

**Ex-Post Project Evaluation 2014:Package I-6
(Kenya, Tanzania, Zambia)**

September 2015

JAPAN INTERNATIONAL COOPERATION AGENCY

ICNET CO.LTD.

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0. Summary

This project was implemented with the objective of increasing the water supply volume and ensuring the provision of safe water to residents in the project target area by improving the water supply system facilities for water intake, conveyance, purification, and distribution in Kapsabet Town, thereby contributing to the improvement of the living environment in the target area. This project has been highly relevant to Kenya’s development plan, development needs, as well as Japan’s ODA policy. Although the one of the objectives was realization of 24-hour water supply, the project resulted in 12-hour water supply because of rising electricity costs, and income from water fees was also below the target. However, the rise in electricity prices that started in 2011 seems to have substantially resulted from the influence of the Arab Spring and related factors, and it is deemed to have been difficult to predict this consideration during planning and incorporate it into the project plan. Therefore, it is deemed that the relevance of the project is high because this factor does not diminish the appropriateness of the plan and the approach of the project. The efficiency of the project is fair, because although the project costs were within the plan, the project duration was longer than the plan. The targets for meter installation and water supply households were met and water supply population was close to the target. The anticipated contributions such as to reduce labor for water transport were confirmed as impacts, but the water supply hours and water supply volume were only about halfway achieved towards the target, and the increase in income achieved only about 60% of the target. Therefore the effectiveness of the project is fair. Sustainability has been observed in the institutional and technical aspects of the project, and there are no problems in the status of operation and maintenance at the time of the ex-post evaluation. Although, in the financial aspect of sustainability, a balance of income and expenditures has not been achieved at the time of the ex-post evaluation, it has been confirmed that there is a possibility for sustainability to be secured through increase in water fee, expected supplementary funding by the Nandi County government, and other factors. Therefore, the sustainability of the project is fair.

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

1. Project Description



Project Location



Sedimentation Pond of the Water Treatment Plant

1.1 Background

Established in 1948 and expanded in 1960 and 1980, Kapsabet Town's existing water supply system uses surface water as its water source, but as it only covered 33% of the administrative district of the town when this project was planned, it was estimated that the system supplied water to about 5,000 people (15%) of the nearly 33,000 residents of Kapsabet Town. The water supply conditions were also extremely unstable because of deterioration of facilities. Thus residents were forced to rely on spring water or river water, and the outbreak of waterborne diseases and other sanitation problems were pointed out.

To improve the water supply situation and raise the number of people supplied with water to 47,500¹, the Government of Kenya (herein after the "GOK") requested a Grant Aid Project from Japan, and the Government of Japan responded by conducting a basic design study in 1993. In implementing the project, three items were given as prerequisites, namely 1) sewerage system construction at Kenya's expense, 2) organizational strengthening of the water supply company, and 3) budgetary provision by the GOK. The GOK completed improvement of the sewerage system in 2002. Regarding the other challenges, in accordance with the Water Act that went into effect in 2002, a system was put in place where the Kapsabet Nandi Water and Sanitation Company (hereinafter the "KNWSC"), which was established in December 2006, became the primary contractor in a contracting agreement with the Lake Victoria North Water Supply Board (hereinafter the "LVNWSB"), with the LVNWSB bearing responsibility for the financial management. With this implementation of setting up a system and amid the continuous development of budgetary provision, the GOK again requested a Grant Aid Project from Japan in 2004. As a result of deliberations between representatives from the both countries, an agreement was reached to narrow the scope of cooperation to upgrading and augmenting the existing facilities using the Kabutie River as a water source.

1.2 Project Outline

The objective of this project is to increase the water supply volume and ensure the provision of safe water to residents in the project target area by improving the water supply system facilities including water intake, conveyance, purification, and distribution in Kapsabet Town, thereby contributing to the improvement of the living environment in the target area.

| | |
|---|--|
| Grant Limit / Actual Grant Amount | 1,956 million yen / 1,956 million yen |
| Exchange of Notes Date / Grant Agreement Date | July, 2009 / July, 2009 |
| Implementing Agency | Lave Victoria North Water Service Board (LVNWSB) |
| Project Completion Date | November, 2011 |
| Main Contractor(s) | Konoike Construction Co. Ltd. |
| Main Consultant(s) | NJS Co. Ltd. |
| Basic Design | September, 2008 |
| Detailed Design | July, 2009 |
| Related Projects | The Project for Management of Non-Revenue Water in Kenya (Technical Cooperation Project) (September 2010–October 2014) |

¹ No information on the basis for this figure was found as it was quoted from the ex-ante evaluation table, but it seems to be based on the population growth rate.

2. Outline of the Evaluation Study

2.1 External Evaluator

Tsuyoshi Ito, IC Net Limited

2.2 Duration of Evaluation Study

Duration of the Study: July, 2014 – September, 2015

Duration of the Field Study: October 5–19, 2014; February 1–10, 2015

3. Results of the Evaluation (Overall Rating: C²)

3.1 Relevance (Rating: ③³)

3.1.1 Relevance to the Development Plan of Kenya

The “Ninth National Development Plan (2002-2008)” of Kenya stated that a stable water provision was indispensable to the sustainable agricultural production and the promotion of industrialization and private enterprise, and had appropriate development and improved maintenance of its water supply systems as one of its goals. Based on this, the National Water Policy was formulated in 1999, the Water Act went into effect in 2002 as a part of the actualization of the policy, and administrative reforms in the water sector were advanced. In addition, the National Water Resources Management Strategy (2007-2009) was formulated in January 2007. With the goal of eliminating poverty through the provision of drinking water and the water necessary for production activities, the strategy aimed to achieve fair access to water, as well as sustainable and efficient water usage.

“Kenya Vision 2030” was created as a more long-term development strategy looking to the years 2008 to 2030, and the First Medium Term Plan (2008-2012) specified the improvement of infrastructure to ensure the provision of safe water as one of the six focus priority areas in the water sector. It also sought to address the problem of non-revenue water.

At the time of the ex-post evaluation, the Second Medium Term Plan (2013-2017) is effective and shows the improvement of urban water supply as one of its flagship programs and projects. The National Water Quality Management Strategy (2012-2016) also specifies a shortage of equipment and materials, as well as a shortage in human resource capabilities, as a challenge in the provision of water. These explain improvements in both infrastructure and institutional aspects are still remaining as priorities.

Kapsabet Town, the target area of this project, had not created policy documents for development plans, etc. at the time of planning of this project (2008-2009)⁴. By a constitutional amendment in 2010, most of the administrative authority was transferred to the 47 regional administrative districts (hereinafter “counties”), with the county governments being the unit of decentralized regional authority. Kapsabet, the target area of this project, is a part of Nandi County. The development plan of the Nandi County

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

³ ③: High, ②: Fair, ①: Low

⁴ From the interview to Nandi County Government.

government for 2013 to 2017 targets 30% of coverage rate for the water supply system for the whole of Nandi County, with improvement of water provision remaining a priority. It also mentions that, in response to rising electricity costs in recent years, the county is working to strengthen gravity flow systems and other water supply systems that minimize operational costs whenever possible.

In this way, improvements in both infrastructure and institutional aspects in the water supply sector remain priority issues in national development plans, sector strategies, and development plans for the target area at the time of project planning and the ex-post evaluation. Therefore, this project is deemed to have relevance to the development policies.

3.1.2 Relevance to the Development Needs of Kenya

Although the water treatment plant that supplied water to Kapsabet Town was constructed in 1948 and had expansion work done in 1960 and 1980, the coverage rate was only 33% of the administrative area of the town, and because of deterioration, the facility was only able to produce 550 m³ per day of their production capacity of 820 m³ per day. For instance, in 2006, only 340 out of 1,120 households registered⁵ at the time were supplied with water⁶. Moreover, according to the basic design study (2008), the number of people supplied with water at the time was estimated at roughly 5,000 (about 15% of Kapsabet's population of 33,000), and water supply restrictions were carried out on a daily basis. Residents not supplied with water used 21 springs and river water, resulting in a burden on water transport labor, as well as waterborne diseases.

According to Impact Report Issue 2 (2009) issued by Kenya's Water Service Regulatory Board⁷ (hereinafter the "WASREB"), in the performance ranking⁸, the KNWSC, which is the target company of the project, ranked No. 52⁹ out of the 55 water supply companies nationwide as of 2008, and could be said to have fallen behind in many areas, such as water supply volume, water supply time, and water quality, even in comparison with Kenya's other water supply companies.

⁵ Including those under process of registration.

⁶ Basic design study.

⁷ As the national body that oversees water supply nationwide, the WASREB issues licenses to water supply companies and monitors company operations, water quality management of supplied water, and other aspects.

⁸ The performance ranking compares companies on ten criteria: sufficiency of staffing in the organization, water supply coverage, non-revenue water rate, fee collection rate, operation and maintenance cost coverage rate, water quality, residual chlorine concentration, water supply hours, water meter coverage, and latrine coverage.

⁹ In Impact Report Issue 7 (2014), the KNWSC is ranked No. 46 (out of 61 companies nationwide), which is still low, but it was one of the three "counties showing greatest improvement," having moved up 15 places.

Table 1: Performance of KNWSC (Unit: % if there is no note)

| Indicators | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 |
|--|---------|---------|---------|---------|---------|
| Residual Chlorine (Rate of tests passed the standard) | 75 | 75 | 83 | 67 | 83 |
| Bacteriological Quality (Rate of tests passed the standard) | na | nd | nd | na | 0 |
| Non-Revenue Water | 64 | 63 | 63 | 51 | 49 |
| Water Coverage | 20 | 5 | 5 | 33 | 45 |
| Sanitation Coverage (Rate of houses with latrine) | nd | 5 | 60 | nd | 87 |
| Water Supply Hours (Hours) | 6 | 6 | 6 | 6 | 18 |
| Staff Productivity (Staff per 1,000 connections) | 33 | 23 | 23 | 9 | 7 |
| Collection Efficiency | 84 | 68 | 68 | 68 | 74 |
| Operation and Maintenance Coverage (collected fee/O&M cost) | 41 | 38 | 69 | 103 | 94 |
| Ranking (Ranking/Total number of Water companies) | 72/77 | 61/62 | 62/63 | 58/64 | 46/61 |

Source: Created from data in “Impact Report,” (Issue 3 to 7, 2010-2014), WASREB

na: not applicable nd: no data

In this way, at the time of project planning, the Kapsabet/Nandi region had a high demand for improvement of water supply coverage, water quality, water supply time, and other demand-side aspects, as well as high demand for increase in registered households (meter installation), decrease in non-revenue water, improvement in maintenance cost coverage, and other supply-side aspects, compared with other regions. Also, despite improvements being seen after the completion of this project, the ranking was still at No. 46 at the time of the ex-post evaluation (table 1), demonstrating that the need for improvement in water supply coverage, water supply time, and other water supply factors remains high.

3.1.3 Relevance to Japan’s ODA Policy

In the Country Assistance Plan for Kenya (FY2008) at the time of the planning, five focus areas of human resource development, agricultural development, economic infrastructure improvement, health and medical care, and environmental protection were set forth, among which “water quality improvement to contribute to greater access to safe water” was given as a part of the health and medical care, and “support for upgrading water supply and sewerage systems” was mentioned as support contributing to “improving the urban sanitation environment and protecting water quality.” Therefore, the project is considered relevant to Japan’s ODA policy.

In view of the above, this project has been highly relevant to the country’s development plan and 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 actual outputs of the project in terms of facilities, equipment, and materials are summarized in Table 2, and the actual outputs in terms of soft components are summarized in Table 3.

Table 2: Outputs of the Project (Facilities and equipment)

| Plan | Changes in Actual (Project Completion Report) |
|--|--|
| Intake Weir: Rehabilitation of intake weir (Height 1m, Length 28m) | As planned |
| Raw water pipe: Construction of a new pipe from the intake weir to the treatment plant (length 700m) | As planned |
| Water Treatment Plant: Construction of a new plant (intake flow: 3,800 m ³ /day, 2 Flocculation tanks, 2 Sedimentation tanks, 4 Raid sand filters, 2 Clear water reservoirs, 5 Sludge drying beds, Administration building and so on) | <ul style="list-style-type: none"> ● Diversion of river stream running adjacent to the water treatment, placement of gabion and refilling of coursed points for bank protection. ● Road-bed improvement for management road of the treatment plant where black cotton soil prevails. |
| Equipment for the Treatment Plant: 2 sets of Chemical feeding equipment, 4 units of Water transmission pumps (2 are for standby), 3 Service pumps (1 is for standby) etc. | As planned |
| Electric Equipment: 1 Transformer, 1 Power receiving panel, 6 Switch boxes (for transmission pumps, service pumps, drain pumps), 1 Outdoor switch box (for service pump), 1 Electromagnetic flow meter, 2 Turbine type flow meter, 1 Pressure gauge, 1 Flow type level gauge, 1 Communication device (for management building) etc. | Cancelation of electric transformer |
| Transmission Pipe: From new water treatment plant to new distribution reservoir (Length: 2,930m) | As planned |
| Distribution Reservoir: 2 units of new distribution reservoir, 2 units office reservoir, Rehabilitation of piping for the Kapsabet High School reservoir | As planned |
| Distribution Pipe: Primary pipe (approximately 4km), Secondary pipe (approximately 22.2km) | Reduction of length of secondary pipe by 585m. |
| Service Pipe: Connection between Distribution pipe and boundary of private land, approximately 400 sites) | As planned |
| Other Equipment: Equipment for water meter (water meter approximately 1,700 units, etc.), Water meter testing equipment, Water quality examination equipment, Computers and relevant software for billing and accounting system (2 Servers, 6 PCs, Software (DAtaflex), etc.) | Increase of printers for billing to 10 units. |
| Soft Component: Training for KNWSC staff members on maintenance and operation of water facilities, and on strengthening of business management. | As Planned. Details in Table 3. |

Some of the outputs were slightly modified from the plan. Most of the modifications were adjustment measures at the construction and they are recognized by the KNWSC as being appropriate to ensure proper construction¹⁰ With regard to the number of printers for issuing electricity bills, they were increased because it was envisaged that they would be used not only for issuing bills but also for issuing receipts and related tasks separately in different departments (from the interview to the main consultant of the project). Thus the consideration on quantity of printers is deemed appropriate.

From the above, the modifications to the inputs are within reasonable limits.

¹⁰ From the interview to KNWSC.

Table 3: Outputs of the Soft Component of the Project

| Subject | Expected Output | Target participants at the Planning | Duration | Actual Participants |
|---|--|--|-----------------------------------|--|
| Training on Business Operation | KNWSC's management level employees and staffs in charge of business/accounting gain business knowledge and operation know-how required for operational management on water supply project and hence can carry out the project operation such as financial management (budget management & cost analysis) and business management. | 2 management level employees in charge of general affairs & business respectively, 5 staffs in charge of business/accounting: 7 staffs in total | 22 May, 2011- 22 July 2011 | 4 LVNWSB staffs 6 KNWSC staffs |
| Training on Public Education | <ul style="list-style-type: none"> - Residents gain adequate knowledge on relation between drinking water and health. - To contribute the promotion on willingness payment of water tariff by enlightening the intension on water service connection - KNWSC's staffs gain the technology on planning/operation of enlightenment assembly | <p>30-40 persons for each assembly: 4 assemblies in Kapsabet town and 2 in other areas.</p> <p>1 management level employee in charge of business division, 2 staffs in charge of business.</p> | 22 May, 2011- 22 July 2011 | 4 KNWSC staffs 497 residents participated in 6 meetings |
| Training on O&M of Water Supply Facilities | KNWSC staffs obtain necessary knowledge and skill to operate and maintain appropriately the facilities (water intake, water conveyance, water treatment and water transmission/distribution) | 1 management level employee & 10 staffs in charge of technical division (4 staffs in charge of O&M on facilities, 2 staffs in charge of electric equipment, and 3 staffs of technicians): 10 staffs in total | 16 October 2011- 16 December 2011 | 12 KNWSC staffs |
| Training on Leakage prevention & Water Meter Management | KNWSC staffs obtain methods of leakage survey/repair/leakage prevention measures and management method of water meter and manage pipeline with appropriate O&M. | 1 management level employee of technical division & 5 staffs in charge of O&M on piping: 6 staffs in total | 1 December 2011- 6 January 2012 | 9 KNWSC staffs 11 from other 2 water companies 4 LVNWSB staffs |
| Training on Billing/Accounting System Operation | KNWSC' staffs in charge of tariff/accounting obtain know-how of tariff application/accounting system | 1 management level employee in charge of business, 6 staffs in charge of tariff/accounting: 7 staffs in total | 1 November 2011- 6 January 2012 | 12 KNWSC staffs |

The actual results of the soft components are also mostly according to plan. Although initially it was envisioned that only KNWSC employees would be targeted, at the time of implementation of this project (before the decentralization) the staffs of the LVNWSB, which is the body that oversees the KNWSC, were also included as participants for “strengthening business operations” and “preventing water leakage.” This is considered to be appropriate from the perspective that it used effectively a valuable opportunity for technology transfer.

3.2.2 Project Inputs

3.2.2.1 Project Cost

The costs of this project borne by Japan were kept within the plan (78.7% of budget) at 1,609 million yen from within the E/N limit of 2,044 million yen. Kenya's portion of the costs is as shown in Table 4 below. Actual figure for the bank charge is not available, however, with all other required cost items were payed, it is reasonable to expect necessary bank charges were paid as well. All the items born by Kenyan side were completed and the total amount confirmed is within the planned budget (25.4%).

In this ex-post evaluation, only Japan's cost burden is assessed because data on some of the the actual cost burden items on the Kenya side could not be obtained, and the project cost is lower than the plan.

Table 4: Actual cost of the Project by Kenyan Side

| Items | Plan (Kenyan Shilling) | Actual (Kenyan Shilling) |
|--|--|--|
| Land acquisition | 2,000,000 (Approximately 3.59 million yen) | 5,921,221 |
| Power line for new water treatment plant (1site) for new service reservoirs (2sites) | 949,000 (Approximately 1.71 million yen) | 4,400,213.20 |
| Installation of service pipes (full set) | 76,932,000 (Approximately 138.01 million yen) | Installed pipes for 1,700m, actual cost data not available |
| Fencing for new water treatment plant (1site), for new service reservoirs (2 sites) | 2,698,000 (Approximately 4.84 million yen) | 4,974,428 |
| Installation of water meters (400 units) | 1,167,000 (Approximately 2.09 million yen) | |
| Preparation of access road outside of construction sites (500m) | 2,133,000 (Approximately 3.83 million yen) | Constructed, actual cost data not available |
| Vehicle (for soft component) | 3,473,000 (Approximately 6.23 million yen) | 2 vehicles purchased, actual cost data not available |
| Bank charge | 581,000 (Approximately 1.04 million yen) | Actual cost data not available |
| Total | 89,933,000 (Approximately 161.34 million yen) | 22,821,434 (Total of available figures) |

Note: 1 Kenyan Shilling = 1.794 yen (at the time of planning)

Source: LVNWSB

3.2.2.2 Project Period

The project period of this project was estimated at the time of the plan to be 32 months from the start of the detailed design study. In actuality, although the detailed design study started in January 2009, the effect of the conclusion of E/N being delayed by about two

months resulted in a period of 33.3 months (28th January, 2009¹¹ to 7th November, 2011), taking longer than planned (104% compared to the plan).

Based on the above, although the project cost was within the plan, the project period exceeded the plan. Therefore, the efficiency of the project is fair.

3.3 Effectiveness¹² (Rating: ②)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

The anticipated effects of this project were divided into operation indicators, namely water supply capacity of water treatment plants, water supply hours, and water meter installation; and effect indicators, namely water supply population, water supply households, and fee collection. The level of achievement of each of the operation and effect indicators is as shown in Table 5.

Table 5: Plan and Actual Achievement of the Project (Operation and Effect Indicators)

| Indicators (Unit) | Baseline year (2006) | Target at project completion (2011) | Target in 4 years after completion (2015) | Actual at project completion (2011) | Actual 2 years after completion (2013) | Actual 3 years after completion (2014) | Actual 4 years after completion ¹³ (2015) |
|---|---------------------------------|-------------------------------------|---|-------------------------------------|--|--|--|
| Water supply capacity ¹⁴ (m ³ /day) | 620 | 3,600 | 3,600 | 1,146 (Actual supply amount) | 1,887 (Actual supply amount) | 1,682 (Actual supply amount) | N.A. |
| Water Supply hours (hours/day) | Time restriction | 24 | 24 | 12 | 12 | 12 | N.A. |
| Water meter installation (Unit) | 46 | 800 | 2,100 | 1,057 | 1,685 | 2,235 | N.A. |
| Water supply population ¹⁵ (person) | 5,000 (Area population :33,000) | | 32,500 (Area population: 41,400) | N.A. (Area population: 45,596) | N.A. (Area population: 47,006) | N.A. (Area population: 48,760) | 29,532 (Area population: 57,078) |
| Water supply households ¹⁶ (household) | 340 (Registered: 1,120) | 1,620 (Registered: 2,230) | 6,500 (Registered: 6,500) | N.A. (Registered: 1,963) | N.A. (Registered: 2,190) | N.A. (Registered: 2,501) | 5,618 (Registered: 2,930) |
| Fee collection (million Ksh) | 2.0 | 7.0 | 23.1 | 6.5 | 9.9 | 14.4 | N.A. |

Source: Figures of the Baseline year and targets are from the Basic Design Study. Actual figures are from KNWSC

¹¹ The detailed plan started on 28th January, the main E/N concluded on 26th July, and the starting date of 28th January is applied for the project period as from the beginning of the detailed plan to the completion of construction.

¹² A rating is assigned based on a judgment of effectiveness with consideration also given to impact.

¹³ Additional data on water supply population as of April 2015 was provided from KNWSC in June 2015.

¹⁴ Looks at whether the constructed facilities have the capacity to produce the water volume and water pressure that were in the initial plan.

¹⁵ "Area population" in the "Water supply population" of the baseline year (2006) was estimated based on figures used by the Ministry of Planning applying the data of census in 1990. The same of the target years in 2011 and 2015 were estimated using a population increase rate of 2.4% which was used by the Ministry of Planning. Target figure of "Water supply population" in 2015 assumed that coverage rates of different areas as follows: 100% in Township area and Kapngetuny area and 505 in rural areas.

¹⁶ Basic Design Study shows number of household in 2007 was 388 (registered number was 1,160) and target of year 2011 is 1,620 households (registered number is to be 2,230). See "(5) Number of Households Supplied with Water" for the method of calculation of the actual figure in 2015.

(1) Water Supply Capacity

The target figure for water capacity were set at 3,600 m³ per day, assuming 24-hour operation, at the time of project completion (2011) and four years after project completion (2015). The actual supplied water volume at the time of project completion (2011) was 1,146 m³ per day (31.8% of the target), whereas at the time of ex-post evaluation (2014) it was 1,682 m³ per day (46.7% of the target), reaching only about half the targeted water supply capacity. The main reason for the water supply volume at the time of the ex-post evaluation (2014) not reaching the target value in terms of water supply capacity four years after completion of the project (2015) was, as detailed in the sustainability section, that difficulties in paying electricity fees made it unfeasible to run the pumps longer than 12 hours, which is half of the initial plan. In contrast, as will be mentioned in 3.3.2 (1) below, more than 70% of users are satisfied with the water pressure. Based on these factors, if 24-hour operation of the pump as initially planned is enabled, it can be deemed that the constructed water treatment plant system has capacity up to the target volume of water.¹⁷

(2) Water Supply Hours

The target water supply time at the completion of the project (2011) and four years after the completion of the project (2015) was set at 24 hours per day, but in actual fact the water supply time at the completion of the project (2011) and four years after the completion of the project (2015) was 12 hours per day. Therefore, the target value was not met.

The reason for the non-achievement of the water supply hours target was same with that of the water supply capacity, which is the restriction on pump operation because of difficulties in paying electricity fees.

(3) Water Meter Installation

The number of meters installed was 2,235 at the time of the ex-post evaluation (2014), thereby meeting the target (2,100 units) for four years after the completion of the project.

The basic design study expected that installation of water meter is particularly for middle and high income households in the township and Kapngetuny area, however, at the time of the ex-post evaluation, KNWSC did not have a particular target of water meter setting. As the result, at the time of the ex-post evaluation, one registered user supposed to have one water meter. Number of registered user at the time of the ex-post evaluation (2014) was 2,501. Given this as the base number, actual number of water meter installation of 2,235 is 89.4% of the registered users. KNWSC explained the reason of the gap between the registered users and water meter installation is because KNWSC did not have enough number of water meters and could not install all the registered users.

