that the system collects, road conditions are assessed into three levels, i.e. “Good”, “Fair” and “Poor”.

evaluated the road surface condition of the project target road section. The result was indicated as “Good”. The International Roughness Index (IRI), which indicates the smoothness of the road surface was under the desired value of 3, and thus it can be seen that the target section is maintained in good condition.

According to the final handover inspection report of October 2008, the following recommendations were made to GHA: (1) maintenance manual must be established by GHA, (2) frequent patrol of the road must be done and prompt actions when finding the defect of the road must be taken by the operation and maintenance agency of the Central Region, (3) overloaded trucks must be strictly controlled by GHA, (4)the local activities which the road being dirtied by the local contractors should well control by GHA, and (5) the cleaning of the drainage structure and the cutting of trees and plants on the road shoulder the drains might be conducted by the local community. Of the above, (1) to (4) have already been implemented by the GHA regional office. Axle Load Controls have been set in place by the City of Elmina to regulate overloaded vehicles. As for (5), these activities have been contracted out to contractors, not to local communities, and the drainage structure is cleaned once or twice and the trees and plans cut three times a year. Implementation of operation and maintenance of the road appears to be mostly good.

However, for better operation and maintenance, some areas could be improved. The Basic Design Study suggested the cleaning of side ditches and drainage pipes four times a year which means that the actual frequency is less than was suggested. Also, the project site survey at the time of ex-post evaluation revealed problems in the drainage facility at the Winneba intersection (drainage defect due to insufficient cleaning and missing side ditch cover), a pavement dent on the culvert near Essuahyia, and damage to the road shoulders at the Kormantsue community. It is desirable that measures to deal with these defects are promptly taken.

As can be seen from the above, no major problems have been observed in the structural, technical and financial aspects of the operation and maintenance system, therefore sustainability of the project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The implementation of this project meets Ghana’s development policy, developmental needs and Japan’s ODA policy, therefore its relevancy is high. Although the project cost was within the plan, the project period was exceeded, therefore efficiency of the project is fair. Some effects were observed after the completion of the project, such as an increase in traffic volume, a decrease in travel expenses, savings in traveling time and improved velocity. In addition, there are positive impacts such as better convenience for local residents, support for agricultural development, activation of the local economy and support for the tourist industry. On the other hand, no improvements in road safety were observed and the relocation of local people is not yet complete. This problem still needs to be solved, as due to a change in the range of relocation targets during implementation of the project, there has been an increase in the number of residents and facilities for relocation. Accordingly, effectiveness of the project is fair. No major problems have been observed in the structural, technical and financial aspects of the operation and maintenance system, therefore sustainability of the project effect is high.

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

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) Follow up on the relocation, the compensation procedure and its results

At the ex-post evaluation, some differences were revealed in the views of residents and of

GHA concerning the matter of relocation and compensation. However, since there is no comprehensive report that gives detailed results and describes the process of resident and facility relocations, the actual facts cannot be confirmed. It is recommended that the resident relocation process of GHA is investigated to find out how it was conducted by the Ghanaian government and whether or it was done properly, as to plan. Analysis should also take place on the causes of dissatisfaction on the part of some residents. Results then need to be fed back to residents in order to promote mutual understanding. Also, it is recommended that a report is made on the analysis and the points for improvement of the resident relocation process which can then be reflected in future resident relocation, if necessary.

(2) Timely implementation of repair and cleaning

At parts of the project target section, drainage defects caused by insufficient cleaning, deterioration of road shoulders that have passed their design life of three years, road surface subsidence in the culvert, and missing side ditch covers have been seen. More of these problems can be expected as years go by, and it is desirable to solve these problems as early as possible.

Regarding drainage cleaning, it is recommended that countermeasures are discussed such as contracting with local communities and peoples directly and conducting cleaning more frequently at a lower cost, as mentioned by the consultant during the time of final handover inspection.

(3) Efforts for improved traffic safety in coordination with local communities, police and related organizations

It is recommended that the current road humps in the project target section are replaced with speed tables that have higher deceleration effect in order to reduce traffic accidents (which have shown a tendency to increase). It is also important to promote traffic safety education for drivers and local residents in coordination with the local communities and police. Further, it is necessary for the Ministry of Roads and Highways, police authority and the National Road Safety Commission to strengthen regulations for reckless driving and traffic violators.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

(1) A need for the effort to improve of traffic safely to be integrated with a road traffic safety awareness campaign

There is generally a tendency for the number of severe accidents to increase after road improvement projects like this. Major causes are lack of care of the part of drivers as well as a lack of traffic safety awareness on the part of pedestrians. From the view of social considerations, it is important that traffic safety education for drivers and local residents is provided in order to avoid any possible negative impacts. Although the Basic Design Study recommended a Ghana traffic safety awareness campaign in its basic planning report, this was not brought to action. Upon implementing road development and rehabilitation projects, it is necessary that the donor country discuss in advance firm requirements for traffic safety education and awareness campaigns to the recipient country. These should be a prerequisite which must be conducted by the end of the project

End

Kenya

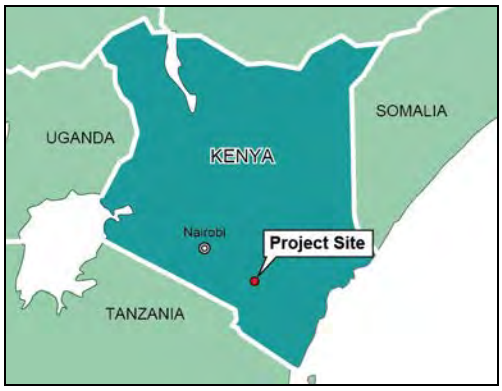
Ex-Post Evaluation of Japanese Grant Aid Project
"The Project for Reconstruction of Athi Bridge and Ikutha Bridge"

External Evaluator: Nobuyuki Kobayashi, OPMAC Corporation

0. Summary

The replacement of Athi Bridge and Ikutha Bridge, carried out by this project, was consistent with the development strategy of Kenya with its emphasis on the maintenance of the existing road network. It was intended that the bridges improve access to Mombasa port, a major port in the East African region, from landlocked areas such as Ethiopia and the northern part of Kenya. As the project implementation was efficient, both project costs and the project period were within the original plan. The comparison of "before" and "after" project implementation showed a substantial increase in traffic volume, in particular those of "Medium Goods" and "Heavy Goods" trucks, and the maximum weight of vehicle also achieved its target. Local residents were fully aware of the improvement in transport and business conditions. In addition, in the agricultural sector, an improvement in the availability of agricultural inputs such as pesticides and fertilizers was found. No serious damage negatively affecting the project effects was observed as a result of the site survey. However, in the long run, the lack of fund remains a sustainability issue as the budget allocation to the implementing agency was insufficient. In light of the above, this project is evaluated to be highly satisfactory.

1. Project Description



Project Location

Athi Bridge

1.1 Background

Kenya, located in eastern Africa, is approximately 1.5 times as large as Japan in terms of national territory. In 1999, a road network of 150,000 km was developed across the country. In the last half of the 1990's, road transport accounted for approximately 90 % of passenger travel and freight, playing a vital role in domestic logistics. Because of Kenya's Mombasa port, a prominent African port in terms of cargo handling, the road network in Kenya was logistically important not only for Kenya but for neighbouring countries as well. The B7 road, where this project was implemented, is one of the trunk roads connecting the northern part of Kenya to Mombasa port.

Road maintenance had not been properly implemented since the 1970's and for this reason road damage prevented the smooth flow of traffic. Although the deterioration of bridges was apparent, constraints in budgets and technological capability had hampered rehabilitation and

the replacement of long bridges. Considering the substantial need for the rehabilitation of bridges, Japan had supported the repair and replacement of bridges through the provision of grant aid and ODA loans (Yen loans). Between 1997 and 1998, weather conditions related to El Nino had caused extraordinary storms which damaged many bridges including the Athi Bridge replaced by this project. The storms caused considerable damage in the Rift Valley Province, the Coast Province, and the Eastern Province, where this project was implemented.

In order to cope with the determination of bridges and disaster recovery, the Kenyan government requested that the Japanese government assisted with major rehabilitation of bridges in the Eastern Provinces. Out of all the damaged bridges in the Eastern Province, the Athi Bridge and the Ikutha Bridge, both of which were on the B7 road, were selected to be replaced by this project.

1.2 Project Outline

The objective of this project is to ensure safe and efficient road traffic, by the reconstruction of two bridges (Athi Bridge and Ikutha Bridge) on the B7 road in the Eastern Province.

Grant Limit / Actual Grant Amount	1,092 million yen / 1,019 million yen
Exchange of Notes Date	January 2002 (Detailed Design) March 2003 (Civil Works)
Implementing Agency	Kenya National Highways Authority
Project Completion Date	August 2005
Main Contractor	Sumitomo Mitsui Construction Co., Ltd.
Main Consultants	Oriental Consultants Co., Ltd (Japan)・Japan Bridge and Structure Institute, Inc.(Japan) (JV)
Basic Design	September 2001
Related Projects	ODA loan “Tana Basin Road Development Project (I)/(II)”, ODA loan “ Kilifi Bridge Construction Project”, Grant aid “Project for the Maintenance of Roads”, Grant aid “Project for maintenance of Roads and Bridges”, Grant aid “Project for Reconstruction of the Sabaki Bridge”, Grant aid “The Project for Improvement of New Nyali Bridge and New Mtwapa Bridge”, World Bank “Norhern Corridor Development Project”, AfDB “Mombasa-Nairobi-Addis Ababa Corridor II Project”

2. Outline of the Evaluation Study

2.1 External Evaluator

Nobuyuki Kobayashi, OPMAC Corporation

2.2 Duration of Evaluation Study

Duration of the Study: November 2010 – November 2011
Duration of the Field Study: March 27 – April 9, 2011 and June 18 – June 24, 2011

2.3 Constraints during the Evaluation Study

Due to the reorganization of the implementing agency, records on counterpart finance taken by the Kenyan government together with land acquisition and resettlement records were dispersed. The source of information on these topics was limited to interviews with stakeholders and local residents. As the sector strategy in Kenya at the time of the ex-ante evaluation could not be obtained, judgment on evaluation results was based on the information in the basic design study report.

3. Results of the Evaluation (Overall Rating: A[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance with the Development Plan of Kenya

The national development strategy at the time of the ex-ante evaluation was the Eighth National Development Plan 1997-2001. It was admitted in the strategy that inadequate maintenance had caused the deterioration of road assets for more than the last decade. In addition, it was also mentioned that inadequate maintenance had resulted in an increase in vehicle operating costs, unreliable delivery schedules and, eventually, a fall in productivity. In light of these issues, the maintenance and rehabilitation of the existing road network was the most important task in road sector policy. The sector plan at the time of the appraisal was the Strategic Plan for the Roads Sector 1997. This plan regarded the maintenance and rehabilitation of the existing network as one issue of the highest priority, which was in accordance with the national strategy.

The national development strategy at the time of the ex-post evaluation was the First Medium Term Plan 2008-2012. The strategy regarded the backlog of maintenance works as one road sector issue and it was planned that a program to conduct maintenance works for the existing road network be launched. As for the sector plan, the Sessional Paper No.5, which was approved in 2006, recognized that delayed implementation of maintenance works had caused the deterioration in road conditions and, as a result, heavy maintenance, including periodic maintenance and rehabilitation, was required. The Road Sector Investment Programme and Strategy 2010-2024 (RSIP 2010-2024)[3], under preparation, assessed that approximately 30% of the total road sections of classified roads was "Poor". For this reason, RSIP planned to conduct capital works including periodic maintenance or upgrading for a length of 15,644 km in total from 2010 to 2014. During this period, it was planned that resurfacing of the section between Kangondi and Embu (approximately 82 km) of the B7 road would be implemented.

