United Republic of Tanzania

Ex-Post Evaluation of Japanese Grant Aid Project

"The Project for the Improvement of Masasi-Mangaka Road"

External Evaluator: Noriyo Aoki, IC Net Limited

0. Summary

The project was implemented for the purpose of ensuring smooth and safe traffic by means of the improvement of the trunk road between Masasi and Mangaka in Mtwara Region, thereby contributing to improved access to social services by local residents, the stimulation of economic activities and regional development.

The relevance of the project is high, because it is consistent with the priority areas of the development policy of Tanzania and the assistance policies of Japan, and development needs are also high. Although project costs were kept within the planned costs, the project period was exceeded slightly; therefore the efficiency of the project is fair. The average speeds was improved, the traveling time was reduced, and the traffic volume also increased. The intended effects of the reduced transportation costs, the reduced operating costs, etc., were observed. The project reduced the cost to stakeholders in key industries of transporting materials and delivering products. The project has also had positive influences through the improvement of residents' access to social services and the stimulation of the local economy, etc., through the commercialization of the area adjacent to the project road. Thus both the effectiveness and impact of the project are high. Although an operation and maintenance management system has been established, along with an increase in traffic volume, ongoing repairs will be continuously required. There are no major issues with regard to financing, and by and large no problems in relation to technical capacity. Some minor issues remain regarding safety measures in operation and maintenance and traffic safety measures for local residents; therefore the sustainability of the effect by the project is deemed fair.

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

1. Project Description

Project Location

Vehicle on Section of Road Covered by the Project

1.1 Background

Although Mtwara Region in the southern part of Tanzania, the area covered by the project, is blessed with agricultural production resources such as cashew nuts and mineral resources

including coal, iron ore and uranium and has a high potential for economic development, it is one of the least developed areas of Tanzania[1]. The section of road covered by the project is part of the Mtwara Corridor, which is included in the Southern African Development Corridor Strategy promoted by the Southern Africa Development Community (SADC). The Mtwara Development Corridor is an international corridor linking Mtwara Port in southern Tanzania with Malawi, Mozambique and other neighboring countries. The four countries involved in the Mtwara Corridor, namely, Tanzania, Malawi, Mozambique and Zambia, were expected to improve the roads within their own countries, and to work together to promote the development[2], but at the time the project was planned, the only surfaced road was a section from the regional capital Mtwara City and Mtwara Port to the small town of Masasi. An improvement of the road connecting to the Unity Bridge[3] spanning the border with Mozambique through the Masasi-Mangaka road, and of the road through Mbamba Bay to Malawi along the Mtwara Corridor, had been lagged behind. Under these circumstances, the road between Masasi and Mangaka covered by the project was regarded as an important section of road in the development of the Mtwara Development Corridor (see Figure 1).

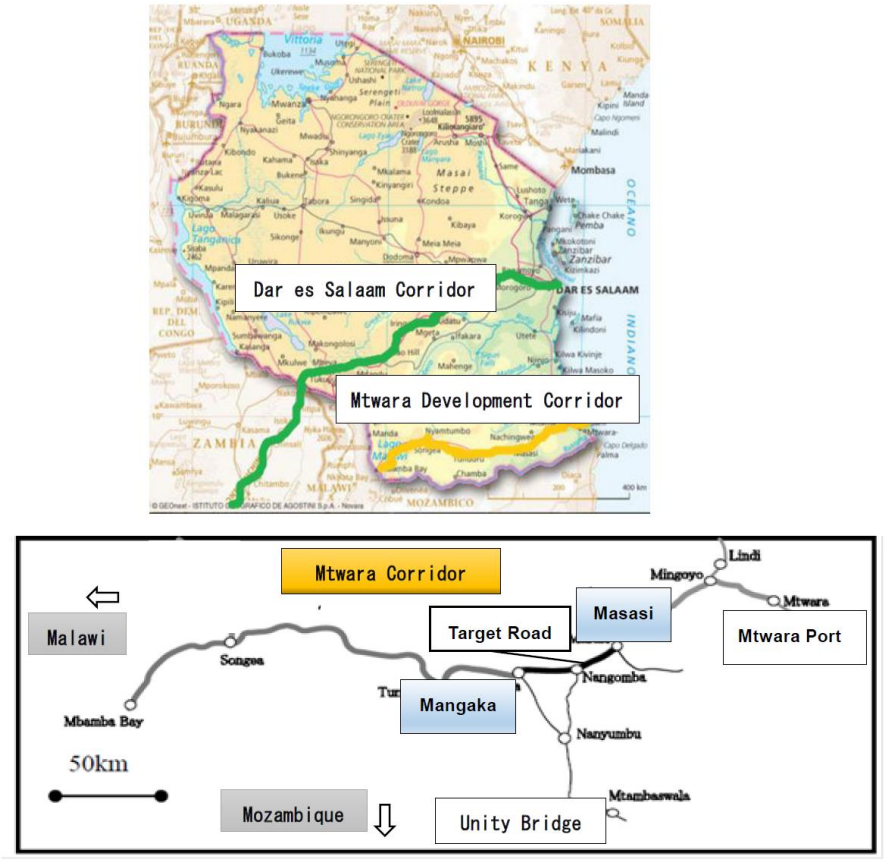


Figure 1: Maps of Project Road and Mtwara Corridor

[1] The GDP (real values) of Mtwara Region ranks 18th of the 21 regions (National Bureau of Statistics, National Accounts of Tanzania Mainland 2001-2013, Ministry of Finance, December 2014). This regional GDP ranks areas according to the number of regions prior to the local government reforms of 2012.
[2] The Southern African Development Community (SADC) contains the Southern African Transport and Communications Commission (SATCC) which sets out standards for road design and road signs. The road signs etc., used in the project follow the SATCC standards.
[3] The Unity Bridge spanning the border between Mozambique and Tanzania was completed in January 2010 and is 600m long, with 10km of surfaced road on either bank. It was financed jointly by Mozambique and Tanzania.

1.2 Project Outline

The improvement of the Masasi-Mangaka road in Mtwara Region in southern Tanzania will ensure smooth and safe traffic, thereby contributing to improved access to social services by local residents, the stimulation of economic activities and regional development.