(4) Water Supply Population

KNWSC estimated the water supply population in April 2015 as shown in Table 6. The target area is divided into three areas, and estimate averages of number of population

¹⁷ The same opinion was obtained from both the KNWSC and the LNVWSB.

served by a water tap or one connection according to different types of water supply (individual connection, yard tap, multi dwelling unit)¹⁸. Then, the total water supply population was calculated by multiplying the number of registered users by average number of population served by a tap or connection¹⁹. According to this estimation, total number of water supply population is 29,532, which is 90.9% of the target figure of the 4 year after the completion (32,500). This can be regarded as target has been almost achieved.

On the other hand, area population in the target area has grown rapidly. Area population 4 years after the completion of the project (2015) was estimated as 41,400, however, it has become 57,078 at the time of the ex-post evaluation (2014)²⁰. This suggests that the increase in the number of people is faster than expected and expansion of water supply system has not been keeping up with the increase in the population of the target area²¹.

Table 6: Water Supply Population in the Target Area (as of April 2015)

| | Namgoi Area | Town Area | Kamobo Area | Total |
|--|--------------|--------------|---------------|---------------|
| Registered individual Connections (a1) | 924 | 934 | 568 | 2,426 |
| Active connections (b1) | 912 | 921 | 483 | 2,316 |
| No. of population served through individual connections (c1) | 5 | 4 | 6 | 15 |
| No. of population served through individual connections (by active connections) (d1=b1xc1) | 4,469 | 3,684 | 2,898 | 11,051 |
| No. of population served through individual connections (by all connections) (e1=a1xc1) | 4,528 | 3,736 | 3,408 | 11,672 |
| Registered yard taps (a2) | 59 | 70 | 333 | 462 |
| Active taps (b2) | 57 | 65 | 302 | 424 |
| Average no. of people served per yard tap (c2) | 29 | 24 | 35 | 88 |
| No. of population served through yard taps (by active taps) (d2=b2xc2) | 1,653 | 1,560 | 10,570 | 13,783 |
| No. of population served through yard taps (by all taps) (e2=a2xc2) | 1,711 | 1,680 | 11,655 | 15,046 |
| Registered multi dwelling units (a3) | 2 | 2 | 38 | 42 |
| Average no. of house hold per unit | 15 | 20 | 11 | 46 |
| Average no. of population served per multi dwelling unit (c3) | 73 | 80 | 66 | 219 |
| No. of population through multi dwelling units (e3=a3xc3) | 146 | 160 | 2,508 | 2,814 |
| Total number of population served (by active taps and connections) (f=d1+d2+e3) | 6,268 | 5,404 | 15,976 | 27,648 |
| Total number of population served (by all taps and connections) (g=e1+e2+e3) | 6,385 | 5,576 | 17,571 | 29,532 |
| Total number of population in the target area | 14,830 | 14,830 | 27,418 | 57,078 |

Source: KNWSC

¹⁸ Individual connection is setting a tap in a resident's house. Yard tap is a tap set in a back yard of the resident's premise. Multi dwelling tap is a tap shared by more than one households at such as tenement houses.

¹⁹ For example, in Namgoi area, the average number of population served by an individual connection is 5 (line c1 of table 6), that of a yard tap is 29 (line c2, ditto) and that of multi dwelling unit is 73 (line c3, ditto). Multiplying these figures by respective number of registered users (individual connection: 924 (line a1, ditto), yard tap: 59 (line a2, ditto), multi dwelling unit: 2 (line a3, ditto)), and adding up all gives the total water supply population of 6,385 (line g of table 6).

²⁰ Each figure is a comparison between the target/forecast values for 2015 and the 2014 actual values.

²¹ When the plan was made, water supply coverage targets were set by areas, with a coverage level of 100% in the target year (2015) for the Township area and Kapngetuny, and 50% coverage for the others areas. In contrast, the actual figure (2013/2014) for the Township area was 72% and for Kapngetuny was 96%, whereas other districts amounted to 26%.

(5) Water Supply Households

KNWSC did not record actual number of water supply households. Based on the figures given by KNWSC in April 2015 (Table 6), total number of water supply household can be estimated as many as 5,618 (registered users is 2,930)²², which is 86.4% of the target (6,500) of the 4 years after the project completion (2015). The target is not fully met, however, considering the fact that water supply population is close to the target, the expected effect of the project of “expansion of water supply service” has been realized in effect.

(6) Fee Collection

Although an increase in fee revenue was observed from 2 million Kenyan shillings (2006) to 14.4 million Kenyan shillings at the time of the ex-post evaluation (2014), the target of 23.1 million Kenyan shillings for four years after the completion of the project (2015) has not been reached (Table 5).

The implementation of this project marked the start of a metered system for fee collection. Before the implementation of the project, the fee structure was a flat fee (250 Kenyan shillings per month) regardless of the amount of water used, however, the installation of water meters by this project changed the system to one of metered payments for at least 70% of registered users²³. After the completion of the project, although the number of registered users had not reached the target of 6,500, it increased dramatically from 1,120 in 2006 to 2,501 in 2014 (123% increase) and maintained about the same ratio of fee collection as before the implementation of the project (around 70%), meaning that the FY2011/2012 fee revenue was roughly double that of the preceding fiscal year (FY2010/2011 total: 3,027,716 Kenyan shillings; FY2011/2012 total: 6,050,291 Kenyan shillings) (Attached Table 1). However, even if the collection rate were to have reached 100%, the the billed amount for FY2013/2014 is about 17.8 million Kenyan shillings and would not meet the target of 23 million.

On the other hand, the fee collection rate for FY2013/2014 was 76% (Attached Table 1), which means that fee for around one-fourth of the water sold was not able to be collected. According to KNWSC, most of the payments in arrears are for the facilities of the police and other central-government-related public agencies. The water supply to these customers cannot be shut off in consideration of the effect it would have on public services, and therefore it is difficult to urge on the payment.

²² In the Basic Design Study, as shown in the target figures in the year of 2015 in the table 5, water user registration was regarded as one household. However, number of household using one water connection or one tap can be different according to type of water supply and more than one household use one registered tap in some cases, therefore, number of households using water of KNWSC is more than the number of registered users. In case of individual connection, “Registered individual connection” (line a1 of Table 6) and number of water supply households should be the same. For the yard tap, regarding the “No of population served through individual connection” of the individual connection (line c1, ditto) as the average number of family members in one household, then the answer of the division of the figure of “No. population served through yard taps” (line e2, ditto) by the average number of family members in one household can be regarded as the number of households (Namgoi area: $1,711/5=342$, Town area: $1,680/4=420$, Kambo area: $11,655/6=1,942$, Total= $2,704$). For the multi dwelling units, “Average number of household per unit” (one line below a3, ditto) times “Registered multi dwelling units” (a3, ditto) gives the number of households (Namgoi area: $2 \times 20=40$, Kambo area: $38 \times 11=418$, Total= 488). As the result, estimated number of the water supply household is 5,618 ($2,426$ (total of a1)+ $2,704+488$).

²³ Results of the beneficiaries study. Also from interview to KNWSC.

One factor influencing fee revenue is the change in the rate of non-revenue water²⁴. After the implementation of this project, the rate of non-revenue water has been improved substantially (Table 7), and along with increases in water treatment plant capacity and the number of households supplied with water, the conditions for increasing fee revenue are coming into line.

In this way, while the introduction of metered rates, improvement of the rate of non-revenue water, and other advancements is creating the right conditions for revenue increases, the revenue increase has not reached the target set during the project planning.

Table 7: Change in Non-Revenue Water in Kapsabet area of KNWSC

| Fiscal Year | 2008/09 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 |
|-------------------------------------|---------|---------|---------|---------|---------|---------|
| Revenue water (m ³) | 73,849 | 79,845 | 80,016 | 180,662 | 312,322 | 370,978 |
| Non-revenue water (m ³) | 141,206 | 130,118 | 144,613 | 231,922 | 367,023 | 234,820 |
| Rate of Non-revenue water (%) | 65.7 | 62.0 | 64.4 | 56.2 | 54.0 | 38.8 |

Source: KNWSC

3.3.2 Qualitative Effects

Other qualitative effects anticipated for this project that were examined during this ex-post evaluation include the level of satisfaction of water users, the status of utilization of manuals introduced through soft component activities, other effects of the soft components, and the structural condition of the fee billing and accounting system.

(1) User Satisfaction

A study was conducted on user satisfaction levels as a reference for effect indicators. According to the beneficiary survey²⁵ the responses on “overall level of satisfaction” of the users were that more than 80% of them were “very satisfied” or “satisfied,” showing an overall high level of satisfaction (Table 8)

Table 8: Overall Satisfaction to the Water Supply after the Completion of the Project

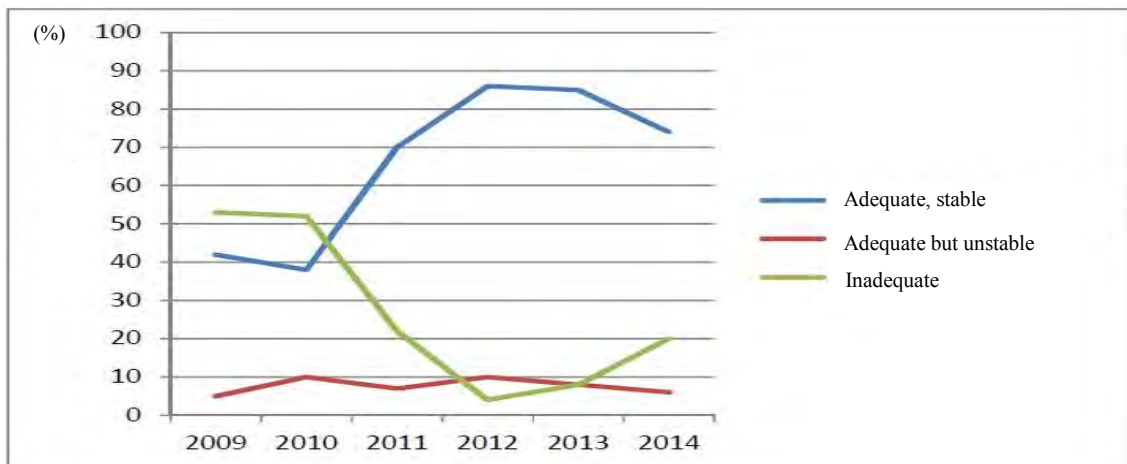
| Response | Rate (%) |
|-------------------------|----------|
| Very much satisfied | 16.5 |
| Satisfied | 65.2 |
| There are some problems | 14.8 |
| Unsatisfied | 3.5 |
| Very much unsatisfied | 0.0 |

Source: Beneficiary Survey of the Ex-post evaluation

²⁴ Refers to the ratio of water for which revenue was not obtained, regardless of whether it was distributed from the water treatment plant. It is due to water leakage and water theft.

²⁵ Face-to-face poll based on a questionnaire of 127 users who had registered in the area where this project engaged in supplying water, conducted over a nine-day period from October 8 to 16, 2014. Sample numbers were apportioned to the number of registered users in each of nine water supply districts of the target area (Showground, Prison, Town, Chebarbar, Kamartagui, Kapngatuny, Kamobo, Kabutiei, and Major), then users were randomly sampled from the user list for each district in the area. 54% of the respondents were ordinal residences, 6% were hotels or restaurants, 2% were retail stores, and other users such as schools, churches, service businesses, and livestock businesses were included. Each respondent was asked questions regarding satisfactory level on water pressure and water volume at the time of ex-post evaluation and also in the past in the same questionnaire.

The level of satisfaction of the water users on each element of water provision was confirmed through a beneficiary survey that assessed satisfaction with water quality (taste, color, and odor), water pressure, water supply hours, and water volume, including the changes before and after the implementation of the project. As a result, regarding water quality, almost 100% of respondents were “very satisfied” or “satisfied” with each of taste, color, and odor (97%, 99%, and 98%, respectively). As for water pressure, about 80% responded selected “adequate” (Figure 2).

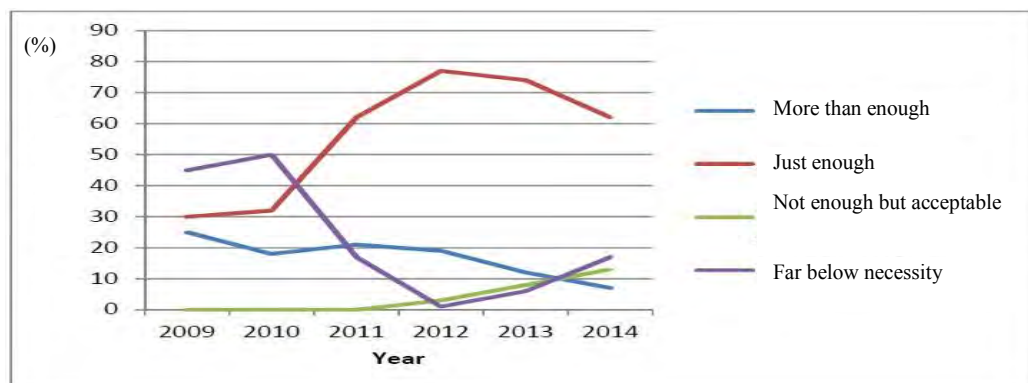


Source: Beneficiary Survey of the Ex-post evaluation

Figure 2: Change in Satisfactory Level on Water Pressure

With regard to water supply hours, responses showed dissatisfaction with the length of hours (it is short), along with dissatisfaction with not knowing when the water will stop.

On water volume, about 70% responded that it was “More than enough.” However, the past trend of “More than enough” responses since 2013 shows a decline, with “not enough” and “far below necessity” responses on the rise (Figure 3).



Source: Beneficiary Survey of the Ex-post evaluation

Figure 3: Change in Satisfactory Level on Water Volume

(2) Status of Use of Manuals Introduced through the Soft Component

At the water treatment plant, water quality inspections are performed twice a day, and the records are stored. The LVNWSB also carries out water quality inspections once per quarter, and through these results water quality is maintained appropriately. In addition, manuals introduced through the soft component were being used at the time of the ex-post evaluation, thus they are having the anticipated effect.

(3) Other Effects of the Soft Component

In this project, training sessions were given in the five areas of “strengthening business operations,” “educating residents,” “operation and maintenance of water supply facilities,” “water leakage prevention and water meter management,” and “fee billing and accounting system operations.” In each area, the following results and effects were confirmed upon the completion of the project and at the time of the ex-post evaluation, demonstrating that the anticipated effects were generally achieved.

(i) Strengthening Business Operations

This training was conducted with the aim of having the staff members in charge of management and business/accounting at the KNWSC acquire the necessary business and management knowledge for the operational management of water supply businesses, and to enable them to perform fiscal management, task management, and other business operations.

In the comprehension test after the training, the trainees’ average scores were more than 70 points in all the subjects including financial document preparation, budget management, cost analysis, measures for reducing non-revenue water, and public relations / extension / education, and it was judged that they had acquired the knowledge. At the time of the ex-post evaluation as well, the trainees maintained the knowledge they had acquired. The accounting and fiscal management works have been standardized and stably exercised.

(ii) Educating Residents

This training was conducted with the aims of having residents obtain adequate knowledge on drinking water and its relation to health, raising awareness for the intention to connect water supply, improving consciousness about paying water fees, and also having KNWSC staff members acquire skills in public relations and the planning and operation of educational assemblies.

During the training period, a questionnaire to the residents who participated in educational activities by the project showed that more than 90% of them understood the importance of sanitation and the role of water supply and sewerage systems, and more than half expressed desire for connecting water supply. Therefore it was judged upon the completion of the project that the anticipated effects had been realized. Two staff members who took part in these training sessions included an acting director and a meter inspection manager, and the knowledge is preserved in the company because they stayed at the KNWSC even at the time of the ex-post evaluation. However, upon commencement of the ex-post evaluation, no decision was made on the staff member that would be in

charge of resident education activities and such education activities were not carried out after the completion of the project. Then, during the execution of the ex-post evaluation, a person in charge of the resident education was appointed. The soft component effect in the resident education is low.

(iii) Operating and Maintenance of Water Supply Facilities

This training was carried out with the aim of teaching the KNWSC's technical staff members the appropriate methods of operating and maintaining of water intake facilities, water treatment facilities, water conveyance and distribution piping, and other water supply systems.

In the On-the-Job-Training conducted during the training period, it was confirmed that operations were being properly carried out, and that each facility's operations and maintenance tasks were converted into routine tasks. From this it was regarded that the objective had been reached at the time of the completion of the project. At the time of the ex-post evaluation as well, it was confirmed that tasks had continued to be carried out in a standardized manner and that manuals were being used, showing that the effect was maintained.

(iv) Water Leakage Prevention and Water Meter Management

This training was carried out with the aim of having the KNWSC's technical staff members understand water leakage investigation, repair, and prevention measures, as well as water meter management methods, to ensure appropriate maintenance of the distribution system.

In the On-the-Job-Training during the training period, it was confirmed that staff members understood water leakage detection methods and how to use water meter inspection devices, as well as that water meters were being installed with the correct tools. Based on these findings, it was deemed that the objective had been reached at the time of the completion of the project. At the time of the ex-post evaluation as well, the operations of meter installation, meter inspection, and new connection were being carried out according to the methods the trainees had learned. As for water leak detection, although the technique is being maintained, the shortage of staffs has resulted in a situation that necessary activities have not necessarily been carried out. Consequently, the effects in this area are partially not realized.

(v) Fee Billing and Accounting System Operations

This training was conducted with the aim of teaching the KNWSC's fee handling and accounting staff members the expertise to operate the fee billing and accounting system.

Upon completion of the project, it was confirmed that the billing and accounting system operations, the water fee billing and collection management and accounting processing using the system, and the customer ledger management had all been converted into standardized tasks. Thus it is deemed that the objective of the training was achieved. At the time of the ex-post evaluation as well, tasks continued to be carried out in a standardized manner, showing that the effect was maintained.

Most of the staff members who participated in the soft component training mentioned above remain on staffs currently, and except for the resident education area, the skills acquired were being used through to the time of the ex-post evaluation. Therefore, the effects have been generally realized according to the plan. As for resident education activities, after the completion of the project, although they were not carried out because staff members were not deployed because of budgetary shortages at the KNWSC, a customer interface staff member was appointed as a person in charge during the ex-post evaluation period

The billing and accounting system was mostly satisfactory, but mutual coordination between the billing and the accounting is inefficient because of lack of LAN in place (From the interview to the person in charge of accounting management).

Another noteworthy lesson regarding the soft component is proactive utilization of On-the-Job-Training. The soft component training plan of this project had the “conversion of tasks to standardized tasks for the instructed items” set as one of the envisioned effects of the training in each subject, wherein the training combined classroom instruction with On-the-Job-Training to apply guidelines and manuals to actual work tasks as a technique for bringing the acquired knowledge and skills into the organization. Because this kind of method requires a degree of flexibility in the training period, it increases the training administration costs, but it has the advantage of more fully realizing the effects from the training and retaining those effects for longer.

3.4 Impact

3.4.1 Intended Impacts

The intended impacts of this project include the stabilization of company’s business (improving the balance of income and expenditures), the status of utilization of the knowledge and skills in “strengthening business operations/management,” “educating residents,” and “measures for preventing water leakage” that were learned through the soft component, reducing the incidence of waterborne diseases in water users, and reducing the burden on water fetching labor.

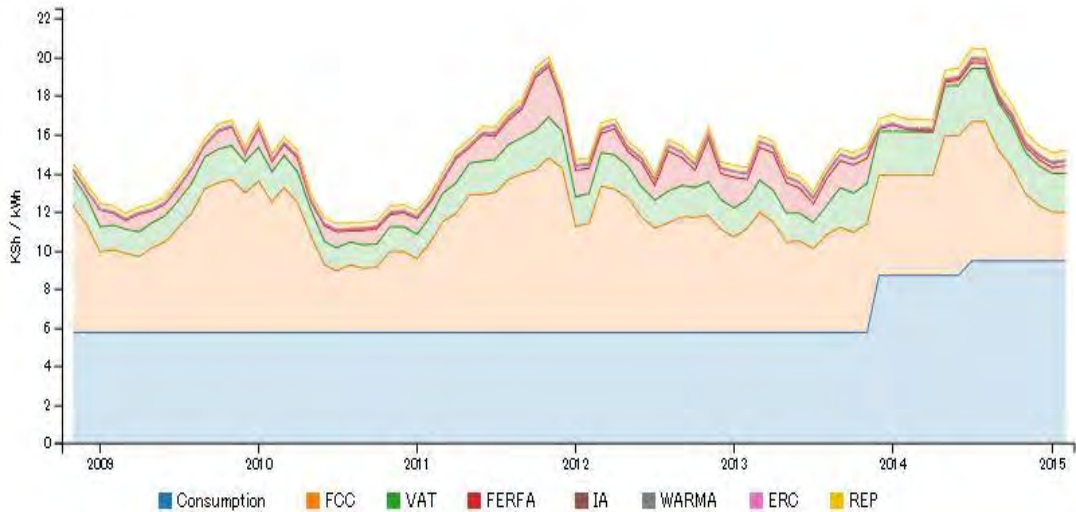
(1) Stabilization of Business (Improving the Balance of Income and Expenditures)

More than 70% of users have been transitioned to a metered fee payment system owing to this project²⁶, and there have been improvements in non-revenue water and a clear effect has been seen toward an increase in fee revenue, but the balance of income and expenditures has not reached to stale situation.

This can be said to be largely a result of the increased electricity fee burden and uncollected bills. In the Basic Design Study, the estimate for electricity usage fees in 2015 was 10.47 million Kenyan shillings per year for 24-hour water supply, but actually for 12-hour water supply status the cost has swelled to 8 to 9 million Kenyan shillings per year. Although the cost lowered slightly in FY2013/2014, electricity usage fees still took up roughly half of total expenditures, which are equivalent to roughly 60% of income excluding uncollected bills, and roughly half the total amount of all bills (Attached Table 2, Attached Table 3).

²⁶ Beneficiary survey of the Ex-post evaluation

Only a 5% inflation rate for electricity charges was taken into account during the planning, resulting in an estimated roughly 10 million Kenyan shillings being envisaged for 24-hour operation costs in 2015, but the actual result was that at the time of the ex-post evaluation the 12-hour pump operation costs amounted to 9 million Kenyan shillings, deviating dramatically from the forecast. Electricity unit price has trended as shown in Figure 4 since the latter half of 2008.



Source: Regulus Limited, Web site: “Electricity cost in Kenya” <https://stima.regulusweb.com/>

(Consumption: consumption unit price, FCC: Fuel Cost Charge, VAT: Value Added Tax, FERFA: Foreign Exchange Rate Fluctuation Adjustment, IA: Inflation Adjustment, WARMA: Water Resource Management Authority Levy, ERC: Energy Regulatory Commission Levy, REP: Rural Electrification Programme Levy)

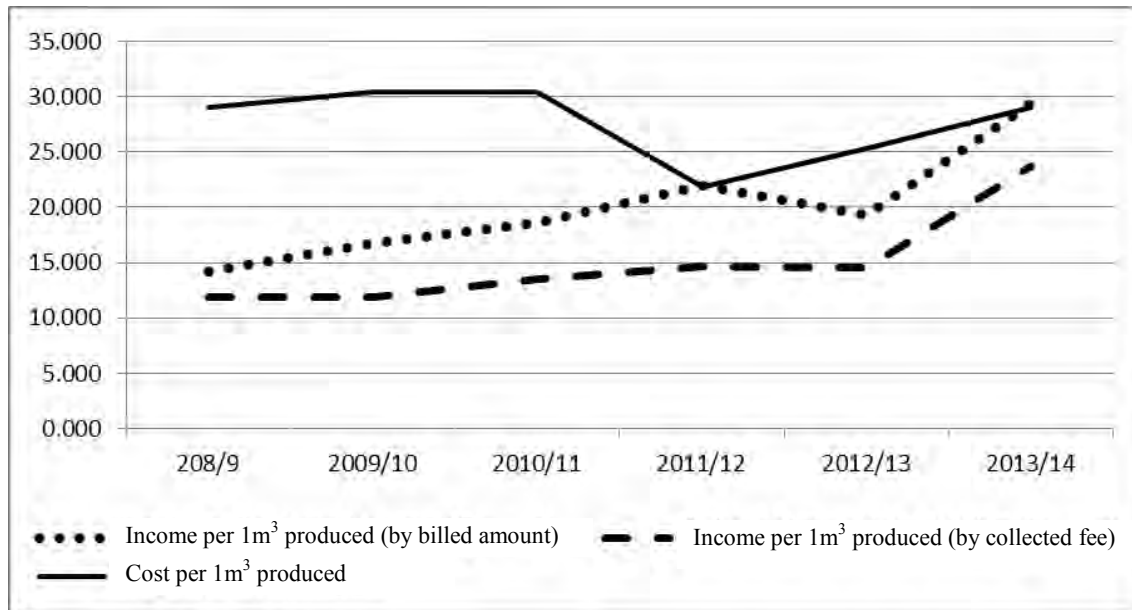
Figure 4: Electricity Unit Price for Small Scale Enterprise in Kenya

During the period from 2008 to 2013, the consumption unit price has not changed. Since the latter half of 2008, the falling oil prices owing to the influence of the bankruptcy of Lehman Brothers resulted in the fuel cost charge falling and put electricity fees on a downward trend, after which they fluctuated gently up and down. Since 2011, fuel cost charge rose again in response to the rising oil prices because of the influence of the Arab Spring, pushing up electricity price substantially, after which they remained at a relatively high level. In the latter half of 2013, electricity price showed a further uptrend, partly because of a price increase in the consumption unit price. As explained above, the influence of the large economic shock on a global scale caused rising electricity prices substantially, and it is deemed to have been difficult to have predicted the rise in electricity costs since 2011, at the time of the planning.