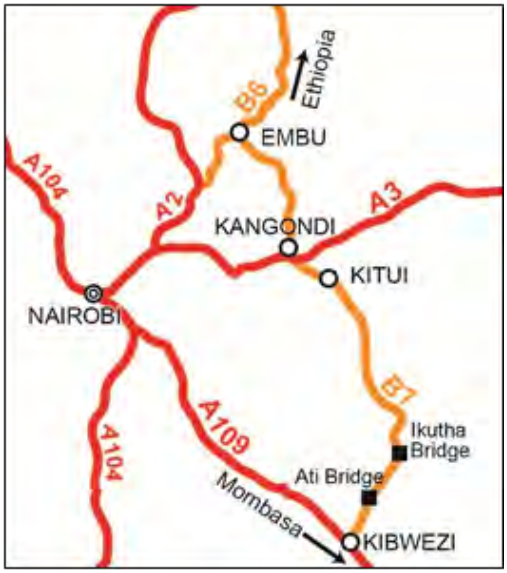


Figure 1: Road Network in Central Kenya

At both the times of the ex-ante and the ex-post evaluations, the Kenyan government recognized the delay in the implementation of maintenance works as an issue in the road sector

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

[2] ③: High, ② Fair, ① Low

[3] RSIP was still under preparation at the time of the ex-post evaluation. Nevertheless, this important plan was assessed in this ex-post evaluation because it set directions for the development and maintenance of roads in the future.

and made efforts towards periodic maintenance and rehabilitation. Moreover, rehabilitation works on the B7 road were planned. As this project replaced two old bridges on the B7 road, it was consistent with the development strategies

3.1.2 Relevance with the Development Needs of Kenya

At the time of the ex-ante evaluation, support for the rehabilitation of five bridges damaged by the extraordinary storms of 1997-1998 was assessed. Out of these bridges, the Athi Bridge and the Ikutha Bridge were selected because of their high classification[4] and their importance in the road network. The Athi Bridge and the Ikutha Bridge, located between Kibwezi and Kitui on the B7 road, were at risk of collapsing should driftwood score or collide with them in the case of a flood. The B7 road was a major route crossing Kenya in a north-south direction avoiding the capital city, Nairobi. It was expected that the improvement of the highway would control through-traffic via Nairobi and cut travel time from the northern part of Kenya to Mombasa port.

At the time of the ex-post evaluation, the road section between Kibwezi and Kitui was still part of the B7 road which held the same road classification. Furthermore, the need to improve the B7 road had emerged in light of the logistics of the East African region. The East African Community, of which Kenya is a member country, selected important road corridors in terms of regional integration and the section of Kibwezi-Kitui-Mwingi-Isiolo was added to the list of regionally important roads in 2003. This section links Corridor No.1 (Kenya-Uganda-Rwanda) with Corridor No.5 (Tanzania-Kenya-Ethiopia) and strengthens the connection of the international corridors. In addition, improvement of the B7 road was expected to enhance the convenience of Mombasa port for landlocked countries, especially Ethiopia. Provided that work on the pavement of the section between Kibwezi and Kitui progresses, it is expected that heavy vehicles traffic will increase and, thus, bridges allowing the traffic of heavy vehicles will play a more vital role.

Mombasa port is a major international port in East Africa at the times of both the ex-ante evaluation and the ex-post evaluation and the amount of cargo handling and the number of passengers at the port has been on the rise. As the B7 road is one of the main routes to Mombasa port from the northern part of Kenya and Ethiopia, maintaining safe and smooth traffic by the replacement of Athi Bridge and Ikutha Bridge was quite meaningful. For this reason, it was concluded that this project was in line with the development needs not only of Kenya but also those of neighbouring countries at both the times of the ex-ante and the ex-post evaluations.

Photo 1: Ikutha Bridge

[4] At the time of the ex-ante evaluation, the classification of roads was A: international trunk roads (roads linking centers of international importance, crossing international boundaries, and terminating at international ports), B: national trunk roads (roads linking nationally important centers), C: primary roads (roads linking provincially important centers), D: secondary roads (linking locally important centers), E: minor roads linking minor centers in rural areas, and Others: special purpose roads. At the time of the ex-post evaluation, the classification of roads used a similar definition.

Table 1: Cargo Handling and Passengers at Mombasa port

	Before Project Implementation (2001)	After Project Completion (2008)
Ship call	1,582	1,686
Passengers	11,917	18,680
Container Handling (TEUs)	290,500	615,733

Source: Kenya National Bureau of Statistics "Statistical Abstract 2010"

3.1.3 Relevance with Japan's ODA Policy

At the time of the ex-ante evaluation, Japan's Official Development Assistance (ODA) Charter, the preceding charter, which was approved in 1992, placed special emphasis on the development of infrastructure through ODA. The charter defined infrastructure as a basic condition of social and economic development and it prioritized assistance in infrastructure investment. The Country Assistance Strategy for Kenya of 2000 recognized the importance of transport infrastructure which was directly linked to the improvement of living conditions (such as small bridges in rural areas). As background to this policy, it has been pointed out that the infrastructure in many sectors, including transport, was inadequate with deteriorating conditions.

It was concluded that this project was consistent with Japan's ODA policies as it supported the replacement of bridges in rural areas of Kenya and intended to remove a logistical bottleneck.

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 Efficiency (Rating: ③)

3.2.1 Project Outputs

As for the main output of this project, the two bridges were constructed as planned. There was no significant change in output negatively affecting the project effects. However, due to the lack of counterpart funds on the Kenyan side, the substructures of both the old bridges, which were supposed to be demolished completely, still remained at the time of the ex-post evaluation. For the same reason, improvements in the approach roads on the left bank of the Athi Bridge were not implemented[5].

Table 2: Project Output (Plan and Actual)

Japanese Side	
Plan	Actual
(1) Bridges · Athi Bridge: PC Bridge, length 120m, width 11m (carriage way 8m, foot walk 3m - both sides) · Ikutha Bridge: PC Bridge, length 75m, width 9.5m (carriage way 8m, foot walk 1.5m - one side)	(1) as planned
(2) Approach roads · Athi Bridge: total 540m · Ikutha Bridge: total 445m	(2) as planned
(3) Revetment	(3) as planned

[5] According to the implementing agency, this work was to be implemented in 2011/12.

Kenyan Side	
Plan	Actual
(1) Demolition of old bridges (2) Improvement of roads on the left bank of the Athi Bridge	(1) Superstructures of the bridges were removed. (2) Implementation planned

Source: Basic Design Study Report, Project Completion Report, Report on Inspection against Hidden Defect

3.2.2 Project Inputs

3.2.2.1 Project Cost

It was difficult to precisely compare the planned amount with the actual amount of project costs borne by the Kenyan side. In addition, the project costs of the Kenyan side were relatively minor and accounted for less than 2% of total costs. For these reasons, the analysis covers only the project costs taken by the Japanese side. As a result of the analysis, the actual project costs were lower than planned (94% of the original plan). Both the cost of civil works and that of design and supervision were below the plan. The difficulty behind making a precise comparison of the project costs borne by the Kenyan side was due to two reasons. First, it was difficult to estimate the costs for the civil works directly carried out by the implementing agency. Secondly, the relevant information was dispersed and lost due to the reorganization of the implementing agency.

Table 3: Project Costs

	Plan	Actual
Civil works	995.9 million yen (Japanese side: 974 million yen)	932 million yen (Japanese side only)
Design and Supervision	115.0 million yen (Japanese side: 115 million yen)	87.9 million yen (Japanese side only)
Total	1,110.9 million yen (Japanese side: 1,089 million yen)	1,019.9 million yen (Japanese side only)

Source: Basic Design Study Report, Project Completion Report

3.2.2.2 Project Period

The Exchange of Notes was made twice for this project and one year was passed between them. Once was for detail design and the second time for civil works. For a precise comparison of the planned and actual periods, the analysis took only the periods required for detailed design and civil works into consideration. The actual project period was shorter than planned (88% of the original period) as both the detailed design and civil works required shorter periods in actual implementation. Land acquisition was completed before the commencement of civil works and contributed to the smooth project implementation.

Table 4: Project Period

	Plan	Actual
Detailed Design	8 months	7 months (March 2002 - September 2002)
Civil Works	24 months	21 month (December 2003- August 2005)
Total	32 months	28 months

Source: Basic Design Study Report, Project Completion Report

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

3.3 Effectiveness[6] (Rating: ③)

3.3.1 Quantitative Effects

As this project intended to cope with the risk of bridge collapse and to ensure the smooth flow of traffic, the judgment for Effectiveness rested mainly on traffic volume and the maximum weight of vehicles allowed to use the bridges. The comparison of "before" and "after" project implementation shows a substantial increase in traffic volume, in particular those of "Medium Goods" and "Heavy Goods" trucks, and the maximum weight of vehicle was also on target.

3.3.1.1 Results from the Operation and Effect Indicators

(1) Traffic Volume

The implementing agency periodically collected traffic data at the Athi Bridge and the Ikutha Junction and a traffic survey was held at the Athi Bridge and the Ikutha Bridge at the time of the basic design study. However, due to the reorganization of the implementing agency, no traffic survey was held after 2007. For this reason, a traffic survey was conducted at the Athi Bridge[7] during this ex-post evaluation.

At the time of the ex-ante evaluation, the forecast for traffic volume had not been prepared and, thus, there was no target for traffic volume after the project completion. The comparison of traffic volumes both "before" and "after" project implementation showed that the traffic volume in 2011 was three times as much as that in 2001. In particular, a remarkable increase was recorded in traffic volume for "Medium Goods" and "Heavy Goods" trucks, both of which had been uncommon before the replacement of the bridges. In the site survey, traffic of trailer trucks, which had not been allowed to use the bridges, was observed. While traffic volume increased in general, that of "Light Goods" trucks, including pickup trucks, remained at the same level. This suggested that more efficient vehicles such as "Medium Goods" and "Heavy Goods" trucks had become more prevalent in cargo transport.

Table 5: Traffic Volume per Day at the Athi Bridge and the Ikutha Bridge

Survey point	Year	Passenger Car	Light Goods	Medium Goods	Heavy Goods	Buses	Total
Athi Bridge	2001*	7	28	4	4	2	46
	2001**	6	33	2	0	6	47
	2007**	6	30	5	3	0	44
	August 11-12, 2011**	25	29	45	12	23	133
	August 15-16, 2011**	23	23	80	9	28	161
Ikutha Bridge	2001*	-	-	-	-	-	64
Ikutha Junction	2001**	6	30	6	8	6	56
	2007**	6	19	2	3	0	30

Source: Basic Design Study Report, KeNHA, Traffic survey conducted by this ex-post evaluation
Note: * Seven day times plus one night time, ** Two day times plus one night time

The section between Kibwezi and Kitui on the B7 road was a gravel road and the maintenance of this section had not been sufficient. Muddy spots and puddles on the road

[6] For the judgment for Effectiveness, the findings in Impact were also taken into consideration in the rating.
[7] The reason for selecting the Athi Bridge as the point for the traffic count was that traffic data for different types of vehicles were available at the Athi Brige. The Ikutha junction, which was in a town area approximately 3km away from the Ikutha Bridge, met another road (D 508) and, therefore, the traffic at the junction was affected by other factors apart from the project effects.

prevented the flow of traffic, especially in the rainy reason. Since there were several drifts[8] around the bridges, heavy rain often halted traffic. In interviews with drivers in the Kibweze - Athi - Ikutha section, some said that traffic on the bridges was smooth all year round but the improvement of roads near the bridges was not satisfactory and, for this reason, some drivers used other trunk roads. It is presumed that even at the time of the ex-post evaluation a part of the traffic to Embu and Kitui, major cities on the B7 road, was via the Mombasa Road (A109). If the section between Kibwezi and Kitui (in particular pavements and new bridges) is improved in the future, traffic volume is expected to further increase.