Grant Limit/Actual Grant Amount	Phase 1 692 million yen/668 million yen Phase 2 758 million yen/735 million yen Phase 3 1,514 million yen/1,504 million yen Total 2,964 million yen/2,907 million yen
Exchange of Notes (/Grant Agreement)	Phase 1 July 2007 Phase 2 June 2008 Phase 3 December 2009 (Grant Agreement /December 2009)
Implementing Agency	Tanzania National Roads Agency: TANROADS
Project Completion Date	December 2011 Phase 1 March 2009 Phase 2 March 2010 Phase 3 December 2011
Main Contractor	TOKURA CORPORATION
Main Consultants	CONSTRUCTION PROJECT CONSULTANTS, INC. INGÉROSEC CORPORATION (Handed over from CONSTRUCTION PROJECT CONSULTANTS, INC. in January 2009)
Basic Design	Phase 1 March 2007 Phase 2 March 2007 Phase 3 October 2009
Related Projects (if any)	・Project Formulation Study for Masasi-Tundul Road Upgrading Project in the United Republic of Tanzania (2005) ・Preliminary Study on the Project for Upgrading Masasi-Mangaka Road in the United Republic of Tanzania (2006) ・Preliminary Study on the Project for Improvement of the Masasi-Mangaka Road in the United Republic of Tanzania (2009)

2. Outline of the Evaluation Study

2.1 External Evaluator

Noriyo Aoki, IC Net Limited

2.2 Duration of Evaluation Study

The ex-post evaluation study was carried out as follows:
Duration of the Study: July 2014 – September 2015
Duration of the Field Study: November 1-15 2014 and January 26-February 2 2015

3. Results of the Evaluation (Overall Rating: B[4])

3.1 Relevance (Rating: ③[5])

3.1.1 Relevance to the Development Plan of Tanzania

At the time of planning, the Tanzanian National Development Plan, namely the National Strategy for Growth and Reduction of Poverty 2005 – 2009 (NSGRP), made the improvement and maintenance of trunk roads a priority issue. Under the 10 Year Road Sector Development Program 2001 – 2010: (10Y-RSDP) formulated in 2001, the road covered by the project, being part of the Mtwara Development Corridor, was ranked a key trunk road (see Figure 1).

The National Strategy for Growth and Reduction of Poverty II, 2010 – 2014 (NSGRP-II), the National Development Plan in place at the time of the ex-post evaluation, aims to promote poverty reduction in rural areas through the expansion and improvement of trunk roads thus providing economic growth and higher incomes. Based on the 10Y-RSDP which was formulated in 2001, the Ten-Year Transport Sector Investment Program 2007 – 2016 (TSIP)[6] has made, and has currently been being implemented. TSIP puts great emphasis on the networking of all means of transport and haulage, including roads, railways, ports and airports. With regard to trunk roads, the Program deems that improvements based on the strategic plan will promote potential development in agriculture, mining and tourism and thus produce an economic effect; with respect to the Mtwara Corridor also, the Program assumes further improvement. TSIP sets as a goal the surfacing of all trunk roads by 2018.

The project is considered to be consistent with the Tanzanian National Development Plan both at the time of the plans mentioned above and at the time of the ex-post evaluation.

3.1.2 Relevance to the Development Needs of Tanzania

When the project was planned, the post-harvest loss[7] in cashew nuts, a major local product in Mtwara Region[8] had occurred, due to the underdevelopment of a network of access roads to market. It made upgrading of the roads a necessity. The existing road was an unsurfaced soil road with a width of around 5m, and two-way traffic was not necessarily safe. During the rainy season, the sandy surface soil caused the state of the road to deteriorate, and some sections became almost impassable to vehicle traffic. Local residents generally travelled short or medium distances on foot or by bicycle[9], but the lack of a hard shoulder, the rough surface of the dirt road and wheel ruts put them in danger of traffic accidents caused by falls or collision with vehicles. As stated in 1.2 Project Summary, it was necessary to give priority to the upgrading of the Masasi-Mangaka section of road, which forms part of the Mtwara Development Corridor[10].

At the time of the ex-post evaluation, the needs identified at the time of planning had been met owing to the improvements made under the project (See Effectiveness); but there continued to be a need for road improvement in the area covered by the project. According to the implementing agency, the development of mineral resources such as coal or iron ore is at the stage of beginning in earnest. Following the upgrading of the

[4] A: Highly satisfactory; B: Satisfactory; C: Partially satisfactory; D: Unsatisfactory
[5] ③: High; ②: Fair; ①: Low
[6] Formulated in June, 2005. A sector plan that was the successor to 10Y-RSDP became TSIP.
[7] Damage to farm produce due to quality impairment at the distribution stage.
[8] The population of the Mtwara Region was approximately 1,130,000: the population of the Masasi District where the road is situated was 440,000 people.
[9] The bicycle is the principal means of transport for producers of cashew nuts.
[10] Basic Design Study Report.

Masasi-Mangaka section of road, progress is being made in upgrading the Mtwara Development Corridor and roads servicing it, with further road works being carried out on the road between Mangaka and Tundul, which is another part of the Mtwara Corridor, and on the road from Mangaka to the Unity Bridge[11].

Thus the project conforms to development needs at the time of both the ex-ante and ex-post evaluation.

3.1.3 Relevance to Japan's ODA Policy

The "Country Assistance Policy for Tanzania" of the Government of Japan, formulated in July 2000, addressed as one of the development issues 'the improvement of the living environment through the development of basic infrastructure, etc.', which is a key area of assistance. In the July 2008 "Country Assistance Policy for Tanzania" 'road-based haulage and transport' was also regarded as a key area with respect to 'Growth and the Reduction of Poverty'. The improvement of the road network is in line with the development issues in the key areas of assistance, and is thus consistent with Japan's ODA Policy.

In view of the above, the implementation of the project has been highly relevant to the Tanzanian Development Plan, development needs, as well as Japan's assistance policy; therefore, its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

Table 1 shows the outputs (planned and actual) provided by the Japanese side in the project, and Table 2 shows those provided by the Tanzanian side.

Table 1: Outputs Provided by the Japanese Side (Planned and Actual)

Item		Plan	Actual
Length of section		55.1km (Masasi-Mangaka)	As planned[12].
Pavement structure	Surface	DBST surfacing (main road, access road, bus stop, etc.)	As planned.
		SBST surfacing (shoulder, entrance)	As planned.
	Roadbed	Base course 15cm (cement stabilization - main road, access road, bus stop, etc.)	As planned.
		Sub base course 20cm (granular material - main road, access road, bus stop, etc.)	As planned.
Road width	Roadway width	Total 6.5m (3.25m each side, 2 lanes)	As planned.
	Shoulder width	1.5m, both sides	As planned.
Cross drainage improvement work		74 points (60 pipe culverts, 11 box culvert, 3 bridges)	As planned.
Other auxiliary structures		Side ditches, retaining walls, bus stops, guardrails, lane markings, road signs, etc.	As planned.

(Source) Basic Design Study Report: Materials provided by JICA: Implementing agency responses to questionnaire

[11] Road Sector Support Project II, jointly financed by ODA Loan and African Development Bank (AfDB).