The trend in overall income and expenditures in Attached Table 3 shows that FY2011/2012 and FY2013/2014 had cash balances (the balance of actual cash income and expenditures) in the red, but the balance of bills and expenditures (the balance of income that should have been received and expenditure) was in the black.

Figure 5 is a graph showing the trend in cost and income per cubic meter of the total volume of water produced at the treatment plant. Because all the water produced at the

water treatment plant has a cost, turning a profit on water production requires not just the sold water but looking at the produced water as a whole. The graph shows that in FY2013/2014 income and costs were in line with each other on a “billed amounts basis,” and that if the fee collection ratio were 100% then enough income to cover the water production costs could be ensured. Although strictly speaking a more detailed analysis is needed, it can be said that as a business the water supply system is approaching profitability. However, it still cannot be said that costs and income are approximately in balance (it is not structured for profit) and that the system has reached a condition of contributing to stable operations.



Source: KNWSC

Figure 5: Cost and Income per 1m³ of Produced Water (Unit: Kenya shillings)

Another major financial issue is the delay in revision of water fee tariff to increase the water fee. This had not yet been achieved at the time of the ex-post evaluation. According to the LVNWSB, the board intends to approve an application to raise water fee if KNWSC carries such an application out. The condition was set, and in 2014 application was submitted once. However, because it was an application only for a rise in water fee in the Kapsabet water supply area²⁷, LVNWSB instructed that the application should be for all of the KNWSC which includes water tariff for the Nandi water supply area. Documents are now being prepared for submission in a re-application, meaning that it is almost certain that a revision in prices will be effected²⁸.

Another issue is that of the transfer of responsibility for financial aid to the KNWSC because of the decentralization of authority to counties based on the constitutional amendment of 2010. Prior to the decentralization, the Ministry of Environment, Water and Natural Resources supplemented the loss portion of the KNWSC’s balance sheet, such as by providing 100% subsidies through the LVNWSB in procuring chemicals and

²⁷ Because the KNWSC is a merger between a company in charge of Nandi water supply area and a company in charge of Kapsabet water supply area, even during the ex-post evaluation the water supply systems for both the areas are independent each other.

²⁸ From the interview to LVNWSB.

reagents for the treatment plant²⁹. The decentralization based on the 2010 constitutional amendment first actually went into effective form in FY2013/2014, after which budgetary allocations were begun for the county governments, and at the time of the ex-post evaluation the transfer work was still in progress. In the initial period of this decentralization, the recognition on the responsibility of the Nandi County government for the KNWSC was what had a large impact on this project. Specifically, the Nandi County government initially considered the KNWSC a private corporation and that, therefore, the Nandi government should not bear the responsibility for providing financial aid to the KNWSC directly³⁰. The delay in the revision to the law establishing the KNWSC (changes in owners, changes in membership in the board of directors, etc.) was another obstacle in adjusting the relationship between the Nandi County government and the KNWSC³¹. In this period of transfer of authority under the framework of the decentralizations, the supplementation of the negative portion of the KNWSC's balance sheet ceased from 2011 onwards.

In relation to this matter, even during the ex-post evaluation period as well, negotiations were being advanced among the three parties: the Nandi County government, LVNWSB, and KNWSC. As of February 2015, the parties had reached near-agreement, with the Nandi County government bearing 100% of the costs of purchasing chemicals and reagents, and also subsidizing electricity costs³².

In view of the above, although increased income was achieved, an improvement in the state of income and expenditures cannot be said to have been reached, nor has the business stabilized, because of such factors as rising electricity fees, delays in the introduction of new fee tariff, and the lack of subsidization of the negative side of the balance sheet from the Nandi County government as of yet.

(2) Effects of the Use of Skills and Knowledge on “Strengthening Business Operation and Management,” “Educating Residents,” and “Measures to Prevent Leakage,” acquired through the Soft Component

The guidelines and manuals provided through the soft component are being used even at the time of the ex-post evaluation for chemical management and water quality inspection at the water treatment plant, and to standardize work tasks for account management software and bill forms. The effects are sufficiently realized and are supporting the technical side of facility operations.

The calculation tables for mix ratios of chemicals at the water treatment plant, the software and bill forms for fee billing, and other measures introduced via soft components are being used even during the ex-post evaluation and are taking root as a way of standardizing work tasks.

²⁹ From the interview to LVNWSB.

³⁰ From the interview to the Nandi County government and LVNWSB.

³¹ From the interview to the Nandi County government and LVNWSB.

³² From the interview to the Nandi County government, LVNWSB, and KNWSC. A copy of the relevant minutes of the hearing was obtained. However, the electricity cost subsidy ratio was still being negotiated as of this ex-post evaluation.

(3) Reduction of Waterborne Diseases in Water Users

As an impact on water users, an effect on the reduction of waterborne diseases was not found (Table 9). Fluctuation in the number of patients shown in the table 9 cannot explain main effect of the changes, and the beneficiary study also found on the state of waterborne diseases that 83% responded that there had been “no change” before versus after project implementation. The reasons seem to include the fact that there was no small number of users who would already boil their water before using it prior to the water supply covering their area (beneficiary study) and that there has been no change in the infection sources not involving water supply (toilets, hand-washing, etc.; heard from Kapsabet Hospital).

Table 9: Number of Waterborne Diseases

| | 2010 | 2011 | 2012 | 2013 | 2014 |
|-----------|------|------|------|------|------|
| Diarrhea | 691 | 206 | 294 | 181 | 707 |
| Dysentery | 795 | 318 | 266 | 682 | 237 |
| Vomiting | 1 | 0 | 0 | 6 | 26 |
| Total | 1487 | 524 | 560 | 869 | 970 |

Source: Nandi County Hospital

3.4.2 Other Impacts

With regard to the expense of procuring water, compared to the purchasing water from a water dealer as was done prior to the implementation of the project, several comments were received to the effect that the procurement costs of water was reduced (beneficiary study). From some beneficiaries, the view received from all members was that before the project implementation they were paying between 30 and 200 Kenyan shillings, whereas the costs at the time of the ex-post evaluation were overwhelmingly less expensive considering the water quality and volume. In addition, many responded that they started a household garden after the completion of the project and that they were able to give more adequate drinking water to their livestock, because they can obtain water from a physically nearby location for a low price.

Moreover, 78% of respondents in the beneficiary study said that the labor they put into water transport had decreased.

There were no other impacts on the natural environment, land acquisition, resettlement, etc.

As explained above, in terms of effectiveness, although water supply hours and income have not met their targets, the water supply capacity achieved the target, water supply population was close to the target, and water meter installations, utilization of various manuals improved through the soft component achieved the targets, and user satisfaction levels are high. Regarding impacts, although business management stability (improvement in income versus expenditures) has not been achieved, the economic effects on users, a reduction in labor, and other benefits have been found, adding up to a degree of effect owing to the implementation of this project. Therefore, this project has to some extent achieved its objectives. Therefore effectiveness and impact of the project are fair.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

The deployment of the staff members of the KNWSC is as shown in Table 10. Although operation and maintenance, as well as the fiscal management structure, for the water treatment plant are mostly adequate, there is a shortage of staffs for water meter checking and drainage pipe management. According to a hearing with the accounting manager at the KNWSC, the lack of staffs deployed to water meter checking means that the monthly bill creation work takes time, often resulting in delayed sending of bills, and overall the fee collection system is not fully effective. During the ex-post evaluation as well, the questionnaire on satisfaction included multiple comments on the delay in sending bills. However, as shown in the section on effectiveness, the fee collection ratio has remained at around 75% despite the increase in the number of registrations, meaning that inadequacies in the billing and fee collection system are not a major issue.

Table 10: Staff allocation in KNWSC (Unit: person)

| Title / Sections | Number of existing personnel at present | Number of allocated personnel for the position / section | Remarks |
|---|---|--|--------------------|
| Board of Directors | 8 | 7 | |
| Internal Audit Manager | 0 | 1 | |
| Managing Director | 1 | 1 | On acting capacity |
| Technical Manager | 1 | 1 | On acting capacity |
| Meter Reader | 1 | 5 | |
| Non-Revenue Water | 0 | 0 | |
| Line Patrollers | 4 | 9 | 4 casual engaged |
| Artisan Plumbers | 3 | 9 | 1 casual engaged |
| Water Supply Operator (Treatment Plant) | 1 | 2 | |
| Electro-Mechanical Technician | 1 | 1 | |
| Pump Attendant | 0 | 1 | |
| Laboratory Technician (Treatment Plant) | 1 | 1 | Engaged a casual |
| Chemical Attendant | 1 | 1 | |
| Sewerage Operator | <i>Not yet</i> | 0 | |
| Laboratory Technician (Sewerage) | <i>handed over</i> | 0 | |
| Sewerage Attendant | <i>to KNWSC</i> | 0 | |
| Commercial & Administration Manager | 1 | 1 | |
| Office Assistant | 1 | 1 | Engaged a casual |
| Customer Care Officer | 1 | 1 | |
| Accountant | 1 | 1 | Engaged a casual |
| Expenditure Clerk | 1 | 1 | |
| Cashier | 1 | 1 | |
| Billing Clerk | 1 | 2 | Engaged a casual |
| IT Operator | 0 | 1 | |
| Supplies Clerk | 0 | 1 | |
| Driver | 2 | 2 | |

Source: KNWSC

Furthermore, the KNWSC hires many non-regular employees (short-term contracts), which is the result of inadequate income to hire regular employees. To address this, the KNWSC is revising its remuneration standards for regular and non-regular employees to

maintain the motivation of non-regular employees for their work. According to the KNWSC, there is no impact evident on their implementation structure due to having many non-regular employees.

Education activities for water supply users were not being conducted during the period leading up to the ex-post evaluation, because of a lack of clarity at the KNWSC as to what department and where the manager who is responsible for education activities resides, as well as because of budget limitations. Therefore, without users fully understanding the water fee system (which is a combination of a flat rate and a metered rate), there is a possibility that this could lead to complaints about fee payment³³. Note that it has been decided that, during the implementation of the ex-post evaluation, the staff member in charge of customer interface will also perform education activities, and will commence these activities with regard to education on sanitation as well³⁴.

In addition, as mentioned in the effectiveness section, the internal LAN structure is outdated, resulting in inefficient transmission of work-related data among departments. In particular, because information transmission among the three departments of fee collection, accounting management, and financial information management is done by hand, there are delays in data transmission, mistakes in data, and other problems occurring.³⁵ Although this has not resulted in any major problems so far, this project has provided servers and other equipment for LAN construction, so the necessary equipment is all available and a prompt effort to build a LAN structure is necessary.

In view of these factors, despite the partial staff shortage, delays in creation of bills, lack of education activities, inefficient data transmission, and other challenges, water supply and fee collection are being carried out appropriately. Therefore, the sustainability in terms of the institutional aspects of operation and maintenance is considered as fair.

3.5.2 Technical Aspects of Operation and Maintenance

With regard to the technical aspects of operation and maintenance of the water treatment plant, the distributing reservoir, and the distribution piping, in each department tasks are being performed in a standards-based manner using the techniques learned via soft components, and there have been no major issues at the time of the ex-post evaluation.

As shown in Table 7, the non-revenue water ratio has been gradually declining since FY2011/2012. In training for a technical cooperation project known as the Project for Management of Non-Revenue Water, which was planned for coordination since when this project was planned, although only the acting manager of the KNWSC participated, afterward the following activities were carried out. Having falling steadily after holding at levels exceeding 60% until 38.8%, then, it is fair to say that the effect on the non-revenue water ratio owes to these activities.

³³ Confirmed from Customer Care Officer that there were claims from customers on over charges despite the calculations of the charge were correct. The beneficiary survey also found some respondents who did not understand how to read the invoice and/or receipt.

³⁴ Heard from the KNWSC.

³⁵ Heard from the accounting personnel at the KNWSC.

- Training to other employees by trainees
- Water leakage inspection and repair
- Replacement of deteriorated acrylic pipes
- Implementation of education activities for users
- Periodic checks for illegal connections
- Swift response to leaks, pipe ruptures, etc.

The malfunction in the water level auto-regulating system for the distributing reservoir that was pointed out in the defect inspection remained at the time of the ex-post evaluation, so it is currently not being used. However, the water level management can be performed manually as well, so this presents no obstacle to operation or maintenance.

Based on the above, the sustainability in terms of the technical aspects of operation and maintenance can be considered as high.

3.5.3 Financial Aspects of Operation and Maintenance

The KNWSC's income, expenditures, and the status of its balance of income and expenditures are shown in Attached Table 1, Attached Table 2, and Attached Table 3. In terms of cash flow there is a chronic loss, but on a billed basis FY2011/2011 and FY2013/2014 are cash-flow positive. However, this is with restrictions in place on the operating time of the pumps. To verify the fiscal stability in the future, consideration will need to encompass elements such as future increases to the water supply prices.

At the time of the ex-post evaluation, the KNWSC had submitted a price revision proposal (Attached Table 4) to the LVNWSB. If fees were to be collected based on this new fee structure, the estimated total billing amount would be about 28.9 million Kenya shillings, which is a 62% increase compared with the amount of 17.8 million Kenyan shillings in FY2013/2014. A concern about the new fee structure is an increase in unpaid fees especially among low income earners, but for users who use the lowest amount, which is less than 6 m³ of water, the flat usage fee will change from the current 250 Kenyan shillings to 380 Kenyan shillings (Attached Table 4)³⁶. As mentioned in the impact section, considering that the payment amount before the project implementation (2009) was 30 to 200 Kenyan shillings per day, an increase of 130 shillings in the monthly rate is seen as within allowable limits. As a result, an increase as estimated is anticipated.

In this new fee structure, supposing the fee collection ratio can be held around 75% as it was during the ex-post evaluation, the yearly cash income would reach about 21.7 million. Because the total expenditures are about 17.5 million Kenyan shillings based on the expenditure figures for FY2013/2014 (Attached Table 2), assuming income of 21.7 million Kenyan shillings, there would be about 4 million Kenyan shillings of net income.

³⁶ In the current fee structure, a water usage fee of 200 Kenyan shillings (33.33 Kenyan shillings x 6 m³) and a meter usage fee of 50 Kenyan shillings combine to total 250 Kenyan shillings. In the submitted proposal, a water usage fee of 330 Kenyan shillings (55.0 Kenyan shillings x 6 m³) and a meter usage fee of 50 Kenyan shillings combine to total 380 Kenyan shillings.

The electricity usage costs for FY2013/2014 were about 8.2 million Kenyan shillings, which corresponds to the conclusion that a rise in electricity usage costs of up to around 50% (to roughly 12.3 million Kenyan shillings) could be covered by that net income. Based on this, the pump operation time could be lengthened and the water supply time could be increased, leading to even more additional income. Achieving the income increase also needs a condition that the rate of non-revenue water is maintained at the level of 2014 (slightly less than 40%)³⁷, and continuous effort of prevention and response to water leakage is necessary.

Another concern in establishing financial independence is how to address the unpaid bills that are centered on public facilities. As mentioned in the Quantitative Effects subsection of the effectiveness section, most of the public facilities that are in arrears are public bodies that are affiliated with the central government. Therefore, it seems as if this will require direct negotiation on dissolution of late payments with the central government agencies under the authority of the Nandi County government. In addition, because the increase in fees may add to the risk of non-payment, this needs to be adequately addressed.

Moreover, as mentioned in the Stabilization of Business (Improving the Balance of Income and Expenditures) of the impact section, the ownership rights over the KNWSC were transferred to the Nandi County government in connection with the decentralization to regions, making financial aid to the KNWSC also the responsibility of the Nandi County government. At the time of the ex-post evaluation, deliberations on financial aid to the KNWSC by the Nandi County government had entered the final stage; as of February 2015, although it appears that a near-agreement has been reached wherein the Nandi County government will bear 100% of the purchase costs for chemicals and reagents and also subsidize electricity usage costs³⁸, actual support has not yet been realized. Furthermore, both the Nandi County government and the KNWSC think that the KNWSC should become financially independent in the future. Thus there are concerns as to how long the subsidies from the Nandi County government will continue and what the KNWSC's road map to financial independence will look like.

Note also that the KNWSC has created a five-year strategic plan starting in 2012³⁹ wherein it puts forth the establishment of its financial independence as one of its five priority challenges, with the following two pillars of activity plans as the concrete means of achieving that. However, the KNWSC has not clarified the feasibility of these activities.

- Increasing customers
 - Review of connections that are not being used
 - Streamlining of fee billing
 - Elimination of corruption

³⁷ Increase of rate of non-revenue water results in the situation that more water production (including waste water) is necessary to earn same amount of profit, which means cost of water production is higher.

³⁸ Heard from the Nandi County government, the LVNWSB, and the KNWSC. A copy of the relevant minutes of the hearing was obtained. However, the electricity cost subsidy ratio was still being negotiated as of this ex-post evaluation.

³⁹ Strategic Plan 2012-2017 (draft, February 2012)

- Promotion of Transfer of Pump Fees
 - Transfer of office and treatment plant lighting to solar generation
 - Conducting a feasibility study on a water supply system that uses gravity with Kilot Dam as the water source
 - If the feasibility of the water supply system above is confirmed, then secure a funding source to commercialize it

Based on these factors, although there is a possibility of achieving financial sustainability in the future through the introduction of a new fee structure and improving the status of electricity cost payment and thereby extending pump operation time as a result, as well as through recovery of unpaid bills from public agencies affiliated with the central government, at the time of the ex-post evaluation the new fee structure still had not been put in place and concerns such as the non-payment of bills focused on public facilities remained. Therefore as of the ex-post evaluation, the sustainability in terms of the financial aspects of operation and maintenance is fair.

3.5.4 Status of Operation and Maintenance

Overall the facilities are being appropriately operated, so there are no major issues. Although there are some malfunctioning devices that have not been repaired, such as the water level auto-regulating system for the distribution reservoir, these have not presented a problem for operations.

From a hearing with the KNWSC, it was learned that the transformer installed by Kenya Power is currently working without issue, and that no subsequent problems occurred regarding the adjustment of voltage pointed out during the defect inspection.

Based on these factors, the status of operations and maintenance can be considered as good.

In view of the foregoing, there is sustainability in terms of the technical aspects, and at the time of the ex-post evaluation there are no issues of note on the status of operation and maintenance. Although the operation and maintenance of the facilities poses no obstacles, there are challenges from an institutional aspect, such as lack of personnel deployment and the non-performance of education activities. Regarding sustainability in terms of financial aspects, although a balance of income and expenditures has not been achieved as of the ex-post evaluation, it was confirmed that there is a possibility that sustainability could be established in the future through price increases, supplemental assistance from the Nandi County government, and other measures.

Therefore, some minor problems have been observed in terms of uncertainty in financial stability of KNWSC, the sustainability of the project effect is fair.

4. Conclusion, Recommendations and Lessons Learned

4.1 Conclusion

This project was implemented with the objective of increasing the water supply volume and ensuring the provision of safe water to residents in the project target area by improving the

water supply system facilities for water intake, conveyance, purification, and distribution in Kapsabet Town, thereby contributing to the improvement of the living environment in the target area. This project has been highly relevant to Kenya's development plan, development needs, as well as Japan's ODA policy. Although the one of the objectives was realization of 24-hour water supply, the project resulted in 12-hour water supply because of rising electricity costs, and income from water fees was also below the target. However, the rise in electricity prices that started in 2011 seems to have substantially resulted from the influence of the Arab Spring and related factors, and it is deemed to have been difficult to predict this consideration during planning and incorporate it into the project plan. Therefore, it is deemed that the relevance of the project is high because this factor does not diminish the appropriateness of the plan and the approach of the project. The efficiency of the project is fair, because although the project costs were within the plan, the project duration was longer than the plan. The targets for meter installation and water supply households were met and water supply population was close to the target. The anticipated contributions such as to reduce labor for water transport were confirmed as impacts, but the water supply hours and water supply volume were only about halfway achieved towards the target, and the increase in income achieved only about 60% of the target. Therefore, the effectiveness of the project is fair. Sustainability has been observed in the institutional and technical aspects of the project, and there are no problems in the status of operation and maintenance at the time of the ex-post evaluation. Although, in the financial aspect of sustainability, a balance of income and expenditures has not been achieved at the time of the ex-post evaluation, it has been confirmed that there is a possibility for sustainability to be secured through increase in water fee, expected supplementary funding by the Nandi County government, and other factors. Therefore the sustainability of the project is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

(1) Prompt Commencement of Financial Aid by the Nandi County Government

To increase the KNWSC's pump operation time and increase the overall volume of water supplied, the Nandi County government and the KNWSC should come to an agreement on the Nandi County government bearing the costs of electricity, as has been promoted up to now, as expeditiously as possible. In conjunction with this, the KNWSC's strategic plan should be finalized promptly and starting in FY2015/2016 it should move to execution starting from whatever can be done, commencing concrete and realistic activities toward future achievement of financial independence.

(2) Effecting the New Water Tariff

To improve financial capacity of KNWSC to pay the electricity bill and to realize financial self-reliance, appropriate revision of water tariff is indispensable. Both KNWSC and LVNWSB have already worked on to realize the revision of the water tariff, however, it was not confirmed during the ex-post evaluation study. LVNWSB should take necessary action to approve the application submitted by KNWSC to realize the revision of the tariff as soon as possible.

(3) KNWSC's Construction of a LAN

To enable the sharing of accounting data between the billing section and the financial section via a LAN and streamline accounting and financial tasks and improve accuracy, the KNWSC should construct a LAN within their organization promptly using the PC servers provided in this project. This can be expected to resolve the data transmission errors, delays, and other problems associated with the current handwritten format for data exchange.

(4) Commencement of Education Activities for Users

Education activities should be carried out for users prior to the introduction of the new fee structure, led by the KNWSC's new education activities manager. This will obtain users' understanding of the need for a fee increase and the potential for improvement in water supply after the increase. Guidance should also be given on how to read the bills and other matters alongside the education, so that the users themselves can understand the reasons for the billed amounts.

(5) Continual Work for Reduction of Non-Revenue Water

To achieve financial stability in the future, KNWSC should continue its effort to maintain the non-revenue water, which was reduced to 38.8% in 2014. KNWSC should continue the on-going activities to improve the rate of non-revenue water to prevent it from getting worse again.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

(1) Ensure the Realization of Sustainable Project by Considering Water Supply Systems that Minimize Production Costs

In this project, it seems that it would have been difficult during planning to consider alternative proposals with lower production cost in operation, because that the elevation of the water source in the requested content was low, there was no other water source that could have used the gravity method for the target area, the water pumping method using an electric pump was still common at the time, and other reasons. However, taking into account water users' ability to pay charges, consideration for low income earners, and financial burden on the water provision business entity, the expansion possibilities for future provision, and other factors comprehensively, it is preferable to minimize water production costs. To achieve this, even if the initial investment is somewhat large, adequate consideration should be given at the project design stage, by both the requesting country and Japan, to the possibility of water supply systems powered by gravity, and other systems that have lower production costs during operation, if at all possible.

(2) Proactive Use of On-the-Job-Training and Introduction of Practical Tools through Soft Component Aiming at Internalization of learned knowledge and skills

The soft components in this project included not only classroom instruction and hands-on training, but it also incorporated those forms of learning into actual practice in actual

work situations. Moreover, by introducing into the training the forms and work process procedures that are actually used, it can be expected to be transferred as is into actual work. This kind of incorporation of OJT into soft components is a highly effective innovation. To boost the technical sustainability of grant facilities after the project, at the project planning stage adequate consideration should be given on the Japan side to these kinds of technology transfer programs that use OJT to the fullest extent when incorporating soft components.