Photo 2: Drift

(2) Maximum weight of vehicle allowed to use the bridges.

Before the replacement of the bridges, the maximum weight of vehicle allowed was 25 tons and constraints were placed on heavy vehicles for industrial use. The Basic Design Study for the Athi Bridge and the Ikutha Bridge[9] assumed a maximum weight of 55 tons under certain conditions. The completed bridges were in line with the technical specifications and technically satisfied the target of maximum weight at the time of the ex-ante evaluation. At the time of the ex-post evaluation, the maximum weight of vehicle was set at 48 tons in accordance with traffic regulations in Kenya. Given the design standards, this limit was within an acceptable level[10]. For vehicles with a weight of 48 tons or more, permission to use the bridges must be obtained in advance. It was concluded that the constraints on the traffic of heavy vehicles for industrial use had been resolved at the time of the ex-post evaluation, as the traffic of trailer trucks was then allowed.

Table 6: Maximum Weight of Vehicle

	At the time of the ex-ante evaluation (2001)	Target level (2004)	At the time of the ex-post evaluation (2011)
Maximum Weight of Vehicle	25 tons	55 tons*	55 tons* (48 tons**)

Source: Basic Deign Study Report, KeNHA

Note: * As mentioned above, the bearing capacity of the bridges under certain conditions

** Maximum weight of vehicle according to traffic regulations in Kenya (weight per trailer truck)

3.3.2 Qualitative Effects

(1) Uninterrupted Traffic and Traffic Safety

For an assessment of the qualitative improvement in road transport, interview sessions were conducted with seven drivers of heavy vehicles (three bus drivers and four truck drivers) in the Kibwezi-Athi-Ikutha section of the B7 road.

The drivers mentioned uninterrupted traffic in the rainy season and the improvement of traffic safety after project completion. Some said that the water level of rivers had risen and submerged the bridges before replacement. The rise of water level had increased the risk of collapse and, therefore, drivers had waited for several hours - one day – until the water level

[8] Bridge can be used when the water level in rivers is low but is submerged when the water level is high.

[9] The design of both bridges satisfied JRA B Live Load, which allows the maximum weight of 55 tons in the case that the load was spread over length 10m and width 5.5 m.

[10] According to KeNHA staff, the maximum weight of vehicle was 56 tons until the revision in 2009.

declined. After this project elevated the super structure of the bridges, traffic was no longer interrupted in the rainy season.

Most of the drivers rarely felt that passing the bridges was dangerous and said that traffic accidents did not occur around the bridges. As the width of the bridges was widened, the passing of oncoming traffic became safer and the instalment of foot walks enabled drivers to keep their distance from pedestrians. One driver pointed out that reflective stickers on guard rails were too small and made it difficult to know the location of guard rails at night.

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

3.4 Impact

3.4.1 Intended Impacts

(1) Impact on local residents' livelihoods and living environment

In order to understand the project effects, focus group discussion (FGD) sessions, one session each for residents near the Athi Bridge and for those near the Ikutha Bridge, were carried out. Voting was held after opinions on the discussion topics had been drawn out in order to quantify qualitative opinions. An outline of the FGD sessions is as follows:

- Location: Ikutha (near the Ikutha Bridge) and Athi/Kailembwa (near the Athi Bridge)
- Date/Time: Ikutha - morning of April 1,2011and Athi/Kailembwa - afternoon of April 1, 2011
- Participants: Residents near the Ikutha Bridge - 12 participants (9 male and 3 female) and Residents near the Athi Bridge - 12 participants (7 male and 5 female)
- Discussion topic: "How have the Athi Bridge and the Ikutha Bridge changed your life?"
- Voting method: After consolidating five (or so) opinions, each participant cast three votes. (Multiple votes for the same opinion were allowed if the voter strongly agreed)

Photo 3: Focus Group Discussion

As the following table shows, both groups recognized the improvement in transport as most important. This reflected the fact that in the rainy season the rise in water levels had increased risks including that of bridge collapse, thus preventing the use of the bridges. The improvement of business conditions was the opinion second most supported. This result was explained by more frequent use of buses and trucks which now meant that buyers from outside came to people's towns and purchased local products while merchandise could be brought to towns more easily. Since there were few health facilities near Athi/Kailembwa, residents often visited hospitals in Kibwezi. Residents in Athi/Kalilembwa considered easier access to hospitals to be a further change brought by the project.

Table 7: The Results of Focus Group Discussion

Ikutha (near the Ikutha Bridge)			Athi/Kailembwa (near the Athi Bridge)		
Rank	Opinion	Vote	Rank	Opinion	Vote
1	Improved Connectivity	17	1	Improved Transport	14
2	Improved Business	12	2	Improved Business	12
3	More heavy vehicles bring more goods	6	3	Increased access to health facilities	6
4	Loss of land	1	4	Increased Social Interaction	4
	Total	36		Total	36

(2) Impact on Agriculture

In order to assess the impact on agriculture, interviews with local residents, mostly farmers, were carried out (2 male and 9 female interviewees). These interviews with local residents focused on topics such as changes in the price and availability of agricultural inputs (fertilizers and pesticides) and changes in cropping patterns.

According to the local residents, before the replacement of both bridges, fertilizers and pesticides had not often been available in the rainy season but both were available all year round at the time of the ex-post evaluation. As the prices of fertilizers and pesticides appreciated in line with the inflation of general prices, the impact on the price of agricultural inputs was not clear. While the farmers whose main crops were maize and beans showed little change in their cropping patterns, other famers expanded the planted areas for vegetables such as peppers and okra, products for which there was a strong demand from outside areas.

3.4.2 Other Impacts

(1) Impacts on the natural environment

It was expected that bridge piles would affect river flow and might increase the water level of rivers in the cases of flood. The bridges were designed so that the river cross-section hindering ratio (bridge piles / the width of rivers) would be less than 5%[11]. In order to reduce the negative impact on the environment, the contractors took several actions such as measures not to avoiding the dumping of concrete chips, debris, oil, and garbage into the rivers and to levelling bowing pits at the project completion were implemented. No significant negative impact on natural environment was observed during the site visit.

(2) Land Acquisition and Resettlement

According to the implementing agency, land acquisition and resettlement were implemented in accordance with the relevant regulations in Kenya. Due to the reorganization of the implementing agency, detailed information on land acquisition (area of acquired land) and resettlement (number of resettled household) was dispersed and unavailable. Based on information obtained from the consultant for the supervision of this project, the resettlement of a few households was carried out on the right bank of the Athi River but land acquisition and the removal of houses were completed by the commencement of civil works.

As shown above, local residents, the final beneficiaries of this project, fully recognized the improvement in transport. It can be concluded that this project contributed to better production conditions for agriculture through an improvement in the availability of agricultural inputs. Based on information provided by the implementing agency and on the site visit, negative impacts on the natural environment and on local residents were presumed to be negligible.

[11] Data on the water level of the Athi River could not be obtained by this ex-post evaluation. Therefore, it was not possible to assess the effect on the river cross-section area after project completion using actual data.

3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

The road administration body in Kenya had been reorganized significantly between the times of the ex-ante evaluation and the ex-post evaluation. While at the time of the ex-ante evaluation the Roads Department of the Ministry of Roads and Public Works was responsible both for long-term strategy for the road sector and for the construction and maintenance of trunk roads, responsibility for the long-term strategy for these areas had been separated by the time of the ex-post evaluation. Based on the long term strategy set by the Ministry of Roads, each road administration, established by road type, was in charge of construction and maintenance under its jurisdiction[12]. KRB (Kenya Roads Board) was responsible for the management of a road fund, the audit of maintenance works, annual maintenance programming , etc.

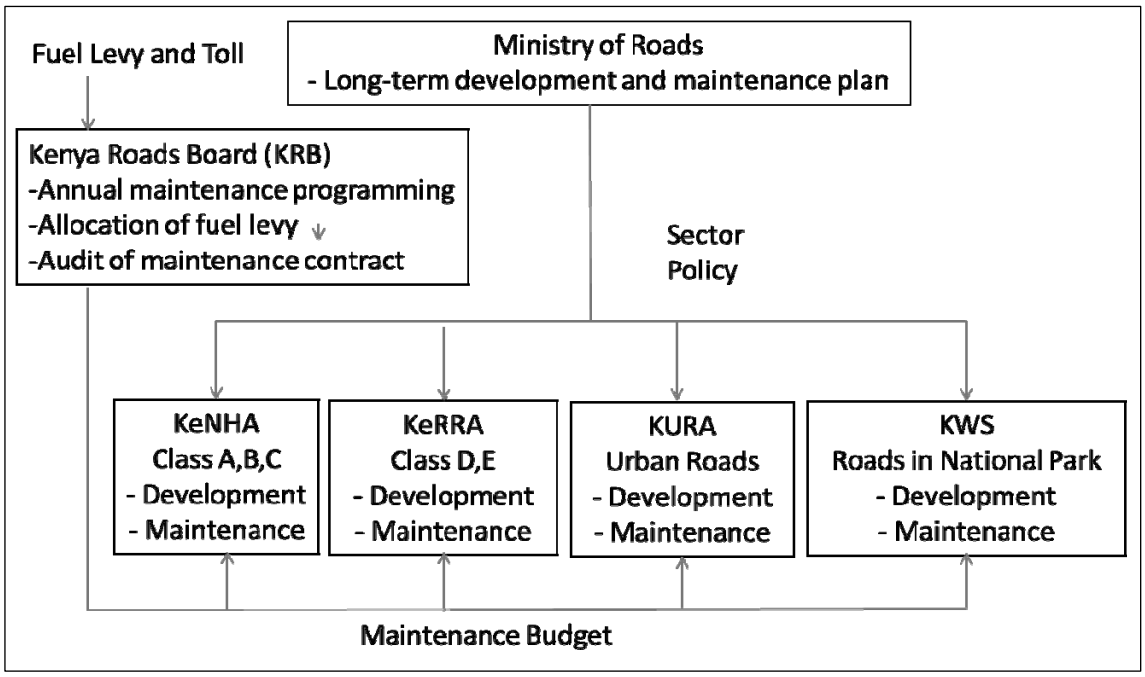


Figure 2: Institutional Arrangement of Road Administration at the Time of the Ex-post Evaluation

KeNHAn (Kenya National Highways Authority) was in charge of the construction and maintenance of A, B and C-class roads and had ten regional offices across Kenya in addition to its headquarters in Nairobi. While regional offices prepared maintenance programmes for areas under their own jurisdiction, these were revised and approved by headquarters. Regional offices also conducted inspections and contract management of maintenance works. After the establishment of KeNHA, the implementation of maintenance works was contracted out to private companies. As maintenance works were no longer directly conducted by the implementing agency, there was no office below the regional offices. The maintenance of the Athi Bridge and the Ikutha Bridge fell into the jurisdiction of the Lower Eastern Regional Office. The number of staff in the Lower Eastern Regional Office was 15, out of which engineers and surveyors numbered 6, with 1 person assigned as bridge inspector in a concurrent post. As the number of inspectors for roads and bridges was limited, efficient implementation became an issue.