[12] In May 2008, the initially planned distance for Phase 2 was reduced by 2.4km due to the steep rise in the price of materials such as gasoline, asphalt, reinforcing rods, cement, etc. Subsequently, based on the results of the Preparatory Survey Report on the Project for Upgrading the Masasi-Mangaka Road, the distance for Phase 3 was increased by 2.4km, so that the total distance was 55.1km as initially planned. (Materials provided by JICA: Preparatory Survey Report on the Project for Upgrading the Masasi-Mangaka Road).

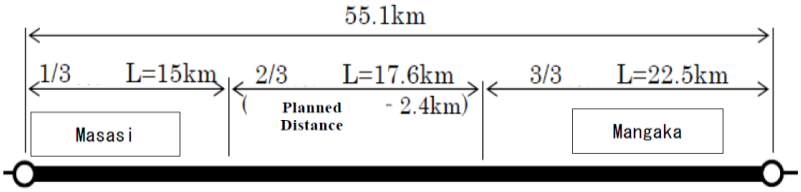


Figure 2: Road Section by Project Phase

Table 2: Outputs Provided by the Tanzanian Side (Planned and Actual[13])

Plan	Actual
Relocation of obstacles to road construction	As planned.
Acquisition of land for improvement of road alignment on some sections, requisition of land for construction yard	As planned.
Relocation of houses located in road-building area, necessitated by road construction	As planned.
Provision of a quarry, borrow pit, disposal site for scrap from dismantling of existing bridges, etc., required for construction work.	As planned.

(Source) Basic Design Study Report: Results of interviews with implementing agency personnel: Implementing agency responses to questionnaire.

The work on pavement structure, road width, cross drainage structures etc., of the project was carried out more or less in accordance with the basic design, though there were some minor changes. The reasons for the changes, their effects and impact are shown in Table 3. These changes were made in response to the final situation in the field, and had no impact on cost or length of work period.

Expansive black cotton soil[14] is distributed[15] in two places in the project area, between the 34km and 37km points and between the 38km and 39km points. The Pavement & Materials Design Manual, 1999 of Tanzania states that great care is needed when dealing with expansive black cotton soil, and the problem was dealt with by replacing the black cotton soil in high fills with good quality soil, as was proposed in the Basic Design Study Report[16].

[13] The consistent information of the each expenditure was not provided from Implementing Agency.
[14] The expansive black cotton soil is firm and has load-bearing capacity when dry, but when the water content increases, it swells, and in the process of drying out again shrinkage cracks are formed.
[15] Preliminary Study Report on the Project for Upgrading the Masasi-Mangaka Road.
[16] Implementation agency responses to questionnaire: information provided by the implementing consultant.

Table 3: Design Changes, their Effects and Impact

Location	Changes	Reason for Change, Effects, Impact on Cost, etc.
Phase 1	・Change in the diameter of reinforcing rods The reinforcing rods to be used in 18 entrance culverts were changed from JIS D13 (φ12.7mm) to the larger BS (British Standards) 16 (φ16.00mm).	・The change to BS made it easier for the implementing agency to understand the specifications. The change had no impact on cost or length of work period.
	・Change in location of culvert construction	・Culverts were constructed in positions suitable for rainwater drainage. The change had no impact on cost or length of work period.
Phase 2	・Change in positioning of box culverts (raised approximately 2.5m) ・Partial change in vertical alignment of road	・Box culverts were positioned in suitable locations for efficient rainwater drainage. The change had no impact on cost or length of work period. ・The change in vertical alignment of the road ensured a clear line of sight and improved safety.
	・Change in the diameter of reinforcing rods The reinforcing rods to be used in the concrete culverts were changed: from JIS D13 (φ12.7mm) to BS D12 and from JIS D19 (φ19.1mm) to BS D20.	・The change to BS was easier for the implementing agency to understand. There was no impact on cost or length of work period.
Phase 3	No changes	No impact

(Source) Materials provided by JICA: Implementing agency responses to questionnaire.

3.2.2 Project Inputs

3.2.2.1 Project Cost

While the planned project cost (E/N limit) was 2,964 million yen, the actual project cost was 2,960 million yen, or 98% of the planned cost [17].

3.2.2.2 Project Period

The project period was prolonged by 13 months over the planned 41 months, lengthening the project period to a total of 54 months. One reason for the delay was the breakdown of heavy machinery procured in Tanzania during Phase 1; this caused a delay of seven months. Another reason was the delay in the arrival in Phase 3 of the temporary drainage construction materials and the asphalt paver due to pirates operating off Somalia; then the rainy season began, and these two factors caused a delay of six months in total[18].

However, as delay due to piracy can be deemed force majeure, in this evaluation only the first seven-month delay was counted as a delay, and the project period was judged to be 112% of the planned period.

From the above, as the project cost was kept within the planned amount while the project period was longer than the planned period, efficiency is evaluated as fair.

[17] Expenditures by the Tanzanian side could not be confirmed, and therefore the costs borne by the Tanzanian side are not included.
[18] Information from the implementing agency: Materials provided by JICA.

3.3 Effectiveness (Rating: ③)

3.3.1 Quantitative Effect (Operational/ Effectiveness Indicators)

As a result of the project a 10km section of road that had been single-lane became two-lane; along the entire road, standards with regard to road width, gradient, etc., were improved. Vehicle running speed rose from 40 – 60km at the time of planning to the target speed of 80km when the work was completed[19] (Table 4). Measurement at the time of the ex-post evaluation showed that actual speeds were 80 – 110km[20]. The time needed to travel the section has been reduced from 83 minutes to 42 minutes. The ADT (Average Daily Traffic) is 5.47 times greater than it was in 2005, largely exceeding the target value (Table 5).

Table 4: Operational/Effectiveness Indicators

Indicator	Standard Value (2006)	Target Value (2012)	Actual Value (2012)	Actual Value (2014)
	Baseline Year	Year of Project Completion	Year of Project Completion	Two years after Project Completion
Length of single-lane section (km)	10km	0km	0km	0km
Vehicle running speed (km/hour)	40 – 60 kph	80 kph	80 kph	80 – 110 kph
Time needed to travel the section (minutes)	83 minutes	42 minutes	42 minutes	42 minutes
Average Daily Traffic	142 NB1)	213 NB2)	n.a.	778 NB3)

(Source) Basic Design Study Report: Results of hearing survey in the field: Results of Traffic Survey.
NB 1) Traffic volume in 2005, at the time of the project formulation study
NB 2) Set as the design standard. The increase in traffic was predicted assuming an annual GDP growth rate of 6% (Basic Design Study Report).
NB 3) See the detailed traffic survey in Table 5.