Attached Table 1 Details of Income of KNWSC (Unit: Kenya shillings, if not specified)

| | Billed amount | Collected amount | | | | Rate of collection (%) | Water produced (m ³) | Sold water (m ³) | Volume of non-revenue water (m ³) | Rate of non-revenue water (%) |
|----------------------------|---------------|------------------|---------|---------|------------|------------------------|----------------------------------|------------------------------|---|-------------------------------|
| | | Consumption | Deposit | Others | Total | | | | | |
| FY 2008/9 Total | 3,048,913 | 2,550,665 | 5,000 | 12,000 | 2,567,665 | 84 | 215,055 | 73,849 | 141,206 | 66 |
| FY 2008/9 Monthly average | 254,076 | 212,555 | 417 | 1,000 | 213,972 | 84 | 17,921 | 6,154 | 11,767 | 66 |
| FY 2009/10 Total | 3,528,698 | 2,468,522 | 17,000 | 16,000 | 2,501,522 | 70 | 209,963 | 79,845 | 130,118 | 62 |
| FY 2009/10 Monthly average | 294,058 | 205,710 | 1,417 | 1,333 | 208,460 | 70 | 17,497 | 6,654 | 10,843 | 62 |
| FY 2010/11 Total | 4,176,300 | 3,016,716 | 4,000 | 7,000 | 3,027,716 | 72 | 224,629 | 80,016 | 144,613 | 64 |
| FY 2010/11 Monthly average | 348,025 | 251,393 | 333 | 583 | 252,310 | 72 | 18,719 | 6,668 | 12,051 | 64 |
| FY 2011/12 Total | 9,040,712 | 5,601,291 | 258,000 | 191,000 | 6,050,291 | 62 | 412,584 | 180,662 | 231,922 | 56 |
| FY 2011/12 Monthly average | 753,393 | 466,774 | 21,500 | 15,917 | 504,191 | 62 | 34,382 | 15,055 | 19,327 | 56 |
| FY 2012/13 Total | 13,102,030 | 8,891,876 | 518,000 | 444,600 | 9,854,476 | 68 | 679,345 | 312,322 | 367,023 | 54 |
| FY 2012/13 Monthly average | 1,091,836 | 740,990 | 43,167 | 37,050 | 821,206 | 68 | 56,612 | 26,027 | 30,585 | 54 |
| FY 2013/14 Total | 17,825,260 | 13,468,260 | 301,000 | 614,500 | 14,383,760 | 76 | 605,798 | 370,978 | 234,820 | 39 |
| FY 2013/14 Monthly average | 1,485,438 | 1,122,355 | 25,083 | 51,208 | 1,198,647 | 76 | 50,483 | 30,915 | 19,568 | 39 |

Source: KNWSC

Attached Table 2: Details of Expenditure of KNWSC and their changes (Unit: Kenya shillings)

| | 2008/9 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 |
|--|-----------|-----------|-----------|-----------|------------|------------|
| Salary | 2,177,484 | 2,177,484 | 2,177,484 | 2,231,969 | 2,955,400 | 3,301,872 |
| Electricity | 3,070,961 | 3,314,098 | 3,219,669 | 5,023,272 | 9,221,274 | 8,218,274 |
| Operation and Maintenance | 113,300 | 161,800 | 351,700 | 456,250 | 617,321 | 1,043,464 |
| Travelling | 47,700 | 23,300 | 166,300 | 93,700 | 210,600 | 571,750 |
| Security | 0 | 0 | 0 | 0 | 1,531,200 | 1,531,200 |
| Chemicals | 615,750 | 575,625 | 626,274 | 882,785 | 1,271,940 | 1,177,570 |
| Stationary | 33,000 | 28,800 | 68,100 | 80,500 | 134,500 | 167,900 |
| Fueling | 118,600 | 70,800 | 94,200 | 138,100 | 685,950 | 715,896 |
| Others | 75,800 | 33,644 | 124,470 | 113,630 | 601,392 | 799,123 |
| Total | 6,252,595 | 6,385,551 | 6,828,197 | 9,020,206 | 17,229,577 | 17,556,249 |
| Rate of Electricity to the Total expenditure (%) | 49.1 | 51.9 | 47.2 | 55.7 | 53.5 | 46.8 |

Source: KNWSC

Attached Table 3: Financial Balance of KNWSC and burden of Electricity expenditure (Unit: Kenya shillings)

| | 208/9 | 2009/10 | 2010/11 | 2011/12 | 2012/13 | 2013/14 |
|--|------------|------------|------------|------------|------------|------------|
| Cash balance | -3,684,930 | -3,884,029 | -3,800,481 | -2,969,915 | -7,375,101 | -3,172,489 |
| Balance of billed fee and expenditure | -3,203,682 | -2,856,853 | -2,651,897 | 20,506 | -4,127,547 | 269,011 |
| Rate of electricity expense to the cash income (%) | 119.6 | 132.5 | 106.3 | 83.0 | 93.6 | 57.1 |
| Rate of electricity expense to the billed fee (%) | 100.7 | 93.9 | 77.1 | 55.6 | 70.4 | 46.1 |

Source: KNWSC

Attached Table 4: New Water Tariff Proposal (Unit: Kenya shilling)

| | 2011/12 (Current) | | 2015/16 (Proposed) | |
|--------------------------------|--|--------------------|--|--------------------|
| | Volumetric charge (per 1 m ³) | Monthly meter rent | Volumetric charge (per 1 m ³) | Monthly meter rent |
| Domestic/residential | | | | |
| 0-6m ³ | 33.33 | 50 | 55.00 | 50 |
| 6-20m ³ | 50.00 | 50 | 65.00 | 50 |
| 21-50m ³ | 65.00 | 50 | 80.00 | 50 |
| 51-100m ³ | 80.00 | 50 | 90.00 | 50 |
| 101-300m ³ | 100.00 | 50 | 120.00 | 250 |
| > 300m ³ | 130.00 | 250 | 140.00 | 250 |
| Commercial/industrial | | | | |
| 0-6m ³ | 33.33 | 50 | 65.00 | 50 |
| 6-20m ³ | 50.00 | 50 | 75.00 | 50 |
| 21-50m ³ | 65.00 | 50 | 90.00 | 50 |
| 51-100m ³ | 80.00 | 50 | 100.00 | 50 |
| 101-300m ³ | 100.00 | 250 | 130.00 | 250 |
| > 300m ³ | 130.00 | 250 | 150.00 | 250 |
| College/universities | | | | |
| <600m ³ | 40.00 | 0 | 50.00 | 250 |
| 600<1200m ³ | 50.00 | 0 | 60.00 | 250 |
| >1200m ³ | 90.00 | 0 | 90.00 | 800 |
| Government Institutions | | | | |
| 0-6m ³ | 33.33 | 50 | 55.00 | 50 |
| 6-20m ³ | 50.00 | 50 | 65.00 | 50 |
| 21-50m ³ | 65.00 | 50 | 80.00 | 50 |
| 51-100m ³ | 80.00 | 50 | 90.00 | 50 |
| 101-300m ³ | | | 120.00 | 250 |
| > 300m ³ | | | 140.00 | 0 |
| Schools | | | | |
| <600m ³ | 40.00 | 250 | 50.00 | 250 |
| 600<1200m ³ | 50.00 | 250 | 60.00 | 250 |
| >1200m ³ | 90.00 | 250 | 90.00 | 250 |
| Water kiosk | 35.00 | 50 | 35.00 | 50 |

Source: KNWSC

Ex-Post Evaluation of Japanese Grant Aid Project
“The Project for Rural Water Supply in Mwanza and Mara Regions”

External Evaluator: Noriyo Aoki, IC Net Limited

0. Summary

The relevance of the project is high, because it is consistent with the priority areas of the development policy of Tanzania and with the assistance policies of Japan, and Tanzania’s development needs are also high. Both the project cost and period were kept within the plan; therefore the efficiency of the project is high. The operational and effectiveness indicators has achieved the planned figures, and the beneficiary survey confirmed both an increase in the amount of water supply and an improvement of water quality, and the project has contributed to improvements of livelihoods in the project areas; thus the effectiveness and impact of the project is high. The operation and maintenance system has been established. However, although at the district level, there exists the number of staff who are able to respond breakdowns and guiding technical matters, they have not yet been providing financial or operational guidance, because a rapid increase of population growth made a strong water supply demand, and there are new plans to establish facilities in addition to the operation and management of existing water points¹. In relation to technical matters, there is a need for retraining of those in the water users’ groups in charge of technical matters. With respect to finances, there is a budget from the Ministry of Water and a budget from the Prime Minister’s Office that is directly allocated to the local governments. In recent years the domestic budget of the Ministry of Water has been on the rise. Foreign capital accounts for the greater part of the budget, and donor initiatives have also meant that foreign funding has also been increasing. While most of the water users’ groups collect water usage fees, coping with the cost when large-scale repairs are needed remains a problem. Therefore, the sustainability of the project effect is fair.

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

1. Project Description



Project Location



Platform in Mhulya Village, Kwimba District, Mwanza Region

1.1 Background

The target Mwanza and Mara regions relatively enjoy an economical privileged

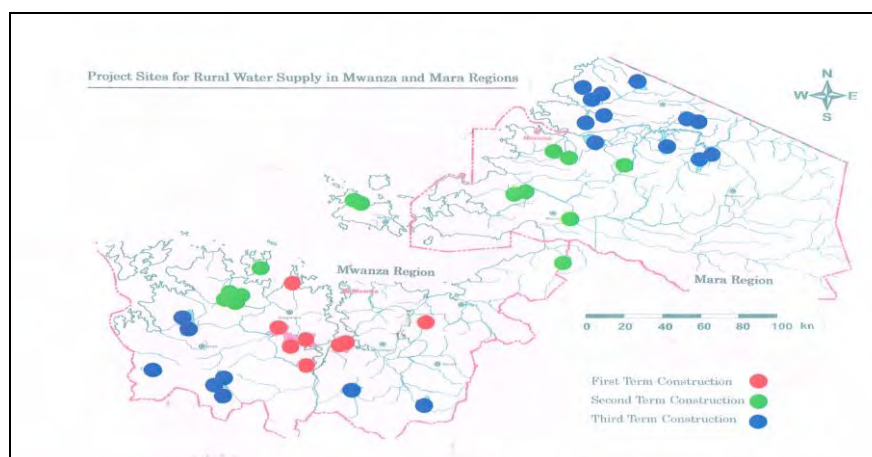
¹ The definition of water point is platforms of each deep well and water outlets of spring protection since the project has two different types of scheme, that is, deep well and spring protection.

environment, endowed with favorable fishery basins facing with Lake Victoria and suitable agricultural land with sufficient amount of rainfall. Especially Mwanza Region has been placed high in the GDP (Gross Domestic Production) ranking². However, the water facilities were built in 1960s - 70s in two regions and had been dilapidated. They had not been kept up pace with an increasing demand caused by the population growth. Thus JICA implemented the Development Study relating to the formulation of a water supply plan for these two regions from 2004 to 2006, and the project was implemented on the basis of the results of the Study.

1.2 Project Outline

The objective of the project is to increase water supply population and to provide safe water sustainably in a total of 44 villages (26 villages in Mwanza and 18 villages in Mara) by constructing water supply facilities, thereby contributing to improvements of living environments in the target areas.

| | |
|---|--|
| Grant Limit/Actual Grant Amount | 1,022 million yen / 697 million yen |
| Exchange of Notes Date/Grant Agreement Date | May 2009/ May 2009 |
| Implementing Agency | Ministry of Water, Rural Water Supply Division |
| Project Completion Date | December 2011 |
| Main Contractor | TONE ENGINEERING CORPORATION |
| Main Consultants | KOKUSAI KOGYO CO., LTD |
| Basic Design | The First Year: March 2008 The Second Year: November 2008 |
| Detailed Design | October 2009 |
| Related Project | Development Study “Water Supply Plan in Mwanza and Mara Regions” (2004 – 2006) |



NB) The construction was carried out in three terms.

(Source) Drawn up by the author from reference materials provided by JICA

Figure 1: Location of Target Villages of Project

² As for the real GDP values of the two regions, Mwanza ranks 2nd and Mara 14th of the 21 regions. (National Bureau of Statistics, National Accounts of Tanzania Mainland 2001-2013, Ministry of Finance, December 2014).

2. Outline of the Evaluation Study

2.1 External Evaluator

Noriyo Aoki, IC Net Limited

2.2 Duration of Evaluation Study

Duration of the Study: July 2014 – September 2015

Duration of the Field Study: October 18 - 31, 2014 and January 18 - 25, 2015

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

3.1 Relevance (Rating: ③⁴)

3.1.1 Relevance to the Development Plan of Tanzania

The Tanzanian government cited an improvement of water supply rate as one of the prioritized areas for poverty elimination strategy in the Long-term Development Strategy “the National Strategy for Growth and Reduction of Poverty (NSGRP), 2005 - 2009” which was drawn up in 2004, based on “the Tanzania Development Vision 2025” (Vision 2025)⁵.

Tanzanian Ministry of Water and Irrigation at that time had formulated “The Long-term Water Sector Development Program (WSDP), 2006 - 2025” based on the National Strategy. In WSDP Phase I (2007 - 2013) this project was considered an integral part of the initiatives for improving a rural water supply rate.

At the time of the ex-post evaluation, WSDP Phase II had been drawn up with a view to achieving the goals of “The National Strategy for Growth and Reduction of Poverty II (NSGRP II) (2010 - 2014)”, with the aim of further developing capabilities relating to the maintenance and management of the water supply at the district and village level.

The National Development Plan called “Big Results Now (BRN)” formulated in the secretariat under the Cabinet Office of President, has been being promoted, and it is supposed to be implemented from 2013 to 2016. BRN includes a program for accelerating the achievement of development outcomes in the water supply sector. Since the National Development Plan is based on a Presidential decree, in order to promote rapid implementation of the Ministry of Water’s WSDP, the plan has been being implemented with target values set for each district.

In view of the above, the project is in conformity with the Tanzanian national development plan at the time of both planning and ex-post evaluation.

3.1.2 Relevance to the Development Needs of Tanzania

The rate of water supply in the target regions as of 2005 was 51% in Mwanza region and 45% in Mara region, below the national average of 52%. The expansion and improvement of water supply facilities had been lagged behind, with the traditional, unhygienic hand-dug wells or shallow wells accounting for 70% of the water supply in either region. This made it impossible for many people to have easy access to water, and the burden of work placed on women and children having to travel great distances to fetch water, and the incidence of water-borne diseases due to unhygienic water sources, had been pointed out. Insufficient understanding of hygiene on the part of residents led to problems, such as a lack of progress in the switch from unhygienic wells to safe water sources. In addition, population growth in the project area is high even in comparison with the national average⁶, and the demand for

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

⁴ ③: High; ②: Fair; ①: Low

⁵ It was published in 1999.

⁶ The population growth rate is Mwanza Region 3.0%, Mara region 2.5%: national population growth rate 2.7% (2012 Population Census).

water is high throughout the area⁷. Under these circumstances, the improvement of the water supply service in both regions was considered to be a matter of urgency.

After the project, with respect to the water supply facilities in the project areas, the switch is being made from the former unhygienic shallow wells to deep wells; in the project villages a greater proportion of the population has access to the water supply and the burden of work placed on women and children by the need to travel great distances to fetch water has been reduced. As described more detailed in the section of “Effectiveness”, while the demand for water continues to be high in the project area, the needs identified at the time of planning have been met; therefore the project is in conformity with development needs⁸.

3.1.3 Relevance to Japan’s ODA Policy

In relation to the water supply sector, the “Country Specific Assistance Plan for Tanzania (2008)” of the Government of Japan proposed the development of water supply-related infrastructure in areas where water resource development was difficult or where there was insufficient access to safe water and also proposed the promotion of enhanced capacity to plan, implement and manage a water supply program through the development of human resources at the local level.

In view of the above, the implementation of the project is in full conformity with the development policies and development needs of Tanzania, as well as with Japan’s assistance policy; therefore, its relevance is high.

3.2 Efficiency (Rating: ③)

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 the outputs (planned and actual) provided by the Tanzanian side.

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

| Item | Plan | Actual |
|-----------------|--|-------------------|
| Facility | 1. Drilling of new boreholes in 177 locations including installation of casings and screens | As planned. |
| | 2. Installation of hand pumps and construction of platforms in 182 locations ⁹ Concrete platform, drainage channel 3.0m | As planned. |
| | 3. Construction of spring protection in one location in one village Water pipeline, spring water intake pipe, water drawing point, two water storage tanks | As planned. |
| Soft Components | 1. Completion Report (by Tanzanian Side, Japanese Side) 2. Community Participatory Approach Training Report 3. Target Village Community Workshop Report 4. Report on Results of Workshop 5. VWC (NB1) Re-examination Minutes 6. Proposal on Operation and Maintenance Management System 7. Accounting Training Report (Implementing Organization and Person in Accounting) 8. Facility User’s Regulation 9. Manual on Break Down Countermeasures | Almost as planned |

⁷ Results of the field survey. Specifically, in Kwimba District, Misungwi District etc., in Mwanza Region, the design standard allowed for each well to be used by 250 people, but each well is actually used by 1,000 - 1,500 people.

⁸ The population of Mwanza is 2,770,000 and of the Mara Region, 1,740,000 (2012 Population Census). The total population of the project area is 4,510,000, but the water supply population targeted by project is 1.3% of the total.

⁹ Including five wells that met the well standards of the Development Study “Water Supply Plan in Mwanza and Mara Regions”.

| Item | Plan | Actual |
|------|---|--------|
| | 10. Planning of Monitoring 11. Report of Operation and Maintenance Management Activity Report 12. Technical Training Report (Implementing organization and person in charge of facility maintenance) 13. Hygiene Education Report 14. Guidance Visit Report | |

(Source) Basic Design Study Report, reference materials provided by JICA

NB1) VWC: Village Water Committee, consisting of members of the Village Committee elected by the people. In charge of village irrigation, management of water resource, etc.

Table 2: Outputs Provided by the Tanzanian Side (Planned and Actual) ¹⁰

| Plan | Actual |
|---|---|
| 1. Allocation of soft component personnel relating to O&M management and hygiene education (Regional Water Adviser (RWA) ^{NB1} , District Water Engineer (DWE) ^{NB 2}) | As planned. |
| 2. Construction of drainage channels to discharge used water of water supply facility (Local residents) | As planned. |
| 3. Erection of fences around water facilities (Local residents) | As planned. |
| 4. Securing of the framework, personnel and budget needed to establish a water supply O&M management system (RWA, DWE) | As planned. |
| 5. Establishment of system to monitor the status of water supply O&M management | Almost as planned ¹¹ . |
| 6. Planting work on embankments around the platforms (Local residents) | Changed due to a design modification, to sandbags and crushed stone reinforced with cement by the contractor. |

NB1) The Regional Water Adviser (RWA) is the technical adviser at the regional level

NB2) In this report, 'District Water Engineer (DWE)' is used to refer to university graduate engineers, as well as technicians who are polytechnic or high-school graduates.

(Source) Basic Design Report, Interviews with related persons, materials provided by the implementing consultant.

The project was implemented almost as planned. The changes from the initial plan were the water intake method of spring protection works and the method of mounding for the platforms of the deep wells. The reasons for these changes, their effect and impact are shown in Table 3. The changes were in response to the on-site situation, and had the effect of enhancing the durability of the facilities. There was no impact on cost or the work period, and the changes are considered to be appropriate.

¹⁰ No information on cost expenditure relating to these outputs has been obtained from the implementing organization.

¹¹ Monitoring of the water supply situation was carried out at the same time as hygiene education in the form of Guide Visits as part of the soft component. (Reference materials provided by JICA) Periodical monitoring following completion of the project has not been carried out due to lack of staff in the DWE office (From the field study).

Table 3: Reasons for Design Changes, Their Effect and Impact

| Item | Changed Contents | Reason | Effect | Impact on Cost and Work Period |
|-------------------------------|---|--|--|---|
| Spring protection works | Design change to water intake method | Changed to a structure to collect water through enclosure in a concrete retaining wall. This is more efficient than the original design of collecting water through the insertion of a water collection pipe as it makes it possible to cope with seasonal changes in the amount of spring water and location of the spring. (Materials provided by JICA, RWA, DWE). | Having the water flow constantly downstream makes it possible to cope with seasonal changes in the quantity of water (DWE). | <ul style="list-style-type: none"> • There was no impact on the project period. The change in the pipe route due to the change in intake point and number of intakes reduced the cost by 21,000 yen. ¹² |
| Mounding around the platforms | Change from planting work carried out by local residents to protect the mounding around the platforms to cement-reinforced sandbag and crushed stone embankment built by the contractor | Reinforcement became necessary because during the rainy season rainwater flowing close to the drainage channel threatened to erode the mounded earth (Materials provided by JICA, RWA and DWE). | The concrete reinforcement increased stability around the platform and reduced the effects of rainwater, thus ensuring a longer service life for the platform (DWE). | <ul style="list-style-type: none"> • There was no impact on the project period or cost¹³. • It was hoped that resident participation in the planting work around the platforms would nurture a sense of community ownership, but residents desired the concrete reinforcement as this would enhance the durability of the facilities. From the long-term point of view, the change has made O&M by the community more sustainable (DWE). |

(Source) Materials provided by JICA, Interview results, Information provided by the implementing consultant.

As Table 4 indicates, for each activity in the soft component, while there were some differences from village to village in the number of participants and who participated, the activities were carried out almost as planned.

¹² Reference materials provided by JICA.

¹³ Because the work was carried out by the contractor within the contract amount, there was no impact on project cost. As for the project period, the hand pumps were installed after the curing period of the platform concrete (28 days), and the concrete-reinforced sandbag and crushed stone embankments were built during this curing period. Thus there was no impact on the project period (Information provided by the implementation consultant).

Table 4: How the Soft Component Activities were Carried Out, and Who Participated

(Activities carried out before construction of water supply facilities)¹⁴

| Plan | | | | Actual |
|----------------------------|--|----------------------------|-------------------------------------|-------------|
| Activity | Content | Modality of Implementation | Participants | |
| Community participation | Community Participation Training | Seminar, OJT | DWE RWA | As planned. |
| | Community Meeting | Village Meeting | Residents (Village Committee, etc.) | As planned. |
| Residents' Group Formation | VWC Discussion | Workshop | VWC | As planned. |
| | Establishment of O&M Management System | Workshop | VWC, WSUG NB1) | As planned. |

NB1) WSUG (Water Sanitation Users Group); WSUG is a maintenance group set up at each water point.*

* The definition of water point is platforms of each deep well and water outlets of spring protection since the project has two different types of scheme, that is, deep well and spring protection.

(Activities during and after construction of water supply facilities)

| Plan | | | | Actual |
|---------------------|--|---------------------------------|---------------------|---|
| Activity | Content | Modality of Implementation | Participants | |
| Management Training | Accounts Training (C/P) NB1) | Lecture Practical training | DWE RWA | As planned. |
| | Accounts Training (Village Accountant) | Lecture Practical training | VWC accountant | Almost as planned. The extent to which the content of the training was transmitted to the WSUC accountant or the extent to which training was carried out varied from village to village. |
| O&M Management Plan | O&M NB2) Formulation of Plan Circulation of regulations for use | Workshop OJT | Residents | As planned. Representatives of the Village Committee, VWC and WSUG received training. |
| | O&M Management Activities | Record of Monitoring Activities | Residents | As planned. Village Administrative Officials, Village Committee representatives etc., received training. In villages with large populations, training was carried out multiple times |
| Technical Training | Technical Training (C/P) Hand Pump Repair | Lecture Practical training | DWE RWA | As planned. |
| | Technical Training (Facility caretaker) Hand Pump Repair | Practical training | WSUG Caretaker NB3) | Almost as planned. The number of WSUG caretakers participating varied from village to village. |
| Hygiene Education | Hygiene Education | Seminar | Residents | As planned. Village Administrative Officials, VWC, Health Workers, WSUG etc., received training. |
| | Guide Visit | Guide Visit | Residents | Almost as planned. LC NB 4) DWE, Village representatives, Village Administrative Officials, Health workers etc., received training. |

NB1) C/P: Counterpart

NB2) O&M: Operation and Maintenance

NB3) Caretaker: WSUG member in charge of facility maintenance

NB4) LC: Local Consultant

(Source) Basic Design Report, Materials provided by JICA, Interviews in the field study.

¹⁴ Period up to completion of drilling of a well conforming to standards.

3.2.2 Project Inputs

3.2.2.1 Project Cost

While the planned project cost (E/N limit) was 1,022 million yen, the actual project cost was kept to 697 million yen (68% of planned cost) within the planned. The reason for the reduction in the project cost was the sharp appreciation of the yen. As was previously stated, the reduction in cost due to the scope change was minute. No information was obtained regarding expenditures by the Tanzanian side¹⁵.

In a comparison of the planned and actual inputs of the soft component, whereas the plan called for 4.0MM by the Japanese experts and 17.1MM by the local consultants, the actual input was 3.97MM by the Japanese experts and 24.5MM by the local consultants, an increase in the MM of the local consultants. The reason for this was that in the project villages there were other events taking place so that it was not possible for all those concerned to gather at one time and the need arose for activities to be carried out multiple times in the same village. This increased the input of the local consultants by 7.4 months¹⁶.

3.2.2.2 Project Period

The originally planned project period was 39 months, and the actual period was 35 months (two years nine months), from May 2009 (E/N Exchange) to January 2012 (89% of the planned period). It was within the plan. The primary cause for the project being completed in a shorter period than planned was that, while the tender for construction of the facilities etc., took longer than planned¹⁷, the construction schedule of the contractor that won the contract was four months shorter than the initially planned 29 months. Thus it was possible for the project period to be shortened by 4 months and the project completed within the planned period¹⁸.