[12] Four governmental administrations: Kenya National Highway Authority (KeNHA), Kenya Rural Roads Authority (KeRRA), Kenya Urban Roads Authority (KURA), Kenya Wildlife Service (KWS)

3.5.2 Technical Aspects of Operation and Maintenance

In 2010/11, training on bridge maintenance for bridge inspectors was conducted with the support of JICA. As equipment for inspections was limited and inspections relied on visual inspection, advanced equipment was not used at the time of the ex-post evaluation. In tandem with the outsourcing of maintenance works, the need for training for contract management, such as in procurement and monitoring of maintenance works became stronger. A computer system for the management of budgeting, payment for civil works, and the processing of completion reports was installed in regional offices and training for the use of this system conducted. According to the implementing agency, manuals for inspection and maintenance of bridges were readily available.

KRB had a computer system for the programming of maintenance activities but data on road conditions had not been updated adequately since 2004. It was planned that data on road conditions would be updated after 2011/12.

3.5.3 Financial Aspects of Operation and Maintenance

The major funding source of the maintenance budgets was fuel levies and KRB allocated budgets to four road administrations in charge of the maintenance of roads. RSIP 2010-2024 assumed that routine maintenance would require KSh 2.1 -2.3 billion per year from 2010 to 2014 and that periodic maintenance for the same period would require KSh 48.7 billion (KSh 9.7 per year). In 2010/11, the budget allocation from KRB to KeNHA was KSh 10 billion, out of which the maintenance budget was KSh 7.1 billion. Given the required budget, the actual allocation for the maintenance budget was not sufficient.

Table 8: Budget Allocation from KRB to KeNHA

Unit: billion Kenyan schillings

	Budget Allocation	Expense within Fiscal Year
2009/10*	10.56	9.22
2010/11	10.00	7.25**

Source: KRB

Note: * Including the budget for the Roads Department before reorganization,
** By expense until the third quarter

The budget allocation at the time of the ex-post evaluation had noticeably decreased from that at the time of the ex-ante evaluation, though the change in maintenance from direct implementation to contracting out did not allow rigorous analysis. Before project implementation, the maintenance budget for the B7 roads had been KSh 48.9 million (approximately JPY 71. 5 million at the exchange rate at that time) in 2001/02. However, at the time of the ex-post evaluation, the maintenance budget for the B7 roads was KSh 23.3 million in 2009/10 and KSh 6.6 million in 2010/11. In 2010/11, the fiscal deficit was expected to surpass 7% of GDP for two consecutive fiscal years. For this reason, the Kenyan government made efforts to control expenses and postponed until the next fiscal year graveling on unpaved sections of the B7 roads, although this had been included in the budget at the beginning of the fiscal year. At the time of the ex-ante evaluation, it had been expected that periodic maintenance would be conducted every five years but periodic maintenance on both bridges had not been implemented since the completion date because of insufficient budget.

3.5.4 Current Status of Operation and Maintenance

The site visit revealed some damage on the bridges including cracks on the road surface, vegetation on the carriageway, and a collapse of slopes and shoulders. Nevertheless, it was considered that this damage was minor and unlikely to negatively affect the project effects. No

serious scouring was observed on either bridge. The implementing agency decided that the shrinking of concrete through temperature changes had caused the cracks on the road surface as they were alligator cracks and their width was narrow. To prevent the growth of vegetation and the collapse of slopes and shoulders, it is desirable that routine maintenance be conducted more frequently. Periodic maintenance, including the detailed inspection of cracks at earlier opportunity, is also advisable.

As a result of the site visit, it was confirmed that the substructures of the old bridges had not been demolished at either the Athi Bridge or the Ikutha Bridge. If the old bridges were not removed, this could lead to a critical situation where the collapse of the piles of the old bridges would reduce the river cross-section area and affect water flow. It could also happen that the piles of the old bridges would trap driftwood and prevent the smooth flow of the river. These problems would likely cause scouring at the new bridges. Given these problems, the Kenyan government was requested to demolish the old bridges at inspection as a measure against hidden defects.

Some problems have been observed in terms of the financial aspects, therefore sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The replacement of Athi Bridge and Ikutha Bridge, carried out by this project, was consistent with the development strategy of Kenya with its emphasis on the maintenance of the existing road network. It was intended that the bridges improve access to Mombasa port, a major port in the East African region, from landlocked areas such as Ethiopia and the northern part of Kenya. As the project implementation was efficient, both project costs and the project period were within the original plan. The comparison of “before” and “after” project implementation showed a substantial increase in traffic volume, in particular those of “Medium Goods” and “Heavy Goods” trucks, and the maximum weight of vehicle also achieved its target. Local residents were fully aware of the improvement in transport and business conditions. In addition, in the agricultural sector, an improvement in the availability of agricultural inputs was found. No serious damage negatively affecting the project effects was observed as a result of the site survey. However, in the long run, the lack of fund remains a sustainability issue as the budget allocation to the implementing agency was insufficient.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

At the time of the ex-post evaluation, the substructures of the old bridges had not been removed either at the Athi Bridge or the Ikutha Bridge. As this project had assumed the removal of the old bridges in its design the Kenyan government was requested to demolish the old bridges at inspection against hidden defects. If the old bridges were not removed, this might lead to scouring at the new bridges. Therefore, the demolition of the old bridges at the earliest opportunity is desirable. If it is difficult to obtain funds to demolish the bridges, it is advisable that garbage entangled in the bridge piles is periodically removed.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

The implementing agency of this project did not collect data on the key performance indicators selected at the time of the ex-ante evaluation. It is advisable that a monitoring mechanism is established in the Basic Design Study with measures such as identifying indicators collected by the implementing agency for project delivery and the management of organization and selecting indicators which can be continuously obtained.

End

Mozambique

Ex-Post Evaluation of Japanese Grant Aid
"Project for Reinforcement of the Dredging Capabilities for Beira Port"

External Evaluator: Mitsue MISHIMA, OPMAC Corporation

0. Summary

The relevance of the project is judged to be fair. Although the objective of this project was consistent with the development plan and the development needs of the Republic of Mozambique, as well as with Japan's ODA policy, it was not that feasible for EMODRAGA to conduct the dredging plan suggested by the project for the achievement of the project objectives. Efficiency was high with regard to the construction of the dredgers; however the objective of the project, which was to dredge 8 m of water in the old channel, was not achieved by the two dredgers constructed through Japanese grant aid. In spite of this however, the two dredgers did contribute to deepening the old channel, allowing it to reopen. Maintenance dredging was also made possible, and therefore the security of the access to the Beira Port was improved. The effectiveness of the project is fair, as the capacity utilization rate of the dredgers was maintained at more than 60 percent. To improve the deficit producing financial condition of EMODRAGA, it is indispensable that an optimal operation of all the dredging equipment is achieved. This would require comprehensive dredging planning and its efficient implementation. The sustainability of the project effects, therefore, is admitted to be fair.

In light of the above, this project is evaluated to be partially satisfactory as although the project had some effect, there remained some issues for improvement.

1. Project Description

Project Location

Dredger "Alcântara Santos"

1.1 Background

The access channel to the Port of Beira had been dredged to 8m depth during 1989 and 1990 with the assistance of the Netherlands so that the port could accommodate ships up to 30,000 DWT [1]. Empresa Moçambicana de Dragagens [2] (hereinafter referred to as "EMODRAGA") was in charge of the maintenance dredging of the access channel. However, since that time, no appropriate maintenance dredging had been carried out due to insufficient

[1] The abbreviation of Dead Weight Ton, the maximum amount of cargo that a ship can actually carry.

[2] A public company under the control of the Ministry of Transport and Communications (MTC). EMODRAGA is dredging all ports nationwide under contract with Portos e Caminhos de Ferro de Moçambique which is also under MTC.

dredging capacity of the equipment. As a consequence, the channel had become shallow in many places due to incessant sedimentation of silt and sand. The worst area was a bend in the channel, named "Macuti Bend", where the administrator of the Port, Portos e Caminhos de Ferro de Moçambique (hereinafter referred to as "CFM[3]"), had been obliged to construct a new provisional access channel, approximately 200 meters south of the old channel, in 1996.

To improve dredging capacity, the Government of Mozambique requested that the Government of Japan provide a dredger under the grant aid scheme. In response to this request, the Government of Japan conducted a development study, "the Study for Maintenance and Improvement Plan of Access Channel of Beira Port in the Republic of Mozambique " between 1996 and 1998, and a "Basic Design Study Report on the Project for the Improvement of Facilities for Dredging at Beira Port in the Republic of Mozambique" between 1997 and 1998. It was decided that "Aruangwa", a Trailing Suction Hopper Dredger (hereinafter referred to as "TSH dredger") with 1,000 m^3 capacity would be provided under the grant aid scheme in 1999, in order to maintain 6.5 m depth for the provisional access channel.

After four years of dredging work in the provisional channel by Aruangwa, it was revealed that the bottom of the bend in the provisional channel consisted of gravel and was partly clay. Thus, it was hard for Aruangwa to dredge in the channel efficiently. At the same time, the size of ships calling at the Port of Beira (containers and bulk ships, etc.) had been increasing, thus making it necessary for a remarkably deep draft at entry and exit. Consequently, in Beira port, the waiting time for high tides for ships entering was further increased. In addition, grounding accidents had occurred frequently at the bend in the provisional channel and there were an increasing number of complaints from ship owners/operators about the entry and exit channel of the Beira port. To tackle these issues, CFM decided to reopen the old channel, which consisted of earth and sand and which was easier to dredge.

As a huge amount of dredging work was required to reopen the old channel, the Government of Mozambique decided that the only solution was to increase the capacity of the dredgers working at the Port and again requested grant aid assistance from the Government of Japan.

1.2 Project Outline

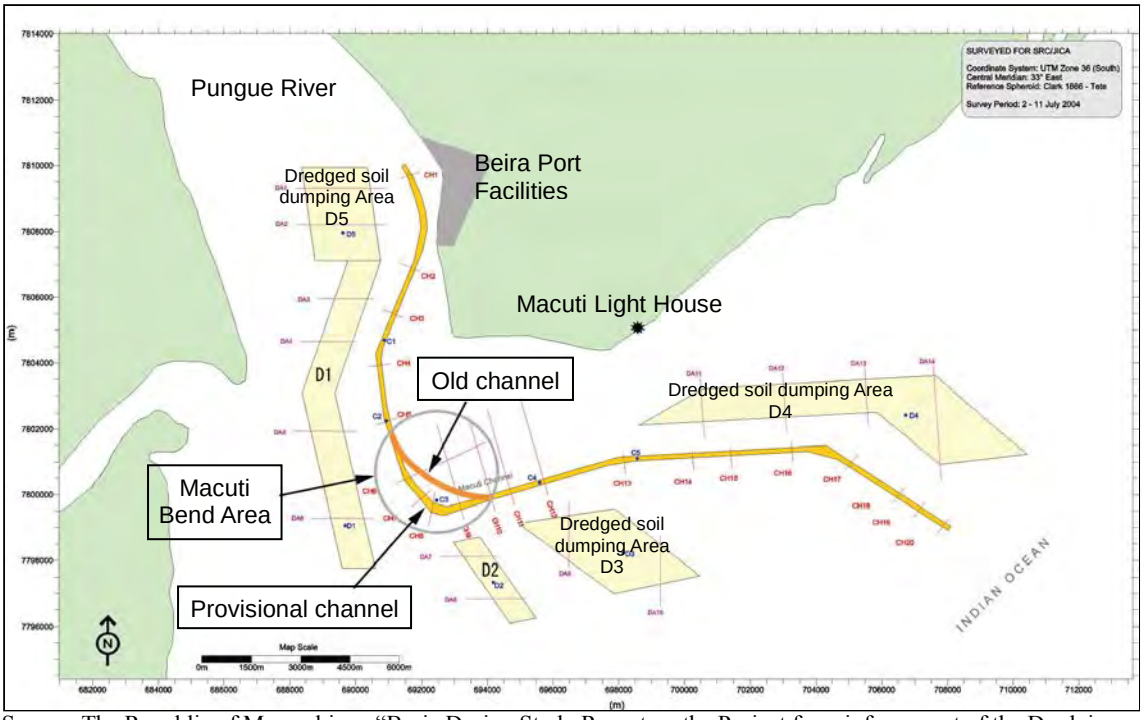
The objective of this project is to maintain a water depth of 8m for the entry and exit route in the port of Beira in Sofala Province through the reinforcement of dredging capability by provision of one dredger[4] to develop the old channel.