Table 5: Average Daily Traffic Volume by Type of Vehicle (At Mkomaindo)[21]

(Unit: number of vehicles)

Year	Passenger vehicle		Truck				Bus		Total
	Car	Pick-up Four-Wheel Drive	Under 5 Tons	5 or Over 5 tons	Semi -trailer	Full trailer	Under 25 passengers	25 or Over 25 passengers	
2004	28	56	9	21	15	0	6	3	138
2005	22	63	18	10	6	1	21	1	142
2014	127	393	53	99	51	9	24	22	778

(Source) The table was drawn up by the author using information from the Project Formulation Study Report, Preliminary Study Report on the Project for Upgrading Masasi-Mangaka Road, Traffic Survey Report
NB) Figures for 2004 are from the TANROADS traffic study. Figures for 2005 are from the traffic survey by the project formation study (Project Formulation Study). The traffic survey for the ex-post evaluation was carried out during the daytime at Mkomaindo in November, 2014. The night-time traffic volume was estimated using the TAFs (Traffic Adjustment Factors) of TANROADS for 2008. Annual data from 2006 to 2013 were unavailable. Due to the expansion of the Masasi town area, at the time of the ex-post evaluation city vehicles had come to pass through the survey point at Mkomaindo, and for this reason the number of vehicles estimated

[19] Materials provided by JICA.
[20] Running speed was measured for each main type of vehicle at the time of the field work (pick-up / four-wheel-drive 110km: mini-bus 80km: medium/large size bus 90-110km: trailer speeds vary depending on load capacity and number of axles). However, as described under 3.3.2.3 Improvement of Safety, there is concern with regard to ensuring traffic safety.
[21] Mkomaindo is located about 4km west of Masasi.

to be traveling within the city was subtracted from the number of vehicles.

In addition, the frequency of bus services, the main means of transport, has increased as a result of the project. Table 6 shows the change in the frequency of bus services on the Masasi-Mangaka section before the project and after its completion. There has been an increase in the number of services by minibus, medium-size bus and long-distance bus compared to when the project was planned. Before the project no long-distance buses came through Mangaka, but after completion of the project, long-distance bus services to Dar-es Salaam and other destinations came into operation.

However, other factors, not only factors arising from the project, are contributing to the increase in traffic described above. For example, other factors that can be mentioned include the completion of the construction of the road between Dar-es Salaam and Mtwara, and the increase in the number of vehicles[22] brought about by the rapid increase in investment in Tanzania.

Table 6: Other Effectiveness Indicators

Indicator	Base value (2006)	Actual Value (2014)
	Planning year	At time of ex-post evaluation
Number of services by minibus/day (round trip) NB 1) Masasi－Mangaka	9	12-15
Number of services by medium-size bus/day (round trip) NB 2) Masasi－Mangaka	0 NB3)	3
Number of services by long distance bus NB 4) /day (one way) Dar es Salaam－Masasi	6	11
Number of services by long distance bus /day (one way) Dar es Salaam－Masasi－Mangaka	0	2
Number of services by long distance bus /day (one way) Dar es Salaam－Masasi－Mangaka－Tundul	0	1

(Source) Results of hearing survey in the field
NB 1) A mini bus with a capacity of up to 25 passengers. Service begins when the bus is full.
NB 2) A medium-sized bus with a capacity of more than 25 and less than 30 passengers.
NB 3) Before the project started, there were no regular services by medium-sized bus; there were some non-regular services.
NB 4) A large-size bus with a capacity of 55 passengers.

3.3.2 Qualitative Effects (Other Effects)

3.3.2.1 Improved Traveling Performance

Interviews with minibus drivers and drivers for cashew nut traders confirmed that compared to driving conditions when the road had been a dirt road, the road is more even and driving conditions are more stable. According to a local road expert, there was better road alignment, ensuring a clear line of sight. The results of a beneficiary survey[23] showed

[22] With regard to the number of registered vehicles, the number of light passenger vehicles (fewer than 12 passengers), for example, was 142,744 in 2006 at the time of the planning; at the time of the ex-post evaluation in 2014 this had increased to 451,644 (Tanzania Transport Registration Authority).

[23] The beneficiary survey was carried out through random sampling by the road in Masasi, Nankomba (a village located 38km from Masasi) and Mangaka. The survey sampled, in addition to 42 cyclists and 50 pedestrians, 21 persons involved in the cashew nut trade; a total of 113 samples (number of valid responses). A separate questionnaire was prepared for each target group. The cyclist respondents were made up of 40% in their 20s, 33% in their 30s, 19% in their 40s and 7% aged over 50; 69% were male, and 31% female. 40% of

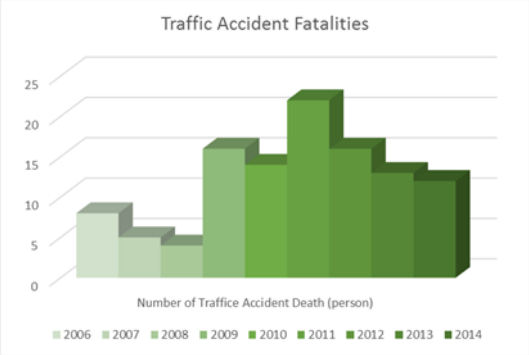
that on the subject of the smooth running of the road, 30.4% replied that it was "considerably improved" and 60.9% that it was "somewhat improved", making a total of 91% answering that there had been improvement. The beneficiaries on the whole gave the safety and smooth running of the road a high evaluation.

(Source) Preparatory Survey Report
Figure 3: Bridge Subject to Flooding Before the Project

3.3.2.2 Improvement of traffic delays during flooding

There are no data on the reduction in the number of days or hours of flooding[24], but according to the implementing agency, the problem of flooding was resolved as a result of anti-flooding measures taken in the project. In interviews, cashew nut traders said that at a number of points prone to flooding[25] each time there was flooding the road would be impassable for 3-5 hours, but after completion of the project, traffic delays caused by flooding had disappeared.

3.3.2.3 Improved Safety



(Source) Masasi District Traffic Police Department

Figure 4: Number of Traffic Accident Fatalities (On the section of road covered by the project)

Thanks to the provision of a shoulder to the road, pedestrians and cyclists no longer experienced the kind of loss of balance that had occurred on the former dirt road, and there were fewer accidents not involving other road users[26]. On the other hand, an increase in the number of collisions involving overtaking vehicles and bicycles traveling on the shoulder has been pointed out. Table 4 shows that after the completion of the Phase 1 construction in 2009, there was an increase in the number of fatal accidents. According to interviews with road users, initially both drivers and road users were not properly aware of the danger of accidents caused by vehicles moving at higher speeds than before. Many collisions have taken place between overtaking vehicles and vehicles traveling in the opposite direction, as well as with bicycles traveling on the shoulder. Interviews with local residents and information from the implementing consultant confirmed that there were no talks on safety etc., aimed at local residents just before the new road came into use.

