

United Republic of Tanzania

FY2021 Ex-Post Evaluation Report of Technical Cooperation Project

“The Project for Capacity Development of Efficient Distribution and Transmission Systems”

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0. Summary

This project was implemented to improve the internal human resource development system of Tanzania Electric Supply Company Ltd. (hereinafter referred to as TANESCO) by developing and implementing a training system, introducing quality control activities, establishing a maintenance work model, and standardising technical work procedures. This project, which aimed to contribute to promotion of power supply through human resource development and improvement of maintenance work, was consistent with Tanzania’s development policy and development needs. At the time of planning, this project was also consistent with Japan’s ODA policy. Regarding internal coherence, it was intended to contribute to other JICA grant aid projects at the time of planning, although it is not possible to compare the actual results with the plan’s specific target. As for external coherence, any specific collaboration or coordination with other projects while planning and implementing could not be confirmed. Therefore, relevance and coherence are high. The project purpose and the outputs were mostly achieved by the time the project was completed. In addition, at the time of the ex-post evaluation, the overall goal was achieved although it was not possible to confirm the manifestation of other impacts, such as the number and duration of power outages in Dar es Salaam City. Therefore, effectiveness and impacts are high. Each output was mostly achieved by the time the project was completed. Regarding inputs, the project cost on the Japanese side greatly exceeded the plan, and the project period also exceeded the plan. However, the additional outputs, such as the establishment of a model (Output 4) and the standardisation of work procedures (Output 5)¹, which were not initially anticipated, were achieved. Therefore, efficiency is evaluated to be moderately low rather than low. Although slight issues have been observed in the institutional/organisational aspects for sustaining the project effects, there are good prospects for improvement and resolution. Therefore, project sustainability is high. In light of the above, this project is evaluated to be highly satisfactory.

¹ Both outputs are based on the Project Design Matrix (hereinafter referred to as PDM) Version 4.

1. Project Description



Project location

(Source: Produced by the evaluator)



On-the-job-training (OJT)
of maintaining distribution lines
(Source: Terminal Evaluation Report p23)

1.1 Background

Electricity demand in Tanzania has shown a significant increase along with economic development and population growth. However, TANESCO, which was responsible for supplying electricity to the country, faced various problems in providing a stable supply of electricity. After the Tanzanian government announced plans to privatise TANESCO in the latter half of the 1990s, TANESCO was forced to curb capital investment not only when constructing new power plants, but also when maintaining and repairing existing power facilities. This situation remained until 2006. Many experienced TANESCO engineers quit, new staff recruitment was curtailed, and the scale of training for engineers was reduced. As a result, TANESCO's electric power facilities were not adequately maintained and progressively deteriorated. Under such circumstances, power failures frequently occurred and adversely affected socio-economic activities. In response, in 2005, the Tanzanian government froze TANESCO's privatisation plans. The new TANESCO management team indicated the importance of developing human resources, especially technical human resources, in order to rebuild TANESCO's operations and improve the reliability of its electric power supply.

1.2 Project Outline

Overall Goal	The improved operation and maintenance practices are implemented at distribution and substation facilities of TANESCO.	
Project Purpose	The internal system for human resource development is improved and sustained.	
Outputs	Output 1	The training system for distribution and substation facilities of

		TANESCO Training Schools (TTS) is developed.
	Output 2	The artisans, technicians and engineers working for distribution and substation facilities are trained and certified through the training system at TTS.
	Output 3	Introduce Quality Control (QC) activities to TANESCO and promote its activities continuously.
	Output 4	Models of maintenance practices for distribution and substation facilities to utilise knowledge and skills acquired through the technical trainings and QC activities are established.
	Output 5	Technical working procedures for operation and maintenance of distribution and substation facilities are standardised.
Total cost (Japanese Side)		1,047 million yen
Period of Cooperation		August 2009 - March 2016 (Extension period: August 2014 to March 2016)
Target Area		Tanzania
Implementing Agency		TANESCO
Other Relevant Agencies/ Organisations		None
Consultant/ Organisation in Japan		Kinden Corporation
Related Projects		<p>Yen Loan Project</p> <ul style="list-style-type: none"> - Iringa-Shinyanga Backbone Transmission Investment Project (December 2010) <p>Technical Cooperation Project</p> <ul style="list-style-type: none"> - The Project for Capacity Development of Efficient Distribution and Transmission Systems Phase 2 (2021-2024) <p>Grant Aid Projects</p> <ul style="list-style-type: none"> - The Project for Reinforcement of Transmission and Distribution Facilities in Oyster Bay Substation (May 2008) - The Project for Reinforcement of Power Distribution in Dar es Salaam (July 2014) <p>International Organisations and Other Donors</p> <ul style="list-style-type: none"> - World Bank: Tanzania Energy Development and Access Expansion Project (2008-2017), Corporate Management System Project

	<p>(2021-2024)</p> <ul style="list-style-type: none"> - United States Millennium Challenge Corporation (MCC): Tanzania Compact (2008-2013) - STATNETT (Norway): Technical cooperation (2010-2013) - African Development Bank (AfDB): Joint Initiative for Private Sector Development in Africa (2005-2016) (partly co-financed with the Yen Loan “Iringa-Shinyanga Backbone Transmission Investment Project”)
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1.3 Outline of the Terminal Evaluation

Terminal evaluation was conducted twice for this project. Following the recommendation of the first terminal evaluation, “Terminal Evaluation” (January-February 2014), the project was extended to maximise its effects. At the end of the extension period, the second terminal evaluation, “Terminal Evaluation (Part 2)” (August-September 2015), was conducted and is described below.

1.3.1 Achievement Status of Project Purpose from the Terminal Evaluation

The TTS mid-term plan, the implementation of the TTS annual training plan, the development of the OJT and maintenance manuals, and the 5S activities² were reported to have led to improvements not only in individual capacities but also in organisational capacities. And it was judged that the project purpose was almost achieved.

1.3.2 Achievement Status of Overall Goal at the Terminal Evaluation (Including other impacts)

It was assessed that the overall goal was likely to be achieved because the implementation of standardised maintenance work to distribution and substation facilities for all Region Offices was expected to be completed by 2018. On the other hand, it was pointed out that improving the accumulation and analysis of blackout network data at the Region Office level was necessary in order to properly verify the operation status of power distribution. It was also pointed out that enhancing capacity to grasp the causes of distribution network accidents was required in order to properly conduct future maintenance and repair works on distribution and substation facilities.

1.3.3 Recommendations from the Terminal Evaluation

The following three recommendations were made based on the evaluation analysis developed using the Five Evaluation Criteria³.

² The 5S activities (i.e., Sorting, Setting-in-Order, Shining, Standardising, Sustaining the Discipline) is the name of a management method that is utilised for improving and maintaining working environments and commencing manufacturing and service industries.

³ In 2021, it was changed to the Six Evaluation Criteria due to revisions.

1) Strengthen data management systems for maintenance work of power distribution networks, including secondary substations: Strengthening of data management of number and duration of outages by cause (establishment of data collection system and data collection/accumulation after project completion).

2) Link the monitoring and evaluation (M&E) activities conducted jointly by TTS and concerned divisions to supervising activities for the status of adherence to the maintenance guidelines and manuals at Zone⁴ and Region⁵ Offices: Continuation of on-site training effect monitoring of trainees jointly with TTS and concerned divisions and addition of monitoring the status of adherence to guidelines and manuals at the Zone and Region Offices after approval of guidelines, etc., by TANESCO management.