Grant Limit / Actual Grant Amount	2,167 million yen / 2,147 million yen
Exchange of Notes Date	May, 2005
Implementing Agency	Mozambique Dredging Company (EMODRAGA)
Project Completion Date	July, 2007
Main Contractor	Mitsubishi Heavy Industries, Ltd.
Main Consultant	Shipbuilding Research Center of Japan
Basic Design	January, 2005

[3] CFM is in charge of the management and operation of the Port and the oil terminal and a joint venture company between Cornelder of Netherland and CFM is in charge of administering cargo and container handling.

[4] 1,000 m^3 type TSH dredger newly constructed and equipped for EMODRAGA under this project.

Related Projects	[Development Study] "the Study for Maintenance and Improvement Plan of Access Channel of Beira Port in the Republic of Mozambique" (FY 1996 – 1997) [Grant Aid] "Basic Design Study Report on the Project for Improvement of the Facilities for Dredging at Beira Port in the Republic of Mozambique" (FY 1997)



Source: The Republic of Mozambique "Basic Design Study Report on the Project for reinforcement of the Dredging Capabilities for Beira Port" (December, 2004)

Figure 1: Access Channel to the Beira Port

2. Outline of the Evaluation Study

2.1 External Evaluator

Mitsue MISHIMA, OPMAC Corporation

2.2 Duration of Evaluation Study

Duration of the Study: November 2010 – May 2011
Duration of the Field Study: January 30, 2011 – February 12, 2011 and March 27, 2011 – April 3, 2011

2.3 Constraints during the Evaluation Study

None

3. Results of the Evaluation (Overall Rating: C[5])

3.1 Relevance (Rating: ②[6])

3.1.1 Relevance with the Development Plan

(1) The Development Plan and Policy of the South African Development Co-ordination Conference (SADC)

Under the 10-year Development Plan for the Beira Corridor, prepared by SADC in 1980, railway, road, port and oil pipeline systems had been constructed between the Beira Port and Zimbabwe by 1996 with financial assistance from Europe and the USA. SADC prepared a Regional Indicative Strategic Development Plan (RISDP) in 2003 to establish a SADC free trade zone by 2008, a customs union by 2010 and a common market by 2015. Thus SADC again placed a high priority on the improvement of ports in Mozambique which were to be bases for trade with SADC countries.

While the targets set by RISDP are still being pursued and a common market has been established, the customs union is yet to be realized and efforts to achieve this target are on-going. The development of the Beira Corridor is promoted for the export of products to, and the transport of materials to and from, neighboring inland countries such as Zambia, Malawi and Zimbabwe. Thus the development and expansion of the Beira Port is emphasized as one of the components of the Beira Corridor Development,.

(2) The Development Plan and Policy of Mozambique

The economic policy of Mozambique has been formulated, based on the Economic and Social Rehabilitation Program (PRES), since 1987. This economic policy has given priority to the transport and communications sector after the agricultural sector. Within this, the improvement of ports as well as roads has been given high priority.

At the time of the ex-ante evaluation of the project, the Action Plan for the Reduction of Absolute Poverty (PARPA) 2001-2005 emphasized the importance of roads improvement in infrastructure projects as a first priority. This was followed by the rehabilitation of ports connected to such roads, which would be bases for the distribution of goods and materials to the main internal regions. The PARPA II 2006-2009, formulated later, contained a discussion of the maximum utilization of the Beira Port in its transportation system development policy for the "promotion of integration in the region and the international economy" – part of "Economic Development" (one of the three pillars of PARPA II). This maximum utilization was for social and economic development in order to enhance the market competitiveness of the area surrounding the Beira Corridor. Therefore, the project is deemed to be important in the national development plan of the country.

In light of the above, in can be seen that this project was relevant to the policy of SADC and to the country's development plan from ex-ante to ex-post evaluation.

3.1.2 Relevance with the Development Needs of Mozambique

The Beira Port handles the second largest amount of cargo after the Maputo Port in the Capital and there has been no change in the importance of its location and the very high demand for its use in terms of the distribution system connected to the inland provinces of the country and to neighboring inland countries. Recently, a coal mining project has begun at the Moatize Coal Mine in Tete Province which is located next to Sofala Province and the Beira port is used to export coal. The railway between Tete Province and the Port has been rehabilitated with financial assistance from the World Bank and the European Investment Bank, and the coal terminal at the Beira Port, to which the railway connects, has been expanded. It is expected that the need for the Beira Port will be even greater in the future.

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

[6] ③: High, ② Fair, ① Low

At the time of the ex-ante evaluation, due to insufficient depth in the old channel, some ship owners were diverting their ships to the Durban Port in South Africa,. Thus ships were avoiding the Beira port. Most of those that did use the port were obliged to reduce cargo volume in order to enter There was a great need to improve the channel in order to reduce waiting time for the high tide and to provide safe access to the Beira Port, in order to meet the increasing demand on the part of large cargo ships (30,000DWT). The flow of sediment from the Pungue River to the channel had necessitated continuous dredging for the access channel and for anchorage at the Beira Port. According to the development study "The Study for Maintenance and Improvement Plan of Access Channel of Beira Port in the Republic of Mozambique" (1996 to 1998), the total amount of soil volume that it was necessary to dredge in order to maintain 8m depth in the channel was 2.5 million m^3 per annum. For this dredging work, the study suggested one TSH dredger with 2,000 m^3 capacity. As an alternative, the procurement of two 1,000 m^3 type TSH dredgers was suggested. In 1999, Japan provided "Aruangwa" – a TSH dredger with 1000 m^3 capacity – under the grant aid scheme as a part of this alternative plan. EMODRAGA negotiated with other donors to seek the possibility of procuring a dredger to fill the gap in the necessary capacity. However, this proved to be impossible. In order to reopen the old channel by dredging to assure water depth and to implement maintenance dredging, the existing equipments of EMODRAGA were insufficient. It was, therefore, indispensable that the dredging capacity of EMODRAGA be reinforced.

Bearing in mind the above, the need to dredge the access channel and develop the Beira Port has remained high since from time of the ex-ante evaluation to the present time of the ex-post evaluation.

3.1.3 Relevance with Japan's ODA Policy

The Guidelines of ODA assistance to Mozambique in FY 2004, prepared by the Ministry of Foreign Affairs of Japan, placed the priority on education, water supply, transportation infrastructure and so on, in accordance with the priority areas of the PARPA. The project is consistent with this ODA assistance policy as it deals with transport infrastructure as prioritized in the Guidelines.

3.1.4 Relevance of the plan to achieving the objectives of this project

To achieve the project objective of dredging the old channel to a depth of 8m water depth, the Basic Design Study of the project proposed that an additional TSH dredger of the same capacity as Aruangwa be procured and that the two dredgers both be used for initial dredging (to assure water depth) and for maintenance dredging of the old channel. The Study concluded that it would be possible to achieve the target water depth in 3years if EMODRAGA conducted 24-hour operation of the two dredgers (hopper capacity 1,000m^3 for each) with two shifts of 3 crew teams. However, after the Study, the Mozambique side decided that it would be impossible for EMODRAGA to implement this plan considering its organizational as well as budget constraints and it started to seek financial assistance from other donors from around 2007. Finally, it was decided that deepening the old channel to a depth of 8m would be implemented as an emergency dredging project and as one of the components of the Beira Corridor Project, signed in April 2009 with financial assistance from European Investment Bank (EIB). For this, 4,700m^3 type and 8,000m^3 type TSH dredgers would be used. Dredging work with the 4,700m^3 TSH dredger started in July 2010 and the 8,000m^3 type TSH dredger started to operate as well in March 2011. At the time of ex-post evaluation, the dredging work was being implemented smoothly and it was expected that it would be complete by July 2011 as scheduled.

The original operation plan proposed by the Basic Design Study of the project (24-hour, two shifts of 3 crew teams) was never implemented. It was too ambitious for EMODRAGA, with its organizational and implementation capacity constraints, to have dredged 8m in the old channel with two 1,000m^3 hopper capacity TSH dredgers in 3 years. The possibility of realizing this operation plan had been slim at the time of the Basic Design Study for the following

reasons:

- EMODRAGA had no experience of 24-hour operations at the time of the ex-ante evaluation. It would have been considerably difficult to immediately implement the 24-hour, 2 shifts system of 3 crew teams from the very beginning of the operation. New crew members were needed for the project, and these required a certain period of time for training.
- The estimated cost of the operation and maintenance for the project in the Basic Design Study was around 4 to 5 million dollars, which was about twice as much as that which had been needed for Aruangwa before the ex-ante evaluation. It was difficult for the Mozambican side to funds to cover such rapidly increasing expenses[7] without specifically envisaged additional financial sources.
- The original plan was that both Aruangwa and a new dredger, "Alcântara Santos", procured by the project, would operate in the access channel to the Beira Port. However, EMODRAGA is in charge of dredging all ports in the country under Government Decree No.38/94, which was enacted in 1994 and which established EMODRAGA. Although its operation may be concentrated at the Beira Port where the demand for dredging is high, EMODRAGA has the responsibility of dredging other ports when necessary. In fact, Aruangwa had operated at ports other than Beira before the Basic Design Study. EMODRAGA's jurisdiction of operations should have been duly incorporated in the Study.

In addition to all this, as it was urgently necessary to deepen and maintain a depth of 8m in the channel, a bigger dredger could have worked more efficiently, achieving the work, especially the initial dredging, in a shorter period of time. In the Basic Design Study there was no active movement seen in support from other donors and a full analysis on the relationship between the project and other donor support was not provided. However, in fact, EMODRAGA requested the provision of a new dredger from Denmark and Denmark conducted a feasibility study for this in 2004.

In conclusion, there were some problems in terms of the appropriateness of the plan to achieve the project objective. The scope of work of the project could in fact only achieve the objective of reopening and partial maintenance dredging of the old channel.

In light of the above, this project has been highly relevant to the country's development plan and development needs, as well as to Japan's ODA policy. However, there was a some problems regarding the appropriateness of the plan in achieving the project objective and therefore the relevance of the project is fair.

3.2 Efficiency (Rating:③)

3.2.1 Project Outputs

One 1,000m^3 capacity Trailing Suction Hopper dredger was constructed as planned. There were some very minor changes in specifications from the Basic Design Study, as in Table 1, which were deemed necessary to meet actual needs. (There was no output from the Mozambique side mentioned in the ex-ante evaluation.)

[7] More details are discussed later in "3.5.3Financial Aspects of Operation and Maintenance".