Table 5: Comparison of Planned and Actual Project Period

| | Plan | Actual | Actual Period |
|------------------------------------|-----------|-----------|----------------------------------|
| Contract | 4 months | 2 months | March and May 2009 |
| Detail Design | | | |
| Up to Approval of Tender Documents | 6 months | 4 months | April - July 2009 |
| After Approval of Tender Documents | 4 months | 3 months | August, October to November 2009 |
| Facility Construction Tender | 1 month | 2 months | September, December 2009 |
| Construction Management | 29 months | 25 months | January 2010 - January 2012 |
| Period from E/N | 39 months | 35 months | |

(Source) Materials provided by JICA, Information provided by the implementing consultant.

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

3.3 Effectiveness (Rating: ③)

3.3.1 Quantitative Effects (Operational and Effect Indicators)

3.3.1.1 Water Supply Population

The planned target value of water supply population was set at 55,151 persons by the year 2020¹⁹. As shown in Table 6, at the time of the ex-post evaluation, the target values²⁰ of water supply population had already been achieved.

¹⁵ The information could not be obtained from the implementing agency.

¹⁶ Information provided by the implementing consultant.

¹⁷ The plan allowed for one month; it actually took two months.

¹⁸ The fact that the contractor used local equipment may be thought to have contributed to the shortening of the construction period (Information provided by the implementing consultant).

¹⁹ The target year was set at 2020 through discussions with the implementing organization. 2015 would have

Table 6: Main Effectiveness Indicators of the Project (Unit: persons)

| Indicator | Baseline Value | Target Value | Actual Value | Actual Value |
|-------------------------|----------------|---------------------------|--------------------|----------------------------------|
| | 2005 | 2020 | 2011 | 2014 |
| | Baseline | 15 years after completion | Year of Completion | 3 years after Project Completion |
| Water Supply Population | 9,401 | 55,151 | - | 57,352 |

Source: Basic Design Report, Materials provided by JICA, Information from DWE in each district

3.3.1.2 Operation Rate

The number of operating water points²¹ was 182 on completion of the project, but at the time of the evaluation it was 164 water points, an operating rate 91.2% of total water points.

Table 7: Operation Rate of Water Points (Unit: water points)

| Indicator | Target Value | Actual Value | Actual Value | Operation Rate |
|----------------------------|--------------------|--------------------|----------------------------------|----------------------------------|
| | 2011 | 2011 | 2014 | 2014 |
| | Year of Completion | Year of Completion | 3 years after Project Completion | 3 years after Project Completion |
| Mwanza Region Water Points | 110 | 110 | 104 | 94.5% |
| Mara Region Water Points | 72 | 72 | 60 | 83.3% |
| Average | | | | 91.2% |

(Source) Information collected from DWE office in each district

Table 8: Break-down Frequency of Water Point

| Frequency of Breakdown | Number of Water Points | Rate |
|---------------------------|------------------------|------|
| Never | 134 | 74% |
| Once a Year | 13 | 7% |
| Twice a Year | 22 | 12% |
| Three times a Year | 6 | 3% |
| Four or more times a Year | 7 | 4% |
| Total | 182 | 100% |

(Source) Information collected from DWE office in each district

Only 7% of water points have broken down more than three times a year²². Over 90% of the water points have broken down less than twice a year. 74% of the water points have never once broken down.

been too soon after completion, while if the target year had been set at 2025 in line with the "Tanzanian Development Vision 2025", it would be over a decade after completion, which would be overestimation. Therefore, the mid-point 2020 was taken as the target year. The planned population in each of the project villages in 2020 was calculated on the basis of the 2002 Population and Housing Census. The population with access to a water supply from an existing facility was not included in the target population.

²⁰ Approximately 85% of the Tanzanian population of 46.22 million (2012 Population Census) has access to a rural water supply (Information from the Ministry of Water, Rural Water Supply Division).

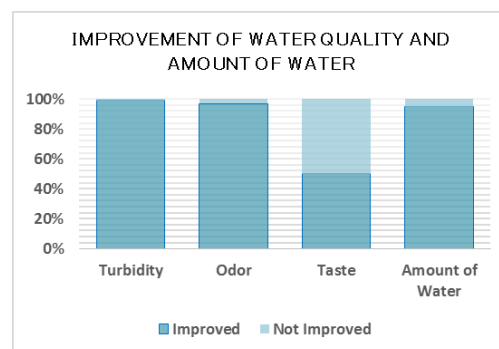
²¹ As the project includes two kinds of water supply facility, namely deep wells and spring-water protective works, each deep well platform and spring water protective works water supply port was defined as a water point.

²² The cause of breakdowns is the failure to replace U-seals and other worn parts, rods breakage, etc.

3.3.1.3 Water Quality

According to the results of the Beneficiary Survey, water quality has improved with respect to turbidity, odor and amount of water. As for taste, opinions differ even among those using the same deep well depending on the water source that was being used previously, and the level of improvement was 50%.

With regard to the water sources that were being used previously, please refer to Table 9.



(Source) Results of Beneficiary Survey
Figure 2: Improvement of Water Quality and Amount of Water

Table 9: Water Sources Used Previously (Multiple answers) (Unit: person)

| | Mwanza | Mara | Total | Rate |
|---|---------|---------|-------|-------|
| Shallow well (unprotected shallow well) | 46 (15) | 53 (21) | 99 | 80.4% |
| River or stream | 5 | 33 | 38 | 30.1% |
| Spring | 15 | 4 | 19 | 15.4% |
| Lake Victoria | 5 | 0 | 5 | 4.0% |

Note) Some users use multiple water resources.

(Source) Results of Beneficiary Survey; 123 responses.

3.3.1.4 Water Management Committee

Water Sanitation User Groups (WSUG) are established at 182 water points and user fees are being collected at 141 water points, or 77.5% of the total (see Table 10). According to interviews with end users and members of WSUG, the reasons for non-collection of user fees are that users are extremely reluctant to pay in cash, and up until now use of the shallow wells and springs has been free of charge.

Table 10: Water Management Committee (WSUG) (Unit: water point)

| Indicator | Target Value | Actual Value | Actual Value | Rate |
|-------------------------------------|--------------------|--------------------|----------------------------------|----------------------------------|
| | 2011 | 2011 | 2014 | 2014 |
| | Year of Completion | Year of Completion | 3 years after Project Completion | 3 years after Project Completion |
| Number of WSUG | 182 | 182 | 182 | 100% |
| Number of WSUG collecting user fees | 182 | 182 | 141 | 77.5% |

(Source) Basic Design Study Report, Materials provided by JICA, Reports from districts

3.3.2 Qualitative Effects (Other Effects)

3.3.2.1 Amount of Water

An adequate amount of water is now available even in the dry season, and 95% of respondents said that things were improved. Some of the project wells serve between 150 and 300 households²³, but so far there has been no case of any of the wells drying up in the dry season, as Mwanza Region and Mara Region are areas with an abundance of underground water²⁴.

²³ Kwimba and Misungwi Districts in Mwanza Region (Information from DWE office).

²⁴ Development Study Report, Information from local water supply experts.

3.3.2.2 Reduction in Time Spent Fetching Water

The project has reduced the time spent fetching water and the distances traveled. 68% replied that the time spent fetching water had been reduced by up to 30 minutes, and 30% responded that the time had been reduced by more than 30 minutes. While the distance to the water source had been reduced, because of the large number of users, at some water points users need to wait their turns to draw water.

All respondents in Table 11 who said that there was no change in the time spent fetching water said that having to wait to draw water meant that ultimately there was no difference in the time it took.

Table 11: Reduction in Time and Distance for Fetching Water

| | Reduced | Not Reduced |
|-----------------------------|---------|-------------|
| Distance for Fetching Water | 99% | 1% |
| Time Spent Fetching Water | 96% | 4% |

(Source) Results of Beneficiary Survey

Table 12: Reduction in Time

| Reduction in Time per Day | Rate |
|-------------------------------|------|
| Less than 30 minutes | 68% |
| Between 30 minutes and 1 hour | 10% |
| Between 1 and 2 hours | 10% |
| More than 2 hours | 10% |
| No change | 2% |
| Total | 100% |

(Source) Results of Beneficiary Survey

3.3.2.3 Switch in Water Sources

While there has been progress in the switch from the shallow wells with poor water quality to the deep wells of this project,²⁵ in the Beneficiary Survey 37% of respondents said that they did not know the difference between a shallow well and a deep well in terms of hygiene. The reason for this is probably that, despite activities to raise awareness of the difference as part of the soft component, the community representatives, household representatives and WSUG representatives who received guidance and instruction in the village meetings had failed to pass on the information to other stakeholders²⁶.

3.3.2.4 Change of Situation of Fetching Water

In this project a hand-operated pump called Afridev²⁷ is used. The water is fetched in a 20 l bucket carried to and fro between the platform and the household. In areas where water was drawn from an open-type shallow well prior to the project, accidents happened when a child drawing water would fall into the well, but after completion of the project, the opinion has been heard such accidents do not happen anymore²⁸.

3.3.2.5 Effect of Soft Component

The soft component activities, targeting 44 villages, 182 water points and 182 WSUGs at the village level, has been conducted in an extensive and scattered way. Consequently, the soft component generally made a good contribution to the clarification of the system of

²⁵ Results of interviews with the beneficiaries.

²⁶ Results of interviews with WSUG.

²⁷ A type of deep well hand pump. It can be procured in Tanzania and is a hand-operated pump that enables users to draw water easily.

²⁸ Results of interviews with the beneficiaries.

support for the WSUG and the DWE offices and of the roles of those involved; to the establishment of an O&M management system through community ownership; to the acquisition of the skills needed for O&M management; and to the enhancement of awareness and knowledge of health and hygiene. Enhanced effectiveness with limited inputs required the proper targeting of participants in seminars and training. For example, as part of the soft component activities, instruction in accounting targeted those responsible for accounts in the upper levels of the Village Committees; it was not instruction that was needed by members of WSUG, whose level of education was low. There were villages where the person who was responsible for accounts and had received training did not provide any substantial instruction to WSUG. It was hoped that what participants in the soft component had learned would be passed on to other stakeholders, but in some villages there was not sufficient sharing of information²⁹.

3.4 Impacts

3.4.1 Intended Impacts

3.4.1.1 Improvement of Livelihood Environment

The time saved in fetching water as a result of the project is being used by the beneficiaries for agricultural activities, housework and community activities.

Table 13: Use of Time Saved in Fetching Water (Multiple answers)

| | Respondents (persons) | Rate |
|---|-----------------------|-------|
| Agricultural Activities | 113 | 91.9% |
| Non-Agricultural Income-generating Activities | 13 | 9.7% |
| Housework | 74 | 60.1% |
| Resting | 4 | 3.2% |
| Community Activities | 24 | 19.5% |
| Participating in Education/Training Course | 5 | 4.0% |

(Source) Results of Beneficiary Survey, 123 responses

3.4.1.2 Influence on Children Tasked with Fetching Water

There has been no change in the task of fetching water being a task assigned to children, but 95% of respondents said that the project had had an influence. Changes mentioned included the child now being able to go to school (49%)³⁰, spending more time studying (39%) etc.



(Source) Results of Beneficiary Survey
Figure 3: Influence on Child Life

Table 14: Changes in Child Life (Multiple answers)

| | Respondents (persons) | Rate |
|--|-----------------------|------|
| It is not necessary to go to fetch water | 3 | 2% |
| It makes able to go to school. | 60 | 49% |
| Learning time increases | 48 | 39% |
| It makes possible to help parents work more than before. | 26 | 11% |

(Source) Results of Beneficiary Survey, 123 responses

²⁹ Results of interviews with WSUG.

³⁰ The response “The child is now able to go to school” encompasses a wide range of meaning, including the child being able to go to school earlier than was previously the case.

3.4.1.3 Improvement in Hygiene Behavior with regard to Water Use

93% of respondents affirmed that they had a better awareness in relation to water use and hygiene. Concrete examples given were mostly changes in hygiene behavior arising from the increased use of water, such as washing clothes more often, more frequent body washing etc. Only a few respondents mentioned changes directly linked to a better awareness of hygiene³¹, such as more frequent hand washing (14%) or boiling water (4%)³². The need for more time spent in instruction and campaigns targeting whole villages to change hygienic concept and awareness is seen as the reason for the lack of frequent hand washing and boiling of water.

Table 15: Changes in Hygiene Behavior (Multiple answers)

| | Respondent (persons) | Rate |
|-----------------------------|-------------------------|------|
| Boiling of Water | 11 | 4% |
| Frequent Hand Washing | 38 | 14% |
| Increase in Washing Clothes | 51 | 42% |
| Frequent Body Washing | 49 | 40% |

(Source) Results of Beneficiary Survey, 123 responses

3.3.1.4 Reduction in Infectious Diarrhea and Other Water-borne Diseases

54% of respondents said that there had been a reduction in infectious water-borne diseases such as diarrhea³³. As shown in Table 9, one factor in the reduction is considered to be the fact that before the project, approximately 80% of the beneficiaries used shallow wells as their water sources.

3.4.2 Other Impacts

3.4.2.1 Impacts on the Natural Environment

With regard to the impact on the natural environment, there have been no incidences of ground subsidence, drying up of other water sources etc., due to pumping of water. The construction work caused no damage to the natural environment³⁴.

3.4.2.2 Land Acquisition and Resettlement

No land acquisition or resettlement was required in the execution of the project³⁵.

3.4.2.3 Impacts of Construction Work on Local Residents

Where the construction site was close to houses, construction time was limited, with no noisy work carried out in the early morning or during the time of the evening meal. The construction sites and material stockyards were patrolled, and while work was in progress the construction site was roped off to keep residents out. Care was taken to ensure the safety of local residents coming and going during boring, so that local residents were not affected by the work³⁶.

In view of the above, it can be seen that the planned effects and impacts, in terms of the increase in the water supply population, the improvement in the volume and quality of water, the reduction in the time spent fetching water, distance traveled to fetch water, etc., were

³¹ Results of interviews with village executive officers and local water supply experts.

³² According to the hygiene education manual, the boiling of water is encouraged because of the possibility of contamination after the water has been drawn. Advice is also given that containers should be washed, and their lids kept closed (Materials provided by JICA).

³³ Results of the beneficiary survey.

³⁴ DWE responses to the questionnaire.

³⁵ Results of interviews with RWA.

³⁶ Information provided by the implementing consultant.

achieved through the implementation of the project; therefore, the effectiveness of the project can be judged to be high.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

3.5.1.1 Implementing Agency

There has been no change in the organizational structure of the Rural Water Supply Division of the Ministry of Water from the time of the planning of the project. The Rural Water Supply Division is composed of three sections, the Technical Support Section, the Community Support Section and the Operation and Planning Support Section. Under the operation and maintenance monitoring system, the DWE submits a weekly report to RWA, and a quarterly report to RWA and the Ministry.

3.5.1.2 RWA Office

The RWA office is in the position of supervising the DWE office. The DWE office plays a main role in providing substantial technical and operational guidance to the villages³⁷.

3.5.1.3 DWE Office

The technicians and engineers³⁸ of the DWE office are assigned many duties relating to district water supply projects, including surveys, planning, implementation, reports, dealing with inspections, response to breakdowns at water points, etc. In particular, a strong demand for water due to the rapid growth in population means that they have a wide range of responsibilities since they must see not only to the operation and maintenance of existing water points, but to deal with plans for more new water points. Therefore, they are not able to verify the operational or financial situation of the O&M organization of each WSUG. Numbers differ from DWE office to DWE office, but 1-4 water engineers and 2-10 technicians are deployed at each office. The number of staff³⁹ at each office at the Ministry of Water was confirmed at the time of the ex-post evaluation, and with the exception of a few special cases staffing levels were sufficient for visits to each defective water point and the provision of technical instruction, but not sufficient to carry out such painstaking duties as providing instruction in the finances or running of the water points. At the time of the ex-post evaluation, as mentioned in 3.1.1, BRN has been being implemented and it was confirmed that over a period of 3 years (2013 - 2016) approximately additional 700 staff would be employed⁴⁰. While it was not possible to confirm mid- to long-term plans for staff recruitment to deal with the increased demand due to future population growth, the Ministry of Water is giving top priority to ensuring that staffing is sufficient to enable an immediate response to water points that have broken down⁴¹.

3.5.1.4 Water Sanitation User Groups in the Villages

At the time of planning, the idea was that the WSUG would report to the Village Executive Officer (VEO) and the Village Water Committee (VWC) who would then contact the DWE, but in fact many of the WSUGs directly contact the DWE when there is a breakdown. In such cases, since there is no reporting system within the village between the WSUG and high-ranking village officials, when there is a major breakdown, the WSUG cannot gain the understanding and cooperation of the high-ranking villagers.

³⁷ Material provided by JICA, Interview results.

³⁸ University graduates are classified as Engineers; graduates of polytechnics and high-school are classified as Technicians.

³⁹ The Ministry of Water has a criteria to increase staffing, that is, each DWE, at least, are able to respond to deal with the breakdown.

⁴⁰ As of February 2015, at the time of the second field survey: Information from the Ministry.

⁴¹ Information from interview with the Director of Rural Water Supply, Ministry of Water.

As shown in Figure 4, the Ministry of Water has changed its policy on village O&M systems from the time of planning, at the time of the Inspection and the time of the ex-post evaluation. The policy was changed with the aim of improving the system of communication and reporting within the village and formulating a more sustainable O&M system.

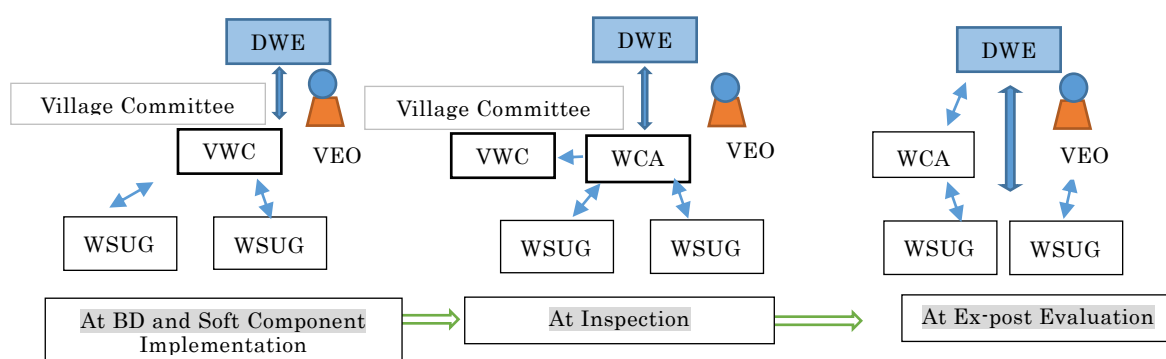
At the time of the Inspection, the O&M management system within the village was changed with the establishment of a Water Consumer Association (WCA) consisting of members elected from the WSUG; the WCA would report to the VWC, and to the Village Council (VC).

After that the government renewed the policy, the government has been promoting an establishment of Community-Owned Water Supply Organization (COWSO) as a legal-entity which would be developed from WSUG and WCA. The condition of establishment of COWSO is an appropriate selection of the leader, strengthening of organizational management and financial structure. Once a group is registered legally, in case of a large scale of repair, a subsidy for the cost of maintenance management repair will be disbursed⁴². At the ex-post evaluation, there is no case of COWSO which has been yet developed from the WSUGs of the project⁴³. Ministry of Water recommends the accumulated financial reserve be kept in the bank account for safekeeping at the time of the establishment of COWSO and so forth. As the situation of the village, villagers have to run a bicycle or pay transportation expenses to go to the financial institution to deposit and withdraw the money spending for the whole one day, which makes them quite a heavy burden for WSUG. Since one of the conditions to form COWSO is a requirement of depositing money in the bank, WSUG of the project do not want to become COWSO ⁴⁴.

⁴² Water Supply and Sanitation Act 2009.

⁴³ Results of interviews with WSUG.

⁴⁴ Results of Interviews with WSUG.



Note) DWE: District Water Engineer
 VEO: Village Executive Officer
 WCA: Water Consumer Association
 VWC: Village Water Committee
 BD: Basic Design

Figure 4: Changes of the Reporting and Communication System within the Village

While an O&M system has been established and at the district level enough personnel have been appointed to deal with breakdowns and provide instruction. They are not yet to give detailed instruction in finances or management at each water point. At the village level, there is a need for the establishment of a functional system of communication and cooperation within the village.

3.5.2 Technical Aspects of Operation and Maintenance

In relation to the level of skills in O&M of the RWA and DWE at the time of the completion of the project, it was observed that they did have the skills needed to give instruction on the management of the water points and to carry out repairs⁴⁵.

The need for the WSUG caretakers to receive training on maintenance and repair was pointed out in the Inspection Survey, but no technical training has been carried out after the completion of the project⁴⁶.

Since it is only when there is a breakdown that the DWE visits a water point, the caretaker of a water point that breaks down frequently has the chance to receive instruction from the DWE⁴⁷.

Table 16 shows the duties of each person responsible for operation and maintenance.

Table 16: Duties relating to Operation and Maintenance

| Person in charge | Duty related to operation and maintenance |
|------------------|---|
| WSUG Caretaker | Able to make a judgement by raising the rod, and to make repairs. O&M including exchange of U-seals, etc. |
| DWE | O&M involving the raising, checking and repair of the pumping pipe |
| Contractor | O&M of the whole well when a pumping cylinder or pumping pipe has dropped |

(Source) Interviews with DWE

NB) Responsibilities regarding O&M may differ depending on the skill level of WSUG caretakers or DWE.

⁴⁵ Information provided by the implementing consultant.

⁴⁶ According to the local water supply expert, the technical training for caretakers in the soft component is an introductory explanation, and for the actual skills to be mastered, seven or so training sessions are needed.

⁴⁷ Results of interviews with DWE and WSUGs. At the Ministry of Water, instructional visits to water points suffering breakdowns are given priority. (Interview with the Director of Rural Water Supply Division in the Ministry of Water).

At the time of the Inspection as well as at the time of the ex-post evaluation, it was confirmed that a single supplier set high prices, and that the WSUG has been paying high prices for spare parts⁴⁸. In some remote areas of Mara Region, poor road conditions make access difficult, and a procurement of spare parts is difficult. In response to this situation, at the time of the ex-post evaluation, the Ministry of Water was planning to establish a procurement center at the district level; but this has been put on hold because of various disputes⁴⁹.

From the technical point of view, there is a need for the WSUG caretakers to receive training on skills and technique in relation to repair.

3.5.3 Financial Aspect of Operation and Maintenance

The budget of the Ministry of Water is divided into funding by the Tanzanian government (referred to below as domestic funding) and foreign aid funding. As Table 17 shows, in the past the expenditure of the Ministry of Water has on the rise, and domestic funding has also increased steadily. Overall, the actual expenditure of the Rural Water Supply Division has tended to increase in terms of both domestic funding and foreign funding. In either case however, there is a heavy dependency on foreign capital⁵⁰.

As for the future budget, as Table 18 shows, the budget of the Ministry of Water as a whole will peak in 2016/17, after which the rate of increase will slow down. The Rural Water Supply Division is assured a budget of around 170 billion Tsh⁵¹ from both domestic and foreign funding⁵².

With regard to the cost of the maintenance of the rural water supply, the Ministry of Water has, in order to improve the operation rate of the water points, committed to the allocation of funds for rural water supply maintenance costs. As shown in Table 18, rural water supply maintenance expenses are increasing year by year⁵³. While most of this funding comes from foreign fund, according to information from the Ministry of Water, the effective BRN campaign⁵⁴ has resulted in an increase in maintenance funding. WSDP Phase I (2007 – 2013), the initial phase of WSDP (2006 – 2025), has left a nationwide issue to be addressed, namely the sound establishment of the principle of payment by all water users; but the increase in the number of facilities has produced positive results such as the expansion of the population served by a water supply⁵⁵, following which in July 2014 WSDP II (2014 – 2019) commenced. Thanks to the influences of BRN, it is thought that donor support can probably be counted on⁵⁶.

⁴⁸ Results of interviews with DWE and WSUG.

⁴⁹ Results of interviews with related persons in the Ministry of Water. There is the argument that the intervention of a public organization might distort the market price for spare parts. Another reason for non-implementation of the plan is the lack of O&M capacity at the district level.

⁵⁰ There are two types of budget, one allocated to the Regional and Local Governments from the Prime Minister's Office, and the Ministry of Water's own budget. Since it is difficult to grasp the overall distribution, it was not possible to confirm any detailed information regarding the form of foreign funding allocated to the rural water supply (grant, loan, etc.).

⁵¹ As of April 7 2015, the exchange rate was 1 yen =0.06Tsh; 1US\$=1,782.80Tsh.

⁵² According to information from the Ministry of Water, this is added to the projected WSDP budget.

⁵³ From interviews with the Ministry of Water.