3) Strengthen the organisational structure to deploy standardised maintenance work for distribution networks: Formulation of maintenance plans for distribution, and of preventive maintenance and maintenance management plans for primary and secondary substations related to transformation, and allocation of necessary personnel to the Preventive Maintenance and Maintenance Management Teams at the Zone Offices.

2. Outline of the Evaluation Study

2.1 External Evaluator

Mayumi Hamada, Foundation for Advanced Studies on International Development

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule:

Duration of the Study: September 2021-November 2022

Duration of the Field Study: February 2021-September 2022 (Implemented through a local research assistant)

2.3 Constraints during the Evaluation Study

Due to the spread of the new coronavirus infection and so on, the planned field survey was cancelled for both the first and second trips and was switched to remote information gathering through a local consultant. The information was collected from the field by a local consultant and the evaluation analysis was conducted by an evaluator in Japan. It took more time than usual to collect the necessary information for the analysis based on the Six Evaluation Criteria due to difficulty obtaining cooperation from the implementing agency regarding the provision of information.

⁴ Geographical segmentation called “zones” in Tanzania. Compared to regions, it does not have administrative authority because it is not an administrative boundary. Tanganyika, or “the mainland,” has the following zones; Central, Coastal, Lake, Northern, Southern Highlands, and Western.

⁵ In TANESCO, Region offices are responsible for site operation (here, “region” does not mean the administrative boundary but a unit of area independently set by TANESCO, which is smaller than the “region” as an administrative boundary). The organisation of TANESCO consists of a vertical relationship (i.e., “headquarters – Zone offices – Region offices”).

3. Results of the Evaluation (Overall Rating: A⁶)

3.1 Relevance/Coherence (Rating: ③⁷)

3.1.1 Relevance (Rating: ③)

3.1.1.1 Consistency with the Development Plan of Tanzania

One of the three goals set in Tanzania's long-term development plan, *Tanzania Development Vision 2025* (1998), is "a strong and competitive economy." This goal includes required infrastructure development in all sectors indicated in the plan. The above development plan was effective from the time of planning to the completion of this project. In addition, the project's direction, which aims to improve the maintenance and management of TANESCO's power distribution and substation facilities, contributes to "growth and income poverty reduction" and "quality of life and social well-being improvement," which were two of the three goal clusters shown in *the National Strategy of Growth and Reduction of Poverty (NSGRP: 1st: 2005/06-2009/10, 2nd: 2010/11-2014/15)*. Based on these policy goals, promoting rural electrification and strengthening the national grid were important issues for the electric power sector. Therefore, from the time of planning to the completion of the project, the development policy's consistency is high.

3.1.1.2 Consistency with the Development Needs of Tanzania

At the time of planning, power demand was significantly increasing in Dar es Salaam City and local cities. The national system peak power demand in actual value was 630 MW in December 2007 and 1,041.63 MW in 2016⁸, showing a significant increase from the time of planning.

For 10 years (beginning in the late 1990s), TANESCO, which is responsible for supplying electricity in Tanzania, did not invest in maintenance, reinforcement, or renewal of existing facilities and did not invest in new facilities after the government announced its policy to divide and privatise TANESCO. Experienced and talented personnel left TANESCO, staff training was not conducted, and new recruitment was not implemented. Consequently, the facilities became decrepit, equipment at each substation was chronically overloaded to meet the increasing demand, and power outages frequently occurred because the distribution facilities were insufficiently maintained.⁹ In addition, TANESCO's human resource development needs were maintained even at the time of project completion¹⁰. Therefore, this project is consistent with Tanzania's development needs.

⁶ A: Highly Satisfactory, B: Satisfactory, C: Partially Satisfactory, D: Unsatisfactory

⁷ ④: Very High, ③: High, ②: Moderately Low, ①: Low

⁸ Questionnaire for TANESCO.

⁹ The Ex-ante Project Evaluation Paper (p. 1-2).

¹⁰ Questionnaire for TANESCO.

3.1.1.3 Appropriateness of the Project Plan and Approach

The initial plan of the project was to develop an internal training system for TANESCO. At the time of the Mid-term Review, it was determined that it was necessary to improve the worksite after the training in order to apply the knowledge and skills acquired and improve operation and maintenance although the training had already been developed to a certain extent. For this reason, the need for an improved model for operation and maintenance of distribution and substation facilities (Output 4) and for standardised guidelines and manuals based on the model (Output 5) was recognised and added to the plan.¹¹ This modification to the plan was considered necessary and appropriate in order to ensure the quality of the overall goal (i.e., implementing improved operations and maintenance) and, in turn, enhance sustainability. In addition, during the selection and fostering of participants and trainers at TTS, sufficient consideration was given to ensure that no one was disadvantaged due to gender, religion, place of birth, etc.¹² Therefore, this project's plan and approach are appropriate.

3.1.2 Coherence (Rating: ②)

3.1.2.1 Consistency with Japan's ODA Policy

Japan designated Tanzania as a priority support country in *the DAC New Development Strategy* (1996) with the overall goal of assisting the “formation and promotion of a virtuous cycle of stable economic growth and poverty alleviation.” In addition, infrastructure development was one of the two priority areas of *the Country Assistance Program for the United Republic of Tanzania* (2008), indicating that establishing a transportation system, a water supply system, and a stable electricity supply was necessary. It advocated support for the development of power transmission and distribution networks with stronger maintenance and management in the capital and regional cities.¹³ Therefore, this project was consistent with Japan's ODA policy at the time of planning.

3.1.2.2 Internal Coherence

At the time of planning, this project intended to develop the transmission and distribution network with grant aid in the future, such as the “The Project for Reinforcement of Transmission and Distribution Facilities in Oyster Bay Substation” and the yen loan “Iringa-Shinyanga Backbone Transmission Investment Project,” and to strengthen TANESCO's maintenance and management capacity.¹⁴ At the implementation stage, “the Project for Reinforcement of Power Distribution in Dar es Salaam” (grant aid project) was implemented. In all of the above cases, improving maintenance and management capabilities through this project was intended to improve the maintenance and management of the developed power-

¹¹ The Mid-term Review Report (p. 20-24), Interviews with Japanese experts and JICA staff of that time.

¹² Questionnaire for TANESCO.

¹³ The Ex-ante Project Evaluation Paper (p. 1-2).

¹⁴ The Ex-ante Project Evaluation Paper (p. 3); document provided by JICA.

related facilities, thereby enhancing sustainability. However, the degree of specific effects expected from the collaboration or indicators were not set in advance. According to TANESCO, the maintenance methods improved by this project are being applied nationwide, including in Dar es Salaam. Thus, it can be inferred that this project contributed to improving the sustainability of the facilities developed by these financial cooperation projects. However, it is difficult to confirm specific results in comparison with the plan.