Table 1: Project Output

Plan (At the time of Basic Design Study)	Actual
One 1,000m^3 capacity Trailing Suction Hopper (TSH) Dredger [Summary of Major Equipment] · Length overall: approx. 70m · Length between perpendicular :65.00m · Breadth: 14.00m · Depth: 4.70m · Draft: 4.00m · Dead Weight Ton: approx.1,800t · Hopper Capacity: 1,000m^3 · Maximum Depth of Dredging: 20.0m · Capacity of the dredging pump: 4,000m^3/h x approx.20mTH 1 · Main Engine Output: approx.1,200PS · Propeller (fixed pitch type): 2 · Service Speed: About 10.2kt · Dredging Speed : About 6.0kt · Number of crew members: 36	As in the plan. There were, however, some very minor changes in equipment specification as below. [Changes in Specification] · Length overall: approx.68m · Dead Weight Ton: approx.1,705t · Hopper Capacity: 1,019 m^3 · Service Speed: 10.5kt

3.2.2 Project Inputs

3.2.2.1 Project Cost

The cost borne by the Japanese side is shown in Table 2. The actual cost was 2,147 million yen, which was within the planned cost of 2,167 million yen (99 % compared to the plan). The reason for the slight reduction in cost was that the design and administration costs were less than planned. According to the Japanese consultant for the project, a part of the design cost was saved as the dredger to be constructed was of the same type as Aruangwa, which had already been constructed under the grant assistance of the "Basic Design Study Report on the Project for the Improvement of Facilities for Dredging at Beira Port in the Republic of Mozambique".

The Mozambique side furnished the fees and charges incurred in the country, and secured a safe quay for the dredger as planned.

Table 2: Project Cost

Unit: Million Yen

Item	Plan	Actual
Total	**2,167**	**2,147.5**
Construction	2,100	1,081
Equipment		1,009
Design and Administration	67	57.5

Source: JICA Document

3.2.2.2 Project Period

The actual project period (from E/N to the handover of the dredger) was 27 months, as planned. As is shown in Table 3, it took two further months, from bidding to handover, than the planned schedule; however, the total project period was within the plan as it was shortened by the two months from E/N to the detailed implementation plan.

Table 3: Project Period

Items	Plan (At the time of Basic Design Study)	Actual
E/N Signing - Handover	**May, 2005 - July, 2007 (27Months)**	**As planned**
E/N Signing - Implementation Plan	May - November , 2005 (7 Months)	May - September, 2005 (5 Months)
Bidding - Construction Contract	December - February, 2006 (3Months)	October, 2005 - January, 2006 (4 Months)
Construction (Design-Handover)	March, 2006 - July, 2007 (17 Months)	February, 2006 - July, 2007 (18Months)

Source: JICA Document

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

3.3 Effectiveness (Rating: ②)

3.3.1 Quantitative Effects

3.3.1.1 Depth Dredging of the Old Channel

As mentioned in **3.1 Relevance** above, depth dredging (initial dredging) was to be implemented as an emergency dredging project separately from the original project plan as proposed by the Basic Design Study Report. This was decided in around 2005 when Alcântara Santos, procured by the project, was still under construction. However, due to the lack of finance of the Mozambican side, it was not until February 2009 that tender for the emergency dredging project was announced. It was finally planned that the emergency project would be financed by EIB and other donor agencies.

With the delay in emergency dredging, there was the option of using the two dredgers procured by Japanese grant aid to reopen the old channel, immediately after the construction of Alcântara Santos was complete. However, the two dredgers actually started depth dredging in September 2008, not in July 2007 immediately after Alcântara Santos was handed over to the Mozambican side.

The reason for this delay was that, if the two dredgers, Aruangwa and Alcântara Santos, did not implement dredging work at the same time to deepen the old and provisional access channel it would have been necessary to temporarily close the access channel to the Beira port. EMODRAGA judged that implementing the dredging work by the two dredgers was indispensible to avoid this. At that time, it was already planned that Aruangwa would operate at Maputo Port from July to December 2007 and at Quelimane Port from May to August 2008 and it was not possible to change this. In addition to deepening the access channel to the Port, it was also necessary to dredge the quay area of the Port. The two dredgers could be used for intensive deepening of the access channel only after September 2008 and this delayed the start of the initial dredging. While Aruangwa operated at other ports, Alcântara Santos conducted dredging work at the provisional and at other channels for about one year after the commencement of operations in 2007.

Photo1: Dredger “Aruangwa”

As the result of the operation of the two dredgers procured by the Japanese government, the water depth at the Macuti Bend was improved as shown in Table 4. The old channel was deepened by 2.6m, from a 3m depth at the time of commencement of dredging to a 5.6m depth by 2010. As the original target depth was 8m,

requiring dredging of 5m, the completion of 2.6m of work meant an achievement ratio of about 52%. Comparing the results of dredging with the annual plan of EMODRAGA shown in Table 4, the achievement ratio was more than 80% in 2009 and 2010. As a result of dredging, the old channel was reopened in June 2009. The two dredgers were operating in the old channel until June 2010, just before the commencement of emergency dredging financed by EIB.

Table 4: Water Depth of the Access Channel to Beira Port (Average at Channel at Macuti Bend)

Year		2007	2008	2009	2010
Water Depth in Provisional Channel (m)	**Actual**	**3.5 (May)**	**4.5 (September)**	-	-
Water Depth in Old Channel (m)	**Plan**	-	5	6	6.5
	Actual	-	**3.0 (October)**	**5.3 (September)**	**5.6 (April)**

Source: EMODRAGA Documents

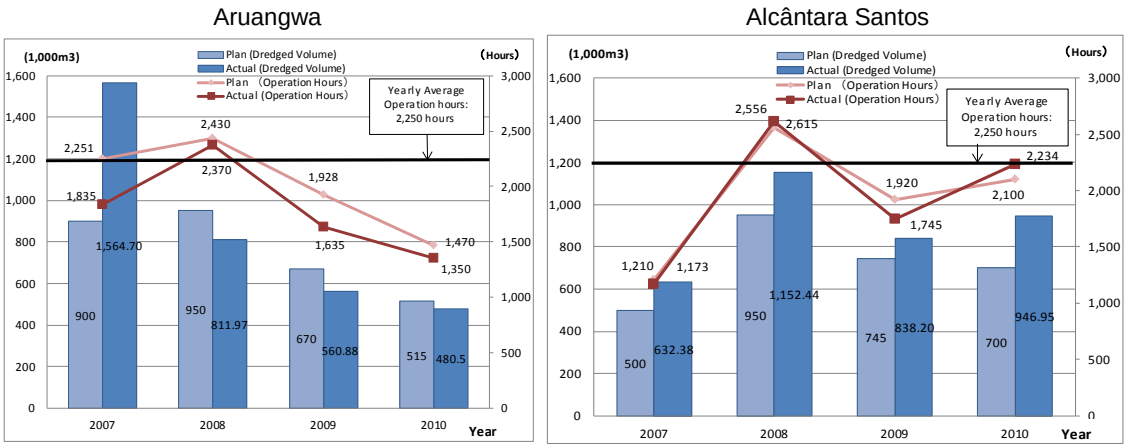
Note: Month in( ) is the time of measurement. The indicators for the plan were set by EMODRAGA at the beginning of the year.

3.3.1.2 Operation of the Dredgers

The two dredgers were used in places other than the old channel of the Beira Port. They were used for dredging the quay area as well as the newly planned coal handling terminal area of Beira Port, Quelimane and Maputo Port. While such additional works were not included in the original objective of the project, the need of such work was already clear at the time of the Basic Design Study. For the sake of analyzing the effectiveness of the project, these additional works were included in the calculation of the operation time of the two dredgers in order to compare the actual operation time with the annual plan of EMODRAGA and the estimated standard annual operation time.

The annual operation target was 4,224 hours based on 19.6 hours per day and 220 days of annual operation; however, this target was not relevant as stipulated in **3.1 Relevance.** Based on discussions with EMODRAGA, considering its implementation structure and budget, the standard annual operation time was thought to be 2,250 hours, based on actual average daily operation hours of 9 to 10 hours per day and 220 days of annual operation.

As shown in Figure 2, the annual volume of dredging carried out by Alcântara Santos exceeded the EMODRAGA annual plan from 2007, and its operation time was more than 90% of that planned. Compared with the standard annual operation time of 2,250 hours, however, the actual time was 116% in 2008, 73% in 2009 and 99% in 2010. The actual dredging volume of Aruangwa was between 80% and 90% from 2008 to 2010 when compared to the EMODRAGA annual plan. The actual operation time of Aruangwa was 105 % in 2008, 72% in 2009 and 60% in 2010, of the standard annual operation time.



Source: Data provided by EMODRAGA
Note: Operation in 2007 of Alcântara Santos is from the July commencement of operation.

Figure 2: Operation of Each Dredger

The actual volume of dredging as well as the operation time of the two dredgers decreased in 2009. According to EMODRAGA, the main reason for this was the 2009 decrease in CFM budget allocation for dredging, which was caused by the worldwide financial crisis in 2008. The operation time of Aruangwa decreased further in 2010 as it was in dock, for large scale repairs for a longer time than it had been in previous years.

In conclusion, the deepening of the old channel and the operation time of two dredgers was more than 80% of the target set by the EMODRAGA annual plan. However, a limited performance of 60% to 70% of the standard annual operation time was seen during the evaluated period. A more efficient dredging plan and additional budget allocation could have maintained the annual average operational ratio above a certain level and this would have achieved more progress in dredging of the old channel. Thus the quantitative effects are fair.

3.3.2 Qualitative Effects

As has been noted, that there was a great number of complaints from ship owners and operators at the time of the Basic Design Study, when the evaluator conducted interviews with them in order to hear their views on the reopened access channel (see Box below). However, the operating company of the Port as well as major shipping companies who used the Port affirmed that the reopening of the old channel had improved safety of access. One of the interviewees even pointed out that without the dredger procured by the project, the Beira Port would have been closed. Considering all comments by stakeholders, such as ship owners, and bearing in mind the fact that there was no dredger as large as the one provided by the project at that time, even though there was a delay of five years until the emergency dredging started after planning, because of the project, the worst case scenario - the closing of the Beira Port – was avoided.

In light of the above, this project can be said to have achieved its objective to a certain level; therefore its effectiveness is fair.

(BOX) Opinions from the Beira Port Operation Company and Shipping Companies

At the time of the ex-post evaluation, the evaluator conducted interviews with Cornelder de Mozambique S.A., the operating company of the Beira Port, and three shipping companies (the Mediterranean Shipping Company, MSC, Sturrock Shipping Ltd., and Beira Bulk Services). The interviewees from the shipping companies were selected from companies on a list prepared by CFM. They were selected because they were typical in their operations and because their personnel in charge could be interviewed in Beira city. Those selected were from two large companies handling large ships (the person in charge at MSC was a representative of the Association of the Shipping Companies) and one comparatively small company, dealing with vegetable oil and other products. The following is the results of the interviews.

[Comparison of the Old Channel Before and After the Project]

- After the reopening of the channel, ships have been able to navigate faster and more safely (MSC).
- Before the project, as the channel was only about 3.5m deep, ships always had to wait for high tide. Bad weather conditions often meant that the waiting time was longer. Thanks to the project, ships could navigate the Macuti Bend area more safely and without fear of grounding (Cornelder).
- The reopening of the old channel improved conditions in the channel remarkably. The number of serious grounding cases caused by insufficient dredging decreased. Current grounding cases do not result in ships being stranded and unable move for some time but ships can now continue to navigate even if they touch the bottom of the channel. Anxiety and tension on the part of crews decreased when navigating the Macuti Bend. (Sturrock Shipping)
- Without the reopening of old channel, the Beira Port would have been closed (Sturrock Shipping). The number of ships visiting the Port would have decreased, thus stagnating the development of the Port (Cornelder). The situation would have been worse than it is today (Beira Bulk Service).
- EMODRAGA has been doing their best considering the constraints of dredging capacity (Struck Shipping).

[Impact on their Operation]

- There used to be three ships using the Port before, but now there are six large ships, one of which is a Panamax tanker entering the Port (MSC).
- There was no major impact on operations (Sturrock Shipping, Beira Bulk Service, Cornelder). Compared to before, the access channel has been partly improved. The need to use the Port will remain unchanged (Cornelder).