The statistics show a sudden increase in the number of fatal accidents at a sharp curve[27] on the Phase 3 section of the road that was opened to traffic in 2010 (Figure 4). The road is constructed to a design that enables safe driving at 80 kph, but there are no road signs

pedestrian respondents were in their 20s, 28% in their 30s, 22% in their 40s and 10% aged over 50; 56% of the respondents were male, and 44% female.

[24] Interview with Mtwara Regional Office; Implementation agency responses to questionnaire.

[25] Flooding occurred at points 25km, 26.3km, 29.8km and 40.5km from Masasi.

[26] From interviews with residents living beside the road.

[27] 41km from Masasi.

indicating the speed limit[28]; many vehicles maintain an actual speed of 100-110 kph, and this excess speed is the cause of vehicles running off the road, rolling over, or colliding with other vehicles or cyclists[29].

The fact that there was no road sign warning of the sharp curve prior to the time of ex-post evaluation suggests that no prior preventive measures had been taken.

In the beneficiary survey, 36% of respondents said that traffic accidents had been reduced by the project. However, 54% said that while overall safety had improved, the number of traffic accidents caused by reckless driving had increased.

Figure 5: Transport Vehicle of Cashew Nuts Production Association

3.3.2.4 Effect of the Reduction in Transportation Cost / Time, Operating Expenses etc.

According to an interview with the cashew nut producers' unions, in the case of the Mkapunda producers' union, a typical union 10 km from Masasi, both the transportation cost and transportation time to the Masasi market had been reduced by half. In the case of the Mangaka producers' union (55 km from Masasi) the cost of transportation to the Masasi market has been reduced to a quarter, and the transportation time halved. Using the project road had eliminated traffic delays and truck rollovers during transportation from the producers' union to the market, and improved driving conditions had shortened transportation times and reduced transportation costs.

In an interview the head of the Mangaka producers' union said that with the old dirt road, vehicles needed frequent repair due to damage caused by vehicle rollovers on heavily rutted sections of the road, bogging down in the mud after rain, dust in the dry season, and the roughness of the dirt road; but with the leveling of the road, repair costs had been reduced. Similarly in the beneficiary survey too, 95% of the cyclists replied that the cost of bicycle repairs had been reduced.

3.4 Impact

3.4.1 Intended Impacts

3.4.1.1 Improved Access to Social Services

(1) Public Health Sector

The only medical facilities in and around Mangaka are Health Centers and Dispensaries, and Masasi District Hospital[30] is the main medical facility. The project improved the transport situation for emergency patients and critically ill patients to Masasi District Hospital[31]. In the beneficiary survey, 96% of respondents replied that access to the District Hospital had improved. Furthermore, according to interviews with residents in the Mangaka area, before the project a difficult birth or a delivery by a mother suffering pregnancy-induced hypertension would often be fatal; but at the time of the ex-post evaluation, shorter transfer times and the improved transport situation made it possible to avoid deterioration of the patient's condition during transfer to hospital and to begin early

[28] Not only on this section of road, but in Tanzania as a whole, the number of road signs is inadequate in view of growing numbers of vehicles.
[29] From interviews with local residents.
[30] 250 beds and 12 doctors.
[31] From interviews with the Masasi District Masasi Town Executive Officer, the Acting District Executive Director of Nanyumbu District, the Director of Masasi District Hospital

treatment[32].

(2) Other Sectors

In the beneficiary survey, 84% of respondents replied that getting to school was easier. The reasons given for this included the increase in the number of bus services, the securing of the school route through the provision of the hard shoulder, and the lowering of bus fares[33] thanks to the participation of more bus companies. In addition, interviews with people living alongside the road revealed that it was easier to reach shops and markets in Masasi for shopping, errands, etc.

3.4.1.2 Impact on the Economy

(1) Impact on Key Agriculture

According to interviews with the producers' unions, improvement of the road had been accompanied by increased membership for unions in the vicinity of the road and an increase in the amount of produce which are delivered and sold (Table 7).

These producers' unions own a number of large trucks. Before the project, there was one processing factory in Masasi; at the time of the ex-post evaluation this factory had closed down and the cashew nuts are now transported from the producers' union warehouse to the Masasi market where they are bought up, transported to Mtwara Port and exported without being processed[34].

Table 7: Changes in Cashew Nut Producers' Unions along the Road and in Amount Sold

Indicators	Before Project (2006)	At Ex-post Evaluation (2014)	Rate of Increase
Major Producers' Union Membership			
Mkapunda Producers' Union NB1)	215 unions	405 unions	188%
Mangaka Producer Union NB2)	499 unions	812unions	162%
Amount of selling per member			
Mkapunda Producers' Union	302 ton/year	699 ton/year	231%
Amount selling per member	1.4 ton/year	1.7 ton/year	121%
Mangaka Producers' Union	403 ton/year	855 ton/year	212%
Amount selling per member	0.8 ton/year	1.05 ton/year	131%

(Source) Interviews with cashew nut producers in Masasi District and Namyumbu District[35]

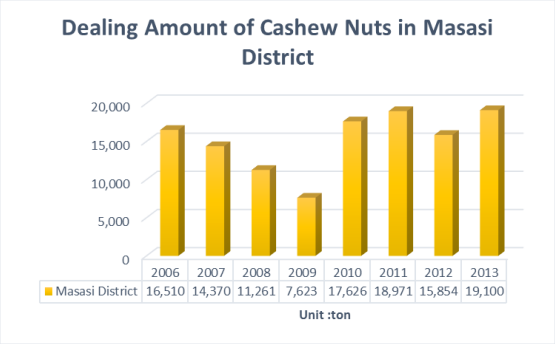
NB 1) Mkapunda Producers' Union is located 10km from Masasi

NB 2) Mangaka Producers' Union is located 55km from Masasi

According to information obtained from the producers' unions, compared to the time the project was being planned, the volume of selling per producer in the Mkapunda producers' union in Masasi city has increased by approximately 20%, and in the Mangaka producers' union by more than 30%.

One reason for the increase in volume of selling is that the improved logistics has meant that fertilizers and agricultural chemicals to combat disease can be transported in when they are needed[36]. On top of this, the reduction in post-harvest loss due to the improvement in

[32] From interviews with people in and around Mangaka.
[33] At the time of the ex-post evaluation bus fares had come to be set by the government.
[34] From interviews with the producers' unions.
[35] A new district that split from Masasi District in 2008. It covers the area around Mangaka.
[36] From interviews with the producers' unions.



(Source) Cash Nuts Board Materials
NB 1) The amount of production was decreased due to lots of rain in 2009
NB 2) The pest influenced the production in 2012

Figure 6: Amount of Dealing of Cash Nuts in Masasi District

transportation conditions is also linked to the increase in volume of selling.[37].