3.1.2.3 External Coherence

From the planning stage to the implementation stage of this project, the World Bank's "Tanzania Energy Development and Access Expansion Project" (2008-2017) was implemented to improve the volume and efficiency of electricity supply, increase access to energy, and develop renewable energy in Dar es Salaam, Arusha, and Kilimanjaro¹⁵. In addition, from 2008 to 2013, the United States Millennium Challenge Corporation (MCC) implemented the "Tanzania Compact," which consists of components in the power, transportation, and water sectors. In the power sector of this project, the objective was to improve and expand electric power services by improving transmission capacity and access to electricity.¹⁶ Although these projects were implemented in the power sector at the same time, specific plans or adjustments were not made regarding the effects of collaboration with this project during the planning and implementation stages.

<Summary of Relevance and Coherence>

This project is highly consistent with the development plan and development needs of Tanzania, and the project plan and approach are appropriate. In addition, there were some JICA projects, with which linkage and coordination with this project were intended at the time of planning and implementation. However, it was difficult to confirm the specific results of collaborations compared with the plan because specific effects expected by the linkage were not sufficiently clarified at planning stage. Regarding cooperation with the organisations apart from JICA, there were some projects, which had the same direction of cooperation with JICA. However, the specific collaboration/coordination were not made. Therefore, the project's relevance and coherence are high.

3.2 Effectiveness and Impacts¹⁷ (Rating: ③)

3.2.1 Effectiveness

Table 1 presents the major PDM revisions made in this project.

¹⁵ <https://projects.worldbank.org/en/projects-operations/project-detail/P101645>

¹⁶ <https://www.mcc.gov/resources/doc/closed-compact-report-tanzania>

¹⁷ When providing the sub-rating, Effectiveness and Impacts are to be considered together.

Table 1 PDM Revisions

PDM	Year	Major points of revision
PDM1	2008	
PDM2	2011	<ul style="list-style-type: none"> - The project purpose of PDM 1 was set as the overall goal (improvement of logic). - Added Output 4 (integration of training results into practice).
PDM3	2012	<ul style="list-style-type: none"> - Overall goal was revised from “The capacity for planning, operation, and maintenance of power systems is strengthened” to “Reliability of power system of TANESCO is improved (improvement of logic) .” - Indicators were corrected.
PDM4	2014	<ul style="list-style-type: none"> - Overall goal was changed from “Reliability of power system of TANESCO is improved” to “The improved operation and maintenance practices are implemented at distribution and substation facilities of TANESCO.” (improvement of logic) - Clarified Output 4’s expression (establishment of a model for maintenance and management of distribution and substation facilities) - Added Output 5 (standardisation of technical procedures for operation and maintenance of distribution and substation facilities)

Source: Produced by the evaluator based on the Ex-ante Evaluation Sheet, the Mid-term Review Report, the Terminal Evaluation Report, and the Terminal Evaluation (Part 2) Report.

Overall, the logic, clarity, and content have improved over the previous version and the changes are mostly appropriate. Therefore, in this ex-post evaluation study, the evaluation was conducted based on PDM4.

3.2.1.1 Achievement of Project Purpose

Table 2 shows the Project Purpose’s indicators and achievement status at the time of project completion. Of the four indicators, improvement was observed in the formulation of a medium-term plan, implementation of a TTS training plan as part of the TANESCO Corporate Business plan, monitoring of QC activities by the M&E team, sharing of the best practices, etc. However, OJT based on the developed guidelines and manuals was not achieved by the time the project was completed. Therefore, it is assessed that the Project Purpose was mostly achieved. In addition, while selecting and fostering participants and lecturers at TTS, sufficient consideration was given to ensure that no participant would be disadvantaged due to gender, religion, place of birth, etc.¹⁸ There were no problems. Although there was no statement in the formulated medium-term plan that stipulated that these considerations should be taken into account, trainees and trainers were selected according to TANESCO’s training needs, regardless of gender, religion, place of birth, etc.¹⁹

¹⁸ Questionnaire for TANESCO

¹⁹ Questionnaire for TANESCO

Table 2 Achievement of the Project Purpose (By Project Completion)

Project Purpose	Indicator	Actual Value (at the time of project completion)	Level of Achievement
Internal system for human resource development is improved and maintained.	<p>a. The mid-term plan for TTS is prepared and approved by the TANESCO management by the 1st quarter of 2013.</p> <p>b. Training Plan for TTS is integrated into the TANESCO Corporate Business Plan by the end of the Project.</p> <p>c. OJTs based on the model maintenance practices and the working guidelines and manuals for distribution and substation facilities are introduced in TANESCO.</p> <p>d. The monitoring and evaluation system confirms the QC activities at the workplace by the end of the project.</p>	<p>a. The TTS mid-term plan (2014-2018) was developed but did not reach approval by management.</p> <p>b. The TTS Annual Training Plan was implemented as a part of the TANESCO Corporate Business Plan. Since 2014, TTS has implemented the training developed by TANESCO and the training developed by this project.</p> <p>c. It was expected that OJT based on the procedure manual prepared in this project would be implemented through the implementation of the maintenance management guidelines and manuals prepared in this project at all offices.</p> <p>d. The M&E team led by the 5S facilitator monitored by visiting Region Offices. Good practices at the Region Office level were shared at the headquarters personnel forum.</p>	③

Source: Terminal Evaluation (Part 2) Report (p. 21-22), questionnaire for TANESCO

Note: Degree of achievement ④ Achieved more than planned, ③ Mostly achieved, ② Partially achieved, ① Not achieved

All of the Outputs' achievements were high. Table 3 shows the achievement status at the time of project completion. At the beginning of the project, only outputs related to the establishment and implementation of an internal training system and the promotion of QC activities were included. However, based on the recommendation in the Mid-term Review, Output 4 and 5 were added. The logic from the Outputs to Project Purpose was first at the output level, a training system was established (Output 1). The established system strengthened the technical capacity of artisan, technicians, and engineers (Output 2), while the QC activities were simultaneously promoted (Output 3). A maintenance work model was established to utilise the knowledge and skills acquired through technical training and QC activities (Output 4). In order to systematically implement the model in actual work, the model was standardised and the contents of the developed guidelines and manuals were reflected into the technical training (Output 5). Through these Outputs' achievements, a practical internal human resource development system related to the maintenance and management of TANESCO (Project Purpose), was established. As an external condition, although some of the trained 5S facilitators retired or resigned, new facilitators were trained for replacement, and there was no negative impact on the achievement of the project purpose.

Table 3 Achievement of Outputs (By Project Completion)