⁵⁴ BRN has carried out a nationwide campaign making full use of TV, radio, street banners, posters etc., and implemented proactive activities appealing for funding

⁵⁵ Ministry of Water, Water Sector Status Report 2014, October 2014.

⁵⁶ Ministry of Water, Water Sector Status Report 2014, October 2014. Information from the Ministry of Water.

Table 17: Changes in Actual Expenditure of the Ministry of Water (Unit: Million Tsh)

| | Expenditure of Ministry | | Expenditure of Rural Water Supply Division | |
|---------|-------------------------|-------------------------------|--|-----------------|
| | Domestic Funding | Foreign Funding ⁵⁷ | Domestic Funding | Foreign Funding |
| 2009/10 | 50,463 | 276,952 | 1,437 | 105,698 |
| 2010/11 | 41,565 | 221,627 | 14,084 | 91,217 |
| 2011/12 | 73,340 | 506,021 | 13,300 | 124,221 |
| 2012/13 | 140,015 | 383,179 | 19,606 | 128,717 |
| 2013/14 | 312,066 | 371,582 | 21,575 | 129,254 |

(Source) Ministry of Water reference materials

Table 18: Expected Budget for the Ministry of Water and Rural Water Supply Division^{NB)} (Unit: Million Tsh)

| | Rural Water Supply Division Budget | Rural Water Supply Budget for O&M | Ministry of Water Budget |
|---------|------------------------------------|-----------------------------------|--------------------------|
| 2014/15 | 178,341 | 28,042 | 496,265 |
| 2015/16 | 171,879 | 45,451 | 867,547 |
| 2016/17 | 170,145 | 62,355 | 971,670 |
| 2017/18 | 168,186 | 73,976 | 646,067 |
| 2018/19 | 173,843 | 89,548 | 450,395 |

(Source) Ministry of Water reference materials

NB) Including foreign funding as well as domestic funding.

The DWE office receives from the district a budget the size of which has been approved by the Ministry of Water and the Ministry of Local Government⁵⁸. The decentralization brought the district government into the Ministry of Local Government under the Prime Minister's Office, and the budget allocated to the DWE office is determined on the basis of the budget directly allocated to the Ministry of Local Government from the Prime Minister's Office. The budget for this project was secured from the budgets of the district and the Ministry of Water, and according to interviews with the DWE, with the exception of some districts, sufficient staffing has been secured to enable visits to water points that have broken down.

At the village level, each WSUG determines how user fees are to be collected, and the amount. As for the system of subsidies and exemption system for households having difficulties paying, eligible households are identified at the discretion of the WSUG⁵⁹. 23% of WSUGs have not collected any user fees⁶⁰, and it was confirmed in the field survey that these WSUGs are hardly active at all. The WSUGs with unpaid charges receive no particular urging or instruction from the DWE, VC or VEO regarding the collection of fees or how to manage the money. The proportion of WSUGs collecting a fixed-quantity fee of around 20Tsh per 20ℓ bucket was 56%, while 21% of WSUGs collected a flat rate per household⁶¹. Some WSUGs make use of a system of management that combines the user

⁵⁷ In the case of WSDP, the principal donors in terms of size of grant are the International Development Agency (IDA) and the African Development Bank (AfDB).

⁵⁸ RWA offices of Mwanza Region and Mara Region.

⁵⁹ Information from WSUG and DWE.

⁶⁰ In some cases, since it is the people around the water point where the well was dug who become members of WSUG, the conditions for different people to work together and cooperate may not be in place. In other cases, there are other reasons people are unwilling to pay: if there is a water source or spring nearby that can be used for free, or if for some reason there is a lack of transparency in the way money is used or managed within the group, this affects the willingness to pay. (Report from the DWE offices).

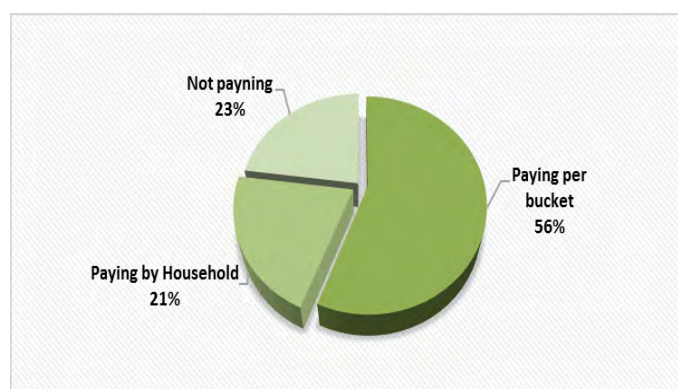
⁶¹ Report from DWE offices.

fees thus collected with the traditional aid structure⁶². In general, WSUGs that collect O&M fees at the village level keep some kind of record of their management of O&M costs⁶³.

Depositing the money in a bank account commenced at the time the facilities were handed over, but when the bank is located far from the village, since the account is temporarily closed if there are no regular transactions⁶⁴, most WSUGs that collect user fees keep the money in the village.

Figure 6 and Figure 7 show the amount of money put aside for maintenance costs, but in reality often the amounts are greater than shown here.

When the money is kept in the village, in many cases information about large amounts of savings are not made public for the sake of security⁶⁵, and in reality there are many WSUGs that have savings in excess of 1 million Tsh⁶⁶.



(Source) Report from DWE Offices

Figure 5: Methods of Payment to the WSUGs

⁶² Interviews with WSUG.

⁶³ Interviews with WSUG.

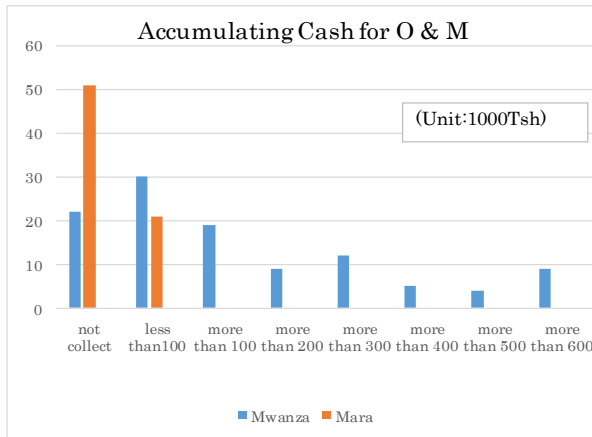
⁶⁴ Report from DWE offices. The Ministry of Water recommends depositing the money in a bank account for safekeeping, for the establishment of a COWSO, etc.

The situation in the villages is that depositing and withdrawing the money is a heavy burden for the WSUG; it takes a villager a whole day to cycle to the financial institution, or he may have to pay transportation expenses. Because the setting up of a COWSO requires the money to be deposited in the bank, the WSUGs have no desire to become COWSOs (From interviews with WSUGs).

⁶⁵ Information from a local water supply expert.

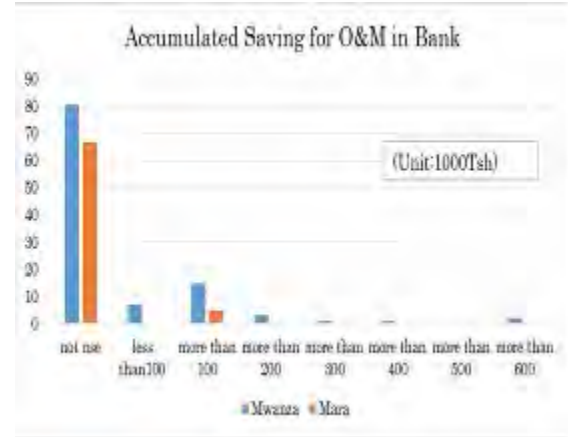
⁶⁶ From interviews with WSUGs. The percentage of WSUGs with more than 1 million Tsh in savings has not been confirmed, but in the case of fixed-quantity payment per bucket, at a rough calculation the annual amount collected per household comes to 36,500Tsh (20Tsh/bucket×5×365) supply. Assuming one water point is used by 50 households, the total amount is in excess of 1,820,000 Tsh per year.

In the case of a fixed-rate payment, the average user fee for one household is 2000Tsh per month, or 10,000Tsh per year per household. Assuming that each water point is used by 50 households, that comes to 500,000 Tsh. As 2 years have passed since the completion of the facilities, one million Tsh would have accumulated.



(Source)Report from DWE

Figure 6: WSUG Accumulating Cash for O&M



(Source)Report from DWE

Figure 7: WSUG Accumulating Saving Deposit in Bank for O&M

In financial terms, most of the Ministry of Water’s overall budget for maintenance comes from donor funding, although the securing of a budget and the amount of expenditure from domestic funding also have been steadily increasing. The long-term implementation of WSDP and the current nationwide BRN campaign have made more funds available, which situation seems likely to continue. There is also the district budget that is allocated to the local government directly from the Prime Minister’s Office.

Although almost 80% of WSUGs are collecting user fees, the problem remains of how to cope when large-scale repairs are necessary.

3.5.4 Current Status of Operation and Maintenance

With regard to the use of facilities and O&M status, information was collected from the DWE offices, and in the case of water points where there was a problem with operational status the situation was verified over the phone. In the case of sites where verification by means of a visit was possible, visits were made to the DWE offices so as to confirm the O&M management status. At the district level, guidance visit records, repair request forms and repair records are kept, but not at the WSUG level.

How the installation of fences at the water-drawing platforms and the issue of drainage around the platforms are dealt with varies from WSUG to WSUG. Overall, the 77% of WSUGs that are able to collect user fees have for the most part been carrying out O&M activities, and their O&M status is all in all good. WSUG that have carried out O&M activities developed their regulations for use of the facilities, and the users also abide by the regulations. In addition, a tendency was observed in the case of very active WSUGs for the regulations for use to be determined on their own initiative, through discussion. In concrete terms, they have on their own initiative strictly prohibited the wearing of shoes on the platform, determined times of use, deployed a guard during times of use, decided that the platform should be locked when not in use, and a night guard stationed⁶⁷. In cases where the state of management of the area around the platform is bad, DWE has given guidance when the site has been visited for a field survey, but it was confirmed that in some cases the instructions of the DWE were not followed⁶⁸.

⁶⁷ Results of interviews with WSUG.

⁶⁸ Results of interviews with DWE.

Although the maintenance management system has been established, the staff engineers at the district level are able to deal with the breakdown of the water point and instruct technical guidance, not only because there are plans to increase new water points, but also because they have to maintain existing water points due to a strong demand of the rapid increase of population. From a technical aspect, it is necessary for DWEs to carry out re-training of caretaker of WSUG. From a financial aspect, the budget allocation concerned with O&M in the Ministry of Water as a whole is also expected to be prioritized to disburse in the future. There are district budget directly allocated to local government from the Prime Minister Office. Although a foreign fund accounts for most of the funding for O&M, the recent BRN's national campaign has strengthening ensuring budget and the future five year's budget for WSDP II has also been able to be expected. Whereas most WSUGs have been collected user fees, an issue remains how to cope with a large-scale repair and so forth.

In light of the above, some minor problems have been observed in terms of the institutional, technical and financial aspects. Therefore sustainability of the project effect is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The relevance of the project is high, because it is consistent with the priority areas of the development policy of Tanzania and with the assistance policies of Japan, and Tanzania's development needs are also high. Both the project cost and period were kept within the plan; therefore the efficiency of the project is high. The operational and effectiveness indicators has achieved the planned figures, and the beneficiary survey confirmed both an increase in the amount of water supply and an improvement of water quality, and the project has contributed to improvements of livelihoods in the project areas; thus the effectiveness and impact of the project is high. The operation and maintenance system has been established. However, although at the district level, there exists the number of staff who are able to respond breakdowns and guiding technical matters, they have not yet been providing financial or operational guidance, because a rapid increase of population growth made a strong water supply demand, and there are new plans to establish facilities in addition to the operation and management of existing water points. In relation to technical matters, there is a need for retraining of those in the water users' groups in charge of technical matters. With respect to finances, there is a budget from the Ministry of Water and a budget from the Prime Minister's Office that is directly allocated to the local governments. In recent years the domestic budget of the Ministry of Water has been on the rise. Foreign capital accounts for the greater part of the budget, and donor initiatives have also meant that foreign funding has also been increasing. While most of the water users' groups collect water usage fees, coping with the cost when large-scale repairs are needed remains a problem. Therefore, the sustainability of the project effect is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

【Follow-up to WSUG by Staff of DWE Office】

The DWE officers do not have sufficient time to visit the sites, and at the time of the ex-post evaluation, they were visiting sites only when there was a breakdown, and at such times they were providing technical guidance in maintenance to the WSUG caretakers, because of the wide range of duties of the DWE with regard to the rural water supply.

The staff (engineer, technician and etc.) of the Rural Water Supply Division has been increased at a region and district level by the execution of the National Plan of BRN. For the sustained maintenance of facilities, hereafter, DWE shall perform site visits for WSUG which does not collect the accumulated user fees for repair. It is necessary to instruct the user fees collection matching to the present conditions of each WSUG, and on the same occasion a follow-up as much as possible is required so that the technical instruction to caretakers would be executed.

【Ownership of Water Supply Facilities by New Village Representatives following Local Government Elections】

The local administration elections were held at the end of October 2014, and the representatives who had received a series of instruction on activities for the maintenance of the water points in the framework of the soft component of the project were replaced. Basically, maintenance has been carried out at the level of the WSUG, and there are not any problems with regard to daily maintenance; In the case of a large scale of maintenance which requires the contractor's repair and needs a large amount of expenditure, it requires the understanding and cooperation of the upper levels of the village administration.

It is one of the solutions that DWE office requests for understanding of representative committee of the ward and village committee with regard to the supervision and management involving the maintenance of the water supply facilities of the project: the involvement of the village administration would resolve the financial issue of large scale repairs.

4.2.2 Recommendations to JICA

None.

4.3 Lessons Learned

【Clarification of the System of Communication and Supervision within the Village】

In the case of a water supply project for villages, the capability of maintenance and management by the ownership of community people greatly influences the sustainability. Therefore, the soft component shall clearly determine the targeted persons to match the purpose of training. The training needs to be carried out, for all the concerned stakeholders such as representatives, caretakers of WSUG, accountants in charge and so forth, so as to participate in the training with appropriate contents by all means,

When those due to be trained cannot attend, another person should attend instead, and when this happens it is necessary to clarify the mechanism by which information is shared in the village, and to ensure that know-how and skills are transmitted accurately. Specifically, at residents' meetings prior to the construction work and at the time of activities during the construction such as instruction in accounting, skills, hygiene etc., relating to maintenance, participants should be urged to make a list of the people to whom the information should be passed on after the training. It must be repeatedly stressed that participants have "a mission to pass on" skills and knowledge. It needs to be a duty for them after training to follow the list and to pass on the knowledge and know-how that needs to be passed on. In addition, a representative needs to be appointed to check that the information has been shared throughout the village.

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 Tanzania¹. 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 development², 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 Bridge³ 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) | <ul style="list-style-type: none"> • 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: B⁴)

3.1 Relevance (Rating: ③⁵)

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 loss⁷ in cashew nuts, a major local product in Mtwara Region⁸ 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 bicycle⁹, 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 Corridor¹⁰.

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 Bridge¹¹.

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).

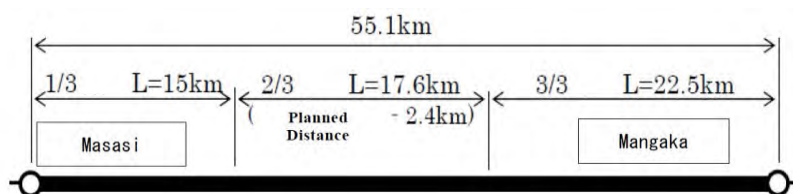


Figure 2: Road Section by Project Phase

Table 2: Outputs Provided by the Tanzanian Side (Planned and Actual¹³)

| 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 soil¹⁴ is distributed¹⁵ 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 Report¹⁶.

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 | <ul style="list-style-type: none"> 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). | <ul style="list-style-type: none"> 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. |
| | <ul style="list-style-type: none"> Change in location of culvert construction | <ul style="list-style-type: none"> Culverts were constructed in positions suitable for rainwater drainage. The change had no impact on cost or length of work period. |
| Phase 2 | <ul style="list-style-type: none"> Change in positioning of box culverts (raised approximately 2.5m) Partial change in vertical alignment of road | <ul style="list-style-type: none"> 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. |
| | <ul style="list-style-type: none"> 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. | <ul style="list-style-type: none"> 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 cost¹⁷.

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 total¹⁸.

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 completed¹⁹ (Table 4). Measurement at the time of the ex-post evaluation showed that actual speeds were 80 – 110km²⁰. 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 vehicles²² 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 survey²³ 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.

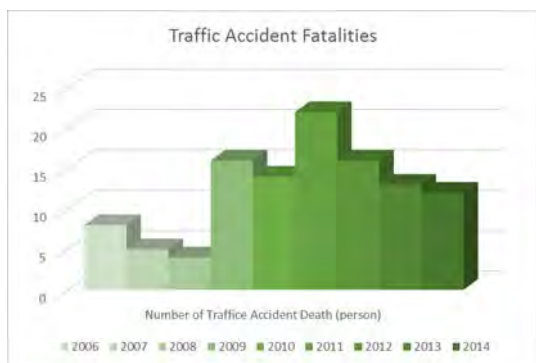


(Source) Preparatory Survey Report
Figure 3: Bridge Subject to Flooding Before the Project

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 flooding²⁴, 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 flooding²⁵ 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)

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 curve²⁷ 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 limit²⁸; 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 cyclists²⁹.

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 Hospital³⁰ is the main medical facility. The project improved the transport situation for emergency patients and critically ill patients to Masasi District Hospital³¹. 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

treatment³².

(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 fares³³ 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 processed³⁴.

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 | <u>121%</u> |
| Mangaka Producers' Union | 403 ton/year | 855 ton/year | 212% |
| Amount selling per member | 0.8 ton/year | 1.05 ton/year | <u>131%</u> |

(Source) Interviews with cashew nut producers in Masasi District and Namyumbu District³⁵

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 needed³⁶. On top of this, the reduction in post-harvest loss due to the improvement in

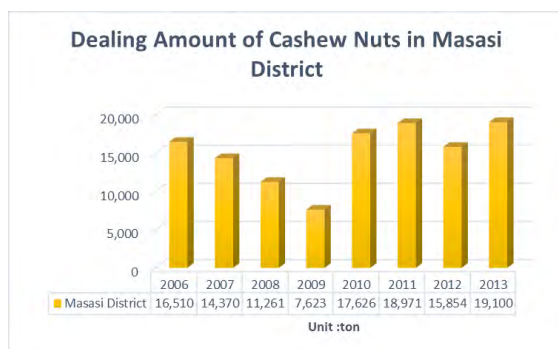
³² From interviews with people in and around Mangaka.

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

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 produce⁴⁰ on the roadside, leading to an increase in income compared to previously⁴¹. 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 income⁴².

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 expanded⁴³. 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 Mangaka⁴⁴, bringing increase of income⁴⁵. According to an interview with

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 project³⁸. 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 change³⁹. 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

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 Region⁴⁶, but the population is on the increase⁴⁷.

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 2016⁴⁸. 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 traffic⁴⁹.

- 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 Office⁵⁰.
- 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 water⁵¹.
- 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 road⁵².
- 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 construction⁵³.

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 occurred⁵⁴. 130 households moved house, affecting a population of 1,605, and 4,310,000 m² of land was acquired for road construction. The land acquired was mainly farmland and residential land⁵⁵.

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 eyes⁵⁶.

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 TANROADS⁵⁷.

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.

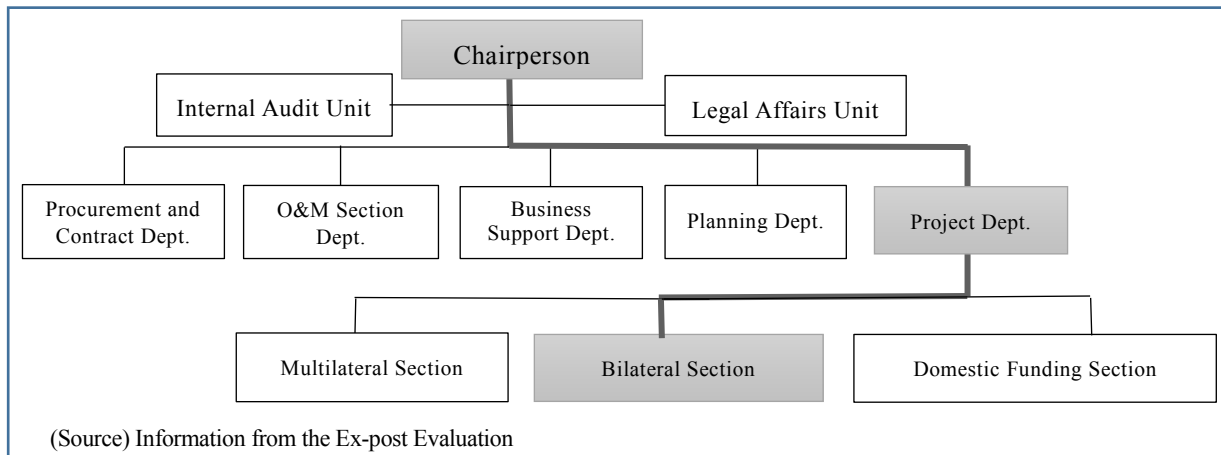


Figure 7: TANROADS Organizational Chart

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 sector⁵⁸.

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 country⁵⁹. 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 adequate⁶⁰. 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 kept⁶². 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

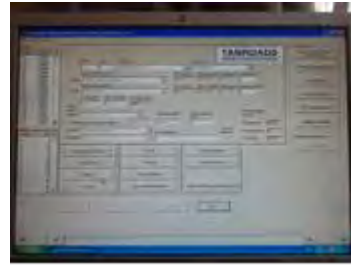
⁶⁰ From interviews with the Mtwara Regional Office and with local road experts.

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 Axle 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 skills⁶⁴. TANROADS provides its regional office staff with basic knowledge regarding road O&M, and training and technical guidance to improve their supervision skills⁶⁵. The TANROADS manuals⁶⁶ are occasionally used in the training and technical guidance⁶⁷. 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 donors⁶⁸. 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 Tsh⁶⁹)

| 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 vehicles⁷⁰, 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.

Republic of Zambia

Ex-Post Evaluation of Japanese Grant Aid Project

The Project for Improvement of Ndola and Kitwe City Roads

External Evaluator: Tsuyoshi Ito, IC Net Limited

0. Summary

This project was carried out with the objective of establishing safe and smooth urban transportation by improving existing roads in imminent need of repair among the major roads running through the industrial and commercial zones and the access roads between the residential zones and the city centers in Ndola City and Kitwe City, main local cities in Zambia, thereby contributing to vitalization of the local society and economy.

Because this project is relevant to Zambia's development policy, the two cities' development needs, and Japan's aid policy, its relevance is high. Regarding efficiency, the project cost is higher than planned, and the project period was longer than planned because of difficulties in procuring construction materials and therefore is evaluated as fair. Most of the expected outputs, such as an improvement in traffic speed, have been achieved. In addition, confirmation has been made of contributions to the impacts, such as an improvement in the local residents' mobility and a decrease in transportation cost for local industries. Therefore, it can be said that the effectiveness and the impact of the project are high. The maintenance activities of two cities have minor problems: their maintenance is on a day-to-day counter measure level, and their institutional, technical, and financial capabilities are just enough to support these day-to-day level maintenance works. Although it had been planned that a system would be introduced to outsource the maintenance work, this plan had still not begun at the time of this ex-post evaluation. Therefore, the sustainability of the effects of this project is fair.

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

1. Project Description



Project Location



Maintenance work on the markings on Independence Way, Ndola

1.1 Background

According to the Fifth Five-Year National Development Plan (2006), Zambia's national development goals were sustainable economic growth, employment creation, and poverty reduction. In the field of transportation, the goals were to use resources efficiently for wealth creation, poverty reduction, and economic development through the reduction of transportation cost. To achieve these goals, maintenance of existing infrastructure and construction of new ones that support economic revitalization, environmental protection and social services were prioritized. In the subsector of roads, the Road Sector Investment Program (ROADSIP) was established in 1997. The firstROADSIP was carried out in the five years between 1998 and 2002 and it was decided that the secondROADSIP would be carried out in the ten years between 2004 and 2013. The secondROADSIP has put the priority on the development of main urban roads for economic vitalization of the major local cities that support local economic revival and social services. Among others, Ndola City (the provincial capital) and Kitwe City (the center of the mining industry) in Copperbelt Province, where the mining of copper and cobalt, the major exports of Zambia, is concentrated, have been selected as the most important local cities for local development and national economic development.

The total lengths of urban roads are 530 km in Ndola City and 582 km in Kitwe City. At the time of the planning of this project, the total lengths of repaired portions were 35 km in Ndola City and 35 km in Kitwe City. Most of the roads still needed rehabilitation and improvement and they were hindrance for smooth and stable urban transportation, and caused an obstacle to the mining and manufacturing industries, commerce, and social service activities. This project was planned against

this background.