[Demand for Cargo handling and Infrastructures Related to use of the Port]

- The operation of the Port needs to be improved. The cargo handling capacity does not meet demand. The Port facility is yet to be developed and there is a particular need to expand the cargo storage space. Waiting time has increased not only because of the problem of the channel but also because of the increasing number of ships using the Port while problems in the operation of the Port still remain (MSC).
- Currently, the connecting railway is neither well operated nor maintained. It was estimated that 70 % of the goods handled at the Port could be carried through connecting roads and 25% through the railway. However, the railway is carrying only 10% and the smooth distribution of goods is constrained (Cornelder).

[Requests Regarding to the future Dredging Work]

- It is necessary to monitor the water depth of the channel continuously. The total capacity of the existing dredgers is less than necessary, considering the volume of silt and sand to be dredged in the channel. A larger dredger is needed in the future. It is hoped that the Beira Port may provide good access for cargo distribution for Malawi and Zimbabwe, where economic growth is expected to increase. If this happens, demand for cargo distribution will become higher (MSC).
- It is hoped that 24-hour use of the access channel will become possible in order to reduce waiting time. One visiting ship is reported to have waited for 20 days before being moored at the quay (MSC).
- In addition to the need to dredge the access channel, it is also always necessary to dredge the quay area (Beira Bulk Service).

Source: Result of Interviews at Ex-post evaluation

3.4 Impact

3.4.1 Intended Impacts

(1) Increase in the size of visiting ships and the volume of cargo

As shown in Table 5, the number of bulk and cargo ships among all large-size ships entering the Port increased in 2009, when the old channel was reopened, and continued to increase in the following year. The average total tonnage as well as the maximum tonnage of visiting ships also increased somewhat. A higher volume of cargo was distributed to neighboring inland countries such as Zimbabwe, Malawi and Zambia, than to inland provinces of Mozambique, and this trend was picked up at the time of the ex-ante evaluation. It is expected that neighboring countries will continue to need to use the port in the future. Interviews with ship owners (see Box) imply that there is a high demand for cargo handling.

CFM admits that the project partly contributed to the increase in the number of bulk and cargo ships and the volume of cargo handling. There has been increasing demand for cargo handling created by the recovery of the Zimbabwe economy after 2009. With the improvement in the access channel to the Port, it can be seen that the project has contributed to meeting this demand.

Table 5: Number, Maximum and Average gross tonnage, and cargo handling volume of Ships Entering the Beira Port

Indicators		2007	2008	2009	2010
Total number of the ship entering to the Port		**366**	**330**	**386**	**398**
(By Type of the Ship in the above)	Number of Container Ships	110	114	144	124
	Number of the Bulkers and Cargo Ships	163	118	139	170
	Number of the Tankers	93	98	103	104
Maximum Gross Tonnage (Ton)		**32,458**	**32,520**	**31,144**	**33,005**
Average Gross Tonnage (Ton)		**12,233**	**13,663**	**13,720**	**15,567**
Total Cargo Volume (1,000ton)		**2,961.1**	**3,036.90**	**3,029.70**	**4,059.81**

Source: CFM- Central documents

(2) Decrease in Marine Accidents

At the time of the Basic Design Study, it had been expected that the deepening of the old channel to 8m would result in a decrease in the number of marine accidents such as grounding at the Macuti Bend. It is difficult to verify the degree of the causal relationship between the project and grounding accidents since accidents are caused by various factors such changes in tide, human error, and so on. However, as shown in Table 6, compared to the period 2006 to 2008, a tendency towards decrease can be seen since 2009 when the old channel was reopened. As CFM Central pointed out, without the project, the number of grounding accidents would have increased more. Accordingly, the change of access from the provisional channel to the old channel has undoubtedly contributed to the decrease in the number of the accidents at least to some extent.

Table 6: Grounding accidents around the access channel to the Beira Port

Indicator	2006	2007	2008	2009	2010	2011
Number of Grounding Accidents	6	5	8	3	5	1

Source: CFM- Central

Note: Indicator in year 2011 is at the time of May. Two accidents out of the five in 2010 happened outside the channel.

(3) Decrease in Waiting Time for High Tide

According to the Basic Design Study, it was expected that the project would lessen the

average waiting time for high tide by 10 hours per ship. However, the actual waiting time more than doubled between 2009 and 2010 (see Table 7) . Above all, the reason for this is that the water depth of the channel has not reached the target depth, which limits the access of large ships. In addition to this, according to CFM, the number of quays for the use of general cargo ships has been reduced due to development work at the Port and cargo handling capacity has decreased by 30% On the other hand, the number of general cargo ships as well as the volume of cargo have increased. This has caused the waiting time for quays to increases leading also to increases in the waiting time for high tide. A breakdown of each cause of increase in waiting time (shown in Table 7) indicates that the proportion of quay waiting time increased between 2009 and 2010.

Table 7: Waiting time for the tide in the access channel of the Beira Port and its causes

Indicator	2007	2008	2009	2010
Waiting Time for the Tide (Hours)	5,106	6,119	8,505	14,315
Wating Time for the Tide per Ship (Hours /Ship)	30.56	28.04	29.82	76.08
Causes of Waiting time				
Convenience of Ship	8%	6%	n.a.	5%
Arrival at Night	4%	35%	6%	2%
Waitng for the Quay	24%	4%	22%	42%
Waiting for the Tide	52%	13%	60%	47%
Bad Weather	10%	34%	7%	3%

Source: CFM- Central

In conclusion, the project contributed to an improvement in safe access to the port and thus partly to meeting the increase in demand for cargo handling. However, the objective of the project (maintaining 8m depth in the channel) was not achieved, and therefore, the intended impact has not been realized.

3.4.2 Other Impacts

(1) Impacts on the natural environment

Neither resettlement nor land acquisition was required for the project. According to CFM and EMODRAGA, there was no negative impact on the natural environment caused by the dredging works, and no negative report was filed with regard to the disposal of dredged silt and sand. The five disposal sites identified at the time of the Basic Design Study are near to the old channel, three of which are now at full capacity and rarely used. A study of is being carried out to look at the availability of additional disposal sites at places farther from the channel.

(2) Other indirect impacts

None.

3.5 Sustainability (Rating:②)

3.5.1 Structural Aspects of Operation and Maintenance

The Basic Design Study proposed that dredging operations be implemented for 24-hours a day using two shifts of 3 team crews with a total number of 54 (18 per one team). At the time of the procurement of the project dredger, it was decided that deepening of the channel to 8m would be implemented as an emergency dredging project with an alternative financial source. The proposed dredging work shifts were never implemented. The actual operation time was 11 hours a day (6:00 to 17:00) from Monday to Friday in July 2010 just before emergency dredging began. This was less than half of the proposed operation hours. After the emergency dredging project, it was planned that operation hours would be extended gradually to 16 hours

per day (Monday to Friday, 4:00 to 20:00) without an increase in the number of staff. EMODRAGA reported that they could manage longer operation hours as they had previous experience of operating 16 hours a day.

The organization of EMODRAGA is shown in Figure 3. The total number of staff is 160, of which 74 are allocated to the Operation Department in charge of dredging, and 30 allocated to maintenance. A total of 65% of staff is in charge of dredging and maintenance. Aruangwa and Alcântara Santos have crews of 33 and 29 respectively: 50% to 60 % of the 54 members proposed by the Basic Design Study. The number of staff in charge of machine operation is less than planned; however, the minimum requirement has been secured for the allocation of staff to each section in order to implement up to 16 hours of operation. At the time of this evaluation survey, EMODRAGA intended to increase the number of staff to at least three for machine operation in the future.

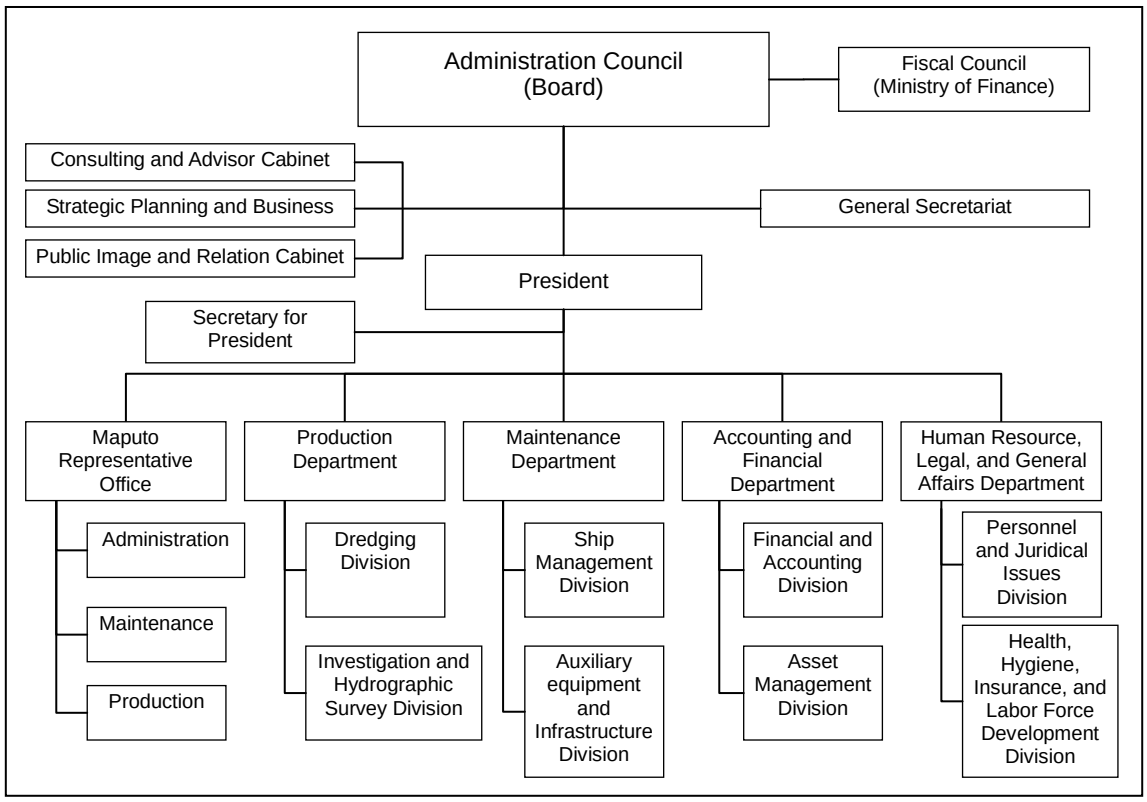


Figure 3: Organization Chart of EMODRAGA

3.5.2 Technical Aspects of Operation and Maintenance

EMODRAGA implements a weekly (on Saturdays) as well as an annual inspection of the equipment as proposed by the Basic Design Study and in accordance with the instructions of the manufacturer. Inspection by the supervising consultant confirmed that proper maintenance was being carried out for the two dredgers. At the time of inspection, the staff in charge of operation and maintenance of equipment (such as the main engine and power generators) were instructed by the consultant. There were no major problems found at the time of the ex-post evaluation. The crews of the two dredgers had the basic knowledge necessary for the handling of the equipment and could deal with minor troubles, thus proving their basic capacity for operation. EMODRAGA staff have seafarers' qualifications as established by the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). EMODRAGA internally arranges capacity evaluation and training courses for their staff, to improve their technical capabilities. (see Table 8).