	Output	Achievement	Level of Achievement
1	The training system for distribution and substation facilities at TANESCO Training Schools (TTS) is developed.	By the time the project was completed, the following had been implemented and each indicator had been achieved. Formulation of annual plans and training curriculum, development of teaching materials, assignment of necessary personnel to TTS, establishment of certification systems, procurement of facilities and equipment, design of specialised training courses, etc.	③
2	The artisans, technicians and engineers working for distribution and substation facilities are trained and certified through the training system at TTS. The target number is as follows. - Artisans: 294 distribution workers, 49 substation workers - Engineers: Distribution 157, Substation 49 workers - Specialised training participants: 453	The number of participants by the time of completion is as follows. All of the target values for the indicators were achieved (the number of trainees is the same as the number of certified trainees): - Artisans: 741 persons - Technicians: 323 in distribution department, 99 in substation department - Engineers: 168 in distribution department, 51 in substation department • Specialised training - Technicians and engineers: 35 courses, 588 persons - Managers: 2 courses, 45 persons • Practical training at TTS Masaki (before OJT) - Power distribution: 3 courses, 82 persons - Substation: 1 course, 21 persons	③
3	Quality Control (QC) activities are introduced to TANESCO and its activities are promoted continuously.	By the time of completion, the following were implemented and the indicators were achieved: Development of 5S training curriculum, preparation of teaching materials, training of facilitators (20 persons), approval of strategic plan, implementation of 5S training (24 offices in all of Tanzania, 3 power plants, 1 head office), incorporation into general training, and establishment of M & E system and its implementation.	③
4	Models of maintenance practices for distribution and substation facilities to utilise knowledge and skills acquired through the technical trainings and QC activities are established.	By the time of completion, the following had been implemented and the indicators were mostly achieved: Procedure manuals for model maintenance work of the middle-tension (MT) feeder lines and for preventive maintenance work of substations were developed. Based on the procedure manual, OJT for distribution facilities was implemented in a pilot distribution facility at Kinondoni North and then expanded to four districts in Dar es Salaam. Substation OJT was implemented at three substations and expanded to all 25 secondary substations in Dar es Salaam. In order to verify these effects, monitoring was conducted on the number and duration of power outages at four offices in Dar es Salaam and on the number of accidents at the secondary substation in Dar es Salaam.	③
5	Technical working procedures for operation and maintenance of distribution and substation facilities are standardized.	By the time of completion, the following had been implemented and the indicators were mostly achieved: Based on the OJT, a maintenance manual and a distribution construction manual were developed for the distribution department and a substation maintenance guideline was developed for the substation department. The contents of the manuals and guidelines were incorporated into the TTS technical training. By March 2016, a system for checking and supervising the implementation structure of guidelines and manuals had been established.	③

Source: Terminal Evaluation (Part 2) Report (p. 14-21); Questionnaire for TANESCO

Note: Degree of achievement ④ Achieved more than planned, ③ Mostly achieved, ② Partially achieved, ① Not achieved

In light of the above, the project mostly achieved its purpose. Each Output was mostly achieved and contributed to achieving the project purpose; and no external conditions affected the achievement of the project purpose.

3.2.2 Impacts

3.2.2.1 Achievement of Overall Goal

Table 4 shows the achievement of the overall goal at the time of the ex-post evaluation. Indicator d (improvement in the number and duration of power outages) is the situation expected to be achieved as a result of the achievement of the overall goal; therefore, it is analysed in “3.2.2.2 Other positive and negative impacts.” As shown in Table 4, all of the indicators from a to c were achieved. Therefore, the project achieved its overall goal.

Table 4 Achievement of Overall Goal (At the time of the Ex-post Evaluation)

Overall goal	Indicator	Achievement	Level of Achievement
The improved operation and maintenance practices are implemented at distribution and substation facilities of TANESCO.	<p>a. The standardised practices of maintenance of the distribution facilities introduced by the Project are implemented in Dar es Salaam Regions by 2018.</p> <p>b. The standardised practices of maintenance for substation facilities introduced by the Project are implemented at all the substations in Dar es Salaam Regions by 2018.</p> <p>c. Standardized working guidelines and manuals for improved operation and maintenance of the distribution and substation facilities are practised throughout TANESCO by 2018.</p> <p>d. The performance of the distribution network in the Dar es Salaam Regions* is improved:</p> <ul style="list-style-type: none"> - Number of outages by causes - Duration of outage by causes <p>*Baseline data (2013-2014) should be collected.</p>	<p>a. By 2018, standardised maintenance practices of distribution facilities had been implemented at Region Offices in Dar es Salaam and continuously implemented at the time of the ex-post evaluation.</p> <p>b. By 2018, standardised maintenance practices for substation facilities had been implemented at all substations in Dar es Salaam and continuously implemented at the time of the ex-post evaluation.</p> <p>c. By 2018, standardised working guidelines and manuals for improved operation and maintenance of the distribution and substation facilities had been practised at all TANESCO offices and continuously implemented at the time of the ex-post evaluation.</p> <p>(d. is analysed with other impacts)</p>	③

Source: Questionnaire for TANESCO

Note: Degree of achievement ④ Achieved more than planned, ③ Mostly achieved, ② Partially achieved, ① Not achieved

The biggest contributing factor for the achievement of the overall goal is the fact that the establishment of a maintenance model (Output 4) and the standardisation of work procedures (Output 5), which were added after the Mid-term Review, had been achieved by project completion. Table 5 shows the continued achievements of the Outputs and the project purpose after the project's completion. The training has continued mainly in rural areas. OJT is conducted at the time of the construction of new facilities. The content includes feeder lines of 1 to 3 kilometres, which were not covered by this project and which shows further improvement. However, the number of trainees at the time of the ex-post evaluation could not be provided from TANESCO (Output 2)²⁰. The scale of QC activities (Output 3) has been reduced. On the other hand, the training system established in this project (Output 1), the maintenance model for distribution and substation facilities (Output 4), and the standardised technical working procedures for operation and maintenance of distribution and substation facilities (Output 5) were maintained even at the time of the ex-post evaluation. This led to the achievement of the overall goal. Table 6 shows the project purpose's status of continuation after project completion. Although OJT has been implemented based on the guidelines and manuals at the time of the ex-post evaluation, the project purpose has partially continued. However, it cannot be said that it contributed greatly to the achievement of the overall goal.

Table 5 Continuation of Outputs (After Project Completion)

	Outcome	achievement	Level of Achievement
1	The training system for distribution and substation facilities at TANESCO Training Schools (TTS) is developed.	Even at the time of the ex-post evaluation, the curriculum and teaching materials developed were used, and the certification system was maintained. TTS has 30 staff members. In recent years, most of the specialised training has been conducted outside Dar es Salaam, where many construction activities are being carried out, including training on the construction of 1 to 3 km distribution lines.	③
2	The artisans, technicians, and engineers working for distribution and substation facilities are trained and certified through the training system at TTS. (The target number is as follows. - Artisans: 294 distribution workers, 49 substation workers - Engineers: Distribution 157, Substation 49 workers Specialised training participants: 453	After the project was completed, and at the time of the ex-post evaluation, the training programmes were implemented with the same curriculum. The OJT and specialised training are being implemented in rural areas (on feeder lines of 1 to 3 km and so on at the time of construction of new facilities). Neither the actual number of trainees nor the number of training courses could be confirmed because the data could not be obtained. The M&E regarding the application of technology to the trainees' work sites had still been conducted four times a year at the time of the ex-post evaluation.	②

²⁰ The following information was provided by TANESCO in the latter half of November 2022. "For substations maintenance the project covered Dar Es Salaam effectively, though most participants who were trained are currently either retired or left the company but the knowledge shared to few successors is still being shared to others. TANESCO is doing all possible means by utilizing few maintenance staff trained for the program to disseminate the knowledge to other zonal maintenance workshops teams." However, the detailed information and the supporting data could not be confirmed.