1.2 Project Outline

The objective of this project is to establish safe and smooth urban transportation in Ndola and Kitwe Cities, major cities in Zambia by rehabilitate roads in imminent need of repair among the major roads running through the industrial and commercial zones and the access roads between the residential zones and the urban areas, thereby contributing to the vitalization of the local society and economy.

| | |
|--|--|
| Grant Limit / Actual Grant Amount | 766 million yen (for failed bidding in FY 2008), 37 million yen (for Detail Design Study in FY 2009-2011), 2,692 million yen (for Construction in FY 2009-2011) / 37 million yen (for Detail Design Study in FY 2009-2011), 2,692 million yen (for Construction in FY 2009-2011) |
| Exchange of Notes Date (/Grant Agreement Date) | November 2007 (for failed bidding in FY 2008), January 2009 (for Detail Design Study), August 2009 (for Construction) / January 2009 (for Detail Design Study), August 2009 (for Construction) |
| Implementing Agency | Ndola City Municipal, Kitwe City Municipal |
| Project Completion Date | February 2012 |
| Main Contractor(s) | Konoike Construction Co. Ltd. |
| Main Consultant(s) | Katahira & Engineers International Co. Ltd. |
| Basic Design | November 2006 (Preliminary Study) October 2007 (Basic Design Study) December 2008 (Implementation Review Study) |
| Detailed Design | December 2008 |
| Related Projects | Road Sector Investment Programme II (2004-2013) |

2. Outline of the Evaluation Study

2.1 External Evaluator

Tsuyoshi Ito, IC Net Limited

2.2 Duration of Evaluation Study

Duration of the Study: October 2014 – September 2015

Duration of the Field Study: October 19 - November 3, 2014; February 10 - 18, 2015

3. Results of the Evaluation (Overall Rating: B¹)

3.1 Relevance (Rating: ③²)

3.1.1 Relevance to the Development Plan of Zambia

(1) National development plan

Regarding the transportation sector, at the time of the planning of the project, Zambia's "Fifth Five-Year National Development Plan (2006 to 2010)" gave priority to efficient use of domestic resources by reduction of transportation cost through the new construction, rehabilitation, and appropriate maintenance of roads, thereby contributing to wealth creation, poverty reduction, and economic development. The revised Sixth Five-Year National Development Plan in 2014, at the time of this ex-post evaluation, gave the highest priority to the construction of new local roads and the maintenance and rehabilitation of existing roads.

(2) Road sector plan

In 1997, Zambia established the Road Sector Investment Program (ROADSIP) as a road sector plan. The first phase was scheduled to run from 1998 to 2002, and the second phase was scheduled to run from 2004 to 2013. Goals, such as the improvement of roads, were set up according to need and priority after consultations with the bilateral assistance partners such as JICA, and development financial institutions such as the World Bank.³

At the time of the planning of this project, during the second phase of ROADSIP, the construction of main roads for major local cities was selected as an important issue for contributing to the economic vitalization of major local cities that would serve as bases for local economic revival and social services. Ndola City, the capital of Copperbelt Province, where mining, Zambia's main export industry, is prospering, and Kitwe City, the center of mining in the province, were selected as the most important local cities. One of the components of ROADSIP was the Urban Road Support Programme, the period of which was divided into several phases like ROADSIP. In the second phase, the rehabilitation of roads was planned for five provincial capitals and 15 major cities. The total length of the roads to be rehabilitated was 775 km (which was estimated to cost 76.6 million US dollars).

At the time of the ex-post evaluation, the road sector plans included "Link Zambia 8000"

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

² (3): High, (2): Fair, (1): Low

³ The following goals were set: (1) repairing and maintenance of arterial road networks with a total length of 40,113 km; (2) improvement of roads according to need and priority; (3) development of the local construction industry; (4) creation of job opportunities by proper techniques and measures; (5) improvement of road safety, environmental management, rural traffic, and mobility; (6) improvement of community roads; (7) improvement of poverty and HIV/AIDS treatment all over the country.

(2012), a plan to construct network roads from urban areas to rural areas, and “Pave Zambia 2000” (2014), a plan to construct roads in major local cities. According to Link Zambia 8000, for example, the construction of arterial roads was planned between Kitwe City, one of the target areas of this project, and Chingola City, where Nchanga copper mines are located, and between Ndola City, the other target area of this project, and Lusaka City, the capital of Zambia.

In light of the above, at the times of the planning and the ex-post evaluation, the national development plan and the road sector plans designated the maintenance and rehabilitation of major local urban roads as a priority issue. Therefore, this project’s relevance to the development policy is high.

3.1.2 Relevance to the Development Needs of Zambia

At the time of the planning of this project, roads with a total length of 35 km had been repaired in each of Ndola and Kitwe Cities in the first phase of ROADSIP. They accounted for only 6.6% of the total length of urban roads in Ndola City and only 6.0% in Kitwe City. Therefore, there were still demands for rehabilitating existing roads. In the Preliminary Study of this project (July 2006), target roads were selected, in light of improvement in access from low-income housing areas in addition to (1) public nature (industrial road, commercial road, bus route, or connection road) and (2) prospects for improvement in public nature in the future (possibility of being used as a bus route after repairing). The target routes were selected according to the priority based on the result of comparison of quantitative data gained from the inventory surveys on the major roads in both cities.⁴ Therefore, the target roads were selected appropriately. Below, development needs are examined in each of the cities at the time of the planning and the ex-post evaluation.

(1) Ndola City

The population of Ndola City was about 394,000 in 2000.⁵ Because a residential area was expanded in the southern part of the City, it was imminently necessary to construct an arterial road that connects the residential area with the city center.⁶ In addition, priority was also given to auxiliary arterial roads all over the City. Many of these roads were not paved or seriously damaged because of defective drainages. Moreover, because pedestrian-vehicle separation was not completed, vehicles had to run slowly. In this way, road conditions greatly

⁴ 21 routes in Ndola City; 30 routes in Kitwe City

⁵ According to the 2003 Census, the increasing rate of population was 1.6% per year.

⁶ Arterial roads are main routes of urban traffic. Auxiliary arterial roads are branch routes that connect residential areas with the urban area. Further branched routes are called district roads.

influenced everyday traffic and transportation, such as commuting to workplaces or schools.

At the time of the ex-post evaluation also, according to the Ndola City Municipality, the construction of secondary roads and major arterial roads for industrial districts and suburban low-income residential districts was highly necessary.⁷ There has been no significant change in development needs since the planning. The population was about 444,000 in 2009 and has been estimated to be 487,000 according to a forecast in 2014.⁸

(2) Kitwe City

The population of Kitwe City was 389,000 in 2000.⁹ It increased to 505,000 in 2009 and is estimated to be 575,000 in 2014.¹⁰ At the time of the planning of the project, because there were many copper-related factories in Kitwe City, minor arterial roads and district roads were highly demanded to connect the industrial districts with the residential districts. In the industrial districts in particular, many trucks, trailers, and other large vehicles ran, resulting in exfoliation and other damage to pavements. This led to impassability or slow driving, which gave damage to not only vehicle traffic but also the lives of the local people.

According to the Kitwe City Municipality, at the time of the ex-post evaluation, it has been also highly necessary to improve the bus routes, the routes in the industrial district, and the routes which connect the city center with the industrial district. There has been no significant change in the development needs since the planning.¹¹

In light of the above, this project is relevant to the development needs in the field of roads in both cities.

3.1.3 Relevance to Japan's ODA Policy

The Country Assistance Program for Zambia (2002) at the time of the basic design study gives priority to “support for the efforts to create a well-balanced economic framework,” and the emphasis within this policy is the importance of the “development of infrastructures that support economic activities to make distribution smooth and vitalize the domestic industries.”

The Assistance Plan aims at “industrial development without excessively depending on copper.” If the purpose in Zambia is to develop urban roads, the targets are Livingston, Ndola,

⁷ Interview with the Ndola City Government

⁸ Ndola City Government

⁹ Census 2003

¹⁰ According to the Kitwe City Government, the population growth rate is 1.1% per year.

¹¹ Interview with the Kitwe City Government

and Kitwe, if excluding Lusaka.¹²

In light of the above, this project is relevant to Japan's ODA policy, and it can be said that there is no discrepancy in the selection of the target areas.

This project has been highly relevant to the Zambia's development policy and road sector plan and development needs of both target cities of developing urban road, as well as Japan's ODA policy. Therefore its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

Table 1 shows the outputs of this project.

Table 1: Plan and actual of the outputs of the project

| Component | Basic Study | Implementation Review Study | Actual Output |
|-------------------------|--|---|--|
| Road Length | Ndola City: 12.73 km, Kitwe City: 11.63 km, Total: 24.36km | No Change | No Change |
| Pavement Work | <ul style="list-style-type: none"> ● Asphalt Concrete Surface Course (T=50mm, Ave. Width= 7.9m), 192,012 m² ● Asphalt Concrete Binder Course (T=50mm, Ave. Width= 7.9m), 60,355 m² ● Granular Base Course (T=100mm - 200mm, Ave. Width=9.9m), 239,536 m² ● Crushed Stone Subbase Course (T=100mm - 300mm, Ave. Width=9.9m), 205,538 m² | No Change | <ul style="list-style-type: none"> ● Asphalt Concrete Surface Course (T=50mm, Ave. Width= 7.9m), 192,000 m² ● Asphalt Concrete Binder Course (T=50mm, Ave. Width= 7.9m), 60,300 m² ● Granular Base Course (T=100mm - 200mm, Ave. Width=9.9m), 239,500 m² ● Crushed Stone Subbase Course (T=100mm - 200mm, Ave. Width=9.9m), 205,500 m² |
| Road Shoulder Surfacing | <ul style="list-style-type: none"> ● Asphalt Concrete Surface Course (T=30mm, Ave. Width=1.25m), 45,211 m² | No Change | <ul style="list-style-type: none"> ● Asphalt Concrete Surface Course (T=30mm, Ave. Width=1.25m), 45,200 m² |
| Footpath Surfacing | <ul style="list-style-type: none"> ● Precast Tile (50cm x 50cm) Surfacing (Width=2.0m), 6,907 m² ● Crushed Stone Subbase Course (T=100mm - 150mm, Width=2.0m), 7,196 m² | No Change | <ul style="list-style-type: none"> ● Precast Tile (50cm x 50cm) Surfacing (Width=2.0m), 6,900 m² ● Crushed Stone Subbase Course (T=100mm - 200mm, Width=2.0m) 7,100 m² |
| Access Way Surfacing | <ul style="list-style-type: none"> ● Asphalt Concrete Surface Course (T=30mm) + Subbase Course (T=150mm), 467 Spots ● Crushed Stone Surfacing (T=100mm), 467 Spots | <ul style="list-style-type: none"> ● Asphalt Concrete Surface Course (T=30mm) + Subbase Course (T=150mm), 17,203 m² ● Crushed Stone Surfacing (T=100mm), 8,386 m² | <ul style="list-style-type: none"> ● Asphalt Concrete Surface Course (T=30mm) + Subbase Course (T=150mm), 17,200 m² ● Crushed Stone Surfacing (T=100mm), 8,300 m² |

¹² Interview with the Ministry of Local Government and Housing

Table 1: Plan and actual of the outputs of the project (continue)

| Component | Basic Study | Implementation Review Study | Actual Output |
|---------------------|--|---|---|
| Drainage Structures | <ul style="list-style-type: none"> ● Stone Masonry Ditch, (Bottom W: 500 - 1200mm), 21,688m ● U-Shape Concrete Ditch (Bottom W: 500 - 1200mm), 10,990m ● L-Shape / Rolled Gutter Ditch, 3,881m ● Cross pipe, 1,167m (diameter: 600 - 1200mm) | <ul style="list-style-type: none"> ● Stone Masonry Ditch, (Bottom W: 500 - 1200mm) , 21,690m ● U-Shape Concrete Ditch (Bottom W: 500 - 1200mm), 10,990m ● L-Shape / Rolled Gutter Ditch, 3,881m ● Cross pipe, 1,167m (diameter: 600 - 1200mm) | <ul style="list-style-type: none"> ● Stone Masonry Ditch, (Bottom W: 500 - 1200mm) , 21,692m ● U-Shape Concrete Ditch (Bottom W: 500 - 1200mm), 10,991m ● L-Shape / Rolled Gutter Ditch, 3,881m ● Cross pipe, 1,164m (diameter: 600 - 1200mm) |
| Box Culvert | <ul style="list-style-type: none"> ● 1 Site, (Width=10m (3+4+3) x Height=3.5m x Length=13.1m) | <ul style="list-style-type: none"> ● 1 Site, (Width=10m (3+4+3) x Height=3.5m x Length=12.6m) | No Change |
| Kerbs | <ul style="list-style-type: none"> ● Concrete Kerb, 4,152m ● Edge block, 3,602m | No Change | No Change |
| Sign Boards | <ul style="list-style-type: none"> ● 179 Each | No Change | No Change |
| Lane Marking | <ul style="list-style-type: none"> ● Centerline, Edge Line, 68.39km (W: 150mm) | <ul style="list-style-type: none"> ● Centerline, Edge Line, 73.35km (W: 150mm) | No Change |
| Road Marking | <ul style="list-style-type: none"> ● 217 Spots (Crosswalk, Stop Line, Left/Right Turn Arrows) | No Change | No Change |
| Hump | <ul style="list-style-type: none"> ● 6 Spots (H:80mm, W:4.8m) | No change | <ul style="list-style-type: none"> ● 11 Spots (H:80mm, W:4.8m) |

Source: Basic Design Study, Implementation Review Study, document provided by JICA

This project was carried out almost according to the plan. Most of the modifications were made because of minor adjustments at the construction. Although the number of hump construction works was increased in response to Zambia's requests, the cost was within the budget and the purpose of adjusting the running speed in the urban area was clear. Therefore, these adjustments are regarded as appropriate.

Although Vitanda Street, one of the target roads in Ndola City, had been rehabilitated by Zambia before the beginning of the project, this rehabilitation was a temporary one carried out to satisfy local residents' strong request for immediate repair of the street and was limited to the renewal of the surfaces layer and the repair of pot holes. Although Zambia did not officially notify Japanese side of the temporary repair, the basic design study judged it appropriate to select the street as a target road as initially planned.¹³

In addition, it was confirmed as a result of defect inspection that all the items planned to be carried out by Zambia (acquisition of sites, measures for moving shops, acquisition of places for collecting soil and places for disposing of soil, and acquisition of places for disposing of waste materials) were carried out.

¹³ Interview with the Ministry of Local Government and Housing and consultant firms

3.2.2 Project Inputs

One of the important events related to the inputs of the project is the failure of the first bidding under the initial plan (basic design study). The E/N for the first phase was concluded in November 2007 based on the results of the basic design study, and bidding was held for the first-phase work in May 2008. However, the bidding failed as the companies eligible for the bidding refused to participate because of a sharp rise in the material cost and a concern on the work period estimated in the basic design. In response to this failure, an Implementation Review Study was conducted. As a result, given that it was difficult to complete the first-phase works by the deadline and that little time remained until the estimated deadline for the conclusion of the second-phase E/N, the first and second phases were integrated into one phase. It is necessary to take this into account when considering the project cost and the project period.

3.2.2.1 Project Cost

Based on the basic design study,¹⁴ the cost of the project was estimated to be 2,210 million yen (2,175 million yen from Japan; 35 million yen from Zambia). However, the actual cost was 2,288 million yen (only from Japan; no information on Zambia's payment was provided). Even looking only at the cost paid by Japan, the actual cost is higher than the plan (105.2% of the plan).¹⁵ As described above, the first bidding failed. The cost of supervising (preparing) the first bidding was 28.2 million yen.

3.2.2.2 Project Period

Although, based on the basic design study, the period of this project was estimated to be 24 months (including the detailed design period), the actual period was 31.5 months and longer than the plan (131.3% of the plan). Of the delay of 7.5 months, a delay of four months was due to the integration of the two phases under the basic design into one phase under the Implementation Review Study.¹⁶ The remaining delay of 3.5 months was mainly due to the following reason: because the president at the time began to promote the national road construction project around May 2011 in preparation for the president election scheduled for

¹⁴ For the purpose of this project, an implementation review study was conducted as a review of the basic design due to the failure of the bidding. Although, according to the results of the study, the budget and the estimated project period were changed, the numerical values specified in the basic design are used for the standards for assessment.

¹⁵ According to the implementation review study after the failure of the bidding, the project cost was reevaluated to be 2,771 million yen (2,731 million yen from Japan; 40 million yen from Zambia). Compared with this, the actual cost was 84% of the estimated cost, if focusing only on the cost paid by Japan.

¹⁶ Interview with the construction consultant. Concretely, when the period was divided into two phases, investment of necessary machinery and equipment was planned for each of the phases. As a result, it was possible to envisage that the machinery and equipment used for the first phase could be used for the second phase. Therefore, it was possible to estimate the work efficiency to be high. However, when the two phases were integrated into one phase, the total volume of invested machinery and equipment decreased and the work efficiency lowered, resulting in a longer construction period.

September 2011, the supply of road construction materials became scarce and procurement became difficult.¹⁷

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

3.3 Effectiveness¹⁸ (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

No operation or effect indicators were set up for the basic design survey of the project. Therefore, consideration was given to see if the annual average traffic volume, which is widely used as the operation indicator for road projects, can be used as the operation indicator. However, because neither Ndola nor Kitwe City had collected data on annual average traffic volume, information gained from residents and business operators along the target roads during the second field survey of this ex-post evaluation was used as the alternative data.

In addition to “improvement in possible traffic speed” (from 18.7 km/h in 2008 to 40.0 km/h in 2011), which was selected for the Implementation Review Study, the number of traffic accidents is used as an effective indicator to check the effect of safety facilities (road signs, pedestrian crossings, humps, and pedestrian-vehicle separation).

(1) Operation indicators

During the interview survey in the second field study, most of the interviewees answered that the traffic volume on almost all the target routes had increased after the completion of the roads by the project. In addition, most of them answered that the traffic volume on the target roads has been increasing at a higher rate than that on the other roads in the City. Most frequently mentioned reasons are followings: (1) the condition of the target roads is better than the condition of the other roads, and the target roads are used also as bypasses from the other roads; and (2) in the residential districts, the target roads of this project are collector roads (roads where branch routes come together) and serve as arterial roads from the residential areas to the urban area.

(2) Effect indicators

Because no record on passable speed existed in Ndola and Kitwe Cities, the traffic speed was measured by a simple method during this ex-post evaluation study. The results showed that the running speed improved on all the target roads. The average running speed is higher than the

¹⁷ Interview with the construction consultant

¹⁸ A rating is assigned based on a judgment of effectiveness with consideration also given to impact.

target speed under the basic design both in the morning and in the afternoon on almost all the target roads (Tables 2 and 3). In addition, according to the results of the beneficiary survey carried out during this ex-post evaluation, all the respondents answered that the running speed had improved and 40% of the respondents answered that the running speed had increased by more than 20 km/hour. Moreover, after this project, the legal speed limit for all the target roads was changed from a range of 20 to 30 km/hour to 65 km/hour.

Table 2: Running speed on the target roads in Ndola city

| | Basic Design Study (km/h) (2007) | | | Ex-Post Evaluation (km/h) (2014) | |
|-----------------------|-------------------------------------|---------------------|---------------------|-------------------------------------|---------------------|
| | 7 : 30~ 8 : 30 | 12 : 00~ 13 : 00 | 17 : 00~ 18 : 00 | 08 : 00~ 09 : 00 | 17 : 00~ 19 : 00 |
| Vitanda Street (N1) | 19.7 | 20.3 | 19.5 | 42.9 | 43.9 |
| Kaunda Drive (N2) | 27.0 | 28.8 | 26.4 | 46.5 | 61.8 |
| Makoli Avenue (N3) | 27.9 | 25.9 | 27.3 | 69.2 | 45.8 |
| Independence Way (N4) | 24.3 | 24.2 | 21.7 | 47.0 | 40.8 |
| Zambia Road (N5) | 18.2 | 17.6 | 16.9 | 49.3 | 48.9 |
| Matelo Road (N6) | 21.2 | 26.9 | 21.6 | 39.4 | 44.7 |
| Lukasu Road (N7) | 13.6 | 14.1 | 13.5 | 50.5 | 48.5 |
| Chambeshi Road (N8) | 21.6 | 20.2 | 21.7 | 49.3 | 48.9 |
| Livingstone Road (N9) | 16.1 | 15.9 | 17.5 | 35.3 | 45.4 |

Source: Basic Design Study, Implementation Review Study, Quick Survey during this Ex-post Evaluation

Table 3: Running speed on the target roads in Kitwe city

| | Basic Design Study (km/h) (2007) | | | Ex-Post Evaluation (km/h) (2014) | |
|---------------------------------|-------------------------------------|---------------------|---------------------|-------------------------------------|---------------------|
| | 7 : 30~ 8 : 30 | 12 : 00~ 13 : 00 | 17 : 00~ 18 : 00 | 08 : 00~ 09 : 00 | 17 : 00~ 19 : 00 |
| Dr Agrey Avenue (K1) | 13.7 | 15.3 | 17.2 | 60.5 | 62.6 |
| Euclid Road (K2) | 15.4 | 14.7 | 15.3 | 40.6 | 48.3 |
| Zomba Road (K3) | 11.6 | 14.0 | 11.1 | 42.1 | 49.9 |
| Blantyre Road (K4) | 15.0 | 17.7 | 16.7 | 60.1 | 62.9 |
| Eshowe Road (K5) | 15.1 | 17.1 | 17.5 | 35.7 | 50.8 |
| Matuka Avenue (K6) | 12.8 | 10.1 | 11.1 | 50.0 | 49.3 |
| Katanta Street (K7) | 20.4 | 18.4 | 18.7 | 58.3 | 58.6 |
| Natwange Road (K8) | 19.6 | 21.4 | 16.7 | 60.3 | 53.8 |
| Mutentemuko Road (K9) | 22.4 | 23.8 | 24.4 | 46.4 | 44.5 |
| Miseshi Street (K10) | 18.9 | 19.7 | 18.3 | 42.4 | 40.9 |
| Kanongesha Road (K11) | 18.1 | 17.3 | 18.0 | 50.3 | 48.4 |
| Mulilakwenda Road (K12) | 16.5 | 15.8 | 15.3 | 43.7 | 46.1 |
| Lilongwe Road (K13) | 22.4 | 21.1 | 18.0 | 52.3 | 43.2 |
| Independence service Lane.(K14) | | | | 40.7 | 43.4 |

Source: Basic Design Study, Implementation Review Study, Quick survey during this Ex-post Evaluation Study

There are no observable trends in the number of accidents in two cities (Table 4). Although they did not show any clear evidences, the police in the cities told that the reason the number of accidents had not decreased was increase in running speed due to the road improvement.

Table 4: Number of traffic accidents on the target roads in Ndola and Kitwe

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---|------|------|------|------|------|------|
| Number of traffic accidents in Ndola city | 59 | 55 | 59 | 69 | 0 | 100 |
| Number of traffic accidents in Kitwe city | N.A | 170 | 143 | 183 | 158 | 140 |

Source: Ndola Police, Kitwe Police

3.3.2 Qualitative Effects

Appropriate separation between vehicles and pedestrians was an expected effect of the project. According to the results of the beneficiary survey, 92% of the respondents in Ndola City and 86% of the respondents in Kitwe City answered that they used sidewalks, if available. Therefore, it can be said that the separation has been realized.

3.4 Impact

3.4.1 Intended Impacts

The intended impacts of the project are divided into benefits to local residents and benefits to local industries. A beneficiary survey was conducted about the following items¹⁹ to inspect changes before and after the project.

Impact on Local Residents

- Improvement in residents' mobility (improvement in the amenity, running speed, and reliability of buses)
- Improvement in the accessibility between low- and middle-income residential areas and hospitals/schools

Impact on Local Industries

- Reduction in transportation costs
- Improvement in the competitiveness of industrial products through improvement of price competitiveness by cost reduction

¹⁹ The survey was conducted from October 22 to 31, 2014. The survey team members visited respondents directly, using questionnaires. The number of samples is 87 in Ndola City (41 residents along target roads; 6 restaurant or hotel owners; 18 public transit drivers; 4 public transit operators; and 22 other persons) and 70 in Kitwe City (15 residents along target roads; 14 restaurant or hotel owners; 6 public transit drivers; 10 public transit operators; and 18 other persons).

- Vitalization of local industries (increases in the numbers of shops and business operators)

(1) Improvement in residents' mobility

75% of the respondents to the beneficiary survey answered that buses became comfortable after the project because they hardly jolted. In addition, 78% of them recognized an improvement in the running speed of public transportations.

(2) Improvement in the accessibility between low- and middle-income residential areas and hospitals/schools

Regarding the improvement of the accessibility to hospitals, schools, and shops, more than 90% of the respondents recognized that the accessibility had been improved for all the destinations.