Table 8: EMODRAGA Training Courses

Training Program	Target	No. Of Trainees	Frequency (times/Year)	Duration
Repair of electric boads	Electric Engineers	10	2	2weeks
Repair of diesel motors	Machinery Engineer	12	2	2weeks
Safety on board	All crews	33	2	1 week
Equipment operation on board	Machine Technitian	10	3	1 week

Source: EMODRAGA

As the natural conditions of the Port require continuous dredging of the access channel which in turn demands a large amount of dredging work, it is important that the techniques, capacity and efficiency of dredging operations are improved. The Basic Design Study pointed out the need for EMODRAGA to acquire ship management methodology such as medium and long term operation planning and evaluation of achievements, utilization and maintenance techniques for dredging equipment, and improvement in the techniques for navigating dredgers, including hydrographic surveys. Such recommendations had not been acted upon at the time of ex-post evaluation. In the light of this, the JICA Mozambique office has been monitoring EMODRAGA's operations and has listed support for EMODRAGA as one of its grant follow up projects for fiscal 2010. Finally, support for EMODRAGA was implemented not by a follow-up grant but by a counter-part fund[8] which was created when the Japanese Government provided Mozambique with non-project and food assistance grants. The fund was used to procure the machine parts needed for maintenance and operation, as well as one year technical guidance by Portuguese experts (an engineer and a surveying engineer) which started at the end of February 2011 and is expected to continue to December 2011. In addition, at the time of the procurement of the 2,500m^3 TSH dredger in 2012, with the financial assistance from Denmark, it is planed that technical assistance will provide intensive operational training. It is expected that this training will lead to technical improvements in ship management as well as in dredging operation.

Photo 2: "Alcântara Santos" Captain and Navigation Room

3.5.3 Financial Aspects of Operation and Maintenance

EMODRAGA is a public company with a general self-support accounting system. The actual costs of the operation and maintenance of the two dredgers, Aruangwa and Alcântara Santos, is set out in Table 9 below. The Basic Design Study Report does not include the estimated costs of operation. However, the estimated annual cost of maintenance was $252,500 for the two dredgers. Table 9 shows that the actual expenses exceeded the estimate considerably. Particularly in 2010, more intensive repairs than in a normal year caused a large increase in maintenance costs.

[8] When the Japanese Government provides developing countries with non-project grants, food grants and poor farmers' assistance, the recipient countries are required to deposit the money acquired by selling the goods provided into a special account. This is then used for social-economic development projects in the recipient countries. Such deposited funds are called counter-part funds.

Table 9: O & M Costs of "Aruangwa" and "Alcântara Santos"

Unit: US dollars

Item	2007	2008	2009	2010
Operation Costs (Personnel, fuel, tax, etc.)	1,497,270	2,101,606	1,260,066	1,458,192
Maintenance Costs (Annual dock, purchase of spare parts etc.)	406,224	612,704	534,169	1,117,607
Total	**1,903,495**	**2,714,311**	**1,794,235**	**2,575,800**

Source: EMODRAGA

The major financial indicators of the EMODRAGA Profit and Loss Account are shown in Table 10. It has continuously recorded a deficit, as the operating expenses have exceeded the operating profit every year. Most of the income from dredging operations has come from dredging works directly contracted with CFM, except dredging works at Maputo Port carried out by Aruangwa in 2007. The contract for this was awarded as a result of competitive bidding. The income from dredging did not cover the costs of operations during 2007 and 2010. The estimated income from dredging was 2.0 – 2.5 $ per m^3 while the estimated costs were 2.3-5.0 $ per m^3. While it is necessary to try to reduce the dredging expenses, first priority should be given to securing sufficient income to cover costs.

As shown in Table 10, the share of the operation and maintenance costs of Aruangwa and Alcântara Santos is around 30% to 40% of the total operation costs. Increases in personnel expenses and fuel costs has pushed up operation costs every year since 2007.

On the revenue side, the income from dredging operations improved in 2007 and 2008 due to the newly procured Alcântara Santos. However, income decreased with the decrease in the CFM budget in 2009, and EMODRAGA dredging works also decreased due to the emergency dredging project in 2010. On the other hand, EMODRAGA has received financial support from the National Dredging Fund (NDF), established to finance dredging works in 2006. This mainly (40%) comes from port charges. While the amount of financial support has been increased yearly, the decrease in income from dredging has only been complemented for the recent two years.

The financial situation up to 2010 has implied that fundamental improvement was not realized by the efforts to increase income and cut expenses. After the procurement of the additional dredger through Danish assistance in 2012, it is predicted that the costs of operation and maintenance, and depreciation expenses, will further increase and this will require a management strategy in order to increase income. In the future, after the two dredgers procured through Japanese assistance resume ordinary operation as before, it is desirable that EMODRAGA attempts to improve its financial condition, establishing a medium and long term operation plan to secure steady income and to implement cost efficient management.

Table 10: Major Financial Indicators of EMODRAGA Profit and Loss

Unit: 1,000MZN

Major Indicators	Year 2006	2007	2008	2009	2010
Revenue	**142,350**	**201,246**	**277,152**	**248,683**	**250,310**
Operation Income	**66,266**	**120,942**	**162,883**	**142,963**	**217,987**
Income from dredging work	65,495	120,301	126,423	83,184	107,281
Subsidies from National Dredging Fund	n.a.	n.a.	35,610	58,408	84,141
Expenditure	**183,984**	**217,217**	**294,711**	**294,223**	**278,224**
Operation Cost	**111,345**	**135,080**	**174,376**	**175,142**	**255,575**
Personnel	14,169	23,720	34,208	38,783	48,184
Goods and equipment supply and service contracts	53,694	62,921	74,746	65,370	106,776
Depreciation	32,439	46,947	63,030	68,901	92,019
O &M Cost of Aruangwa and Alcântara Santos ( ) is percentage to total operation cost	-	44,732 (33.1%)	67,857 (38.9%)	52,983 (30.2%)	82,811 (32.4%)

Major Indicators	Year 2006	2007	2008	2009	2010
Loss	-41,634	-15,970	-17,559	-45,540	-27,913

Source: EMODRAGA
Note: Reference 1MZN=2.50JPY (Exchange Rate at the time of end 2010)

3.5.4 Current Status of Operation and Maintenance

At the time of the ex-post evaluation field study in February 2011, with emergency dredging on-going, the two dredgers had been moored at the quay (see Picture 3) since the beginning of 2011. EMODRAGA was conducting maintenance work and changing of parts while also carrying out intensive staff training for their crews. Maintenance dredging of the old channel was planned to start with the two dredgers in June 2011, just before emergency dredging is completed. According to EMODRAGA, while there was no official medium and long term operation plan for all of their dredging equipment, they were planning to use mainly the new dredger procured through Danish assistance for the maintenance dredging of the access channel of the Beira Port. The other two dredgers would be used for the maintenance dredging of the other part of the Beira Port and for other ports. When the Danish dredger is out of the Port, the other two dredgers will implement maintenance dredging of the access channel of the Beira Port.

Photo 3: Aruangwa and Alcântara Santos anchored at the Pier

Photo 4: Alcântara Santos anchored at the Pier and Crews

When the ex-post evaluation field study was conducted, some equipment, which had experienced trouble from over-use or damage, was found to be unrepaired in Alcântara Santos, although equipment trouble had been dealt with as much as possible, for example, broken dredging pumps had been changed. Since the only thing that could be done would be to change parts, it was intended that the counter-part fund established with Japanese assistance and mentioned above would be used for procurement of the parts necessary. It is also planned that the counter-part fund would be used to employ technical experts in order to strengthen the planning capacity of EMODRAGA in drafting a medium and long term plan for maintenance and management (as of July 2011). In order to improve the operation, maintenance and management capacity of EMODRAGA, a greater technical as well as operation management capacity is required and some efforts were being made towards improvement.

In light of the above, as some problems were observed in terms of the technical and financial aspects of maintenance and management, the sustainability of the project effects were considered to be fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

While the objective of this project was consistent with the development plan and the development needs of the Republic of Mozambique, as well as with Japan's ODA policy, the relevance of the project is fair, as the implementation plan was not appropriate in achieving the project objective in the context of the actual conditions of the implementing agency. The efficiency was high with regard to the construction of the dredger. However, the objective of the project, which was to dredge the old channel to a depth of 8m, had not yet been achieved even with additional dredging works carried out with financial assistance from other donors. The two dredgers constructed with Japanese grant assistance contributed to deepening and to maintenance dredging of the old channel which then reopened. Therefore the safety of the access to the Beira Port was improved. The effectiveness of the project is fair, as the two dredgers had maintained a certain level in operation rate, dredging quays and the new terminal area of the Port as well as other ports in Mozambique. To improve the financial condition of EMODRAGA, it would be necessary for EMODRAGA to make efforts towards the optimal and efficient operation of all dredgers, which would require both comprehensive dredging work and operation and maintenance planning from the point of view of a medium and long term management strategy. Therefore, the sustainability of the project effects is fair.

In light of the above, this project is evaluated to be partially satisfactory as although the project had some effect, there remained some issues for improvement.

4.2 Recommendations

4.2.1 Recommendations to the Implementing agency

It is planned that the new dredger, to be procured with Danish assistance in 2012, will mainly be used to dredge the access channel to the Port. The two dredgers procured with Japanese assistance will be used until that time and it is recommended that these two dredgers are properly maintained, managed and utilized thereafter in accordance with the long term management strategy. It is important that EMODRAGA formulates a medium and long term plan which takes into account the utilization of all EMODRAGA equipment to meet with the needs for dredging at the ports in the country under their jurisdiction, as well as a strategy for expanding operations together with increased dredging capacity in the future. It is also important that this plan clarifies the maximum operation of the two dredgers and that EMODRAGA implements it firmly.

4.2.2 Recommendations to JICA

At the time of the ex-post evaluation, the status of the operation, maintenance and management of EMODRAGA, as well as the long term operation plan for the two dredgers were uncertain. It is recommended that JICA monitor whether the procurement of parts and technical guidance by experts financed by the counter-part fund will result in an improvement in the operation, maintenance and management of EMODRAGA in one or two years.

4.3 Lessons Learned

The relevance, effectiveness, and sustainability of the project are fair because the project was not implemented based on a realistic analysis of the project implementation structure, capacity and finance. The ex-ante evaluation should have given comprehensive analysis to the organization, capacity and financial condition of the implementing agency and then set inputs and outputs of the project in order to achieve the objective. The following two points should have been considered when formulating the project at the time of the ex-ante evaluation.

(1) A feasible implementation plan should have been formulated based on a comprehensive

analysis of the implementation capacity and organizational structure of EMODRAGA. It was impossible for them to implement a 24-hour two shift operation immediately given the actual condition of the implementing agency and its capacity. In terms of the financial aspect, the possibility of mobilizing finance should have been assessed before the project with an estimation of actual costs to be incurred to the implementing agency (O &M cost analysis in particular, and operation costs) based on the future operational structure of the implementing agency. Recommendations made to the implementing agency at the ex-ante evaluation for technical improvements (the training component) and human resource development should have been implemented at an early stage of the project. If these needs had been well analyzed and included as inputs and outputs of the Project or cooperation sought from other assistance schemes at the time of ex-ante evaluation, the project might have had more fruitful results.

(2) When assessing the objectives of the project and drafting a dredging plan, it was also important to have taken into consideration the whole picture of the operation of the implementing agency and other donors' activities. The ex-ante evaluation should have examined the relationship between the overall operation plan of the agency and that for the project. This overall operation plan should have included dredging of the access channel as well as other parts of the Beira Port, as well as dredging in other ports. Also, it was critical that the relationship between other donors' activities and the project was examined. It was desirable that after consideration of internal and external factors which might affect the implementing agency, the project was analyzed, its objective established, and proper inputs and outputs determined for the achievement of the project objective. Finally, the target indicators for the Project objective should have been set within a range attainable within three years after Project completion.

End