3	Quality Control (QC) activities are introduced to TANESCO and its activities are promoted continuously.	After the project was completed, 5S training and M&E training were conducted once. The teaching materials developed during the implementation were still utilised at the time of the ex-post evaluation, when there were 21 5S facilitators engaged in the 5S workshops. 5S activities have been implemented even after the completion of the project, and M&E reports are submitted every year by 10 to 20 Region Offices and power plants nationwide (the number of all Region Offices at the time of the ex-post evaluation was 29). However, only about 50% of the necessary amount is secured for the budget to monitor the visiting style, which is not sufficient.	③
4	Models of maintenance practices for distribution and substation facilities to utilise knowledge and skills acquired through the technical trainings and QC activities are established.	The models of maintenance practices established during the implementation have been maintained even after the project completion. A check and supervision system for manuals and guidelines was established in 2016.	③
5	Technical working procedures for operation and maintenance of distribution and substation facilities are standardised.	At the time of the ex-post evaluation, the manuals and guidelines that were developed have been incorporated into TTS training and applied at the work sites nationwide.	③

Source: Questionnaire and Interviews to TANESCO

Note: Degree of achievement ④ Achieved more than planned, ③ Mostly achieved, ② Partially achieved, ① Not achieved

Table 6 Continuation of Project Purpose (After Project Completion)

Project Purpose	Indicator	Achievement	Level of Achievement
Internal system for human resource development is improved and maintained.	<p>a. The mid-term plan for TTS is prepared and approved by the TANESCO management by the 1st quarter of 2013.</p> <p>b. Training Plan for TTS is integrated into the TANESCO Corporate Business Plan by the end of the Project.</p> <p>c. OJTs based on the model maintenance practices and the working guidelines and manuals for distribution and substation facilities are introduced in TANESCO.</p> <p>d. The monitoring and evaluation system confirms the QC activities at the workplace by the end of the Project.</p>	<p>a. The TTS Training Plan for 2019-2021 was formulated based on the training needs assessment conducted in all TANESCO departments and offices.</p> <p>b. The TTS training plan is not reflected in the TANESCO business plan, but all TTS training is in line with the TANESCO corporate business plan.</p> <p>c. OJT based on the model maintenance practices and the working guidelines and manuals for distribution and substation facilities are implemented at the time of the ex-post evaluation.</p> <p>d. At the time of the ex-post evaluation, some commented that the office environment was improved by continuing QC activities on a regular basis.</p>	②

Source: Questionnaire and Interviews to TANESCO, TANESCO Strategic Plan 2021/22-2025/26

Note: Degree of achievement ④ Achieved more than planned, ③ Mostly achieved, ② Partially achieved, ① Not achieved

3.2.2.2 Other Positive and Negative Effects

1) Impacts on the Natural Environment

At the planning stage, this project was classified as Category C based on JICA Guidelines for Environmental and Social Considerations²¹. This was because the objective of this project was to improve

²¹ JICA Evaluation Division. There was no record in the Ex-ante Evaluation Paper.

the capacity to maintain and manage facilities related to power supply and to develop human resources. Thus, it was believed that there would be almost no undesirable impact on the environment or society. No impact on the natural environment was anticipated, and no such impact has actually occurred²².

2) Resettlement and Land Acquisition

There was no resettlement or land acquisition for this project.

3) Gender Equality

No positive or negative impacts on gender was observed.

4) Marginalised People

No positive or negative impacts on marginalised people was observed. At the time of planning, it was assumed that this project, which could have an impact on the stable supply of electricity to Dar es Salaam and regional cities, would also have an indirect ripple effect on the poor. However, since this survey framework does not envisage large-scale surveys targeting the poor, however, verification on this point was not carried out.

5) Social Systems and Norms, Human Well-being and Human Rights

No positive or negative impacts on social systems/norms, or people's well-being were observed.

6) Unintended Positive/Negative Impacts

a) Change of outages (number and duration) in the four areas in Dar es Salaam

TANESCO has four Region Offices covering Dar es Salaam: Ilala, Kinondoni North, Kinondoni South and Temeke. Tables 7 to 10 show changes in the number and duration of accidental outages per year for each office. The number of annual accidental power outages shows a decreasing trend except for Kinondoni South. On the other hand, the annual accidental outage duration decreased in Ilala and Kinondoni South but increased in Kinondoni North and Temeke. Thus, common tendency on the change in duration of accidental outages was not observed.

Table 7 Ilala Region Office

	2013/14	2018/19	2020/21
MT feeder lines (number)	42	42	78
Number of accidental outages (times)	381	239	209
Annual number of accidental outages per MT feeder line (cases/year)	9.0	5.6	2.6
Duration of accidental outages (hours)	5,554	598	523
Accidental outage hours per year per MT feeder line (hours)	132.2	14.2	6.7

Source: Produced by the evaluator based on the TANESCO Ilala Region Office questionnaire

²² Questionnaire for TANESCO

Table 8 Kinondoni North Region Office

	2013/14	2018/19	2020/21
MT feeder lines (number)	42	46	48
Number of accidental outages (times)	259	140	147
Annual number of accidental outages per MT feeder line (cases/year)	6.2	3.0	3.1
Duration of accidental outages (hours)	708	1,040	1,316
Accidental outage hours per year per MT feeder line (hours)	16.8	22.6	27.4

Source: Created by the evaluator based on the TANESCO Kinondoni North Region Office questionnaire

Note: Power outage hours for the Kinondoni North Region Office include planned power outage hours, so a simple comparison with other offices is not possible.

Table 9 Kinondoni South Region Office

	2013/14	2018/19	2020/21
MT feeder lines (number)	2	30	30
Number of accidental outages (times)	N/A	514	648
Annual number of accidental outages per MT feeder line (cases/year)	N/A	17.1	21.6
Duration of accidental outages (hours)	N/A	1,052	804
Accidental outage hours per year per MT feeder line (hours)	N/A	35	26.8

Source: Produced by the evaluator based on the TANESCO Kinondoni South Region Office questionnaire

Note: Data for FY2013 are not available.

Table 10 Temeke Region Office

	2013/14	2018/19	2020/21
MT feeder lines (number)	N/A	N/A	N/A
Number of accidental outages (times)	73	0	57
Annual number of accidental outages per MT feeder line (cases/year)	N/A	N/A	N/A
Duration of accidental outage (hours)	119	20	172
Accidental outage hours per year per MT feeder line (hours)	N/A	N/A	N/A

Source: Produced by the evaluator based on the TANESCO Temeke Region Office questionnaire

(Reference) Table 11 Whole City of Dar es Salaam

	2012	2014	2020/21
Number of accidental outages per year per MT feeder line (times)	14.9	9.4	N/A
Duration of accidental outages per year per MT feeder line (hours)	22.3	5.3	N/A

Source: Terminal Evaluation (Part 2) Report p29, Questionnaire for TANESCO Headquarters/East Zone

The implementing agency commented that in areas where the frequency of power outages decreased, losses in power sales decreased and contributed to increased earnings²³. However, it was not possible to clarify which regions specifically contributed to the increase in revenue and to what extent, since the decline was disproportionate even in the same area.

²³Questionnaire for TANESCO

b) Change of number of outages caused by accidents at secondary substations in Dar es Salaam

Table 12 shows the number of outages due to accidents at secondary substations in Dar es Salaam after project completion. It decreased in Kinondoni North and Kinondoni South, but sufficient data for comparison could not be obtained for other areas. In addition, only Kinondoni North has a large number of cases, but the reason for this could not be clarified.