(3) Reduction in local operators' transportation costs and its effect to improvement in competitiveness

Responding to questions to carriers, 88% of the respondents answered that costs (mainly, costs of repairing vehicles) were reduced as a result of the road improvement. However, because the average annual cost cut was about 5,000 Zambian Kwacha,²⁰ 85% of the respondents answered that the reduction in transportation costs had a slight impact on the company's profit, while 15% answered that there was almost no impact on it.

(4) Vitalization of local industries

According to the results of interviews with retailing shops, hotels, and restaurants along the target roads, 85% of the respondents answered that there was an increase in the number of customers. Regarding the increasing rate, 83% answered that it was a slight increase of less than 10%, while 17% answered that it was between 10% and 20%. According to the results of additional interviews during the second field study, however, respondents along some roads answered that the number of customers had greatly increased as a result of the project.

3.4.2 Other Impacts

(1) Impacts on the natural environment

At the time of the planning of the project, any environmental impact during the use of the rehabilitated roads was not expected. Therefore, environmental monitoring after the completion of the construction was not carried out. During the construction, measures were carried out, such as using water spray to prevent spreading of dusts. As a result, no environmental problem

²⁰ 1 kwacha = 18.39 yen

occurred during the project implementation period.²¹ In addition, because the project was to rehabilitate existing roads, it was confirmed that there would be no impact on the natural environment after the end of the project either.²²

(2) Land acquisition and resettlement

Because the project was to rehabilitate existing roads, there was no land acquisition or resettlement.²³

Regarding the effectiveness of the project, although no official data is available, the annual average traffic volume can be presumed to have increased as a result of the project. In addition, the improvement of the running speed and the separation of pedestrians – initially expected effects of the project – have been achieved.

As for the impacts of the project, it was confirmed that the benefits to residents – such as an increase in the amenity of public transportations through road improvement and an increase in accessibility to hospitals, schools, etc. – have been achieved almost as planned. On the other hand, some of the expected impacts on the local economy were recognized, such as a reduction in local companies' transportation costs (a reduction in the cost of repairing vehicles) and an increase in the number of customers of commercial and service businesses along the target roads.

This project has largely achieved its objectives. Therefore effectiveness and impact of the project are high.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

Regarding the construction, improvement and maintenance of roads in Zambia, the city municipalities have jurisdiction over the urban roads under the supervision of the Ministry of Local Government and Housing (MLGH), while the Road Development Agency (RDA) has jurisdiction over the arterial roads (including those passing between cities). In reality, however, borders of jurisdiction are not well followed – for example, the RDA has also rehabilitated general city roads.²⁴ Since FY2014, coordination has intentionally been made among the city governments, MLGH, and RDA. When a new project is planned and examined, consultations are

²¹ Interview with a construction consultant

²² Interview with the Ndola City Government and the Kitwe City Government

²³ Ndola City Government, Kitwe City Government

²⁴ Ndola City Government, Kitwe City Government

held among the three parties.²⁵

During the defect inspection study of the project in 2013, regular patrolling for damage detection and establishment of maintenance systems were proposed. However, regular activities had not begun by the time of the ex-post evaluation. Basically, some activities are carried out only when residents give reports.²⁶ Another issue raised by the inspection study was to strengthen coordination with other related agencies, such as water supply companies and sewerage companies for more effective response to road damages caused by water leakage, however, such coordination has not been carried out sufficiently.

Attached Tables 1 and 2 show the distribution of personnel by the Engineering Department of each city.

Although it is planned that 20 staff members should be placed in the Road and Drainage Division of Ndola city, which maintains urban roads, the number of actual staff members is only six, about one-third of the planned number. In Kitwe City, the number of staff members placed in the division is 10, about a half of the planned number of 19. These staff shortage are one of the reasons why regular patrols are difficult in both cities.

To solve the above-mentioned problem, the MLGH has introduced “performance contract,” the outsourcing of road maintenance to the private sector. In the capital city of Lusaka, a performance contract has been carried out to maintain main roads constructed after 2010. Based on this experience, the MLGH plans to carry out performance contracts in other major cities. In Copperbelt Province, performance contracts are planned to be carried out in Ndola, Kitwe, Luanshya, and Mufulira from 2015. The contents of the contracts include the clearing of road surfaces and drainage channels, the repair of road surfaces and shoulders, and the repainting of marks.

Although the maintenance of urban roads should be carried out by each city municipality, it is unlikely that each of them will be capable of conducting regular road maintenance work because of staff shortage and insufficient budget, which will be described in the next section. From a realistic viewpoint, it can be deemed appropriate for the central government to take over the initiative of the regular maintenance activities at municipal level.

²⁵ Ndola City Government, MLGH, RDA

²⁶ Ndola City Government, Kitwe City Government

At the time of the second field survey of this ex-post evaluation, all major roads in the cities were planned to be maintained in this way, and MLGH had requested each municipality an estimate of the budget.

In light of the above, the maintenance system is not well established. Although it is almost certain that performance contracts will be introduced, they had still not been carried out at the time of this ex-post evaluation. The sustainability from institutional aspects is judged to be fair.

3.5.2 Technical Aspects of Operation and Maintenance

Both Ndola and Kitwe have experience in many road repair projects. In past projects, both cities hired local consultants to carry out study, design, and work management. Minor repair works such as repair of potholes are done by both cities as ordinal works. They have written operating procedures for the works, and are technically capable of maintaining roads at such a level. Although many of the road maintenance machines and tools owned by Ndola municipality are not usable, repair works that require large machinery are outsourced and therefore the impact is limited.²⁷ Kitwe's repair equipment is in good condition.²⁸

Although larger-scale maintenance works, repair, and rehabilitation are outsourced, skills in study, planning, and supervision of these outsourced work for long-term maintenance are insufficient.²⁹ Although the local offices of the MLGH and the RDA in Ndola are supposed to give such technical support, little technical support has been given so far in reality, because such large-scale works were rarely carried out in the past.

In principle, the MLGH is responsible for the provision of technical support to each municipality. The MLGH places importance in the strengthening of the management capacity for maintenance, such as contract management. The MLGH's Technical Consulting Unit also gives training. The MLGH plans to strengthen training to carry out the performance contracts.³⁰ The MLGH gave group training three times in 2014. It had already given it twice this year at the time of the ex-post evaluation. Whenever a technical problem arises in a city government, the city government takes necessary measures for gaining technical information, such as sending an inquiry to the MLGH or RDA, although this has not been institutionalized.³¹

In light of the above, because both cities can do day-to-day simple repair and will not need to

²⁷ Ndola City Government

²⁸ Kitwe City Government

²⁹ Interview with the Ndola City Government and the Kitwe City Government

³⁰ MLGH

³¹ Ndola City Government, Kitwe City Government, RDA Office in the Copperbelt Province

perform many regular repair works after the introduction of performance contracts in the near future, they will not need to have work skills among themselves (it will also be unnecessary to have repair equipment). On the other hand, regarding skills in the management of performance contracts (such as preparation of specifications, quality management, and management of contract changes), although efforts to improve the skills have begun, issues remain. Therefore, the sustainability from technical aspects is fair.

3.5.3 Financial Aspects of Operation and Maintenance

Both city governments receive road maintenance budgets from the National Road Fund Agency (NRFA) and depend on funds from the NRFA for most of their budgets.

No data was gained on Ndola City’s road-related budget. Table 7 shows the actual expenditures. Regarding Kitwe City, Attached Table 3 shows the Engineering Department’s budget and actual expenditures. In the case of Kitwe, the item “Supplies & Services” in the table corresponds to the budget for road maintenance and improvement. A budget of about 10 million kwacha was allocated to the “Supplies & Services” in FY2014. Of the budget, about 90% is allocated to maintenance. In reality, however, the budget execution rate for “Supplies & Services” has been about 20% in most years. The execution rate is low not only for “operation-related” but also for the other items except personnel cost. These low execution rates are due to not only the low execution capacity as a result of staff insufficiency but also insufficient fuel cost for patrol vehicles³² and the Engineering Department’s lack of budget. Although Ndola Municipality has no data other than expenditure amounts, the interviewees answered that Ndola Municipality also cannot have a sufficient budget for carrying out maintenance activities regularly according to plan.

Table 7: Expenditure on road by Ndola Municipality (Unit: Zambian Kwacha)

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|---------------------|-----------|-----------|---------|-----------|-----------|---------|
| Expenditure on road | 6,099,218 | 1,823,506 | 419,258 | 1,570,000 | 1,112,366 | 565,035 |

Source: Ndola Municipality

According to the results of the inspection of major roads in the cities during this ex-post evaluation, not many spots were found left without repair. As long as major roads are concerned, it can be inferred that there is at least minimum budget necessary for carrying out temporary measures for maintaining roads when residents make a report or complaint.

³² Kitwe City Government

On the other hand, as described in the preceding section concerning the technical aspect, the National Road Fund is used for the budget for the performance contracts. According to the MLGH, a budget of 60 million kwacha is allocated to Ndola, Kitwe, Luanshya, and Mufulira in Copperbelt Province as a budget for several years. The MLGH estimated that a performance contract would need one to two million kwacha, and the budget can supply funds for concluding performance contracts for several years.

In light of the above, it seems that the budget for maintaining roads by performance contract has been almost secured and it would enhance the sustainability in the future. However, this has still not been realized and uncertainty remains, and the sustainability from financial aspects is fair.

3.5.4 Current Status of Operation and Maintenance

In both Ndola and Kitwe, road surfaces and shoulders had some spots in need of repair, but stayed mostly in good condition. In contrast, while most sidelines remain, most central lines have disappeared. Although some central lines have been repainted in Ndola, in general, it cannot be said that they have been kept in appropriate conditions and it affects road safety.

Sediment has accumulated in many drainage channels, some of which have been damaged in their function. Although insufficient drainage had still not brought about erosion of road shoulders at the time of this ex-post evaluation, this is an issue to be solved.

In Kitwe, large vehicles are regulated and hardly enter the city. In Ndola, however, large vehicles are running in the city. Although the roads have not yet been damaged, road surfaces may receive impact in the future. In both cities, overloading vehicles are regulated on surrounding arterial roads.

Some minor problems have been observed in terms of limited capacity of road maintenance only at day-to-day and small-scale repair level. Also, although the introduction of performance contracts, under which most of the road maintenance works are outsourced, has steadily advanced, bidding had still not been prepared at the time of the ex-post evaluation. Therefore sustainability of the project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was carried out with the objective of establishing safe and smooth urban transportation by improving existing roads in imminent need of repair among the major roads running through the

industrial and commercial zones and the access roads between the residential zones and the city centers in Ndola City and Kitwe City, main local cities in Zambia, thereby contributing to vitalization of the local society and economy.

Because this project is relevant to Zambia's development policy, the two cities' development needs, and Japan's aid policy, its relevance is high. Regarding efficiency, the project cost is higher than planned, and the project period was longer than planned because of difficulties in procuring construction materials and therefore is evaluated as fair. Most of the expected outputs, such as an improvement in traffic speed, have been achieved. In addition, confirmation has been made of contributions to the impacts, such as an improvement in the local residents' mobility and a decrease in transportation cost for local industries. Therefore, it can be said that the effectiveness and the impact of the project are high. The maintenance activities of two cities have minor problems: their maintenance is on a day-to-day counter measure level, and institutional, technical, and financial capabilities are just enough to support these day-to-day level maintenance works. Although it had been planned that a system would be introduced to outsource the maintenance work, this plan had still not begun at the time of this ex-post evaluation. Therefore, the sustainability of the effects of this project is fair.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

(1) Implementation of the performance contracts

To strengthen the management and maintenance systems, the MLGH should support both cities in determining specifications for the performance contracts to start the contracts immediately.

(2) Support for improvement of the municipalities' contract management capacities

The MLGH should organize more technical training for the improvement of each city's capacity to manage outsourcing affairs, including the supervision of the implementation of the performance contracts. Establishment of an on-demand technical support mechanism for municipalities is also necessary.

(3) Thorough regulation of heavy vehicles in Ndola City

In order to regulate the entering of heavy vehicles into Ndola City thoroughly, the Ndola Municipality should begin consultations with the Ndola police to strengthen the cooperation between them. If needed, the MLGH should support coordination with the Ministry of Home

Affairs, which has jurisdiction over the police.

4.2.2 Recommendations to JICA

(1) Consideration of technical support in ordering and contract management

The recipient country's implementing agency sometimes outsources the construction, rehabilitation, and maintenance of roads to private companies. In such cases, it is essential to improve skills in the management of contracts with contractors, however, it is not necessarily easy for the recipient country itself to do it. In relation to the project, the MLGH hopes that Japan will give technical support in this regard. If possible, consideration should be given to whether to incorporate a contents related to contract management into "country-focused training for Zambia (road technology)" held in Japan.

Alternatively, it is advisable to consider giving technical support to introduce a contract management methodology by dispatching experts and Japan Overseas Cooperation Volunteers as a follow-up of the project.

4.3 Lessons Learned

(1) Consideration of response to higher running speed as a result of road improvement

If the running speed increases as a result of road improvement, this may increase a risk of accident. On urban roads, it is possible to reduce the running speed to some extent through the appropriate placement of humps. In this project, although the running speed has increased, it has not been confirmed that the higher running speed has resulted in an increase in the number of accidents. However, the result of an interview with the police indicates that road improvement may result in an increase in the running speed. When improving urban roads on which vehicles frequently cross pedestrians, it is necessary, at the basic design stage, to consider appropriate placement of humps along each target road with careful consideration of drivability and durability of road.

(2) Confirmation of clear grounds for the prospects for sustainability of the maintenance work at the time of planning

In case of this project, introduction of the performance contract, whereby the maintenance activities are outsourced by the use of the central government's budget, has made the prospect for the sustainability of the maintenance favorable to some extent. If there had not been any plan of the performance contract system, prospects for the sustainability would have been severe. When the basic design study was conducted, however, the conclusion from the situation at the time was that the maintenance would be possible without the performance contract. At the time of basic

design, it is necessary to judge prospects for capability of the maintenance with firm confirmation of sufficient grounds, instead of easily drawing a conclusion. If it seems difficult to have confident prospects for sustainability, more durable pavement method should be adopted if needed. Moreover, consideration should be given to taking measures for minimizing the cost of regular maintenance and prolonging the renewal period, such as the use of paints that do not need frequent repainting. In addition, to establish the sustainability of the maintenance, positive consideration should be given to donor coordination (in sharing roles in providing road improvement support, personnel training support, and financial support).

Attached Table 1: Staff allocation and actual assignment of Engineering Department, Ndola Municipality

| Section / Position | Allocated number (Person) | Actual number (Person) |
|--|---------------------------|------------------------|
| 1. Director | 1 | 1 |
| 2. Assistant Director | 1 | 2 |
| 3. Road and Drainage Section | 6 | 20 |
| Civil Engineer | 1 | 2 |
| Assistant Civil Engineer | 1 | 3 |
| Highways Superintendent | 1 | 1 |
| Highways Senior Engineer | 0 | 2 |
| Assistant Highways Superintendent | 1 | 2 |
| Engineering Assistant | 0 | 2 |
| Foreman | 2 | 4 |
| Draughtsman | 0 | 1 |
| Assistant Foreman | 0 | 4 |
| 4. Design Section | 0 | 5 |
| Civil Engineer | 0 | 1 |
| Assistant Civil Engineer | 0 | 2 |
| Senior Engineer Assistant | 0 | 1 |
| Draughtsman | 0 | 1 |
| 5. Traffic Lights/Street lighting Section | 5 | 12 |
| Electrical Engineer | 0 | 1 |
| Assistant Electrical Engineer | 0 | 1 |
| Superintendent | 1 | 1 |
| Assistant Superintendent | 0 | 1 |
| Senior Engineer Assistant | 0 | 1 |
| Works Supervisor | 0 | 1 |
| Electrician | 2 | 2 |
| Foreman | 0 | 2 |
| Assistant Foreman | 2 | 2 |
| 6. Administration Section | 3 | 4 |
| Senior Administrative Officer | 1 | 1 |
| Administrative Officer | 0 | 1 |
| Clerical Officer | 2 | 2 |
| 7. Architectural Section | 2 | 11 |
| Chief Architect | 0 | 1 |
| Architect | 2 | 3 |
| Assistant Architect | 0 | 2 |
| Foreman | 0 | 1 |
| Assistant Foreman | 0 | 1 |
| Senior Clerk of Works | 0 | 1 |
| Clerk of Works | 0 | 1 |
| Draughtsman | 0 | 1 |
| 8. Quantity Surveying Section | 1 | 6 |
| Senior Quantity Surveyor | 1 | 1 |
| Quantity Surveyor | 0 | 2 |
| Assistant/QS Surveyor | 0 | 1 |
| Senior Q/S Assistant | 0 | 1 |
| Quantity Surveyor Assistant | 0 | 1 |
| 9. Building Construction and Maintenance | 3 | 15 |

| Section / Position | Allocated number (Person) | Actual number (Person) |
|--|------------------------------|---------------------------|
| Building Works Manager | 1 | 1 |
| Senior Clerk of Works | 0 | 1 |
| Building Superintendent | 0 | 1 |
| Assistant Building Superintendent | 1 | 2 |
| Foreman | 0 | 4 |
| Works Supervisor | 0 | 2 |
| Assistant Foreman | 1 | 4 |
| 10. Parks and Garden Section | 2 | 12 |
| Parks Manager | 0 | 1 |
| Parks Superintendent | 1 | 1 |
| Zoo Curator | 0 | 1 |
| Assistant Parks Superintendent | 0 | 1 |
| Foreman | 1 | 2 |
| Zoo Foreman | 0 | 2 |
| Parks Supervisor | 0 | 2 |
| Assistant Parks Foreman | 0 | 2 |
| 11. Mechanical Workshop Section | 6 | 19 |
| Mechanical Engineer | 0 | 1 |
| Assistant Engineer | 0 | 1 |
| Superintendent | 1 | 1 |
| Assistant Superintendent | 0 | 1 |
| Engineering Assistant | 0 | 1 |
| Auto Electrician | 0 | 4 |
| Mechanics | 4 | 8 |
| Foreman | 1 | 1 |
| Assistant Foreman | 0 | 1 |
| 12. Fire Brigade Section | 67 | 94 |
| Chief Fire Officer | 1 | 1 |
| Deputy Chief Fire Officer | 0 | 1 |
| Division Officer | 0 | 2 |
| Assistant Division Officer | 0 | 2 |
| Station Officer | 2 | 6 |
| Sub Officer | 1 | 6 |
| Leading Fire Fighter | 3 | 6 |
| Fire Fighter | 51 | 60 |
| Fire Fighter Driver | 9 | 10 |
| Total | 97 | 196 |

Source: Ndola Municipality

Attached Table 2: Staff allocation and actual assignment of Engineering Department, Kitwe Municipality

| Section / Position | Allocated number (Person) | Actual number (Person) |
|--|---------------------------|------------------------|
| 1. Director | 1 | 1 |
| 2. Assistant Director | 1 | 1 |
| 3. Road Section | 11 | 19 |
| Senior Civil Engineer | 1 | 1 |
| Civil Engineer | 4 | 4 |
| Assistant Civil Engineer | 2 | 2 |
| Highways Superintendent | 2 | 2 |
| Senior Engineer Assistant | 1 | 1 |
| Assistant Highways Superintendent | 1 | 2 |
| Foreman | 0 | 3 |
| Draughtsman | 0 | 2 |
| Assistant Roads Foreman | 0 | 2 |
| 4. Electrical / Street lighting Section | 4 | 6 |
| Electrical Engineer | 0 | 1 |
| Assistant Electrical Engineer | 1 | 1 |
| Electrical Superintendent | 1 | 1 |
| Senior Electrical Engineer Assistant | 1 | 1 |
| Assistant Electrical Supervisor | 0 | 1 |
| Electrician | 1 | 1 |
| 5. Administration Section | 2 | 13 |
| Senior Administrative Officer | 0 | 1 |
| Administrative Officer | 0 | 1 |
| Registry Supervisor | 1 | 1 |
| Clerical Officer | 1 | 10 |
| 6. Quantity Survey / B. Maintenance Section | 2 | 9 |
| Senior Quantity Surveyor | 0 | 1 |
| Quantity Surveyor | 1 | 1 |
| Senior Architect | 0 | 1 |
| Senior Clerk of Works | 1 | 1 |
| Clerk of Works | 0 | 1 |
| Senior Architectural Assistant | 0 | 1 |
| Building Superintendent | 0 | 1 |
| Senior Q/S Assistant | 0 | 1 |
| Architectural Assistant | 0 | 1 |
| 7. Parks Section | 11 | 16 |
| Parks Manager | 0 | 1 |
| Parks Superintendent | 1 | 1 |
| Assistant Parks Superintendent | 1 | 1 |
| Parks Supervisor | 2 | 2 |
| Foreman | 0 | 1 |
| Assistant Parks Foreman | 6 | 9 |
| Clerical Officer | 1 | 1 |
| 8. Mechanical Section | 7 | 9 |
| Mechanical Engineer | 1 | 1 |
| Mechanical Superintendent | 0 | 2 |
| Heavy Duty Mechanic | 1 | 1 |
| Auto Electrician | 5 | 5 |

| Section / Position | Allocated number (Person) | Actual number (Person) |
|--------------------------------|------------------------------|---------------------------|
| 9. Fire Brigade Section | 46 | 46 |
| Chief Fire Officer | 1 | 1 |
| Deputy Chief Fire Officer | 0 | 1 |
| Divisional Officer | 1 | 0 |
| Station Officer | 3 | 3 |
| Sub Officer | 4 | 4 |
| Leading Fire Fighter | 2 | 2 |
| Fire Fighter | 35 | 35 |
| Total | 85 | 120 |

Source: Kitwe Municipality

Attached Table 3: Budget plan and actual expenditure of Engineering Department of Kitwe Municipality

(Unit: Zambian Kwacha)

| | 2009 | | | 2010 | | | 2011 | | |
|------------------------|---------------|---------------|---------|---------------|---------------|--------|---------------|---------------|--------|
| | Budget | Expenditure | Rate | Budget | Expenditure | Rate | Budget | Expenditure | Rate |
| Employee Expenses | 793,257,000 | 774,262,000 | 97.61 | 980,723,500 | 773,598,757 | 78.88 | 979,771,688 | 573,767,885 | 58.56 |
| Premises | 66,000,000 | 0 | 0.00 | 0 | 0 | 0.00 | 0 | 0 | 0.00 |
| Supplies & Services | 1,627,682,000 | 61,746,600 | 3.79 | 1,598,250,000 | 390,152,236 | 24.41 | 1,148,258,000 | 373,761,000 | 32.55 |
| Transport & Plant | 1,217,578,000 | 340,175,160 | 27.94 | 1,406,486,000 | 312,640,250 | 22.23 | 1,067,666,000 | 47,888,135 | 4.49 |
| Establishment | 0 | 90,000 | -900.00 | 5,000,000 | 1,330,000 | 26.60 | 17,000,000 | 44,253,500 | 260.31 |
| Miscellaneous Expenses | 580,000,000 | 0 | 0.00 | 580,000,000 | 498,218,040 | 85.90 | 1,560,000,000 | 75,292,000 | 4.83 |
| Total | 4,284,517,000 | 1,176,273,760 | 27.45 | 4,570,459,500 | 1,975,939,283 | 43.23 | 4,772,695,688 | 1,114,962,520 | 23.36 |
| | | | | | | | | | |
| | 2012 | | | 2013 | | | 2014 | | |
| | Budget | Expenditure | Rate | Budget | Expenditure | Rate | Budget | Expenditure | Rate |
| Employee Expenses | 1,474,504,324 | 424,872,954 | 28.81 | 798,006 | 829,342 | 103.93 | 983,806 | 886,202 | 90.08 |
| Premises | 5,200,000 | 0 | 0.00 | 56,510 | 23,243 | 41.13 | 25,020 | 15,529 | 62.07 |
| Supplies & Services | 2,335,990,000 | 566,841,320 | 24.27 | 4,249,590 | 792,429 | 18.65 | 9,445,880 | 2,130,061 | 22.55 |
| Transport & Plant | 1,599,950,000 | 554,337,758 | 34.65 | 17,000 | 6,725 | 39.56 | 17,000 | 15,010 | 88.29 |
| Establishment | 101,510,164 | 4,575,000 | 4.51 | 48,000 | 1,962 | 4.09 | 15,000 | 0 | 0.00 |
| Miscellaneous Expenses | 3,419,750,000 | 1,751,220,790 | 51.21 | 13,500 | 0 | 0.00 | 13,500 | 6,300 | 46.67 |
| Total | 8,936,904,488 | 3,301,847,822 | 36.95 | 5,182,606 | 1,653,701 | 31.91 | 10,500,206 | 3,053,102 | 29.08 |

Source: Kitwe Municipality

Note: Figures before 2012 is in Old Zambian Kwacha