In addition, the reduction in transportation costs etc., as a result of the project has increased the profits of producers' unions responsible for transportation to market, so that dividends to members are higher than they were before the project[38]. However, in response to questions regarding whether or not the income of producers had improved in comparison with before the project, 90.4% respondents replied that there had been no change [39] . According to interviews with the producers' unions, the purchase price of cashew nuts is determined by government policy. While the project had improved driving conditions on the road and facilitated the transportation of materials that had previously been subject to delays in distribution, thus enabling the timely input of fertilizers etc., in recent years the crop had been affected by heavy rains and disease which in some years had necessitated an increased input of fertilizers and agricultural chemicals; and these external factors had meant that producers' revenues had not necessarily been on the rise.

(2) Impact on other agricultural products and income improvement.

It was not possible to obtain data on agricultural production relating to the impact on the delivering and selling of crops other than cashew nuts that have traditionally been cultivated, such as legumes, maize, etc. On the other hand, for producers and traders along the road, use of the road had led to shortened transportation times and reduced transportation costs; producers are also able to sell their produce[40] on the roadside, leading to an increase in income compared to previously[41]. In the beneficiary survey, in response to a question regarding increased income from roadside sales, etc., 97.5% of respondents said that roadside sales had had the effect of increasing income[42].

3.4.1.3 Stimulation of the Local Economy through Commercialization

There is increased access to Masasi town and Mangaka from Newela District, which is adjacent to Masasi District and Nanyumbu District, and from Nachingwen District, and the distribution range of the area has expanded[43]. Distribution of a variety of materials has begun, and there has been an increase in commercial activity, such as retail stores, in Masasi, Nankomba and Mangaka[44], bringing increase of income[45]. According to an interview with

[37] From interviews with the producers' unions.
[38] From interviews with the producers' unions.
[39] From the survey of beneficiaries. Almost all the cashew nut producers are small-scale farmers; they usually purchase fertilizers etc., on credit, and pay back the loan from the income obtained when the crop is delivered and bought in the unions.
[40] Tomatoes, peanuts, onions etc.
[41] From interviews with people living near the project road.
[42] In addition to agricultural products, craft products such as baskets or hats are also being sold.
[43] From interviews with distributors in and around Mangaka, and with the Deputy-Governor of Nanyumbu District.
[44] From interviews with distributors in and around Mangaka, and with the Deputy-Governor of Nanyumbu District.
[45] From interviews with the Masasi District official responsible for Masasi Town and with Masasi Town

an official of Masasi town in Masasi District, Masasi town has become center to the local economy of the surrounding districts; Masasi town has expanded, and the population has reached 100,000. The population of the Masasi District as a whole has risen from 440,000 in 2006 to 490,000 in 2012. Looking at Masasi District as a whole, the increase is not outstanding when compared with the rate of population growth in Mtwara Region[46], but the population is on the increase[47].

3.4.1.4 Impact on International Distribution

There are two access routes from the project road to the Unity Bridge, from Mangaka and from Nankomba. As the 65km section of road from Mangaka to the Unity Bridge is under construction and the access road from Nankomba to the Unity Bridge is unsurfaced, there has as yet been no improvement in traffic conditions from the project road to the Unity Bridge and no international distribution route; however, construction of the section from Mangaka to the Unity Bridge is expected to be completed in 2015. At the time of the ex-post evaluation the road from Mangaka to Tundul on the through route to the Malawi border was under construction, but is set to open to traffic in July 2016[48]. It is expected that with their construction these roads will become part of a future international distribution route.

3.4.2 Other Impacts, Positive and Negative

3.4.2.1 Impact on the Natural Environment

According to interviews with the TANROADS Mtwara Regional Office, EIA (Environment Impact Assessment) monitoring was carried out during construction and after the road was opened to traffic[49].

- With regard to environmental conservation during the construction period, scrap materials and surplus soil from the removal of existing structures such as drainage structures were transported the site designated by the Mtwara Regional Office[50].
- Out of consideration for local residents, steps were taken to reduce the dust generated from the embankment work, surfacing work, etc., through the regular sprinkling of water[51].
- During the construction work, color cones and caution tape were put in place to clearly identify the working area; when necessary, traffic conductors were stationed to guide general traffic and ensure the safety of people living near the road[52].
- After the road was opened to traffic, monitoring was carried out of the return to their original state of locations used as temporary storage facilities etc., during the construction[53].

businesspersons.

[46] From interviews with the Masasi District official responsible for Masasi Town and with the Deputy-Governor of Nanyumbu District. According to the 2012 Population Census, the population growth rate of Tanzania as a whole is 2.1% and of the Mtwara Region, 1.2%. The present survey found the population growth rate of Masasi District to be 1.1%.

[47] Including the population of Nanyumbu District (2012 Population Census).

[48] Scheduled for completion in July 2016.

[49] Mtwara Regional Office. In the preliminary study, an Initial Environmental Examination (IEE) was carried out under Category B of the JICA Guidelines for Environment and Social Considerations.

[50] Mtwara Regional Office.

[51] Information from the implementing consultant.

[52] Information from the implementing consultant.

[53] Mtwara Regional Office.

3.4.2.2 Resettlement of Residents / Land Acquisition

Although the implementation of the project did not involve the resettlement of residents, the acquisition of land did take place. Procedures to obtain land were undertaken in conformity with the laws and ordinances of Tanzania. Land acquisition took place with the level of compensation agreed with the residents, and no disputes occurred[54]. 130 households moved house, affecting a population of 1,605, and 4,310,000 m^2 of land was acquired for road construction. The land acquired was mainly farmland and residential land[55].

3.4.2.3 Environment-related Impact on Local Residents Following the Opening of the Road to Traffic

As a result of the road being surfaced the incidence of eye trouble caused by dust was reduced, and in the beneficiary survey, 72% of pedestrians and cyclists reported an improvement in redness of the eyes[56].

After completion of the project, efforts were made to improve average speeds, shorten traveling time and improve traveling performance. The effects of increased traffic volume, reduced transportation costs and the reduced cost of bus services were recognized, thus confirming a high level of effectiveness. In terms of impact, although the fact that there had been an increase in fatal accidents caused by drivers driving excessively fast was a negative point, local residents' improved access to hospital and the reduction in transportation costs of agricultural produce etc., were positive benefits. Whereas the underdevelopment of the surrounding roads meant that the area is not yet connected to international distribution routes, the economic stimulation of Mangaka, Masasi and the surrounding areas has had a positive impact.

From the above, it can be concluded that the implementation of the project has more or less had the planned effect and that the effectiveness and impact of the project are high.