Table 12 Number of Outages due to Accidents at Secondary Substations in Dar es Salaam

(Unit: cases/year)

	2018/19	2020/21
Ilala	1	N/A
Kinondoni North	65	43
Kinondoni South	1	0
Temeke	N/A	N/A

Source: Questionnaires for TANESCO Ilala, Kinondoni North, Kinondoni South, Temeke Region Office

There were some comments that the preventive maintenance²⁴ promoted by this project led to a decrease in damage to equipment at substations, and trouble caused by such damage decreased due to decreased overload at secondary substations²⁵. However, it depends on each area, according to the above figures.

c) Changes in number of complaints in Dar es Salaam

Regarding the number of complaints from customers (Table 13), no common trend could be found, as the number of complaints decreased in Ilala compared to FY2018, while it increased in Kinondoni North and Kinondoni South. Data for Temeke were not available.

Table 13 Power Outage Complaints

(Unit: cases)

	2018/19	2020/21
Ilala	5,675	2,346
Kinondoni North	28,321	30,234
Kinondoni South	48,543	52,812
Temeke	N/A	N/A

Source: TANESCO Ilala Region Office, Kinondoni North Regional Office, Kinondoni South Office

²⁴ There are two types of maintenance (preservation) for electric power equipment: reactive maintenance, in which repairs are made whenever a failure or accident occurs, and preventive maintenance, which is performed systematically before a failure or accident occurs. The concept of preventive maintenance was introduced by this project. Prior to that, TANESCO's power facility maintenance was limited to reactive maintenance. In reactive maintenance, it is not possible to foresee failures and accidents in advance. Thus, it takes longer than preventive maintenance to identify the causes and consider countermeasures, which require a longer time for restoration. Preventive maintenance makes it possible to identify problems in advance by systematic patrol inspections and periodic inspections, leading to a reduction in sudden failures and accidents and the extension of equipment life (Terminal Evaluation (Part 2) Report p31).

²⁵ Questionnaire for TANESCO

d) Changes in Resident Perceptions on Outages (Dar es Salaam)

Table 14 and 15 show the results of interviews conducted with 20 residents of Dar es Salaam who had lived there since before the project (five people from each area, or 20 people). The respondents' perceptions were that while there was no noticeable change in the frequency of power outages, the duration of power outages was either "very short" or "short," which is increasing, although it is not possible to say with certainty that the trend of the city as a whole can be shown due to the small sample size.

Table 14 Frequency of Outages

(Unit: persons)

	2008	2016	2022
Very rare	2	4	4
Rare	2	9	4
Neither rare nor often	4	6	5
Often	9	1	6
Very often	3	0	1
Do not know	0	0	0
Total	20	20	20

Source: Residents interview in Dar es Salaam City

Table 15 Duration of Outages

(Unit: persons)

	2008	2016	2022
Very short	0	5	6
Short	3	10	4
Neither short nor long	4	5	4
Long	9	0	4
Very long	3	0	2
Do not know	1	0	0
Total	20	20	20

Source: Residents interview in Dar es Salaam City

e) Development of a Team Approach and Improvements in network (system) management and maintenance work through coordination and collaboration among related departments

At the time of the Terminal Evaluation (Part 2), the followings were pointed out as impacts of this project: enhanced understanding on the importance of the team approach through the OJT, coordination made for the OJT between the distribution department and the transmission and substation department, and monthly joint meetings between the Distribution and Customer Service Department and Distribution and Transmission Department at headquarters. At the time of the ex-post evaluation, the status of interdepartmental coordination and collaboration could not be confirmed, in spite of efforts to obtain supporting information.

f) Other

No negative impact was confirmed. Strengthening the data management for the number and duration of outages by cause (establishment of the data collection system and data collection and accumulation after project completion) was recommended as strengthening the data management system of the distribution network including secondary substations. At the time of the ex-post evaluation, data on outages was provided by Region Office level in Dar es Salaam, but not from the Zone or headquarters level, where data sharing was expected. During project implementation, information management was indicated as an issue, but even at the time of the ex-post evaluation, concerns remained about whether different levels are sharing various types of data.

<Summary of Effectiveness and impacts>

This project has achieved the project purpose of improving TANESCO's internal human resource development system. As for the overall goal, the improved operation and maintenance practices of distribution and substation facilities have been confirmed, and the effects have been realised as planned. Therefore, the effectiveness and impacts of the project are high.

3.3 Efficiency (Rating: ②)

3.3.1 Inputs

Table 16 shows the planned and actual inputs for the implementation at the project completion.

Table 16 The Project's Inputs (By Project Completion)

Input element	Plan	Actual Status
(1) Experts	<ul style="list-style-type: none"> • Long-term: No number listed (chief advisor/power training, business coordination/strengthening training functions) • Short-term: No mention of the number of persons (power transmission and distribution technology/training plan, power distribution plan, system analysis, power supply command, substation equipment, work efficiency improvement [TQM]) 	<ul style="list-style-type: none"> • Dispatch of experts: 15 persons in 11 fields (about 248M/M) • Long-term: 2 persons in 2 fields (139M/M) • Short-term: 13 persons in 9 fields (about 109M/M)
(2) Trainees received	<ul style="list-style-type: none"> • Counterpart training: No mention of the number of trainees (Some counterparts may participate in Group Training Program.) • Third country training (if necessary) 	<ul style="list-style-type: none"> • Training in Japan: 16 people (4 courses) • Third country training: 23 people (3 courses)
(3) Equipment	<ul style="list-style-type: none"> • Training equipment (measuring instruments for maintenance and inspection, equipment for lectures and exercises, system analysis software, etc. Prices not stated) 	<ul style="list-style-type: none"> • Foreign currency portion: 43 million yen, \$235,000 • Local currency portion: 195.891 million Tanzanian shillings
(4) Expenses for strengthening overseas business	No amount stated	85 million yen
Japanese Side Total Project Cost	No amount stated	1,047 million yen

Tanzanian Side Total Project Cost	1. Counterpart arrangement: • JCC: No number listed • Working Group (WG): No mention of number • Task Force (TF): No mention of number	1. Counterpart placement: 81 persons • JCC: 10 persons • WG: 5 persons • TTS staff: 28 persons • TF: 23 persons • 5S facilitators: 13 persons
	2. Provision of land and facilities: Project office and equipment	2. Provision of land and facilities: Project offices and training schools (TTS City Centre and TTS Masaki) Project office and equipment
	3. Local cost burden: No amount stated	3. Local cost burden: 13,256 million Tanzanian shillings (TTS City Centre and TTS Masaki repair work costs, administrative costs related to training, etc.)
		4. Equipment: tools and consumables for maintenance training at the training school (TTS Masaki)

* MM stands for man month.

3.3.1.1 Elements of Inputs

TANESCO mentioned in its reply to the question on the quality, quantity, and timing of the major inputs from Japan, such as the dispatch of experts, equipment, training in Japan, and local costs, on a 5-point scale (five being high, one being low) that it was mostly five. The inputs from the Japanese side were highly evaluated, and no problems were observed. Inputs from the Tanzanian side were mostly carried out as planned, and training facilities were also repaired. No particular problems were observed.

3.3.1.2 Project Cost

The actual cost from Japan was 1,047 million yen, significantly exceeding the planned amount of 501 million yen (209% of the planned amount). However, the main reasons for the overrun of the budget were the addition of Output 4 and Output 5 (establishment of a maintenance management model through introduction and implementation of OJTs and its reflection on training, as well as development of guidelines and manuals for implementation of the model), in response to the result of the Mid-term Review. As a result, the training not only improved maintenance knowledge and skills, but also led to the application of knowledge and skills into the work sites. Although the project cost significantly exceeded the plan, it is assessed moderately low instead of low, in light of the fact that additional outputs that were not originally planned were produced as described above.

3.3.1.3 Project Period

The initial project period was from October 2008 to September 2013 (60 months), while the actual

period was from August 2009 to March 2016 (80 months) (133% of the plan), exceeding the plan. The main reason for this is the addition of Outputs 4 and 5, which is the same as the project cost overrun. In the same manner as the project cost, it is assessed as moderately low rather than low, since these outputs have been produced.

<Summary of Efficiency>

As mentioned above, each output was mostly achieved by the time of project completion. In terms of inputs, the project cost on the Japanese side significantly exceeded the plan, and the project period also exceeded the plan. However, the reason for this is the addition of outputs 4 and 5. Considering these two additional outputs have been produced, it is assessed moderately low rather than low. There were no problems with the quality, quantity or timing of inputs. Therefore, the efficiency of the project is moderately low.

3.4 Sustainability (Rating: ③)

3.4.1 Policy and System

Regarding the policy and system necessary for future continuation in implementing TANESCO's internal human resource development system and operation and maintenance practice at distribution and substation facilities, which were improved by this project, *Tanzania Development Vision 2025*, which was mentioned in the section on Relevance, is valid. In addition, *the National Five-Year Development Plan (FYDP III)'' (2021/22-2025/26)* advocates in its plan for energy sector the enhancement of accessibility and reliability of electricity by expanding power generation capacity as well as the transmission and distribution network. Therefore, sustainability in terms of policy and system is high.

3.4.2 Institutional/Organisational Aspect

As Tanzania's central public power corporation, TANESCO is responsible for power generation, transmission and distribution, supplying power to all areas except Zanzibar Island. This role did not change from the time of planning to the time of ex-post evaluation. In addition, TTS is still responsible for staff training, as it was during project implementation.

Regarding the maintenance and management of MT feeder lines, at the four Region Offices in Dar es Salaam, which was the pilot area of this project, one or more teams were organised for maintenance work consisting of five to six technical staff at each office. These teams carried out the maintenance work introduced by this project. This system is still maintained at the time of the ex-post evaluation. In addition, after the completion of the project, measures were taken to improve the system, including the securing of personnel and equipment at Region Offices nationwide, which were pointed out as necessary during the

terminal evaluation (Part 2) study²⁶.

In this project, in addition to TTS, which conducts training, activities were conducted involving many sections. These included horizontal relationships such as the Department of Distribution and Customer Service and the Department of Substation Transmission (for establishment of model for maintaining transmission and distribution facilities as well as standardisation of work procedures), Human Resource Department of the Headquarters (for implementation of 5S Kaizen Training and its M&E). In addition, the project also involved many sections with vertical relationships such as Region Offices (for implementation of OJTs and actual maintenance work), Zone Offices (for supervision of Region Offices), and the headquarters. Moreover, during implementation, regular meetings among departments were held with an awareness of this horizontal connection. At the time of the ex-post evaluation, it was not possible to confirm the continuation of these activities.

The terminal evaluation study (Part 2) recommended strengthening of the data management system for the maintenance work of the distribution network including secondary substations. Given that information was not smoothly provided at the time of the ex-post evaluation, concerns remain about the data management system within the organisation. However, in the Phase 2 project currently underway, this point may be improved in the future²⁷.

3.4.3 Technical Aspect

This project established a model and standardised its procedures of the operation and maintenance works of distribution and substation facilities. In order for this improved operation and maintenance works to be technically maintained in the future, it will be important to maintain the technical capacity of artisans, technicians, and engineers, who were fostered by the project, to continue OJTs, and to maintain the quality of training into the future.

At the time of the ex-post evaluation, the technical staff who received OJTs are considered to have sufficient knowledge and skills to perform maintenance and management in accordance with the guidelines and manuals. Regarding those who have not received OJT, the views were split on their capacity. Some considered their capacity to be sufficient because the participants in OJT will share their knowledge, while others thought there was a gap between the knowledge and skills of both. However, to fill this gap, guidance is being provided at the level of the Region Office. In addition, at the time of the ex-post evaluation, OJT was implemented mainly as part of the construction of distribution lines in rural areas such as Tanga, Kagera, Mbeya, and Iringa, while it was being implemented in the four areas of Dar es Salaam during implementation. This was because certain results have already been achieved in Dar es Salaam, and the application of the guidelines developed through this project should be expanded to local distribution lines

²⁶ Questionnaire for TANESCO

²⁷ Interview with Phase 2 Expert

of 1 to 2 km in length to improve maintenance management technology²⁸.

In the training during the implementation period, a mechanism for technology dissemination was incorporated in which instructors who had been selected and trained on transmission and distribution technology served as trainers, and technology was passed on in the workplace by training core engineers. In addition, assignment was made so that trainers with sufficient knowledge and skills could guide the artisans, technicians, and engineers engaged in the operation and maintenance of the distribution networks. As for the specialised training, the trainers were assessed as having sufficient knowledge and skills. The M&E team also conducted M&E on the effects of the training (such as the status of addressing the problems set by the trainees). The M&E team was assessed as providing appropriate feedback for the improvement of Region Offices. At the time of the ex-post evaluation, the trained trainers maintained the knowledge they had acquired and used it to conduct the training at TTS. About 70% of the trainers fostered during project implementation (38 persons) and after completion (2 persons) continued to work as trainers at the time of the ex-post evaluation²⁹. Also, at the time of the ex-post evaluation, although the M&E team's capacity to judge the implementation status of the maintenance guidelines and manuals was sufficient, further training was considered necessary for more effective M&E activities³⁰.

At the time of the terminal evaluation, it was judged that the 5S facilitators who were trained to promote QC activities had sufficient skills and knowledge to implement 5S workshops and training, as well as to conduct monitoring at offices. At the time of the ex-post evaluation, it was recognised that the 5S facilitators were maintaining the above skills and knowledge well. Although about half of the trained 5S facilitators have retired, new staff had been assigned and trained, and no problems have arisen³¹.

3.4.4 Financial Aspect

The key to financial sustainability is whether a financial base has been secured to implement the improved operation and maintenance work for transmission and distribution facilities. First, Table 17 shows the budget allocation to TTS.

Table 17 Changes in TTS budget

(Unit: billion Tanzanian shillings)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Training Cost	0.6	1.6	1.9	2.5	4.4	N/A	2.2	2.1	2.2	2.3	2.2
TTS Maintenance and Renovation Costs	4.3	0.2	-	-	-	N/A	N/A	N/A	N/A	N/A	N/A

Source: Produced by the evaluator based on the Terminal Evaluation (Part 2) Report (p36) and Questionnaire to TTS

²⁸ Interview with TTS

²⁹ Questionnaire for TANESCO

³⁰ Questionnaire for TTS

³¹ Questionnaire for TANESCO

TANESCO's budget for training costs at TTS has expanded year by year, reaching a cumulative total of 11 billion Tanzanian shillings (approximately 610 million yen) from 2011 to the time of the terminal evaluation (Part 2). In addition, along with the implementation of this project, TTS bore its own maintenance cost, which amounted to 4.5 billion Tanzanian shillings (approximately 250 million yen).