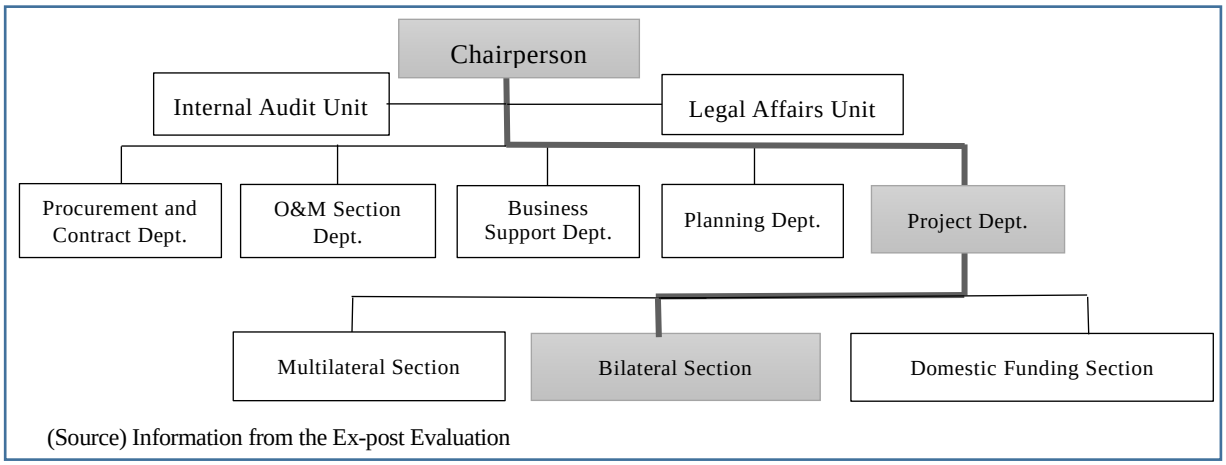
3.5 Sustainability (Rating: ②)

3.5.1 Structural Aspects of Operation and Maintenance

3.5.1.1 Implementing Agency

The Tanzania National Roads Agency (TANROADS) was established in July 2000 under the supervision of the Ministry of Infrastructure Development (MOID), and is in charge of the development, operation and maintenance of trunk roads and local trunk roads. In 2008 a Board of Directors was established within TANROADS and it was granted the authorization of decision-making on project implementation under MOID. In January 2011, MOID became the Ministry of Work (MOW). According to TANROADS headquarters staff, the change of MOID into MOW has had no effect on the operation, maintenance and management structure of TANROADS[57].

[54] Mtwara Regional Office.
[55] Mtwara Regional Office; it was not possible to confirm the cost of land acquisition.
[56] According to the Project Formulation Study Report, the most common illness in the Masasi District was malaria, the second cholera, and the third ophthalmia. The reasons for ophthalmia were considered to be inflammation and infection due to the dust from unsurfaced roads.
[57] Implementation agency responses to questionnaire.



(Source) Information from the Ex-post Evaluation

Figure 7: TANROADS Organizational Chart

Table 8 shows staff numbers at TANROADS at the time of the ex-post evaluation. There is no change in number from before the project. The necessary maintenance and operation is to be out-sourced to the private sector[58].

Table 8: TANROADS staff numbers at time of ex-post evaluation (unit: person)

Position	TANROADS total	Mtwara Regional Office
1. Engineer	221	8
2. Technician	179	6
3. Other NB 1)	280	19
Total	680	33

(Source) Implementation agency responses to questionnaire
NB 1) Clerical staff, etc.

3.5.1.2 Mtwara Regional Office

TANROADS has 26 Regional Offices throughout the country[59]. The Regional Office in charge of the project is Mtwara Regional Office. The Regional Office outsources maintenance and operation of the roads to the private sector and supervises the contractors. There are 60 contractors registered at the Mtwara Regional Office, of which 10 have funds and equipment. Orders are placed according to competitive tender, and the Regional Office undertakes patrols to check on the work of the contractors. The structure by means of which TANROADS awards contracts and supervises the contractors, and its management capacity, may be considered more or less adequate[60]. A Road Maintenance Management System (RMMS) [61] based on the reports of the contractors and patrolling results is used and O&M performance records are kept[62]. The RMMS is networked with the TANROADS headquarters, and the O&M status is input into RMMS on a daily and periodical basis. O&M reports are made to TANROADS headquarters on the basis of the RMMS data.

[58] From interviews with TANROADS
[59] From interviews with the Mtwara Regional Office
[60] From interviews with the Mtwara Regional Office and with local road experts.
[61] A system for the management of data on the O&M status. Future road repair times, O&M costs, etc., can be predicted on the basis of road conditions, O&M records, etc.
[62] Mtwara Regional Office.

Imposition of Axel Load and Vehicle Weight Measurement
Mingoyo Weighing Station in Mtwara Region

O&M System (RMMS)
Mtwara Regional Office

In order to prevent the overloading of large vehicles, there is a weighing station in Mingoyo near Mtwara, where all large vehicles heading to Mtwara or Masasi are measured. The construction of a weighing station in Mangaka is also planned. A crackdown on violations of the weight/axle load restrictions in recent years has reduced the number of violations by large-size vehicles across the board.[63]

3.5.2 Technical Aspects of Operation and Maintenance

Daily and periodical road maintenance is outsourced, and road surface patching, roadbed repair, road surface repairs and road shoulder repairs are carried out appropriately. According to local road experts, the contractors are considered to be more or less equipped with the necessary road repair skills[64]. TANROADS provides its regional office staff with basic knowledge regarding road O&M, and training and technical guidance to improve their supervision skills[65]. The TANROADS manuals[66] are occasionally used in the training and technical guidance[67]. The O&M skills of the Mtwara Office are considered to be more or less reasonable.

3.5.3 Financial Aspects of Operation and Maintenance

The budget for TANROADS comes from the Road Fund, the MOW budget, and funds from donors[68]. Annual expenditures and revenues are rising, and revenues continue to exceed expenditures.

[63] From an interview with the Mtwara Regional Office official responsible for the Mingoyo Weighing Station.
[64] Local road experts.
[65] From implementation agency response to questionnaire.
[66] Road Maintenance Handbook (2013), Inventories and Road Condition Survey Manual (2013), etc. These manuals were prepared in the JICA Technical Cooperation Project 'Project to Support Road Maintenance Supervision Skills'.
[67] From implementation agency response to questionnaire.
[68] The loan/grant ratio, and the prospect of future donor funding have not been confirmed.