At the time of the terminal evaluation, there was no data on the budget necessary to implement activities related to the standardisation of maintenance work for distribution and substation facilities at all Region Offices. However, the necessary budget was assessed to have been provided for tools, materials equipment, and cars. At the time of the ex-post evaluation, data on the budget for tools, materials and equipment could not be obtained. Table 18 shows TANESCO's financial status as a whole³². It indicates the financial status in black figure except for fiscal year (FY) 2016 and FY2017.

Table 18 TANESCO Financial Status

(Unit: billion Tanzanian shillings)

	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Revenue	1,643	1,562	1,668	1,778	1,881	1,909	1,993
Expenditure	1,638	1,641	1,713	1,769	1,863	1,899	1,979
Balance	5	-79	-45	9	18	10	14

Source: Questionnaire for TANESCO

However, at the time of the terminal evaluation, although the budget for promoting 5S Kaizen activities had been allocated, the budget for the 5S facilitator team to visit monitoring activities was not sufficiently secured. Even at the time of the ex-post evaluation, the budget for visit-type monitoring activities was about 50% of the required amount³³.

3.4.5 Environmental and Social Aspect

As already mentioned in the impact section, the implementation of this project did not have any negative impact on the environment. Judging from the contents of this project, it is believed that it will not occur in the future either. Thus, no problems in environmental and social considerations are observed.

3.4.6 Preventative Measures to Risks

At the time of planning, the risks identified as external factors to be met included the continuation of trained trainers, the establishment and application of reward systems for internal qualifications and internal certification, the securing of funding and investment status, including other development partners, and drastic policy changes in the electric power sector.

During the ex-post evaluation, about 70% of the trained TTS instructors were still engaged in training,

³² Questionnaire for TANESCO

³³ Questionnaire for TANESCO

and about half of the trained 5S facilitators had retired or left their jobs. However, their successors were assigned and trained so that no problem occurred. Although a reward system was not yet established at the time of the ex-post evaluation, it is under consideration within TANESCO³⁴. As for support from other aid partners, the World Bank's "Corporate Management System Project" (2021-2024) is underway with 65 million dollars, and France's AFD's "Grid Modernisation Project" is in the planning stage³⁵. Therefore, no particular problem is observed in terms of risk management.

3.4.7 Status of Operation and Maintenance

Tables 19 and 20 show changes in the maintenance status of substations and MT feeder lines in Dar es Salaam from project commencement to the ex-post evaluation³⁶. At the time of the ex-post evaluation, the maintenance status of the substations and MT feeder lines in Dar es Salaam has improved compared to when the project started. Therefore, no problem is observed in the operation and maintenance.

Table 19 Substation maintenance status

(Unit: places)

	2009	2016	2022
Very well maintained	13	19	32
Well maintained	5	6	1
Neither well nor poor	10	4	2
Poorly maintained	0	0	0
Very poorly maintained	0	0	0
Total	28	29	35

Source: TANESCO questionnaire

Table 20 Maintenance status of MT Feeder Lines

(Unit: places)

	2009	2016	2022
Very well maintained	0	0	196
Well maintained	170	182	0
Neither well nor poor	0	0	0
Poorly maintained	0	0	0
Very poorly maintained	0	0	0
Total	170	182	196

Source: TANESCO questionnaire

<Summary of Sustainability>

Slight issues have been observed in the organisation and system aspects in order to sustain the project effects of this project, but there are good prospects for improvement and resolution. Therefore, sustainability of the project effects is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

This project was implemented to improve the internal human resource development system of

³⁴ Questionnaire for TANESCO

³⁵ Interview with TANESCO headquarters

³⁶ Questionnaire for TANESCO

Tanzania Electric Supply Company Ltd. (hereinafter referred to as TANESCO) by developing and implementing a training system, introducing quality control activities, establishing a maintenance work model, and standardising technical work procedures. This project, which aimed to contribute to promotion of power supply through human resource development and improvement of maintenance work, was consistent with Tanzania's development policy and development needs. At the time of planning, this project was also consistent with Japan's ODA policy. Regarding internal coherence, it was intended to contribute to other JICA grant aid projects at the time of planning, although it is not possible to compare the actual results with the plan's specific target. As for external coherence, any specific collaboration or coordination with other projects while planning and implementing could not be confirmed. Therefore, relevance and coherence are high. The project purpose and the outputs were mostly achieved by the time the project was completed. In addition, at the time of the ex-post evaluation, the overall goal was achieved although it was not possible to confirm the manifestation of other impacts, such as the number and duration of power outages in Dar es Salaam City. Therefore, effectiveness and impacts are high. Each output was mostly achieved by the time the project was completed. Regarding inputs, the project cost on the Japanese side greatly exceeded the plan, and the project period also exceeded the plan. However, the additional outputs, such as the establishment of a model (Output 4) and the standardisation of work procedures (Output 5), which were not initially anticipated, were achieved. Therefore, efficiency is evaluated to be moderately low rather than low. Although slight issues have been observed in the institutional/organisational aspects for sustaining the project effects, there are good prospects for improvement and resolution. Therefore, project sustainability is high. In light of the above, this project is evaluated to be highly satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

It is desirable to strengthen the internal information management system of TANESCO so that data and information, including the results of monitoring within TANESCO, can be shared and appropriately managed at different levels among Region Offices, Zone Offices and Headquarters.

4.2.2 Recommendations to JICA

It is desired that JICA Tanzania Office watch the progress of the Phase 2 project regarding the strengthening of the information management system within TANESCO, and provide support if necessary.

4.3 Lessons Learned

The importance of establishing a data and information management system including the monitoring results

In this ex-post evaluation study, there was difficulty in collecting data from the implementing agency, and it is possible that the data management and sharing system within the implementing agency is not functioning sufficiently. The Terminal Evaluation (Part 2) Report also pointed out the need to strengthen

the data management system for maintenance work, but significant improvements were not seen in this regard after the project's completion.

As in this project, when the horizontal connection of the project spreads across the country and all vertical levels of the implementing agency are involved—from headquarters to intermediate sections such as Zone Offices and field organisations such as Region Offices—it is important for continued effects that information including monitoring results is shared in timely manner with the intermediate sections that provide on-site support as well as the headquarters that makes decisions on overall policies. For this reason, it is essential to sufficiently investigate at the planning stage the counterpart organization's status not only of the maintenance skills of power facilities, but also of the management and sharing status of information, including monitoring capacity and monitoring results. When necessary, a component should be included to strengthen the data and information management system in the plan and deal with it during the implementation stage.

5. Non-Score Criteria

5.1. Performance

5.1.1 Objective Perspective

At the time of planning, it was suggested that the engineers (KAUDA team) trained in past JICA projects in Tanzania should be effectively utilised. A KAUDA team was dispatched to each Region Office to maintain and manage the MT feeder lines in Dar es Salaam. They still support the maintenance work, and these engineers are actually utilised.

During the implementation stage, the Japanese expert team set the motto of this project as “working together, learning together, and growing together as one team,” and enthusiastically engaged with their counterparts and sincerely engaged in project activities. As a result, a close cooperative relationship was established between the core counterparts and the Japanese experts³⁷.

³⁷Terminal Evaluation (1st) Report (p18), Interview with Japanese Expert