Table 9: TANROADS Financial Performance (Unit: Million Tsh[69])

	Item	2006/7	2007/8	2008/9	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15
Revenue	Road Fund (Maintenance Works)	53,322	139,201	139,734	165,981	203,520	205,479	326,675	139,201	469,494
	Road Fund (Development, O&M)	-	4,990	-	770	18,456	18,057	8,267	4,990	35,522
	MOW Public Bond (Priority development)	97,190	147,785	264,532	377,747	225,252	552,325	450,324	147,785	430,716
	MOW (Salaries)	5,781	5,575	9,548	7.687	8,088	9,674	9,091	5,575	10,924
	Donor Support	14,605	25,688	6,760	9,151	12,194	1,183	1,581	25,688	-
	Other	3,483	4,130	5,215	6,630	7,395	9,429	10,641	4130	6,660
	Total	**174,383**	**327,369**	**425,791**	**567,968**	**474,907**	**796,150**	**806,582**	**327,372**	**953,316**
Expenditure	Staff Salaries	9,457	10,576	16,509	17,522	17,241	21,283	24,038	10,576	
	General Administrative Costs	5,864	8,130	11,227	12,244	18,613	18,144	23,064	8,130	
	Construction Management Costs	3,995	5,026	7,211	7,424	9,551	11,034	10,198	5,026	
	O&M Works Costs	51,401	122,329	142,441	154,269	161,785	192,491	244,752	122,326	
	Development Works Costs	101,634	155,595	245,537	405,293	671,039	357,114	485,462	155,595	
	Total	**172,355**	**301,656**	**422,928**	**596,734**	**878,231**	**600,068**	**787,516**	**301,657**	

NB) Figures for 2014/2015 is the budget requested.
(Source) TANROADS data

Figure 10: Actual Outsourcing Expenditure in Mtwara Regional Office

(Unit: 1000 Tsh)

Fiscal Year	Outsourcing Expenditure
2006/2007	3,813,320
2007/2008	6,778,192
2008/2009	5,942,146
2009/2010	6,880,980
2010/2011	5,113,466
2011/2012	7,649,739
2012/2013	9,635,759
2013/2014	11,236,883
2014/2015 NB)	13,945,241

(Source) Mtwara Regional Office
NB) Budget requested

Outsourcing expenditure from O&M costs by the Mtwara Regional Office has been increasing year by year, and in 2013 was 11,200 million Tsh. As spending on O&M for the trunk roads is given precedence over that for other roads controlled by the Regional Office, there is considered to be no problem from the financial perspective.

3.5.4 Current Status of Operation and Maintenance

Four and a half years have passed since completion of the Phase 1 section of the project, and while not enough to disrupt the smooth flow of traffic, damage has already occurred in places on the road surface and shoulder, and repairs have been carried out. On the Phase 2 section too, areas of road that had been repaired were to be seen here and there. Based on traffic surveys, the design standard was set at a Daily Traffic Average of 220 vehicles and 60 large vehicles[70], from which it may be thought that a large part of the

[69] Tsh is the local currency, the Tanzanian Schilling. As of March 24 2015, ¥1= 0.06Tsh.
[70] Basic Design Study Report.

damage is due to the road being used by a heavier volume of traffic than was designed for.

As to the situation regarding road repairs, the contractors to whom the O&M is outsourced carry out daily and periodic inspections and carry out early repairs of the damage areas. In the beneficiary survey, road users were asked their opinions of the state of repair and maintenance status of the road. 82.9% of cyclists replied that repairs were carried out appropriately. The road surface and shoulder suffer partial damage in places where large numbers of vehicles come onto the road. Ongoing road repairs will continue to be necessary.

Along the whole length of the road, and in particular at the sharp curve on the Phase 3 section of the road, there are no road signs indicating the speed limit. Almost all vehicles on the road exceed the design speed limit, creating a situation in which accidents can occur relatively easily. In order to ensure greater safety, safety measures, namely the erection of appropriate road signs, need to be taken.

For the sake of local residents living near the project road, safety awareness needs to be raised. Since there are no road signs urging drivers to watch out for pedestrians and cyclists on the other side of the road when overtaking, measures need to be taken to prevent fatal collisions. A carefully considered signage from the perspective of the vulnerable road user, is necessary, for example, signs to protect the safety of schoolchildren in places where they walk to school along the hard shoulder.

From the above, with regard to the maintenance and management of the project, a system to continue maintenance and management has been established, the financial resources for O&M have been secured, and there are no major issues with respect to technical capability; but as some issues remain regarding safety measures for O&M and traffic safety measures for local residents. Therefore, the sustainability of the effects manifested by the project can be said to be fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The project was implemented for the purpose of ensuring smooth and safe traffic by means of the improvement of the trunk road between Masasi and Mangaka in Mtwara Region, thereby contributing to improved access to social services by local residents, the stimulation of economic activities and regional development.

The relevance of the project is high because it is consistent with the priority areas of the development policy of Tanzania and the assistance policies of Japan, and development needs are also high. Although project costs were kept within the planned costs, the project period was exceeded slightly; therefore the efficiency of the project is fair. The average speeds was improved, the traveling time was reduced, and the traffic volume also increased. The intended effects of the reduced transportation costs, the reduced operating costs, etc., were observed. The project reduced the cost to stakeholders in key industries of transporting materials and delivering products. The project has also had positive influences through the improvement of residents' access to social services and the stimulation of the local economy, etc., through the commercialization of the area adjacent to the project road. Thus both the effectiveness and impact of the project are high. Although an operation and maintenance management system has been established, along with an increase in traffic volume, ongoing repairs will be continuously required. There are no major issues with regard to financing, and by and large no problems in relation to technical capacity. Some minor issues remain regarding safety measures in operation and maintenance and traffic safety measures for local residents; therefore the sustainability of the effect by the project is deemed fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

【Erection of Road Signs】

Throughout the entire section of road, there are no road signs indicating the speed limit. At the sharp curve on the Phase 3 section in particular, the sign for the sharp curve suddenly appears, it is not clear to what extent drivers should slow down after the sign. Road users need easy-to-understand signs, and need to be informed in advance where caution is necessary. As this is a regional trunk road, carefully well-considered road signs need to be erected to ensure the safety of local residents: in places which children walk to school along the shoulder signs warning of schoolchildren need to be erected, and drivers need to be urged to watch out when overtaking for cyclists etc., riding on the shoulder on the other side of the road.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

【Reinforcement of Traffic Safety Measures】

After the implementation of a road improvement project such as the present project, there is generally a tendency to increase in serious accidents. The main reasons are poor driving etiquette by drivers and a lack of awareness of road safety on the part of pedestrians and cyclists. In order to avoid this kind of negative impact as far as possible, it is essential that drivers and local residents be properly educated about road safety, while the road is still under construction and immediately after it is opened to traffic. When implementing a road improvement project, the assisting country needs to specify to the recipient country clearly and in writing that road safety education and awareness-raising activities involving local residents is a required condition and both sides need to agree to this.